CHAPTER III

METHODOLOGY

3.1 Introduction
3.2 Methods Adopted
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3.4 Tools and Techniques Used
3.5 Sample for the Study
3.6 Procedure for Data Collection
3.7 Scoring and Consolidation of Data
3.8 Statistical Techniques Used
METHODOLOGY

3.1 Introduction

Methodology of investigation is the core of every research work and the success of all research studies depends on the methodology adopted and the tools and techniques employed. A pre-planned and well-designed methodology provides the researcher a scientific and feasible plan for solving the problem under analysis. Methodology lays out the way that formal research is to be carried out and outlines the detailed description of the research variables and procedure (Barr, 1960). It helps the researcher to explore different trends in the field and adequately measure them so as to satisfy the requirement of the investigation. The method adopted, the data gathering instruments, the selection of sample, the procedure of data collection and the outline of statistical techniques employed in the analysis of data are described under appropriate heads as presented below.

3.2 Methods Adopted

Survey and experimental methods were used for collecting relevant data for the present study. “Survey studies are conducted to collect detailed description of existing phenomena with the intent of employing data to justify current conditions and practices or to make more intelligent plans for improving them” (Koul, 1996).
The survey method was adopted for understanding the health awareness of student teachers at secondary level. The method was also used for knowing the facilities and instructional resources available in Teacher education Colleges and for collecting opinion and views of teacher educators and student teachers at secondary level regarding the various aspects of the present Health Education curriculum. The study was also intended to prepare a learning package for developing health awareness among student teachers at secondary level.

Experimental method was used for testing the effectiveness of the learning package prepared for the student teachers at secondary level. The research design adopted for this purpose was pretest - posttest parallel group design (Best, 1995).

3.3 Variables of the Study

“Variables are the conditions or characteristics that the experimenter manipulates, controls or observes” (Best, 1995).

In the present study, independent and dependent variables play a significant role. As this study was intended to determine the effectiveness of learning package in comparison with the conventional lecture method, the independent variable happens to be the two techniques of teaching, namely, the learning package and conventional lecture method.

A dependent variable is defined as what the experimenter actually measures (Nation, 1997). The dependent variable is
measured before and after the manipulation of the independent variable. Health awareness and Achievement in Health Science areas of student teachers at secondary level were taken as the dependent variable.

The extraneous variables are those that operate in the experimental situation in addition to the independent variables such that it is difficult to determine the effects of each (Gay, 1996). Here the extraneous variables considered for the experimentation were general health awareness, age, sex, intelligence, teacher factor and length of instruction. Attempts were made to control extraneous variables by comparing groups that are homogeneous with respect to these variables.

### 3.4 Tools and Techniques Used

The following tools and techniques were used for collecting data for the present study.

1. Content Analysis
2. Health Awareness Test
3. Achievement Test
4. Interview Schedule
5. Prepared Learning Package on Health Education
6. Raven’s Standard Progressive Matrices (SPM)

The details regarding the tools and techniques employed for the study are given below.
3.4.1 Content Analysis

As a preliminary step the investigator made an attempt to analyse the present teacher education curriculum at secondary level with regard to different health education aspects. On analysis of the content, it is observed that the main health science aspects like first aid, communicable diseases, food and nutrition, health and hygiene, health examination and health service, effect of exercise on systems of the body are included in the pedagogical theory of teacher education curriculum at secondary level. Based on the findings, a Health Awareness Test and a learning package were prepared on the health education areas mainly included in the teacher education curriculum at secondary level and other socially relevant areas.

3.4.2 Health Awareness Test

One of the objectives of the study was to assess the awareness of student teachers about different health education aspects. For that a Health Awareness Test was constructed and standardised by the investigator in consultation with the experts. The test was used to understand the health awareness of student teachers at secondary level. The present curriculum of health education at B.Ed. Degree Level and a comprehensive study of the review of related literature helped the investigator in selecting the various topics on health issues that are significant at present.

The steps followed in the construction of the test are described under the following heads.
1. Preparation of test items
2. Scoring procedure
3. Pilot test
4. Try out of the test
5. Item analysis
6. Finalisation of the test
7. Validity and Reliability of the test

3.4.2.1 Preparation of the Test

Before constructing the health awareness test the investigator considered many of the health issues in our society. The investigator has done a thorough review of the related literature and also consulted many experts in the field and had long discussions with the health workers and authorities of Health Department of Kerala.

While identifying the important areas of health issues in our society, care has been taken to make them most suitable to our culture and background. Lucas (1979) is of the opinion that curriculum materials produced in one country are not suitable for another country and that they should give emphasis to locally important questions and issues.

One hundred and twelve items were prepared and were scrutinized by a team of experts in the field. Some items were deleted and some others were re edited in the light of expert criticism. The number of items in the draft test was thus reduced to ninety-eight.
Considering the merit of multiple-choice questions, all items were decided to be multiple-choice questions.

3.4.2.2 Scoring Procedure

For each question, four probable distracters were given. One mark was given to each correct answer. Separate response sheet was given to each student teacher.

3.4.2.3 Item Analysis

Item analysis was done using the method suggested by Ebel (1991). The response sheets of four hundred and twenty five student teachers were scored. For a correct response one mark was allotted and for an incorrect answer no mark was given. Incomplete response sheets were deleted and thus three hundred and eighty eight answer sheets were obtained for analysis. The number was again reduced to 370 by rejecting 18 answer sheets (by rejecting every 22\textsuperscript{nd} answer sheet). The two extreme groups were separated from the sample of 370, student teachers who scored the highest and who scored the lowest. Thus the upper 100 (27\% of the total group) answer sheets having highest scores and the lower 100 answer sheets having lowest scores were selected.

The number of subjects making the correct answer for an item in the high achieving and low achieving groups was counted. Discrimination power was calculated using the formula
\[ D_p = \frac{U - L}{N} \]

and the difficulty index was calculated using the formula
\[ D_i = \frac{U + L}{2N} \]
where 'U' is the number of correct responses in the upper group, 'L' is the number of correct responses in the lower group and 'N' is the number of subjects in both the groups. The item analysis data is presented as Appendix II.

### 3.4.2.4 Finalisation of Health Awareness Test

Items having the difficulty index range between 0.6 and 0.4 and with discriminating power 0.3 and above were selected. But few items having the Di 0.3 and Dp between 0.2 and 0.3 were also chosen in order to give due importance to all the areas. 60 items were thus selected for the final test. The copy of the Draft and Final form of Health Awareness Tests are given as Appendix I and III respectively. The copies of Response Sheet and Scoring Key of the Health Awareness Test are given as Appendices IV and V respectively.

### 3.4.2.5 Validity and Reliability of the Test

#### Validity of the Health Awareness Test

Validity involves “the appraisal of theoretically expected patterns of relationships among item scores or between test scores and other measures” (Messick, 1995).

Content validity is the situation included in the test which is representative of the group of situations that the test is supposed to sample (Travers, 1964). Eight different areas were given due
weightage in the Awareness test. The items related to all the areas were finalised on the basis of the suggestions of experts in the field. Table 3.1 shows the areas of health science and the number of test items included in each area.

**Table No 3.1 Areas of Health Science and Number of Test Items**

<table>
<thead>
<tr>
<th>Health Science Areas</th>
<th>Number of test items included</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.First Aid</td>
<td>7</td>
</tr>
<tr>
<td>2.Communicable Diseases</td>
<td>14</td>
</tr>
<tr>
<td>3.Non Communicable Diseases</td>
<td>3</td>
</tr>
<tr>
<td>4.Health and Hygiene</td>
<td>4</td>
</tr>
<tr>
<td>5.Food And Nutrition</td>
<td>19</td>
</tr>
<tr>
<td>6.Child Care</td>
<td>6</td>
</tr>
<tr>
<td>7.Blood Groups</td>
<td>2</td>
</tr>
<tr>
<td>8.Postural Defects and Correction Exercises</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>60</strong></td>
</tr>
</tbody>
</table>

For improving the construct validity, the test items must be specific, concrete, and precise. For that, specific, concrete and precise test items were prepared to ensure construct validity.
The statistical validity of the test was established by correlating the test scores with qualifying examination marks. The validity coefficient was computed by Pearson’s Product Moment Method and has got validity ($R = 0.751, N = 80$) when calculated on a sample of 80 students.

**Reliability of the Health Awareness Test**

Reliability of a test is its trustworthiness or its consistency. The reliability of Health Awareness Test was found out by Split Half Method for 100 student teachers. The coefficient of correlation between the scores of two tests was calculated using Pearson’s Product Moment Method. Coefficient of correlation was found to be 0.947, which shows that the test is reliable to measure Health awareness of student teachers at Secondary Level.

### 3.4.3 Achievement Test

The present study also aimed at understanding the effectiveness of the prepared learning package on achievement in health science areas at B.Ed. Degree Level. The achievement test was prepared mainly based on the health science topics included in the B.Ed. Degree Syllabus. This test was used as the pre-test and post-test.

In the preparation of the achievement test, due weightage was given to the instructional objectives and content areas. The test items are based on the category of objectives- Knowledge, Comprehension,
Application and Skill. The prepared achievement test was shown to experts in the field of education and health science and some changes were made in the form and number of questions. The final test consists of 25 questions and among them, 12 are objective type, 12 short answer type and 1 essay type question. The test carries a total of 50 marks and the time duration of 1\(\frac{1}{2}\) hours. The copy of the final achievement test is given as Appendix - VI

The details regarding the weightage given to objectives, content, details of blue print and the way of scoring are given below.

3.4.3.1 Weightage to Objectives

The weightage given to different categories of objectives in the Achievement Test are given below.

Table No 3.2  Weightage to Instructional Objectives in the Achievement Test

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Objectives</th>
<th>Marks</th>
<th>% of Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Knowledge</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>2.</td>
<td>Comprehension</td>
<td>25</td>
<td>50</td>
</tr>
<tr>
<td>3.</td>
<td>Application</td>
<td>10</td>
<td>20</td>
</tr>
<tr>
<td>4.</td>
<td>Skill</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>50</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
Table No 3.3 Weightage to Content in the Achievement Test

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Content</th>
<th>Marks</th>
<th>% of Marks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>First Aid</td>
<td>12</td>
<td>24</td>
</tr>
<tr>
<td>2.</td>
<td>Communicable Diseases</td>
<td>8</td>
<td>16</td>
</tr>
<tr>
<td>3.</td>
<td>Non-Communicable Diseases</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>4.</td>
<td>Health and Hygiene</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>5.</td>
<td>Food and Nutrition</td>
<td>13</td>
<td>26</td>
</tr>
<tr>
<td>6.</td>
<td>Child Care</td>
<td>6</td>
<td>12</td>
</tr>
<tr>
<td>7.</td>
<td>Blood Groups</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>8.</td>
<td>Postural Defects and Correction Exercises</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td><strong>50</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

3.4.3.2 Blueprint of Achievement Test

Blueprint is a three dimensional chart showing, content, instructional objectives and form of questions. The three different forms of questions i.e. objective type, short answer type and essay type were used here. The number inside the bracket indicates the number of questions and the number outside the bracket indicate the marks. The blueprint is given as Table 3.4.
Table No 3. 4 Blueprint of Achievement Test

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Knowledge</th>
<th>Comprehension</th>
<th>Application</th>
<th>Skill</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Form of Questions</strong></td>
<td>E</td>
<td>SA</td>
<td>O</td>
<td>E</td>
<td>SA</td>
</tr>
<tr>
<td><strong>Content</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First Aid</td>
<td></td>
<td>(1)</td>
<td>4</td>
<td></td>
<td>(1) 2</td>
</tr>
<tr>
<td>Communicable Diseases</td>
<td></td>
<td>(1) 1</td>
<td></td>
<td></td>
<td>(1) 2</td>
</tr>
<tr>
<td>Non-Communicable Diseases</td>
<td>(1) 2</td>
<td></td>
<td></td>
<td></td>
<td>(1) 1</td>
</tr>
<tr>
<td>Health and Hygiene</td>
<td>(1) 2</td>
<td></td>
<td></td>
<td></td>
<td>(1) 1</td>
</tr>
<tr>
<td>Food and Nutrition</td>
<td></td>
<td>(1) 2</td>
<td></td>
<td></td>
<td>(1) 1</td>
</tr>
<tr>
<td>Child Care</td>
<td></td>
<td>(1) 4</td>
<td></td>
<td></td>
<td>(1) 2</td>
</tr>
<tr>
<td>Blood Group</td>
<td></td>
<td>(1) 4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Postural Defects and Correction</td>
<td></td>
<td>(1) 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exercises</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>10</td>
<td>25</td>
<td>10</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>
3.4.3.3 Scoring

A scoring key and marking scheme were prepared by the investigator with respect to the achievement test. Prepared scoring key and marking scheme are given as Appendices VII and VIII respectively.

3.4.4 Interview Schedule

An interview schedule is essentially the oral in-person administration of a questionnaire to each member of a sample and filled in by the interviewer in a face-to-face situation with another person (Gay, 1996). For the present study, two sets of interviews were conducted. The first set of interview was meant for getting information about facilities available and suggestions and views of teacher educators who teach health education syllabus. The second set of interview was meant for collecting information from student teachers about their opinion about health education classes and their suggestions and views about health education curriculum. Two sets of interview schedules were prepared. The first set for teacher educators handling health education classes consists of 20 questions and the second set for student teachers consists of 25 questions. These questions were edited and printed. They were given to experts for their suggestions and changes were made in the questions based on their recommendations.
3.4.4.1 **Try out**

The tryout was made on a small sample of student teachers and teacher educators as pilot study before using it for actual investigation.

3.4.4.2 **Preparation of the Final Interview schedule**

Feed back from the pilot study was used to revise questions that were not clear and did not give any desired information. In the final interview schedule of teacher educators, 14 questions were included and for student teachers 20 questions were included.

The following areas were included in the interview schedule for teacher educators.

1. Opinion about the quality of the present health education syllabus in the B.Ed. curriculum.
2. Nature of present Health Education syllabus and its ability to attain the necessary objectives.
3. Opinions and suggestions about facilities needed for taking Health Education classes.
4. Uses of modern strategies, and live demonstrations for teaching health education syllabus.
6. Extend of taking Health education classes by experts in the field of Health Sciences.
7. Availability of time for teaching health science areas.
8. Extent of satisfaction in developing health awareness using the present health education curriculum.
10. Limitations in the institution and curriculum for developing health awareness.
11. Suggestions for improving the quality of present health education syllabus,

The following areas were included in the interview schedule for student teachers.

1. Total number of periods available for health education classes in a week and their actual utilisation.
2. Opinion and interest towards teaching strategies adopted by the teacher educators for taking the Health education classes.
3. Aids and methods used for demonstrating Health education classes.
4. Total number of seminars, discussions and expert classes they attend in the area of Health education, during their B.Ed. course.
5. Need for knowing more about different health science aspects.
6. Practical works done by student teachers as a part of their health education syllabus.
7. Availability of library books and laboratory equipments related to Health Education.

8. Opportunity to participate in community health programmes conducted by the Government.

9. Limitations of the present health education curriculum.

10. Opinion about self-learning materials in the areas of Health Education.

11. Areas of interest to be included in the health education syllabus.

12. Modern teaching strategies to be adopted for present health education syllabus.

The copies of interview schedule for teacher educators and student teachers are given as Appendices IX and X respectively.

3.4.5 Prepared Learning Package

In the learning package, the learning is private and aimed at individual learning styles. Learning packages are self-contained teaching units that appeal to students who learn slowly or whose learning style characteristics respond to this method. Pre-test, post-test, information to be learned, learning activities, colourful pictures, motivating choices, selection of when, where and how and the freedom to move about make the learning package an effective instructional strategy for many students. (Dunn & Dunn, 1996).
All these facts persuaded the investigator to think along the lines of preparing a learning package for developing health awareness among student teachers at secondary Level.

The details regarding the preparation of learning package are given under the following heads.

3.4.5.1 Areas Selected

Based on the results of the Health Awareness Test administered to the student teachers at secondary Level and the health education syllabus at B.Ed. Degree Level, the investigator decided the specific areas to be included in the learning package. Suggestions from experts in the field were also sought in this regard. Thus the following eight areas of health science were selected for the preparation of the learning package.

1. First Aid
2. Communicable Diseases
3. Non-Communicable Diseases
4. Health and Hygiene
5. Food and Nutrition
6. Child Care
7. Blood Groups
8. Postural Defects and Correction Exercises
3.4.5.2 Pattern Followed

The investigator prepared the learning package mainly based on the pattern followed by Patricia and Williams (1979). It includes pre-test, information to be learned and post tests. The investigator made certain additions in this format based on some other pattern (Dunn & Dunn 1996). And thus included objectives and tasks analysis also. The prepared learning package is given at the end of this chapter.

3.4.6 Raven’s Standard Progressive Matrices (General Mental Ability Test)

In order to measure the general mental ability of the sample, the investigator decided to administer a non-verbal test of intelligence. Taking into consideration the opinions of the experts in this field, the investigator decided to use Raven’s Standard Progressive Matrices sets A, B, C, D and E for measuring the general mental ability of student teachers in the experimental and control groups.

Raven’s Standard Progressive Matrices published in 1938 is a non-verbal group test administered to measure a person’s capacity to apprehend meaningless figures presented for observation, see the relation between them, conceive the nature of the figures completing each system of relations presented and so develop a systematic method of reasoning. The test consists of 60 problems divided into
five sets of 12 each. In each set, the first problem is the easiest one and the consecutive problems become gradually difficult.

The order of the test provides the standard training in the method of working. The five sets provide five opportunities for grasping the problem and the progressive assessment of a person’s capacity or intellectual activity. Everyone, irrespective of his age, was given exactly the same series of problems in the same order and was asked to work at his own speed without interrupting from the beginning to the end of the test.

3.4.6.1 Reliability

The studies on SPM, Raven (1948) found reliabilities ranging from 0.83 to 0.93 with higher values being associated with younger subjects (under 30). The test has retest reliability varying with age from 0.83 to 0.93. For the age under 30 the mean score is 48 and retest reliability 0.93.

3.4.6.2 Marking procedure

A person’s score on the scale is the total number of problems solved correctly when allowed to work quietly through the series from the beginning to the end. A person’s total score provides an idea of his intellectual capacity, whatever be his nationality or education.

To record the answers, a record form is available with matrices. The standard record form is arranged so that it can be quickly and
accurately marked by superimposing a stencil-marking key, which is also given with the matrices. A copy of the scorecard of Raven’s Standard Progressive Matrices is given as Appendix XI.

3.5 Sample for the Study

“Sampling is the process of selecting a number of individuals for a study in such a way that the individuals represent the larger group from which they were selected” (Gay, 1996). In the study, samples are selected for the descriptive survey and for the experimental approach. The details of sample selected are given under the following heads.

1. Sample for the Survey

2. Sample for the Experimental Study

3.5.1 Sample for the Survey

For the present study, the survey was confined to a sample of 1600 student teachers at secondary level and 21 Teacher Educators who take health education classes. Proportionate Random sampling was adopted in selecting the sample for the study. The student teachers selected for the study were from the 4 Districts of Kerala under Mahatma Gandhi University. The details of sample selected for the survey with the names of institution are given in Table 3.6. Care was taken to give due representation to the following.
1. Type of Management of Colleges

- Aided
- Unaided
- University Centre

2. Optional Subjects

The break up of sample is represented below.

- English
- Malayalam
- Hindi
- Mathematics
- Physical Science
- Natural Science
- Social Science
- Commerce

**Table No 3.5 Institution (Management) wise Distribution of Samples for Testing Health Awareness**

<table>
<thead>
<tr>
<th>Sl.No.</th>
<th>Type of Institution</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Aided Training Colleges</td>
<td>395</td>
<td>24.7</td>
</tr>
<tr>
<td>2.</td>
<td>Unaided Training Colleges</td>
<td>509</td>
<td>31.8</td>
</tr>
<tr>
<td>3.</td>
<td>University Colleges of Teacher Education</td>
<td>696</td>
<td>43.5</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td>1600</td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
### Table No 3.6 Institution wise Distribution of Samples for Testing Health Awareness

<table>
<thead>
<tr>
<th>District</th>
<th>Sl.No</th>
<th>Name of College</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kottayam</td>
<td>1.</td>
<td>UCTE Paippad.</td>
<td>161</td>
<td>10.06</td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td>UCTE Vaikom.</td>
<td>20</td>
<td>1.25</td>
</tr>
<tr>
<td></td>
<td>3.</td>
<td>NSS Training College, Changanacherry.</td>
<td>125</td>
<td>7.8</td>
</tr>
<tr>
<td></td>
<td>4.</td>
<td>St. Johns The Baptist Training College,</td>
<td>80</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nedumkunnam.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ernakulam</td>
<td>1.</td>
<td>UCTE Muvattupuzha.</td>
<td>150</td>
<td>9.38</td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td>St. Joseph College of Teacher Education,</td>
<td>140</td>
<td>8.75</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ernakulam.</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.</td>
<td>Avila Training College, Edakochi.</td>
<td>155</td>
<td>9.69</td>
</tr>
<tr>
<td>Pathanam-thitta</td>
<td>1.</td>
<td>UCTE Elanthoor.</td>
<td>170</td>
<td>10.63</td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td>Titus II Teachers College, Thiruvalla.</td>
<td>130</td>
<td>8.13</td>
</tr>
<tr>
<td>Idukki</td>
<td>1.</td>
<td>UCTE Nedumkandom.</td>
<td>195</td>
<td>12.19</td>
</tr>
<tr>
<td></td>
<td>2.</td>
<td>SNDP Yogam Training College, Adimaly.</td>
<td>144</td>
<td>9</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>12</strong></td>
<td><strong>1600</strong></td>
<td><strong>100</strong></td>
<td></td>
</tr>
</tbody>
</table>
Table No 3.7 Subject wise distribution of samples for testing

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Subject</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>English</td>
<td>150</td>
<td>9.38</td>
</tr>
<tr>
<td>2.</td>
<td>Hindi</td>
<td>100</td>
<td>6.25</td>
</tr>
<tr>
<td>3.</td>
<td>Malayalam</td>
<td>150</td>
<td>9.38</td>
</tr>
<tr>
<td>4.</td>
<td>Mathematics</td>
<td>220</td>
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<td>Physical Science</td>
<td>250</td>
<td>15.62</td>
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<td>6.</td>
<td>Natural Science</td>
<td>300</td>
<td>18.75</td>
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<td>7.</td>
<td>Social Science</td>
<td>300</td>
<td>18.75</td>
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<tr>
<td>8.</td>
<td>Commerce</td>
<td>130</td>
<td>8.12</td>
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<tr>
<td></td>
<td><strong>Total</strong></td>
<td>**1600</td>
<td><strong>100</strong></td>
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3.5.2 Sample selected for the Experimental Study

For conducting the experiment, the investigator selected the sample from Mahatma Gandhi University College of Teacher Education, Kudamaloor. Investigator has personal contact with this institution and knows its atmosphere, student socio-economic background and co-operative mentality of the authorities.

The experimental study was conducted on a final sample of 200 student teachers at secondary level. After matching the student teachers of different optional subjects based on the marks of qualifying examination (BA & B.Sc.) and score of Raven’s Standard Progressive Matrices, the investigator divided them into two groups i.e. experimental and control (100 each). The experimental group and
control group consists of equal number of student teachers from each optional subject.

Health Awareness Test and an Achievement test were given to the sample of experimental and control groups in order to compare the groups in terms of initial or basic health awareness and achievement in different health science areas.

3.6 Procedure for Data Collection

The procedures adopted for the collection of data are given under the following heads.

a. Collection of Data for the Survey Study

b. Collection of Data for the Experimental Study

The details under each head are given below.

3.6.1 Collection of Data for the Survey Study

The data collection was done by the investigator herself. She made necessary arrangements with the heads of the institutions by seeking permission and fixing up the time schedule for administering the different tools. In administering the test, a uniform procedure was adopted in all the institutions.

3.6.1.1 Conducting Interview for Understanding the Facilities and Activities Conducted in the Colleges

To understand the facilities and activities conducted in the Teacher Education Colleges for developing health awareness among student teachers, interview was conducted among 21 teacher educators who were handling health education classes. A second set
of interview was conducted for student teachers (20 numbers) from each institution representing different optional subjects. The teachers and students were requested to respond honestly.

3.6.1.2 Administration of Health Awareness Test

The Health Awareness Test was administered to a total of 1800 student teachers at B.Ed. Degree Level. First the response sheets were given to each student. Then the investigator explained how the pupils had to fill up the details required in the response sheet and also the method of marking their response. Then the test booklets were distributed. Time limit was observed whenever necessary. After the stipulated time of thirty-five minutes, the response sheets were collected back along with the test (HAT). The test was administered to the whole sample in the same manner.

3.6.2 Collection of Data for the Experimental Study

Permission to conduct the experiment for 3 months was secured in advance from the respective college principal. The procedure adopted for conducting the experiment is given below.

3.6.2.1 Methods Adopted for Comparing the Initial ability of the Groups

In order to compare the two groups (experimental and control groups) the investigator collected the qualifying examinations marks (BA/B.Sc. Marks) from the college records. The scores of qualifying examinations (BA/B.Sc) and Raven’s Standard Progressive Matrices were tabulated and used for statistical treatment.
3.6.2.2 Administration of Health Awareness Test and Achievement Test

On the next day the prepared health awareness test was administered to the experimental and control groups to know their initial health awareness. The answer sheets were collected back and valued.

Along with the health awareness test, an achievement test was also given to both the groups (experimental and control groups) in order to check whether there was any significant difference in the basic achievement in health sciences. The data obtained from both the tests were tabulated and used for statistical analysis.

3.6.2.3 Learning by the Experimental Group

The prepared learning package consists of eight blocks and each block is divided into different units. Each unit contains pre test, information to be learned, post test and follow up activities. The investigator gave each unit of the prepared learning package along with necessary explanations and instructions for each period of 35 minutes. Learning package permits each student teacher to study at his/her own pace, time and according to his/her interests and abilities.

After learning each unit of the package, there was a session for discussion. The students raised their doubts and the investigator clarified them. The investigator noticed that the student teachers were very eager and curious to read all the units. They observed the
pictures very carefully and did all the necessary activities from first to the last block. The knowledge they obtained from the learning package, about the different health aspects like first aid, communicable diseases, immunization, food and nutrition etc motivated them to learn more about health sciences. The investigator cleared all the doubts of the student teachers and enabled them to overcome many superstitions and misconceptions. The experimental group learned the prepared learning package for 3 months. (15 periods)

3.6.2.4 Learning by the Control Group

The same topics were taught to the control group by the investigator. These topics were included in the prescribed health education syllabus of the B.Ed. curriculum. The investigator used the conventional lecture method to explain the different concepts and taught these topics for 3 months i.e. 15 periods were taken to complete the content. The investigator cleared all the doubts raised by the student teachers in order to enable them to get good understanding about the areas taught. Care was taken to give equal time and effort to the control group and the experimental group. Thus every care was taken to make the study a reliable one.

3.6.2.5 Administration of Post-tests

After completing the learning by the experimental and control groups, the health awareness test was again given to both the groups, to know whether there is any development in their health
awareness. The response sheets were collected back. Every precaution was taken to make the study as reliable and valid as possible.

The achievement test prepared was administered to both the groups of student teachers i.e. experimental and control groups on the same day. The response sheets were collected back.

3.7 Scoring and Consolidation of Data

In the survey part of the study, scoring of the response sheets of the student teachers was done according to the direction given in the Health Awareness test. At first the answer sheets with incomplete data were deleted. It came to 200. Then 1600 data sheets were retained out of the basal sample of 1800 student teachers of 12 institutions.

The scores of the awareness test, and data obtained from the interview with 21 teacher educators and 220 student teachers (20 from each institution representing various optional subjects) were tabulated and consolidation was done keeping in view of the important sub samples obtained viz. eight optional subjects, management of institution. The tabulated data was used for the analysis of the study.

In the experimental part of the study, the scores of the qualifying examination and General mental ability test were tabulated and used for statistical treatment. The response sheets collected back
for the health awareness test and achievement test were scored and used for statistical analysis.

3.8 Statistical Techniques used for Analysis

The responses given by the student teachers of the various optional subjects were tabulated systematically. These responses were analysed and the percentages were found out. The levels low, medium, high were found out from the health awareness of student teachers in different types of institutions. Those who come below 40% are considered as low aware, between 40% to 60% medium aware and above 60% as high aware. The Critical Ratio was found out for comparing the health awareness of student teachers in various health science aspects.

In the experimental part of the study to test the effectiveness of the learning package, the experimental and control groups were compared based on the previous achievement scores and General mental ability test scores. But we cannot consider them as identical as they are restricted to separate classrooms. So they can be considered only as similar. To rectify these drawbacks, Analysis of Covariance was also used to find out the effectiveness of the learning package.
Since the main objective of the study is the Preparation of a Learning Package for developing Health Awareness, the prepared package is given at the end of this chapter.
MAHATMA GANDHI UNIVERSITY
SCHOOL OF PEDAGOGICAL SCIENCES
KOTTAYAM

LEARNING PACKAGE
ON
HEALTH EDUCATION

Prepared by
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M.G. University

Guided by
Dr. P.J. Jacob
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School of Pedagogical Sciences
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Let us begin here

This is a learning package on health education for the student teachers at secondary level.

The information to be learned is divided into eight blocks. Each block is further divided into units. The number of units in each block varies according to the bulk of information contained in the block. All units have similar design. A schematic presentation of the design of the units is given below.

Unit X
X.0 Objectives
X.1 Unit (Main theme)
   X.1.1 (Sub unit 1 of Unit 1)
   X.1.2 (Sub unit 2 of Unit 1)
   X.1.3 (Check your progress)
X.2 Unit II (Main Theme)
   X.2.1 (Sub unit 1 of Unit 2)
   X.2.2 (Sub unit 2 of Unit 2)
   X.2.3 (Check your progress)
X.3 Let us sum up

There will be a list of contents at the first page of each unit. The sections Objectives and Summary are presented in all units. Other sections will vary according to the information presented in each unit.

The section Objectives in each unit will give you an idea about what new behaviour will be acquired by the completion of that unit.

Hope you will be benefited by this package.

Wish you all the best.
Objectives of the Package Prepared

(i) To identify the need and importance of health education.

(ii) To develop knowledge about the concept of optimum health.

(iii) To understand the importance of the first aid.

(iv) To understand the different types of communicable diseases and their mode of transmission.

(v) To analyse the complexity and interrelatedness of health issues.

(vi) To understand the need of immunization.

(vii) To develop critical thinking about the condition that leads to the development of many habit borne diseases.

(viii) To utilize the knowledge about nutrition and balanced diet in daily life.

(ix) To develop skill in observing and finding out the actual developmental stages of a child.

(x) To understand the actual complexity in the process of blood transfusion.

(xi) To know the influence of neuro muscular coordination in maintaining a good posture.

(xii) To develop sensitivity about social health issues
BLOCK – I

FIRST AID

Unit 1 – First Aid- General Introduction
Unit 2 - First Aid - Emergencies

Block Introduction

There are 2 units in this block. Unit 1 is about what first aid is, its need and general introduction about actions in an emergency situation and dressings and bandages used at the time of giving a first aid. Units 2 deals with first aids given to a number of emergency or accident situations.

First aid is an immediate and temporary scientific care given to victims of accidents or sudden illness, to relieve the symptoms, to prolong or save lives till the service of a doctor can be obtained. First aider cannot take the place of a doctor and his responsibilities ends as soon as medical help is available.

Hope you will enjoy working through the unit of this block.

Asses Yourself

1. What is the main aim of first aid?
2. Give any five qualities of a first aider.
3. Name some equipments which are essential in a first aid box.
4. List out the precautions taken during the transportation of an amputated part.
5. What are the main symptoms of a fracture?
6. What first aid can be given for a severe burn?
7. What is the first aid to be done for a dog bite?
8. What is first aid given for a cramp?
Unit 1
First Aid-General Introduction

Objectives
Task Analysis and Priorities of First aid
Action in an emergency
Dressings & Bandages

Let us sum up

I. 0 Objectives

After studying this Unit you will be able to
1. Identify the need and importance of giving first aid.
2. To assess the seriousness of the accidental situation.
3. Explain how and why first aid is necessary.
4. Analyse the cause of death in accidental situations.
5. Act immediately at the time of an emergency.
6. Avoid wrong practices.

I. 1 TASK ANALYSIS and Priorities of First Aid
Priorities of First Aid

I. Aims of First Aid

II. The ABC of First Aid or Revival

III. Artificial ventilation

I. Aims of First Aid

- To preserve life
- To limit worsening of the condition
- To promote recovery.

Responsibilities of a first aider

- To assess a situation quickly & safely.
- To protect the injured person & others from possible danger.
- To give the injured person or casualty appropriate first aid.
- To remain with the casualty until further care available.

Resuscitation Techniques

To assess and treat a casualty who has collapsed, use resuscitation techniques (Refer CPR page no. ...)

i. Checking response

On discovering a collapsed casualty, your first establish whether he is conscious or unconscious.

ii. The AVPU Code

There are different degrees of impaired awareness. You should assess the casualty quickly by using the AVPU Code:

A – Alert
V – response to Voice
P – response to Pain
U – Unresponsive
Check Points

Eyes : Do they remain closed?
Speech : Does the casualty respond to the question you ask?
Movements : Does the casualty obey commands? Does he respond to a painful stimulus such as pinching?

II. The ABC of First Aid or Revival

First aid is the initial assistance or treatment given to a casualty for any injury or sudden illness before the arrival of an ambulance, doctor or other qualified person.

A is for AIR WAY

Place two fingers under the point of casualty’s chin, lift the jaw.
Tilting the casualty’s head back and lifting the chin will open the airway’. 

Fig: 1 Checking Airway

B is for BREATHING

If a casualty is not breathing you can breath for him by giving ‘Artificial respiration’.
(Refer page no. 105)

Fig: 2 Artificial Respiration
C is for CIRCULATION

If the heart stops, you can apply ‘Chest Compression’ (Refer page nos.106 & 107) to force blood through the heart & around the body.

Fig: 3 Chest Compression

Examining a Casualty

A detailed examination of the casualty should be undertaken only after taking the vital action needed. Always start at the head & work down: top to toe is easy.

Fig: 4 Head to toe examination

Fig: 5 Areas of examination of Head
The above two pictures shows the important areas of examination from head to toe.

**Check your progress 1**

1. What is first aid?
2. Which are the main aims of first aid?
3. State the ABC of first aid.

**III. Qualities of a First aider**

Everybody should know the basis of first aid and its practice. A first aider must be able to

(i) Assess a situation quickly and safely.
(ii) Protect the injured person and others from possible danger.
(iii) Give the injured person early and appropriate first aid.
(iv) Remain with the casualty until further care available.
(v) Keep himself calm and controlled.
(vi) Not to attempt too much and not to be in a hurry.
(vii) Keep the onlookers away
(viii) Expect the worse and protect the condition

**First Aid Box**

First aid boxes can be kept in houses, schools, vehicles etc. First aid box should contain scissors, safety pins, blade, cotton, gauze, bandage, forceps, stitching needles, antiseptic lotion, ointment, life saving drugs etc. The first aider must be able to manage emergencies until medical aid is available.
Fig: 6 Materials for a First aid Box

Check your progress 2

1. Give any five qualities of a first aider?
2. Name some equipments that are essential in a first aid box.

1.2 Action in an Emergency

1. **Assess the Situation**
   
   Are there any risks to you or the casualty?

2. **Assess the Casualty**
   
   Is the casualty visibly conscious or unconscious?

3. **Assess the Condition**
   
   Are you alone? Assess the condition and maturity of the casualty. If breathing is absent, ask a helper to call an ambulance and pass the details of the casualty’s condition. Move on to give artificial respiration.

4. **Open the airway; check breathing**
   
   Is the casualty breathing?

5. **Breath for the casualty**
   
   Has breathing returned? If not, give two breaths of mouth-to-mouth ventilation.

6. **Assess for Circulation**
   
   Is there a pulse or any sign of recovery?
7. **Commence CPR**

Alternate 15 chest compressions with two ventilations.

**Breathing for the casualty**

**Artificial Ventilation (Artificial respiration)**

The body especially the brain requires oxygen to keep the cells active. The air that you breath out still contains about 16% of oxygen, so it can save life if it is blown into the casualty’s lungs. If the pulse is absent Artificial Ventilation must be combined with chest compressions.

**Giving mouth to mouth ventilation**

![Fig: 7 Removing obstructions from mouth](image)

![Fig: 8 Blowing into casualty’s mouth](image)
1. Make the casualty lying flat on his back. Remove all the obstructions from the mouth which you can see from outside.
2. Open the airway by tilting the head and using two fingers to lift the chin.
3. Close the casualty’s nose by pinching it with your finger & thumb. Take a full breath & place your lips around the casualty’s mouth and make a good seal.
4. Blow into the casualty’s mouth until you see the chest rise. Take about two seconds for full chest expansion. Remove your lips allow the chest to fall fully. Repeat this once & then assess for signs of circulation.

In situations such as rescue from water or when mouth-to-mouth ventilation is impossible you may change to mouth to nose method of ventilation.

**Mouth to Nose ventilation**

First the casualty’s mouth is tightly closed. Then form a tight seal with your lips around the nose and blow. Open the mouth at intervals to let the breath out.

**Chest compression**
Pushing vertically down on the breastbone squeezes the heart against the backbone, expelling blood from the heart’s chambers and forcing it into the tissues. As pressure is released, the chest rises, blood refills the heart chambers. This blood is then forced out of the heart by the next compression.

**Assessing for Circulation**

For assessing the circulation, the pulse of the casualty is to be checked for up to 10 seconds. The pulse is a wave of pressure created due to each heartbeat. The pulse rate is usually between 60-80 beats per minutes.

The pulse can be recorded at the wrist which is known as Radial pulse or in an emergency at the neck which is known as carotid pulse.
Radial Pulse

Place three fingers in the hollow immediately above the wrist at the base of the thumb and press lightly. Check the rate and strength.

Fig: 10 Assessing Radial Pulse

Carotid Pulse

Place two fingers in the hollow between windpipe and large neck muscle, check the rate and strength.

Fig: 11 Assessing Carotid Pulse

Cardio-Pulmonary Resuscitations (CPR)

If there is no pulse, it means that the heart has stopped beating. Then immediately begin CPR (Cardio-Pulmonary Resuscitations). CPR is the process of giving chest compression combined with artificial ventilation. Compress the chest 15 times, followed by two breaths of artificial ventilation. Continue this cycle until breathing returns or help arrives. If breathing returns, place the casualty in the recovery position.
Recovery Positions – Method

1. Kneel beside the casualty. Open his air way by tilting the head and lifting the chin. Straighten his legs. Tuck the hands nearest to you, arms straight and palm upwards under his right thigh.

2. Bring the arm farthest from you across the chest and hold the back of the hand against the casualty’s nearer cheek. With your one hand, pull up the far leg just above the knee keeping the foot flat on the ground.

3. Keeping the casualty’s hand pressed against his cheek, pull on the upper leg to roll the casualty towards you and on to his side.

4. Use your knees to support the casualty so that he is prevented from rolling too far forward.

5. Tilt the head back to ensure the airway remains open. If necessary, adjust the hands under the cheeks.

6. Adjust the upper leg, if necessary so that both the hip and the knee are bent at right angles.

7. Adjust the lower arm so that the casualty is not lying on it. Make sure that his hand is still positioned with the palm facing upward.

Fig: 12 Method of placing the casualty in Recovery Position.
Check your progress 3

1. What are the important points to be noticed in an emergency situation?
2. What is meant by Cardio Pulmonary Resuscitations?
3. What is the main difference between Carotid and Radial pulse?
4. What happened in the body during each chest compressions?

Activities

1. Practice the different steps of Mouth to mouth ventilation.
2. Practice the method of placing the casualty in Recovery position.
3. Practice the method of taking Radial and Carotid pulse.

1.3 DRESSINGS & BANDAGES

1.3.1 Dressings

Dressings consist of a dressing pad and a roller bandage. The dressing pad is usually a layer of cotton wool padding. While doing the dressing, care should be taken to make it most sterile.

The following diagrams show the way of dressing a wound. Do not bandage so tightly that the circulation is blocked.

Fig: 13 Dressings
Method

1. Remove the wrapping, unwind the bandage’s loose end, taking care not to drop the roll or touch the dressing pad.
2. Unfold the dressing pad, holding the bandage on each side of the pad. Put the pad directly on to the wound.
3. Wind the short end or tail of the bandage once around the limb and the dressing to secure the pad, and then leave it hanging.
4. Wind the other end or head of the bandage around the limb to cover the whole pad, and leave the tail hanging free.

5. To secure the bandage, tie the ends in a reef knot (refer Reef Knot page no...), tied over the pad to exert firm pressure on the wound.
6. If bleeding appears through the dressing, do not remove it. Apply another dressing on the top.
7. Check the circulation, if necessary, loosens the bandage.

Improvised Dressings

If a prepared dressing is not available, you can improvise with any clean material. Clean towels or handkerchiefs are best for the purpose.
Fig: 14 Improvised Dressings

**Method**

1. Hold the material by the edges only. Open it out and refold so that the inner surface becomes outermost.
2. Place the pad of material directly on to the wound. If necessary, cover with more material.
3. Secure the pad with a bandage or a clean cloth strip. Tie the ends using a reef knot.

**Adhesive dressings**

These dressings or plasters are useful for small wounds.

Fig: 15 Adhesive Dressings

**Method**

1. Dry the surroundings area. Remove the wrapping and hold the dressing pad side down by its protective strips.
2. Peel back, but do not remove the protective strips. Without touching the pad, place it on to the wound.
3. Carefully pull away the protective strips. Press the ends and edges down.
1.3.2 Bandages

**Roller Bandage**

A roller bandage is used to hold dressings in place on the hand or foot, or to provide support to wrists, ankles, elbows, knees that have been sprained or strained.

The following diagrams show how to apply a roller bandage. When the bandage is partly unrolled, the rolled part is called the head & the unrolled part the ‘tail’.

**Method**

![Diagram of applying roller bandage with labels: Keep arm supported while you work, Head of bandage.]

Place the tail of the bandage below the injury and, working from the inside of the limb outwards, make two straight turns with the head of the bandage to anchor it in place.

![Diagram of applying roller bandage with labels: Keep bandage support.]

Make a series of spiraling turns, winding from the inside of the limb and working up the limb. Make sure that each turns covers between a half and two third of the previous layer of bandaging.

![Diagram of applying roller bandage with labels: Make straight turn to finish.]

Finish off with one straight turn, and secure the end with a safety pin.
Regularly check the circulation to the extremity of the injured limb.

Fig: 16 Method of applying Roller Bandage

**Checking circulation - Method**

Press one of the nails (see inset) or the skin of the hand or foot, until it is pale. If, on releasing the pressure, the colour does not return, or return slowly, the bandage may be too tight.

If the bandage is too tight, partially undo it and reapply it more loosely.

**Hand & Foot Bandage**

**Method**

Place the tail of the bandage on the inside of the wrist by the base of the thump. Make two straight turns over and around the wrist.

From the thump side of the wrist take the bandage diagonally across the back of the hand so that the top edge touches the nail of the little finger.
Take the bandage under and cross the fingers so that the upper edge of the bandage touches the base of the nail of the index finger.

Take the bandage diagonally across the back of the hand to the outer side of the wrist then around the wrist and up.

Repeat the sequence of turns, covering two-thirds of the bandage from the previous turn each time. When the hand is covered, make two straight turns around the wrist and secure the end with either a safety pin or a clip.

On a bandaged foot, check the circulation on the toes.

Fig. 17 Methods of applying hand and foot bandage

**Reef Knot**

When tying a bandage always use a reef knot, as it lies flat and more comfortable for the casualty. It is secure & will not slip but easy to untie.
Tying a Reef Knot – Method

Pass the left end (dark) over and under the right.

Bring both ends up again.

Pass the right end (dark) over and under the left

Pull the ends firmly to tighten; tuck in ends

Fig: 18 Method of Tying a Reef Knot

Untying a knot – Method

Pull one end and one piece of bandage apart
Hold the knot; pull the end through it and out

Fig: 19 Method of Untying a Reef Knot

**Slings**

Slings are used to support the arm in the case of fractures or sprains.

**Arms sling**

Support the injured arm so the hand is above the uninjured elbow. Pass one end of the bandage through at the injured elbow and pull to the opposite shoulder. Spread the bandage out so the base is level with the little fingernail.

Bring the lower end of the bandage up over the forearm to meet the other end at the shoulder.
Tie a reef knot at the hollow over the collarbone on the injured side. Tuck both end of the bandage under the knot to pad it.

Fold the point forward at the elbow. Tuck any loose bandage underneath it, and secure the point to the front of the bandage with a safety pin. Regularly check the circulation in the exposed fingers.

Fig: 20 Method of Applying Arm sling

This supports the arm with the forearm horizontal or slightly raised. This is used for an injured upper arm, wrist or forearms or a simple rib fracture.
Elevation sling - Method

1. As the casualty to support the injured arm across his chest, with his fingertips touching the opposite shoulder.
2. Drape one end of a triangular bandage over its shoulder on the uninjured side, with the point on his injured side.
3. As the casualty to release his arm. Tuck the base of the bandage under his hand and forearm and behind his elbow.

Bring the lower end up diagonally across his back to meet the other end at his shoulder.

Tie the ends in a reef knot at the hollow above his collarbone. Tuck the ends under the knot to pad it.
Twist the point until the bandage fits around the elbow. Tuck the point into the sling at the elbow to secure it. Regularly check the circulation in the fingers.

Fig: 21 Method of Applying Elevation Sling

This supports the upper limb with the hand in a well-raised position. It is used to control bleeding from wounds in the forearm, to reduce swelling in burn injuries and for complicated rib fracture.

Check your progress 4

1. What is the main difference between a dressing and a bandage?
2. What are the main advantages of a Reef Knot?
3. How will you assess the circulation while doing a bandage?

Activities

1. Practice doing a dressing on arm with a dressing and a roller bandage.
2. Practice doing a bandage on the foot.
3. Practice tying and untying Reef Knot.
4. Practice applying Arm sling and Elevation sling and identify its main difference.

1.4 Let us sum up

In this unit we have discussed about priorities of first aid, actions in an emergency and different types of dressings and bandages. We hope it will help you to understand why and how first aid techniques work. A clear understanding of what is normal should help you to decide what may be wrong or abnormal, and enable you to provide the correct treatment.
2.0 Objectives

This unit is about the First Aid given for some emergency situations. At the end of this unit, you will be able to

1. Avoid wrong practices while doing first aid.
2. Identify risk factors in an emergency situation.
3. Develop presence of mind in an accidental situation.
4. Understand the actual seriousness of situations.
5. Explain the reason for the occurrence a situation.

2.1 WOUNDS & BLEEDING

2.1.1 Wounds with External Bleeding

Remove or cut clothing to expose the wound. Watch out for sharp objects such as glass pieces.
Apply direct pressure over the wound with your fingers or palm, preferably over a sterile dressing or clean pad.

Raise & support the injured part above the level of the casualty’s heart.

Lay the casualty down, this will reduce blood flow to the site of injury and minimizes shock.

Fig: 22 First aid for Wound with external Bleeding
2.1.2 Foreign bodies in wounds

Foreign body lying in a wound can be carefully picked off or rinsed off with water. This cannot be possible if it is embedded in the wound. In such case the wound can be covered with a bandage without pressing down and make arrangements to take the casualty to hospital.

![Fig: 23 First aid for wound with foreign body](image)

2.1.3 Head Wounds

![Fig: 24 Indications of Head Injury](image)

In the case of head wounds, examine the injured person very carefully because a scalp injury may be a part of a more serious underlying skull fracture.
Fig: 25 First aid for Head Injury

Apply firm pressure over a pad or clean cloth placed over the wound. The pad is retained there with a bandage and then lay the person down with head & shoulders slightly raised.

### 2.1.4 Wounds to the palm

The palm is richly supplied with blood and a wound may bleed profusely.

1. Press a dressing pad firmly into the palm and ask the casualty to clench his fist over it.

2. Bandage the casualty’s palm in the clenched position. Then support the arm with an elevation sling & arrange to take to hospital.

Fig: 26 First aid for wounds to palm
2.1.5 Amputation

In the case of severe and forceful injury that may result in tearing of a limb or part of a limb is called Amputation. Micro surgical techniques are used to ‘replant’ an amputated part and so it is important to locate and preserve it.

Care of injured person

1. Control blood loss by applying pressure & raising the injured part.
2. Apply sterile dressing.

Care of amputed part

1. Wrap’ the amputated part in a plastic bag.
2. Wrap it again in soft cloth & place in another container or a plastic bag that contains ice.
   - Do not allow direct contact with ice
   - Do not wash it
3. Mark the package with time of injury and the casualty’s name. The sooner the casualty & amputed part reach hospital the better.

2.1.6 Eye Wounds

All eye injuries are serious.

Fig:27 First aid for Eye Wounds
Make the casualty to lie down on his/her back holding the head still. Ask the person to hold a pad over the injured eye, which prevent the eye from moving and causing further injury. Immediately send the casualty to hospital.

2.1.7 Bleeding from Ear

An explosion, a blow to the side of the head or a foreign body pushed into the ear may cause injury to the ear-drum. This results in the bleeding from the ear and sharp-pain. This can be also a symptom of head injury.

1. Make the person to sit with head inclined to the injured side to let the blood drain.
2. Cover the ear with a sterile dressing. Send the casualty to hospital.

2.1.8 Bleeding from mouth

![Figure 28: First aid for Mouth Bleeding]

1. Make the person to sit down with head inclined forward towards the injured side. This will allow the blood to drain.
2. Ask the casualty to press a dressing pad over the wound for about 10 minutes.

Fig: 28 First aid for Mouth Bleeding

If a tooth socket is bleeding, tell the casualty to bite dressing cotton in the place. Advice the casualty to avoid hot drinks for 12 hrs and do not wash the mouth, as it may disturb the clot.
2.1.9 Nose Bleeding

Make the injured person sit down with his head bent forward. Ask him to breath through the mouth and to pinch his nose just below the bridge. Ask the casualty not try to speak, swallow, cough, sniff, or spit as it will disturb blood clot.

Fig: 29 First aid for Nose Bleeding

Check your progress 1

1. What is the first aid given for an embedded foreign body in a wound?
2. List out the precautions taken during the transportation of an amputated part.
3. In the case of bleeding tooth socket, the person should avoid hot drinks for 12 hours because.................
4. In the case of eye injuries, we must prevent the eye from moving. Why?
5. What are the conditions that can cause injury to the ear-drum?

2.2 FRACTURES & DISLOCATIONS

A fracture is a break or crack in a bone. When skin is intact it is simple fracture and when skin is broken it is a compound fracture.
**Symptoms**

(i) Affected area is swollen and pain on touch.

(ii) Severe pain on movement.

(iii) Friction sound is produced while moving at times.

Fractures are classified into *Simple, Compound* or *Greenstick* based on its nature and it may be *open* or *closed*.

<table>
<thead>
<tr>
<th>Simple</th>
<th>Compound</th>
<th>Greenstick</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Skin surface" /></td>
<td><img src="image2" alt="Swelling and bruising" /></td>
<td><img src="image3" alt="Unbroken skin" /></td>
</tr>
</tbody>
</table>

Fig :30 Types of Fracture

<table>
<thead>
<tr>
<th>Open</th>
<th>Closed</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image4" alt="Wound" /></td>
<td><img src="image5" alt="Unbroken skin" /></td>
</tr>
</tbody>
</table>

Fig: 31 Types of Fracture
2.2.1 Fractured Upper Arm

Make the casualty sit down. Then ask her to place the injured arm across the chest in a comfortable position and then support the arm.

Fig: 32 First aid for Fractured Upper Arm

Place the affected arm in an arm sling and place soft padding between the arm & the chest. Secure the arm to the chest by tying a broad fold bandage around the chest & over the sling.

2.2.2. Fractured fore arm & wrist

Make the casualty sit comfortably. Support the injured forearm across the chest. Gently surround the forearm in soft padding.

Tie the arm and it’s padding in an arm sling to support it.

Fig: 33 First aid for Fractured Fore Arm & Wrist
2.2.3. Fractures of leg

Fig: 34 First aid for Fractured Leg

Help the casualty to lie down and then carefully support the injured leg. Straighten the leg gently.

For transporting the casualty, the leg must be carefully supported. For that, splint the injured leg to the uninjured or a separate splint is used.

**Dislocation** is a partial or full displacement of bones at a joint. In a joint there are two bones, one forming a socket and the other head fitted into it. When there is a jerk and stretching, the head may be displaced out of socket, which is called dislocation of joint.

**Symptoms**

(i) Swelling and pain on joint

(ii) Abnormal movement

(iii) Intense pain

(iv) Loss of power and function
2.2.4 Dislocated Shoulder

Make the casualty sit down and ask her to place the affected arm across the chest at an angle which causes least pain.

Place soft padding between the arm & the chest on the affected area. Tie an arm sling so that the arm and its padding are supported. Send the casualty to hospital keeping her seated.

Fig: 35 First aid for Dislocated Shoulder

2.2.5 Sprained Ankle

A sprain can be treated by the RICE procedure.

<table>
<thead>
<tr>
<th>RICE</th>
<th>Procedure</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>Rest the injured part</td>
</tr>
<tr>
<td>I</td>
<td>Apply Ice</td>
</tr>
<tr>
<td>C</td>
<td>Compress the injury</td>
</tr>
<tr>
<td>E</td>
<td>Elevate the injured part</td>
</tr>
</tbody>
</table>

1. Rest, steady & support the injured part
2. Apply ice or cold compress to reduce swelling

3. Apply even pressure or compression to the injured part.

4. Elevate & support the injured limb to reduce blood flow to the injury.

Fig: 36 First aid for Sprained Ankle

2.2.6. Back Injuries

Back injuries include fracture or fracture-dislocations of the bones of the spine and disc injuries. The main danger with any back injury is that the spinal cord or nerves may be damaged.
First check the casualty’s breathing & pulse. Then steady & support his/her head placing your hands over his/her ears. Maintain this support with help of folded cloth.

Lay the casualty in recovery position (Refer page no.) to keep the spine protected.

2.2.7 Back Pain

Help the casualty to lie in the most comfortable position either on the ground or on a firm mattress. Advice the casualty to rest until the pain eases.

Check your progress 2

1. Which are the different types of fractures?
2. Which are the main symptoms of fractures?
3. An open compound fracture is more susceptible to infection. Why?
4. What is the first aid to be given for dislocated shoulder?
5. Explain the RICE procedure for sprained ankle?
6. Why should back injuries be carefully handled?
2.3 BURNS & SCALDS

Burns are injuries produced by application of dry heat such as flame, heated solid substance or by radiant heat, electricity, lightening etc. on the surface of body.

In the case of burns, first aid is given after assessing the cause of the burn, depth of the burn and its extent. If 60% of the skin surface (40% in very young & old) is burned, kidney failure is likely to occur up to six weeks.

Scalds are moist heat injuries produced by hot liquid or vapours.

2.3.1 Minor Burns & Scalds

Cool the injured part with cold water for at least 10 minutes to stop & relieve the pain. Then gently remove the jewellery, watches or clothing from the injured area before it begins to swell.

Cover the area with loose sterile dressing. Do not break blisters. Do not apply adhesive dressings or lotions and ointments which may damage the affected tissue and cause infection.

Fig: 39 First aid for Minor burns and Scalds
**2.3.2 Severe burns & Scalds**

Lay the casualty down. Cool the burned area for about 10 minutes with plenty of water. Then carefully remove the burned clothing unless it is sticking to the burn.

Cover the injury with a sterile dressing. Electrical burns & lightning strike are treated like above and send immediately for medical help.

**Check your progress 3**

1. How is a burn different from a scald?
2. What is the first aid given for minor burns?
3. ‘Blisters formed due to burns should not be broken’ Why?
4. What first aid can be given for a severe burn?

**2.4 BITES & STINGS**

**2.4.1 Insect Stings**

Bee and Wasp stings are painful. An initial sharp pain is followed by swelling & soreness.

If we can see the sting in the wound pluck it out firmly with a forceps. Apply an ice pack to relieve pain and minimise swelling. If swelling and pain persists advise to see a doctor.

Fig: 40 First aid for Insect Stings
2.4.2 Animal Bites

**Dog Bite**

Among the animal bites most important and serious for us are rabid animal bites. Bites from sharp, pointed teeth cause deep puncture wounds, which may lead to serious infections like Rabies, Tetanus etc.

Wash the wound with soap and warm water. Control bleeding by applying direct pressure and raising the injured part.

Cover the wound with sterile dressing. Arrange to take the casualty to hospital for necessary treatment against infections. The animal can be kept under observation for ten days for the confirmation of rabies infection.

Fig: 41 First aid for Animal bite

2.4.3 Snake Bite

20-50% of snakes found in India are poisonous. Full venom of one large cobra can kill 7 adult persons. However only $\frac{1}{5}$ cases of poisonous snake bites show features of poisoning and still less cases die.
Poisonous Snakes

If the snake is Cobra or Krait, after 2-10hrs of bite, paralysis starts because the venom is a neurotoxin. In the case of Viper, the venom affects the blood circulation. The victim develops pain, swelling and later bleeding from nose, gum, wound and later blood in urine. Kidney failure is common. Death may happen within 8-72 hrs.

The main point to be noticed in the case of a snake bite is, due to anxiety and fear of death, the victim may present many symptoms. Even the bite of a non-poisonous snake may cause death due to excessive frightness. The first aid for snake bite is;
1. Make the person calm and still. Wash the wound with soap & water if available.

2. Compress the limb above the wound with a light bandage. Loosing the bandage for ½ or 1 minute per 20-30 minutes is advisable. Immobilise the injured part. Arrange urgent removal to hospital. Do not apply a tourniquet, or cut the wound with a knife, or attempt to suck out the venom.

Check your progress 4

1. What is the first aid to be done for a dog bite?
2. In the case of insect stings, in order to relieve pain and swelling we must apply......
3. In the case of snakebite, the first & most important thing to be done is to make the casualty calm & still. Why?
4. What is the main difference between the venom of Cobra and Viper?

2.5 POISONING

A substance that causes injury to normal systems of body function is called poison. The effect of poisoning varies depending on the type and amount of poison absorbed. Poisoning is often accidental or may be deliberate (in the case of attempted suicide).

Poisoning may be by

1. Household poisons
eg: detergent, bleach, pesticides, paint etc.

2. Drugs

3. Industrial poisons
eg: poisonous gases, corrosive chemicals etc.

4. Poisonous plants

5. Alcohol
6. Food poisoning – caused by Salmonella group or Staphylococcus group of bacteria. The main symptoms are vomiting, diarrhea, severe abdominal pain, fever etc. Keep the casualty warm and comfortable and give plenty of drink like water or diluted fruit juice to prevent dehydration. A bowl is kept aside to use if the casualty vomits. If necessary shift to the nearest hospital.

Poison can enter the blood through:

(i) Mouth - which is swallowed
(ii) Skin by contact, injection or bite.
(iii) Lungs by inhalation of poisonous gases

First Aid Priorities

If the casualty is unconscious, open the airway, check the breathing and pulse and if necessary give artificial ventilation. For, Swallowed Poisons - No attempt to induce vomiting as this may further harm the casualty.

Inhaled Poisons - Remove the casualty from danger into fresh air. Next the patient is to be shifted to the nearest hospital.

Check your progress 5

1. In the case of swallowed poisoning one should not attempt to vomit. Why?
2. In the case vomiting & diarrhea due to food poisoning, one should drink plenty of water or fluids in order to prevent ..... 
3. Poison enters into the body system through three ways. Which are they?
2.6 DROWNING, ELECTRICAL INJURIES AND HEART ATTACK

2.6.1 Drowning

In drowning, water enters into lungs and stomach. Water in respiratory passage excites coughing; air is expelled and replaced by water.

Death by drowning occurs when air cannot get into the lungs. If the person is unconscious, carry him out of water with head lower than the chest to minimise the risk of inhaling water.

Lay the person on his back with head low and to one side so water drains from mouth. Open the airway, check breathing and pulse and if necessary start artificial ventilation.

Do not use abdominal thrust unless the person’s airway is obstructed and artificial ventilation has failed.

2.6.2 Electrical Injuries

You should approach the casualty until it is officially told that the power has been cut off. Do not touch the casualty if he is in contact with the electric current. Use only non-metallic things to push away the casualty from the current source.

The electric current may cause sudden muscular contraction, which results in the ‘throwing away’ of the casualty to some distance causing fractures.
If the casualty is unconscious, open the airway, check breathing and pulse and give artificial ventilation. If necessary, send the casualty to hospital.

Fig: 45 First aid for Electrical injuries

2.6.3 Heart Attack

A heart attack usually occurs when the blood supply to part of the heart muscles is suddenly obstructed. The main symptom is persistent central chest pain, spreading often to the jaw and down left arm.

Your aim is to minimise the work of the heart. So make the casualty as comfortable as possible to ease the strain on the heart. Then call for urgent medical help and send the casualty to hospital.

Fig: 46 First aid for Heart Attack

The condition ‘Cardiac Arrest’ refers to one type of heart attack, which is very serious. The main symptoms are absence of pulse and breathing. The first thing to be done in this case is arrange urgent removal to hospital.
1. What first aid can be given in the case of drowning?
2. In the case of electric shock, we should use wood piece or non-metallic things to break the contact between the person & electric current source. Why?
3. What are the main symptoms of a heart attack?
4. In the case of heart attack, you should make the person calm & comfortable in order to.........

2.7 MISCELLANEOUS CONDITIONS

2.7.1 Fainting

A faint is a brief loss of consciousness that is caused by a temporary reduction of blood flow to the brain. It may be a reaction to pain or fright or the result of emotional upset, exhaustion or lack of food.

![Fig: 47 First aid for Fainting]

1. Lay down the person. Raise and support the legs.
2. Make sure that he has plenty of fresh air.
3. As the person recovers, help him to sit up gradually.
2.7.2 Fever

A sustained body temperature above the normal level of 37°c (98.6°F) is known as fever. A temperature above 40°c (104°F) can be dangerous.

Make the casualty comfortable in cool surroundings. Spong the body of the casualty with luke warm water in order to reduce temperature. Give plenty of drinks to compensate lost fluids and recommended dose of paracetamol syrup.

2.7.3 Headache (Migraine)

This is a type of severe ‘sickening’ headache. Migraines usually follow a pattern. Try to avoid bright light, loud noise etc. Take precaution for a vomiting condition.

Help the person to lie down comfortably in a quiet dark room with lot of fresh air. Help her to take recommended dose of painkillers. If the pain does not ease within two hours, send her to hospital.

2.7.4 Earache

An infection of the middle ear is the most common cause of earache, particularly in children.

Give the casualty a source of heat (hot water bottle wrapped in a towel) to hold against the affected ear. Ask the casualty to take recommended dose of medicines or painkillers. If there is a discharge, fever or marked hearing loss send the casualty immediately to hospital.

Fig: 48 First aid for Earache

2.7.5 Cramp

Cramp is a sudden, involuntary and painful muscle contraction. Stretching and massaging the affected muscle often relieve cramp.
**Cramp in the foot**

Help the casualty to stand with his weight on the front of his foot. When the first contraction has passed, massage the foot.

Fig: 49 First aid for Cramp in the foot

**Cramp in the calf**

Straighten the casualty’s knee and draw the foot firmly and steadily upwards towards the shin. Massage the muscles.

Fig: 50 First aid for Cramp in the calf

**Cramp in the thigh**

For cramp in the back of the thigh, straighten the casualty’s knee by raising the leg. Bend the knee for cramp in the front of the thigh. In each case, massage the affected muscle firmly with your fingers until the pain eases.

Fig: 51 First aid for Cramp in the thigh

**2.7.6 Hysteria**

Hysteria is a sub conscious condition caused by psychological stress, shows up as some physical complaint.

Move the casualty to a quiet place away from on lookers. Do not throw water over the casualty’s face or slap the face or use any force to
restrain the casualty. Stay with him/her until he/she has recovered and do not be over-sympathetic.

Check your progress 7

1. What is the normal temperature level of a human being?
2. What are the main causes of fainting?
3. What is a cramp?
4. What is the first aid given for a cramp?
5. A case of Hysteria needs to be handled firmly & positively. Why?

2.8 Let us sum up

The principles and practice of first aid are based on the principles of practical medicine and surgery. During accidents or sudden illness, knowledge of first aid enables trained persons to give assistance as it will preserve life and prevent the injury or illness becoming worse until medical aid is available.

It is not possible for every person to get the appropriate doctor with drugs and equipments at every needful moment. Hence at the time of emergencies any intelligent bystander who knows first aid can give this service with any material available which may be of life saving to the victim.

Evaluate yourself

Answer the following questions.

1. What is pulse? Give the normal pulse rate.
2. What are the precautions to be taken while transporting a person with eye injury?
3. What is dislocation? What are its main symptoms?
4. Why should back injuries are said to be carefully handled?
5. What is the first aid given for a minor burn?
6. What first aid can be given in the case of drowning?

7. A case of hysteria need to be handled firmly and positively. Why?

**Activities**

1. Perform the steps of mouth-to-mouth ventilation.

2. Practice taking Radial pulse and Carotid pulse.

3. Prepare a first aid box including all necessary equipments.

4. Perform the RICE procedure for sprained ankle.

5. Practice tying a Reef knot

6. Explain and perform how to put an arm sling.

7. Do an elevation sling for your friend.
In this Block there are 6 units. Unit 1 is about the problems of communicable diseases. Unit 2 deals with about air borne or respiratory infections. Unit 3 gives the details of water and food borne or intestinal infections, and Unit 4 is about contact or surface infections. Unit 5 discusses about arthropod (insect) borne infections and Unit 6 is about Zoonoses or diseases spread through higher animals.

Infections that can be transmitted from person to person or from animal to person are called communicable diseases. These diseases are caused by a bacteria or virus or some other organisms. If it rapidly spreads from person to person the disease appears in epidemic form which may cause deaths. To control or eradicate these epidemics of communicable diseases, knowledge regarding life cycle of agent, mode of spread, reservoir series of infection and disease cure are required. Adequate preventive measures are to be planned and carried out in community to prevent the spread of disease and to protect lives.
Hope you will enjoy working through the units of this block.

**Assess Yourself**

1. Which are the three necessary things for the occurrence of a disease?
2. Which are the different modes of transmission of diseases?
3. What are zoonoses? Give one example.
4. What is meant by an incubation period of a disease?
5. What is meant by disinfection?
6. MMR vaccine is used to prevent three diseases. What are they?
7. Which are the steps taken to avoid food poisoning?
8. How is AIDS transmitted?
9. What are the main modes of transmission of Leptospirosis (Weil's disease)?
10. Name any three diseases, which can be prevented by mosquito control.
1.0 Objectives

In this unit we will discuss the important aspects of Communicable disease. After learning this unit you will be able to
(i) Know about the variety of diseases, which are communicable.
(ii) Understand the different modes of transmission of diseases.
(iii) Identify the stages in the causative organism’s life cycle.
(iv) Avoid the risk factors.

1.1 Communicable Diseases - Introduction

According to American Public Health Association Communicable disease is “An illness due to a specific infectious agent or its toxic products which arises through transmission of that agent or its products to a susceptible host, either directly or indirectly through an intermediate plant or animal host or vector or through an environment”
For the occurrence of a disease in man three things are required, namely AGENT, HOST and ENVIRONMENT. Diseases cannot occur in the absence of any one of these factors.

**Agent factors**

- Biological: Bacteria, fungus, viruses, protozoa etc.
- Chemical: Metals, gases, fumes etc.
- Physical: Heat, cold, electricity, radiation etc.
- Mechanical: Trauma, injuries etc.

**Host factors**

Age, Sex, Heredity, Nutrition, Occupation, Customs, Habits etc. are host related factors.
Environmental factors

Physical environment – Unsafe water, contaminated soil, poor housing etc

Biological environment – Animals, insects, rodents etc.

Social environment – Customs, habits, culture, standard of living etc

Check your progress 1

1. What is a communicable disease?
2. Which are the three things necessary for the occurrence of a disease?
3. State some of the agent factors in a communicable disease?
4. Which are the environmental factors involved in the spread of a communicable disease?
1.2 Modes of Transmission

Fig: 53 Modes of transmission
There are different ways by which communicable diseases are transmitted from a source of infection to a susceptible individual. They are as follows

**Air borne**

When a person with respiratory infection coughs, sneezes or even talks loudly, fine droplets of saliva containing millions of bacteria and viruses are blown into the air. These droplets when inhaled by another person, forms the source of infection for him. This is otherwise called droplet infection. Some large droplets may settle down on dust. During sweeping and making bed these dusts may float and enter into air passage of healthy individuals, and cause infection. Influenza, Measles, Mumps etc. are example of this type.

**Water & Food borne**

Many germs are passed out along with faeces of infected person and surface water contamination is likely to occur. A healthy man when takes this contaminated food or water, gets infected.
Fig: 54 Modes of communication of water & food borne diseases

Flies in their legs can carry these germs and when sit on the food it get contaminated.

Cholera, typhoid, dysentery, poliomyelitis etc are examples of diseases spread like this.
Direct contact

Direct contact like skin to skin, mucous membrane to mucous membrane, genital transmission, infected syringes, mother to baby are some of the means of disease transmission.

Trachoma, Leprosy, AIDS, Hepatitis B are some examples of this type.

Vector borne

Vector is defined as an arthropod that transports an infectious agent to a susceptible individual. In majority of the cases the infectious agent spends a part of its life cycle inside the vector’s body.
Zoonoses

Zoonoses is defined as an infection or a disease transmitted under natural conditions from a vertebrate animal to man.

Eg: Rabies, Plague, Leptospirosis, Anthrax etc.

Check your progress 2

1. Which are the different modes of transmission of diseases?
2. How are airborne diseases spread?
3. How the transmission of water and food borne diseases different from contact diseases?
4. What is the main peculiarity of the diseases causing agents, which spread through a vector?
5. What is zoonoses? Give one example.

1.3 Stages in infectious diseases

When an infectious agent enters a healthy man, it may spread into the tissues, blood stream, lymphatic system, nerves etc. After the entry of germs there are 3 distinct stages.

1. Incubation period

This is an interval from the time of entry of germ, to the appearance of symptoms. During this period the germ settles down in an organ, multiply and cause physiological changes. The affected person normally is not infective to others during this period.

2. Sick period

At this stage, symptoms appear and the person falls ill. In this period, the patient shows the characteristic symptoms of the disease and is usually infective to others.
3. Convalescent period

This is recovery period of acute illness. Complication may develop. The patient may or may not be infective depending upon the type of disease.

Check your progress 3

1. Which are the 3 stages of an infectious disease?
2. ...... is the infective period of majority of the diseases
3. What is the peculiarity of incubation period?

1.4 Prevention and control of infectious diseases

For the prevention and control of the spread of infectious diseases, the following steps can be considered.

a) Early diagnosis

Sooner the detection, easier is the control.

b) Notification

Once identified, local health authorities should be informed.

c) Investigation

Identification of the source of infection, vector or vehicle of transmission of disease, magnitude of spread etc.

d) Isolation

The purpose of isolation is to protect the community by preventing the transfer of infection

e) Treatment

Treatment of diseased person reduces the duration of illness, infectivity, growth of organism etc.

f) Disinfection

Disinfection is the killing of organism outside the body. Throughout the course of the disease, patients urine, faeces, vomit,
contaminated clothes, bed sheets and dressing materials are to be disinfected. Terminal disinfections after cure or death of the patient is to be done by burning unusable materials and proper disinfections of usable materials.

UV rays of sunlight are natural disinfectant. Drying, boiling, autoclaving, radiation, and using of phenol, dettol, bleaching powder, iodine, 70% alcohol, lime and chlorinated lime are all disinfecting agents.

Fig: 56 Methods of Disinfection

Check your progress 4

1. Briefly state the different steps taken for the prevention of communicable diseases.

2. What is meant by disinfection? Name some disinfecting agents?

1.5 Let us sum up

We have discussed the important aspects of communicable diseases, their mode of transmission, stages in infection and prevention and control in general. In the coming units we are going to discuss in detail about each disease based on their mode of
transmission. And this introduction will help you a lot in understanding the details of each disease.

Assignments

1. Prepare a brief note on the environmental factors involved in the spread of a communicable disease.

2. Conduct a seminar and prepare reports on the major modes of transmission of communicable diseases.


4. Conduct a discussion about the prevention and control of infectious diseases.
Unit 2

Air Borne Infectious Diseases

2.0 Objectives

In this unit we will discuss the major air borne infectious diseases. After reading this unit you will be able to:

i) Know about ten major air borne infectious diseases
ii) Analyse the incubation period and symptoms of these airborne diseases
iii) Avoid risk factors
iv) Understand the control and preventive measures in order to avoid the spread of air borne communicable diseases.

2.1 Air borne Infectious diseases

<table>
<thead>
<tr>
<th>Name of the disease</th>
<th>Causative agent</th>
<th>Symptoms</th>
<th>Mode of transmission</th>
<th>Control Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Common Cold</td>
<td>Virus (Rhino)</td>
<td>Infection in respiratory tract, Sneezing, Running nose etc. Last for 2-7 days</td>
<td>Droplet spread during sneezing, coughing etc</td>
<td>No specific treatment</td>
</tr>
<tr>
<td>2. Chicken pox</td>
<td>Virus (Varicella-zoster)</td>
<td>Fever, rashes appear after 2-3 days all over the body</td>
<td>Droplet spread from discharges from nose, throat etc</td>
<td>No specific treatment. Now vaccines are available but long term immunity is not possible</td>
</tr>
<tr>
<td>---------------</td>
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<td>------------------------------------------------------</td>
<td>--------------------------------------------------</td>
<td>-----------------------------------------------------------------</td>
</tr>
<tr>
<td>3. Measles (Rubeola)</td>
<td>Virus (RNA paramyxo virus)</td>
<td>Incubation period 10-14 days. Fever, sneezing, nasal discharge, photophobia etc. Rashes first appear in the mouth and then spread all over the body.</td>
<td>Droplet infection from 4 days before the onset of rash and 5 days after</td>
<td>Isolation for 7 days after and onset of rash. Prevented by immunization given at the age of 9 months.</td>
</tr>
<tr>
<td>4. German Measles (Rubella)</td>
<td>Virus (Toga virus)</td>
<td>Mild fever with measles like rash. The rash fades by the 2nd day and disappears by the 3rd. Rubella leads to congenital defects in children.</td>
<td>Droplet infection and direct contact. The person is infective for 2 weeks.</td>
<td>Active immunization of all children above one year with MMR vaccine (Measles, Mumps, Rubella vaccine)</td>
</tr>
</tbody>
</table>
5. Mumps
- Virus (Myxo virus parotiditis)
- Fever, Swelling of parotid gland behind the ear lobule. The swelling lasts for 1-2 weeks.
- Droplet infection and direct contact
- Control of mumps is difficult. Prevention through immunization by a vaccine MMR

6. Diphtheria
- Bacteria (Coryne bacterium diphtheriae)
- Fever, Sore throat, difficulty in swallowing, formation of oedema at the anterior portion of neck, presence of grayish or yellowish false membrane over tonsil.
- Droplet infection and direct contact with objects contaminated with secretions from nose and mouth
- Control of disease by early detection, isolation of the patient and treatment. Prevention by active immunization by DPT vaccine. (Diphtheria, Pertusis, Tetanus vaccine)

8. Whooping-cough (Pertusis)
- Bacteria (Bordetella pertussis)
- Mild fever, Irritating cough with a characteristic ‘whoop’ sound (loud inspiration) Found among infants and pre school children.
- Droplet infection and direct contact
- Prevented by DPT vaccine (3dozes) given at an interval of 1-2 months ‘starting when the infant is about 6 weeks old.

Fig. 59 Chicken Pox
<table>
<thead>
<tr>
<th>Disease</th>
<th>Bacteria (N. Meningitides)</th>
<th>Symptoms</th>
<th>Incubation Period</th>
<th>Prevention Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meningococcal Meningitis</td>
<td></td>
<td>Headache, Vomiting, Fever, Stiff neck, progress to a coma stage within few hours</td>
<td>3-4 days.</td>
<td>Isolation of patients up to 24hrs after starting antibiotics. Prevented by improving housing conditions among the low socio economic group. Over crowding in schools, camps etc must be properly managed.</td>
</tr>
</tbody>
</table>
| 10. Tuberculosis | Bacteria (Mycobacterium tuberculosis) | Continuous fever. Persistent cough of about 3 to 4 weeks, chest pain. Primarily affect lungs and also can affect intestine, bones & joints, lymph gland, skin etc | Droplet infection mainly during coughing | Control is by identification of case and proper treatment. Prevention by BCG vaccination given at the time of birth. Tuberculosis formed a fatal partnership with HIV. HIV damages the immune system and accelerates the spread of TB leading to non-curable condition. Worldwide number of people with HIV & TB is raising by millions every year.

Fig:63 Meningitis

Fig:64 T.B

Granulomas from Mycobacterium tuberculosis
Check your progress 1

1. Chicken Pox is an ______________ disease.
2. What are the main symptoms of Measles?
3. MMR is a vaccine used to prevent ____________, ___________ & ___________.
4. Diphtheria, Pertusis and Tetanus can be prevented using the vaccine _____________.
5. What are the main steps to be taken for the prevention of Meningitis?
6. BCG vaccination prevented ____________ infection.
7. A major air borne bacterial disease found among HIV patients is _____________.

2.2 Let Us Sum Up

We have discussed about the important aspects of airborne communicable diseases, the mode of transmission, causative organism, symptoms and control measures. In this group, the causative agents produced infection and disease after they are inhaled. The primary infection is usually in the respiratory tract.

Assignments

1. Prepare a chart with major air borne diseases including their symptoms and preventive measures.
2. Conduct a survey in your locality and find out the seasonal variation in the occurrence of air borne diseases.
3. Prepare posters and charts to increase public awareness about preventive measures taken against the spread of air borne diseases.
Unit 3

Water & Food borne infections (Intestinal infections)

3.0 Objectives

This unit is about water and food borne communicable diseases. From this unit you will get information about its symptoms, mode of transmission control measures etc. At the end of this unit you will be able to;

i) Get knowledge about the causative agents in various intestinal infections (water and food borne communicable diseases).

ii) Develop awareness about the preventive measures taken to avoid the spread of intestinal infections like Cholera, Poliomyelitis etc.

iii) Understand the importance of ORS solution to prevent dehydration.

iv) Discriminate mode of transmission of Hepatitis A and Hepatitis B infections.

v) Apply the knowledge about food sanitation and personal hygiene in your daily life.
### 3.1 Water & Food borne infections

#### Table: 2 Water and food borne communicable diseases

<table>
<thead>
<tr>
<th>Name of the Disease</th>
<th>Causative Agent</th>
<th>Symptoms</th>
<th>Modes of transmission</th>
<th>Control Measures</th>
</tr>
</thead>
</table>
| 1. Cholera          | Bacteria (Vibrio cholerae) | Incubation period 1-5 days  
Abdominal pain, Vomiting, Watery motion looking like rice water are the characteristics of Diarrhoea. Marked dehydration if continued. | 1. Contaminated water in wells, ponds etc.  
2. Food contaminated by infected person.  
3. Direct contact | Control includes identification of the cases and giving proper rehydration therapy using ORS solution.  
Prevention- Prompt reporting to health authorities when first case is identified in order to prevent spreading.  
Sanitary Measures  
1. Water sanitation by chlorination & boiling.  
2. Proper excreta disposal.  
3. Food sanitation includes preparation under hygienic condition and eating cooked hot food.  
5. Vaccination-immunity for about 3-6 months  
Simple ORS solution (Oral Rehydration Salt solution)  
Salt –5gm  
Sugar-20gm |
2. Poliomyelitis

Virus (Poliovirus)

Infection in the intestine later affects central nervous system leading to paralysis and sometimes death. Usually affect children at the age group 0-4 years causing “Lameness”.

Spreads through food & drinks contaminated by faecal matters from infected persons. Faecal-oral route.

Prevention by immunization using Oral Polio Vaccine (OPV) & Inactivated Polio Vaccine (IPV) Pulse Polio Immunization conducted by Govt. of India, recommended to immunize all children under 5 years (Irrespective of their immunization status)

Drinking Water- 1 liter.
### 3. Viral Hepatitis

<table>
<thead>
<tr>
<th>Virus</th>
<th>Description</th>
<th>Route of Transmission</th>
<th>Control Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>A virus</td>
<td><em>Hepatitis A</em> - Fever &amp; fatigue leading to vomiting. Dark urine &amp; Jaundice</td>
<td>Faecal- oral route</td>
<td>Control by Personal &amp; Community hygiene</td>
</tr>
<tr>
<td>B virus</td>
<td><em>Hepatitis B</em> - Severe liver damage, chronic liver disease leads to liver cancer.</td>
<td>Infected blood &amp; blood products transmit the virus during transfusion, dialysis, contaminated syringes and needles etc and also from mothers to babies</td>
<td>No specific treatment and so prevention has been the major aim. Immunization with Hepatitis B vaccine and proper sterilization programme.</td>
</tr>
<tr>
<td>C virus,</td>
<td><em>Hepatitis C</em> - Liver damage</td>
<td>Contaminated blood and unsterile equipments.</td>
<td>Proper sterilization programme</td>
</tr>
<tr>
<td>D virus, E virus etc</td>
<td>Continuous fever for 3 to 4 weeks with headache and gastro intestinal discomfort. If untreated death may occur in 3rd week.</td>
<td>Faecal –oral route</td>
<td>Prevention by food hygiene&amp; environmental sanitation. Proper treatments of affected cases are also necessary.</td>
</tr>
</tbody>
</table>

### 4. Typhoid Fever

<table>
<thead>
<tr>
<th>Bacteria (Salmonella typhi)</th>
<th>Description</th>
<th>Route of Transmission</th>
<th>Prevention Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Continuous fever for 3 to 4 weeks with headache and gastro intestinal discomfort. If untreated death may occur in 3rd week.</td>
<td>Faecal –oral route</td>
<td>Prevention by food hygiene&amp; environmental sanitation. Proper treatments of affected cases are also necessary.</td>
</tr>
</tbody>
</table>
5. **Food Poisoning**

<table>
<thead>
<tr>
<th>Bacterial</th>
<th>Fever, Nausea, Vomiting, and Watery diarrhoea are the usual symptoms. In the case of Botulism the condition of patient is frequently fatal.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>a. Salmonella</strong> food poisoning</td>
<td>1. Contaminated meat, milk, egg, and other animal &amp; poultry products.</td>
</tr>
<tr>
<td><strong>b. Staphylococcus</strong> food poisoning</td>
<td>2. Transmitted through salads, custards, milk &amp; milk products.</td>
</tr>
<tr>
<td><strong>c. Botulism</strong> by Clostridium botulinum</td>
<td>3. Preserved foods like pickles, canned foods, smoked foods etc.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Food Sanitation</strong></th>
<th>Primary prevention is by food and water hygiene environmental sanitation. Secondary by early diagnosis and treatment.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal hygiene</td>
<td>I. Refrigeration</td>
</tr>
<tr>
<td>Sanitary improvements</td>
<td>II. Refrigeration</td>
</tr>
<tr>
<td>Health Education</td>
<td></td>
</tr>
</tbody>
</table>

6. **Amoebiasis**

<table>
<thead>
<tr>
<th>Entamoeba hystolytica (parasite)</th>
<th>Abdominal discomfort and diarrhoea leading to acute dysentery.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Faecal-oral route</td>
<td>1. Faecal-oral route</td>
</tr>
<tr>
<td>2. Vectors-Flies, cockroach, rodents carry the organism to food materials.</td>
<td>2. Vectors-Flies, cockroach, rodents carry the organism to food materials.</td>
</tr>
<tr>
<td>7. Worm Infection</td>
<td>1. Round Worm</td>
</tr>
<tr>
<td>------------------</td>
<td>---------------</td>
</tr>
<tr>
<td></td>
<td>2. Hook Worm</td>
</tr>
<tr>
<td></td>
<td>3. Pin worm</td>
</tr>
</tbody>
</table>

---

**Check your progress 2**

1. What are the main sanitary measures to be taken for the prevention of cholera?
2. What is the main aim of Pulse Polio Immunization Programme?
3. What is the main difference in the spread of Hepatitis A infection and Hepatitis B infection?
4. Which are the steps taken to avoid food poisoning?
5. Amoebiasis or Amoebic dysentry is caused by ___________

### 3.2 Let us sum up

Now you came to know about major intestinal infections. The infective agent enters the body along a with water and food, multiples in the intestine and is passed out in stools. When the infected stools contaminate water, milk, food or hands it will lead to further spread of infection. As these infections are
spread through faecal contamination of water and food, food sanitation and personal hygiene must become a part of your daily life.

As a teacher you must give instructions to your students to practise personal hygiene and take necessary steps to make it compulsory during school hours.

Assignments
1. Prepare a chart with major intestinal infections including their symptoms and preventive measures.
2. Conduct a survey in your locality and find out the seasonal variation in the occurrence of intestinal infections.
3. Prepare posters and charts to increase public awareness about preventive measures taken against the spread of intestinal infections.

Unit 4
Contact or Surface Infections

4.0 Objectives

In this unit you will come across the important contact of surface infections. At the end of this unit you will be able to;

i) Know about the mode of transmission of various contact diseases like AIDS, Leprosy, Tetanus etc.

ii) Develop an awareness about the misconceptions regarding the spread of diseases like AIDS, leprosy etc.
iii) Apply the knowledge in preventing the spread of various contact diseases.

### 4.1 Contract of surface infections

<table>
<thead>
<tr>
<th>Name of the Disease</th>
<th>Causative Agent</th>
<th>Symptoms</th>
<th>Mode of transmission</th>
<th>Control Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Trachoma</td>
<td>Chlamydia trachomatis (bacteria)</td>
<td>Inflammation leads to conjunctival scarring. This cause inward deviation of eye lashes. Corneal ulceration by eyelashes followed by visual loss.</td>
<td>Eye to eye transmission by direct or indirect contact with eye discharges or materials handled by infected persons.</td>
<td>Control by an Assessment survey and Mass treatment to entire community. Prevention by personal &amp; community hygiene.</td>
</tr>
<tr>
<td>2. Tetanus</td>
<td>Clostridium tetani. (Bacteria)</td>
<td>Affect main areas of nervous system. The death rate is 40-80%</td>
<td>Contamination of wound with tetanus spores. Injuries due to accidents are more prone to infection &amp; also unhygienic delivery practices.</td>
<td>Active immunization with tetanus toxoid. Clean delivery practices &amp; TT injections given at the time of pregnancy reduce the neonatal tetanus.</td>
</tr>
<tr>
<td>3. Leprosy</td>
<td>Mycobacterium lepra (Bacteria)</td>
<td>Pigmented patches, Loss of skin sensation, Presence of nodules in skin, loss of fingers or toes etc.</td>
<td>Direct contact especially with skin &amp; nasal secretion of affected persons</td>
<td>Early detection &amp; proper treatment of affected cases. Isolation of cases prevent the spread of disease. Improved housing condition &amp; proper health education.</td>
</tr>
<tr>
<td>4. Ring worm (Tinea)</td>
<td>Fungus</td>
<td>Infection in the skin, hair and nails. The lesion is seen in patches which have a healing scaly centre and a ring like spreading edge</td>
<td>Incubation period 10 – 14 days. Transmitted through common bath, shoes, socks under wares, toilet seats, instruments of a barber etc.</td>
<td>Contact with infected persons must be avoided. Foot bath in hypochlorite solution. Clothes and objects of infected must be avoided. Barbers should be licensed.</td>
</tr>
</tbody>
</table>
Fig: 69 Trachoma

Fig: 70 Tetanus

Fig: 71 Ring worm

Fig: 72 Leprosy
4. AIDS

AIDS, the Acquired Immuno-Deficiency Syndrome is a deadly disease caused by a virus known as Human Immuno-deficiency Virus (HIV), which breaks down the body’s immune system leaving the person vulnerable to a host of life threatening infections, neurological disorder or unusual malignancies. Once a person is infected, the virus remains in the body life-long. The risk of developing AIDS increases with time. Since HIV infection can take years to show up itself, a symptom less carrier can infect other people for years. High risk groups in the case of AIDS infection is Male homosexuals and bisexuals with heterosexual partners (including prostitutes), intravenous drug abusers, transfusion recipients of blood and blood products and STD (Sexually Transmitted Diseases) affected persons.

**Modes of transmission**

The basic modes of transmission are

1. *Sexual transmission*
2. *Blood contact*
3. Maternal-foetal transmission: Mother to child transmission

There is no evidence that HIV is transmitted through mosquitoes or any other insect, casual social contact with infected person or by food and water.

Fig: 74 Modes of man to man transmission of AIDS

**Incubation period**

Incubation period is uncertain. It may be from a few months to 6 years or even more, from HIV infection to the development of AIDS.

**Symptoms and diagnosis**

A number of bacterial and viral diseases are found in association with AIDS. Tuberculosis, Sarcoma (cancer), Encephalitis, Dermatitis, Meningitis, Pneumonia, etc. are some of them. WHO’s definitions about the major signs of AIDS are

i. Weight loss greater than 10% of body weight.
ii. Chronic diarrhoea for more than 1 month

iii. Prolonged fever for more than 1 month.

Diagnosis

Two different tests are commonly used to detect AIDS. The first test used to detect HIV- antibodies is ELISA and second confirmatory test is WESTERN BLOT:

Control of AIDS

There are some basic approaches to control AIDS

I. Prevention can be done by

   a. Health Education (Guidelines)

      1. Avoiding indiscriminate sex and using condoms
      2. Avoid sharing of razors & toothbrushes
      3. Avoid sharing of needles & syringe
      4. Women suffering from AIDS should avoid pregnancy
      5. Educational materials & guidelines for prevention should be made widely available
      6. All Mass Media channels should educate the people on AIDS

   b. Prevention of blood borne HIV transmission

II. Antiviral treatment

   At present there is no vaccine for HIV infection/ AIDS. The antiviral drug treatment has proved to be useful in prolonging the life of severely ill patients.
III. Primary Health Care

Integration of AIDS control programmes with country’s primary health care system.

Limiting the spread of HIV requires constant survey, reporting and record keeping of cases for scientific purposes. The Government of India has established a network of centers in the country to screen high-risk groups. This includes nine referral centers also (eg. National Institute of Virology Pune, Christian Medical College, Vellore, All India Institute of Medical Sciences New Delhi, National Institute of Communicable Diseases Delhi) where higher levels of diagnostic facilities are available.

Check your progress 3

1. What are the main symptoms of trachoma?
2. Tetanus is caused by the organism ___________
3. Tetanus can be prevented by ________________
4. AIDS is caused by ____________Virus
5. How AIDS is transmitted?
6. Which are the two tests used to diagnose AIDS?
7. Which are the Heath Education guidelines to avoid AIDS infection?

4.2 Let us sum up

We have discussed the contact or surface infection which comes out of the skin or mucus membrane of the patient and enters thorough the skin and mucus membrane of a healthy person through bodily or sex
contact. The infection may also be carried indirectly through formites such as kajal sticks and handkerchief in the case of Trachoma, towels and socks in the case of ring worm infection etc.

**Assignments**

1. Prepare a chart with major contact or surface infections including their symptoms and preventive measures.
2. Prepare posters and charts to increase public awareness about modes of transmission and preventive measures taken against the spread AIDS.
3. Conduct a survey in your locality and find out the seasonal variation in the occurrence of contact infections.
4. Prepare a brief report on the control measures taken by Govt. of Kerala to prevent the spread of AIDS.
5.0 Objectives

This unit is about insect borne or arthropod born infections. After reading this unit you will be able to;

i) Know about five major infectious diseases, which are transmitted by insects.

ii) Understand the importance of mosquito control in preventing the spread of many communicable diseases

iii) Take special interest in participating social activities like environmental protection and cleaning.

5.1 Arthropod borne infections

<table>
<thead>
<tr>
<th>Disease</th>
<th>Causative Agent</th>
<th>Symptoms</th>
<th>Mode of transmission</th>
<th>Control measures &amp; Prevention</th>
</tr>
</thead>
</table>
| 1. Dengue Fever | Virus           | Incubation period 3-10-days High Fever & chills, Intense headache, muscle and joint pain which prevent all movement. Eye pressure & photophobia develops. Other common symptoms include extreme weakness, constipation, altered taste sensation etc. | The transmission cycle is Man-mosquito –Man. Aedes mosquito is the main vector. | 1. Mosquito control  
2. Vaccines  
3. Other measures like isolation of cases under bed nets during first few days, Individual protection against mosquito. |
| 2. Malaria | Plasmodium (parasite) | Shows 3 distinct stages  
1. **Cold stage**  
Headache, nausea, chilly sensation Temperature rise 39-41°C. This stage lasts for ¼ to 1 hr.  
2. **Hot stage**  
Feeling of burning hot, skin, dry to touch. Headache intense. Pulse full and respiration rapid, lasts for 2-6 hours  
3. **Sweating stage**-Fever comes down with profuse sweating. Skin cool and moist. Pulse rate slow. This stage lasts for 2-4 hours. | 1. Vector transmission  
Female Anopheles Mosquito act as the vector.  
2. Direct transmission Through blood transfusion.  
3. Congenital Malaria From infected mother to child | Prevention by  
1. Mosquito control  
2. Case detection  
3. Treatment National Malaria Eradication Programme has contributed a lot for the control of Malaria |

| 3. Filariasis (Elephantiasis) | Parasite (microfilarie of wuchereria bancrofti) | Soft swelling due to blockage of lymph vessels followed by fibrotic changes gives rise to the picture of elephantiasis usually seen in legs and feet. | Transmission by Female *Culex* mosquito and it depends upon man-mosquito contact (infective biting rate) | 1. Mosquito control  
2. Treatment with drugs. |

| 4. Yellow Fever | Flavivirus fibricus (Group B arbovirus) | Show symptoms of dengue fever. Incubation period 3 – 6 days In severe cases jaundice with specific manifestations like black vomit, and aneuria, | Two known cycles of transmission  
Jungle cycle: Involves transmission of disease between | 1. Mosquito control (Vector control)  
2.17-D Vaccination |
shock, agitation and comma. In general death occurs between 5th and 10th day of illness.

monkeys by various mosquito especially Aedes variety. **Urban cycle**: Person to person transmission by *Aedes aegypti*

| 5. Chikungunya fever | Togavirus Group A virus | Shows symptoms of Dengue fever. Main symptom is excruciating joint pains and high fever. | Transmitted by female Aedes, Culex mosquitoes | Vector control No vaccine has yet been developed. |

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**Fig: 75 Mode of infection of Malaria**

**Fig: 76 Filariasis**

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**Check your progress 4**

1. Dengue fever can be prevented by ____________ Control
2. Which are the three distinct stage of Malarial infection?
3. What are the control measures taken against Filarial infection?
4. What are the main symptoms of Chikungunya fever?

5.2 Let us sum up

Now you know about various insect or arthropod borne communicable diseases. Insects transmit diseases causing agents in two ways: one as mechanical carriers and other as biological vectors. In Mechanical transmission the infectious agent is carried on the wings, legs and mouth parts of insects which later on infect food and drinks. In the case of biological vectors the disease agent multiplies in the body of the vector (insect) which may act as a definitive host, alter on transferred to man by inoculation (Example. Mosquito bite) or by contamination of skin.

Assignments

1. Conduct a survey in your locality and find out the seasonal variation in the occurrence of insect borne infections.
2. Prepare posters and charts to increase public awareness about importance of mosquito control preventive measures taken against other insect borne diseases.
3. Prepare a brief report on the preventive measures taken by the government against the spread of insect borne diseases.
4. Conduct public awareness programmes in infection prone areas about the importance of environmental sanitation.
6.0 Objectives

This unit is about Zoonoses or zoonotic diseases. After reading this unit you will be able to;

i) Know about the new area of zoonotic diseases
ii) Understand the seriousness of various zoonotic diseases like Rabies, Pleague, Leptospyrosis etc.
iii) Analyse the life cycle of infectious agent and their close contact with the vertebrate animals.
iv) Take necessary precautions while rearing domestic animals.

6.1 Zoonoses

Table: 5 Zoonotic diseases

<table>
<thead>
<tr>
<th>Disease</th>
<th>Causative Agent</th>
<th>Symptoms</th>
<th>Mode of Transmission</th>
<th>Prevention &amp; Control Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Rabies (Hydrophobia)</td>
<td>Virus</td>
<td>Begins with headache, sore throat, fever lasting for 3-4-days. Later when it is serious all attempts for swallowing liquid become unsuccessful. At later stage mere sight or sound of water may provoke the patient (characteristic symptoms of hydrophobia)</td>
<td>1. Animal bites: Human rabies cases resulting from dog-bites. 2. Animal Licks: Licks on abraded skin can transmit the diseases. 3. Man to man transmission</td>
<td>1. General consideration Anti rabies treatment given for all who were bitten by a suspected animal. Observe the animal for 10 days 2. Treatment of the wound a. Cleaning b. Chemical treatment (Washing with iodine, alcohol etc. 1. Anti-tetanus treatment 4. Immunization The aim of vaccination is to produce an immunity as quickly as possible to the person</td>
</tr>
</tbody>
</table>
| 2. Plague | Bacteria (Y. Pestis) | Sudden fever, chills, headache, tender lymph nodes develop in groin, axilla or neck | 1. Bite of infected rat-flea. (Vector)  
2. Direct contact with the tissue of infected animal  
3. Droplet infection | 1. Control of fleas  
2. Control of rodents  
3. Vaccination  
*Control of cases*  
a. Early diagnosis  
b. Isolation  
c. Treatment  
d. Disinfection of discharges & articles soiled by patient. |
| --- | --- | --- | --- | --- |
| 3. Leptospirosis (Weil’s disease) | Leptospirosis interrogans (spirochete) | Fever for 4-5 days, muscular twitching, and pain in calf muscles. Jaundice in 60% cases. Death occurs in about 10% cases. | Organism present in the urine of field rodents foxes, sheep or dog form reservoir of infection. The organism enters human body through skin abrasion when they come in contact with water mud or soil contaminated by urine of rats. The organism is sensitive to HCL in stomach & free chlorine in water. | 1. Control rodents  
2. Avoid contact with polluted soil or water  
3. Treat all cuts & wounds  
4. Antibiotic treatment for all affected cases.  
5. Adding bleaching powder to polluted water |
| 4. Anthrax | Bacteria (Bacillus anthracis) | Cutaneous (skin) anthrax affects the skin. Pulmonary anthrax affects the lungs Intestinal anthrax affects the intestine. Shivering and haemorrhages results in bleeding from all openings. | From Animals like horses, cattle, sheep, goats & pigs to man. Spores may enter the human body through skin or inhalation or through improperly cooked meat of infected animals. | 1. Animals should be inspected before slaughtering.  
2. Contact with infected animals should be avoided.  
4. The fur, wool or hides should be adequately disinfected. |
Fig: 77 Rabid animals
Fig: 78 Means of transmission of Leptospirosis

**Cheek your progress 5**

1. What are the main steps to be taken for preventing Rabbis infection?
2. What are the modes of transmission of plague?
3. Leptospirosis (Weil’s disease) is spread through ________
4. What are the control measures to be taken to prevent Anthrax?
6.2 Let us sum up

We have discussed about zoonoses which are infectious diseases transmissible under natural conditions from vertebrate animals to man. As per mode of transmission they include all the four groups mentioned earlier infections.

In addition, some diseases are transmitted directly though bites of animals. Eg. Rabies, Rat bites fever etc. Still others have varied modes of transmission (Example Anthrax, Leptospirosis) The zoonic diseases which do not fit into a clear pattern as per the four modes of transmission are mentioned above. Zoonosis and human health are matters of particular concern in India because nearly 80% of Indian population is rural and live in close contact with domestic animals.

Assignments

1. Prepare posters and charts to increase public awareness about the preventive measures taken against Rabies infection.
2. Prepare short note on the symptoms and mode of transmission of Leptospirosis.
3. Conduct a discussion about necessary precautions taken while rearing domestic animals.

Evaluate yourself

1. Which are the three main things necessary for the occurrence of a disease?
2. Which are the environmental factors involved in the spread of a communicable disease?
3. State the different steps taken for the prevention of communicable diseases
4. DPT vaccine is used to prevent three major diseases. Which are they?
5. What is the main difference in the mode of transmission of Hepatitis A and Hepatitis B?
6. Which are the Health Education Guidelines to avoid AIDS infection?
7. What control measures are to be taken to prevent the spread of Leptospirosis (Weil’s disease)?
8. State briefly the main symptoms of Rabies infection.
BLOCK - III

NON - COMMUNICABLE DISEASES

UNIT-1 Non Communicable diseases-General Introduction
UNIT-2 Cardiovascular Diseases and Stroke
UNIT-3 Cancer
UNIT-4 Diabetes Mellitus
UNIT-5 Blindness
UNIT-6 Asthma

Block Introduction

In this block there are 5 units. Unit 1 is about the problem of non-communicable disease and risk factors. Unit 2 gives the details of cardiovascular diseases like Coronary heart disease, Hypertension etc. Unit 3 deals with Cancer and Unit 4 is about Diabetes. Unit 5 deals with Blindness in detail and Unit 6 is on Asthma.

This block deals with the occurrence of non-communicable diseases like Cancer, Diabetes, Stroke etc. Here the causative agent may be non-living instead of living agent in the case of communicable diseases. Majority of them are chronic and slowly killing diseases.

Hope you will seriously work through the units of this block.

Assess yourself

1. State some risks factors which are responsible for the occurrence of the non communicable diseases
2. Which are the risk factors that lead to the development of cardiovascular diseases?
3. Why should prolonged throat infection must be treated seriously?
4. Suggest some effective means for preventing Hypertension
5. Which are the major features of Cancer?
6. Which are the frequently occurring types of cancer in men and women?
7. Which are the usual treatments given to Cancer patients?
8. What are the main causes of Diabetes mellitus?
9. Give two preventive measures to avoid Diabetes.
10. Give some name of diseases, which cause blindness in India.
11. Briefly state the secondary prevention programmes of blindness in India.

**Unit 1**

**Non Communicable Diseases – General Introduction**

**Objectives**

At the end of this unit, you will be able to

(i) Understand about the seriousness of chronic diseases.
(ii) Identify the risk factors of these diseases.
(iii) Avoid conditions lead to many non- communicable diseases.
(iv) Explain reasons for the occurrence of a life style disease.

**1.0 Objectives**

This unit presents the important aspects of non- communicable diseases.

1.1 The Problem

Chronic non-communicable diseases are increasing among the adult population in both developed and developing countries. Cardio vascular diseases and Cancer are at present the leading causes of death in developed countries.

The prevalence of these chronic diseases is showing an upward trend is most countries. One reason is the increasing life expectancy and another is the changing life styles and behavioural patterns of people. The important non-communicable diseases are Cardio vascular diseases like coronary heart disease and hypertension,
Stroke, Cancer, Diabetics etc. Modern medical care enables many people to live long along with these chronic diseases.

Fig: 79 Attending a serious patient

Any way the impact of chronic diseases on the lives of people is serious when measured in terms of loss of life, disablement, family hard ship, poverty and economic loss to the country.

Check your progress 1

1. State any two reasons for the increasing occurrence of chronic non-communicable diseases.

2. ......... is a non-communicable disease which forms the leading cause of death in many countries.

3. State the impacts of chronic diseases.

1.2 Risk factors

The risk factors responsible for the occurrence of adult non-communicable diseases are

1. Cigarette use and other forms of smoking.

2. Alcohol abuse.
3. Failure or inability to obtain preventive health services (eg. for hypertension control, cancer detection, management of diabetes.)
4. Life-style changes (eg. Dietary patterns, physical activity).
5. Environmental risk factors. (eg. occupational hazards, air and water pollution and possession of destructive weapons).

Check your progress 2

1. State briefly some risk factors, which are responsible for the occurrence of non-communicable diseases.

1.3 Let us sum up

We have discussed about the actual problem of non-communicable diseases and certain risk factors, which increase the rate of occurrence of these chronic diseases. Among them life style changes and addiction to certain bad habits form the most important ones.

Assignments

1. Conduct a survey to find out the frequency of the occurrence of chronic non-communicable diseases among people with different life styles.
2. Make a list of the risk factors responsible for the occurrence of adult non-communicable diseases.
Unit 2
Cardio Vascular Diseases and Stroke

Objectives

Cardio vascular diseases
- Coronary heart diseases
- Rheumatic heart diseases
- Hypertension
- Stroke

Contents

Let us sum up

2.0 Objectives

In this unit we will have a discussion on the important aspects of cardio vascular diseases. At the end of this unit, you will be able to

1. Recognize major cardiovascular diseases.
2. Identify coronary heart diseases.
3. Understand the risk of rheumatic fever.
4. Explain the conditions lead to hypertension.

2.1 Cardiovascular Diseases

Cardiovascular diseases constitute the leading cause of death in developed countries. Twelve million persons die annually worldwide due to diseases of heart and arteries. 50% of these deaths are preventable. 40 million persons in India are estimated to be suffering from cardio-vascular diseases.

The high prevalence of cardio-vascular diseases motivated the WHO to choose “Heart Beat-The Rhythm of Health” as the theme for the World Health Day 1992.

2.1.1 Coronary Heart Diseases (CHD)

It is a defect in the heart function due to inadequate blood flow to the heart compared to its needs, causing changes in the circulation to the heart. This may be due to the blockage in the coronary artery.
Coronary heart disease may show up as

(i ). Angina pectoris
(ii ) Myocardial infarction
(iii ) Irregularities of the heart.
(iv ) Cardiac failure
(v ) Sudden death

CHD is a worldwide disease and it forms the largest public health problem in many developed and developing countries. The risk factors of coronary heart disease, which place an individual in a high-risk category, include.

1. Cigarette smoking
2. High blood pressure (Hypertension)
3. Elevated cholesterol
4. Diabetes
5. Obesity
6. Sedentary habits
7. Stress
8. Alcohol
The degree of risk of developing CHD is directly related to the number of cigarettes smoked per day. Cigarette smoking seems to be the most important cause of sudden death from CHD in men under 50 years of age.

Hypertension accelerates the risk of causing CHD. The increased serum cholesterol level is also an important risk factor for the incidence of CHD (leads 220mg./dl or more). The risk of CHD is 2-3 times higher in diabetics than non-diabetics. Sedentary life style is associated with a greater risk of the development of early CHD. High alcohol intake, defined as 75 gm or more per day is a risk factor for CHD.

**Prevention of CHD**

The diseases can be prevented by population education for changing their life styles. Avoiding bad habits, low fat diet and regular exercise can reduce the occurrence of CHD.

**Check your progress 1**

1. Which are the risk factors, which lead to the development of CHD?
2. What are the common symptoms shown by a patient with CHD?
3. How can the onset of CHD be prevented?

**2.1.2 Rheumatic Heart diseases (RHD)**

Rheumatic heart disease is a major public health problem in India. Rheumatic heart disease (RHD) cannot be separated from Rheumatic Fever (RF). Rheumatic Fever often leads to RHD, which is a crippling disease.

Rheumatic Fever is a disease that starts as a throat infection, which later affects the connective tissue of heart. A communicable disease(Streptococcal Pharyngitis) leads to Rheumatic fever (RF), which later leads to RHD. R.F is a typical disease of childhood and adolescence (5-15 years).
The consequences of RHD include: continuing damage to the heart increases disabilities, repeated hospitalization and premature death usually by the age of 35 years or even earlier.

**Prevention**

The Primary prevention is to prevent the attack of R.F. by identifying all patients with streptococcal throat infection and treating them with Penicillin. In order to prevent single case of RHD, several thousands of cases must be identified and treated. The high-risk group is school age children and so they should be kept under observation.

The non-medical measures for the prevention of R.F are related to improving living condition and breaking the poverty-disease-poverty cycle.

**Check your progress 2**

1. Why should prolonged throat infection be treated seriously?
2. How can Rheumatic heart disease be prevented?
3. .................. is the communicable disease that may leads to Rheumatic fever.

**2.1.3 Hypertension (High blood pressure)**

Hypertension is the commonest cardiovascular disorder all over the world. It is not easy to define hypertension because blood pressure (BP) is not a constant figure and show marked fluctuations during 24 hrs. Normal BP is 140/90 mm Hg or lower. Blood pressure 140/90 and 160/95 mm Hg are defined as borderline hypertension.

Blood pressure equal or greater than 160/95 mm Hg is defined as hypertension.

**Risk factors for hypertension**

1. **Obesity**

   The greater the weight gain, the greater the risk of high B.P
Table 6  Weights of Humans indicating overweight and obesity

<table>
<thead>
<tr>
<th>Height without shoes (m)</th>
<th>Men Weight without clothes (kg)</th>
<th>Women Weight without clothes (kg)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Desirable weight range</td>
<td>Obese</td>
</tr>
<tr>
<td>1.45</td>
<td>46.0 42-53</td>
<td>64</td>
</tr>
<tr>
<td>1.48</td>
<td>46.5 42-54</td>
<td>65</td>
</tr>
<tr>
<td>1.50</td>
<td>47.0 43-55</td>
<td>66</td>
</tr>
<tr>
<td>1.52</td>
<td>48.5 44-57</td>
<td>68</td>
</tr>
<tr>
<td>1.54</td>
<td>49.5 44-58</td>
<td>70</td>
</tr>
<tr>
<td>1.56</td>
<td>50.4 45-58</td>
<td>70</td>
</tr>
<tr>
<td>1.58</td>
<td>55.8 51-64</td>
<td>77</td>
</tr>
<tr>
<td>1.60</td>
<td>57.6 52-65</td>
<td>78</td>
</tr>
<tr>
<td>1.62</td>
<td>58.6 53-6</td>
<td>79</td>
</tr>
<tr>
<td>1.64</td>
<td>59.6 54-67</td>
<td>80</td>
</tr>
<tr>
<td>1.66</td>
<td>60.6 55-69</td>
<td>83</td>
</tr>
<tr>
<td>1.68</td>
<td>61.7 56-71</td>
<td>85</td>
</tr>
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<td>1.70</td>
<td>63.5 58-73</td>
<td>88</td>
</tr>
<tr>
<td>1.72</td>
<td>65.0 59-74</td>
<td>89</td>
</tr>
<tr>
<td>1.74</td>
<td>66.5 60-75</td>
<td>90</td>
</tr>
<tr>
<td>1.76</td>
<td>68.0 62-77</td>
<td>92</td>
</tr>
<tr>
<td>1.78</td>
<td>69.4 64-79</td>
<td>95</td>
</tr>
<tr>
<td>1.80</td>
<td>71.0 65-80</td>
<td>96</td>
</tr>
<tr>
<td>1.82</td>
<td>72.6 66-82</td>
<td>98</td>
</tr>
<tr>
<td>1.84</td>
<td>74.2 67-84</td>
<td>101</td>
</tr>
<tr>
<td>1.86</td>
<td>75.8 69-86</td>
<td>103</td>
</tr>
<tr>
<td>1.88</td>
<td>77.6 71-88</td>
<td>106</td>
</tr>
<tr>
<td>1.90</td>
<td>79.3 73-90</td>
<td>108</td>
</tr>
<tr>
<td>1.92</td>
<td>81.0 75-93</td>
<td>112</td>
</tr>
<tr>
<td>BMI</td>
<td>22.0 20.1-25.0</td>
<td>30.0</td>
</tr>
<tr>
<td></td>
<td>20.8 18.7- 23.8</td>
<td>28.6</td>
</tr>
</tbody>
</table>

BMI = Body Mass Index

\[ BMI = \frac{Weight(kg)}{Height^2(m)} \]

2. Salt intake

High salt intake (ie 7-8gm/day.) increase blood pressure proportionately.
3. Saturated fat

Saturated fat raises BP as well as serum cholesterol

4. Environmental stress

Struggle for job, competition, loss of job, difficulties at home and work place, death in the family etc. induce mental stress and strain leading to increase in BP.

Prevention and Control

Primary prevention

This can be achieved by population education of the following areas.

(i) Nutrition
   (a) Reduction of salt intake (not more than 5g/day)
   (b) Moderate fat intake
   (c) Avoidance of high alcohol intake

(ii) Weight reduction
   Prevention and correction of obesity (Body Mass Index) (BMI) greater than 25)

(iii) Exercise promotion

(iv) Behavioral Changes
   Reduction of stress and smoking, modification of personal life-style, practice of yoga etc

(v) Health Education
   Educating the community about risk factors

Secondary prevention

(i) Early case detection

(ii) Treatment
   Treatment of high BP is normally life long as it depends on patient’s behaviour ie. his attitude to follow the diets and executing other life style changes.

Check your progress 3

1. Hypertension is blood pressure greater than . . . . . . mm of Hg
2. What are the main risk factors of hypertension?
3. Suggest some means for the prevention of hypertension?

4. BMI greater than . . . . included in the category obese.

2.2 Stroke

Stroke is a worldwide health problem and it is one of the leading causes of deaths and disability. This is a disturbance in the brain, caused due to the blockage of blood vessels to the cells of the brain, which may lead to paralysis or death.

The risk factors of stroke are

(i) Hypertension
(ii) Abnormalities of heart (cardiovascular diseases)
(iii) Diabetes
(iv) Obesity
(v) Glucose intolerances
(vi) Smoking
(vii) Blood clotting

Prevention and Control

Controlling hypertension, diabetes, smoking etc and early detection and treatment of all cardiovascular diseases will reduce the occurrence of stroke. Prevention of other risk factors and population education will also reduce the cases.
2. What are the main risk factors of stroke?
3. Early detection and treatment of -------- disease will reduce the occurrence of stroke

2.3 Let us sum up

We have discussed the cardiovascular diseases and stroke. Coronary heart diseases, Rheumatic heart diseases and Hypertension are included in the first category. Stroke is a fatal disease, which affects the brain. All these chronic diseases can be controlled and prevented by leading a healthy life with a low fat diet and proper exercise.

Assignments

1. Make a list of the risk factors responsible for the development of coronary heart diseases.
2. Prepare a report about the activities of Rheumatic Heart Club in your locality.
3. Conduct a survey among your classmates and prepare a BMI chart to classify the high risk group and low risk group.
4. Discuss and prepare a short note on primary and secondary preventive measures of Hypertension.
5. What is Stroke? Discuss the risk factors of Stroke.

Unit – 3
Cancer
3.0 Objectives

In this unit we will have a discussion about the important aspects of cancer. At the end of this unit you will be able to

(i) Identify the characteristic of cancer
(ii) Explain the occurrence of cancer.
(iii) Avoid practices and habits causing cancer.
(iv) Analyze the causes of cancer

3.1 Characteristic Symptoms of Cancer

Cancer in all forms is causing about 12% of death throughout the world. In the developed world, cancer is the second leading cause of death, next to cardiovascular diseases. Although Cancer is widely perceived to be a disease of industrialized nations, the majority of deaths from cancer occur in the developing world.

Cancer may be regarded as a group of diseases characterized by

(a) Abnormal growth of cells
(b) Ability to invade adjacent tissues and even distant organs.
(c) The eventual death of the patient if the tumor has progressed beyond that stage, when it can be successfully removed.

Cancer can occur at any site or tissue of the body

The major categories of cancer are

(i) Carcinomas - arise from epithetical cells (usually affecting areas are: mouth, oesophagus, intestine, and uterus)
(ii) Sarcomas - arise from mesodermal cells (found in fibrous tissue, fat and bone)
(iii) Lymphomas
(iv) Myelomas - arising from the cells of bone narrow

and
(v) Leukemias - immune system.
What are the major features of Cancer?

2. Give the different types of Cancer occurring in human body.

**3.2 Cancer Pattern**

There is wide variation in the distribution of cancer throughout the world. The following table shows the ranking order of cancer affecting organs.
Table - 7 Ranking order by site of 8 selected Cancers

<table>
<thead>
<tr>
<th>Rank</th>
<th>Males</th>
<th>Females</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lung</td>
<td>Breast</td>
<td>Lung</td>
</tr>
<tr>
<td>2</td>
<td>Stomach</td>
<td>Cervix</td>
<td>Stomach</td>
</tr>
<tr>
<td>3</td>
<td>Colon/Rectum</td>
<td>Colon/Rectum</td>
<td>Liver</td>
</tr>
<tr>
<td>4</td>
<td>Prostate</td>
<td>Stomach</td>
<td>Colon/Rectum</td>
</tr>
<tr>
<td>5</td>
<td>Oral</td>
<td>Lung</td>
<td>Oesophagus</td>
</tr>
<tr>
<td>6</td>
<td>Liver</td>
<td>Oral</td>
<td>Breast</td>
</tr>
</tbody>
</table>

On a global basis, when two sexes are combined, the one which occur first is lung cancer which is followed by stomach cancer.

**Check your progress 2**

1. ---------- Cancer is most frequent type of cancer in men
2. The most common occurring Cancer form in woman are ---------.
3. In the world, the highest cancer occurring organ is-------.

**3.3 Causes of Cancer**

The Cancer affecting factors are generally classified as

A. Environmental factors
B. Genetic factors

**A. Environmental factors**

(a) **Tobacco**

Smoking and chewing of tobacco leads to cancer of lungs, larynx, mouth, pharynx, oesophagus etc.

(b) **Alcohol**

Excessive alcohol consumption leads to liver and oesophageal cancer.

(c) **Dietary factors**

A variety of dietary factors such as food additives and contaminants are causative agents of cancer. Smoked fish is related
to stomach cancer, lack of dietary fiber to intestinal cancer, beef consumption to bowel cancer and high fat diet to breast cancer.

(d) Occupational exposures

This include exposure to benzene, arsenic, cadmium, asbestos, polycyclic hydrocarbon etc.

(e) Viruses

Hepatitis B and C viruses are related to the origin of hepatocellular carcinoma. Human papiloma virus is a chief suspect in cancer cervix. Human T cell Leukemia virus is associated with adult T. cell Leukemia.

(f) Others

There are numerous other environmental factors such as sunlight, radiation, air and water pollution, medication, pesticides etc, related to cancer.

(g) Customs, habits and life-style

Certain customs, habits and life styles of people such as tobacco and betal chewing (oral cancer) smoking (lung cancer) are associated with an increased risk.

B. Genetic factors

Genetic influence of Cancer has long been suspected, but is difficult to identify. It is found that there is a complex interrelationship between hereditary susceptibility and environmental cancerous stimuli.

1.----------- is the cause of majority of lung cancers.
2. Name two virus infections that later leads to cancer.
3. Which are the major environmental factors causing cancer?

3.4 Cancer Control

Cancer control consists of a series of measures based on present medial knowledge in the fields of prevention, detection,
diagnosis, treatment, after care and rehabilitation. It aims at reducing the number of new cases and increasing the number of cures.

**Primary Prevention**

(i) Control of tobacco and alcohol consumption.
(ii) Personal hygiene
(iii) Measures to protect workers from exposures to industrial carcinogens.
(iv) Foods, drugs and cosmetics should be tested for carcinogens.
(v) Pollution Control
(vi) Reduce the amount of radiation received by each individual.
(vii) Legislation to control known environmental cancer causing agents.

**Secondary Prevention**

(a) Cancer Registration

It provides a base for assessing the magnitude of the problem and for planning the necessary service.

(ii) Early detection of cases

Cancer screening is mainly used for early detection of cancer at a pre malignant stage (before life threatening). This forms the best possible protection because by early detection, prompt treatment for early cancer and pre cancerous condition can be given to individuals.

(iii) Treatment

Treatment like surgical removal, radiation, and chemotherapy are given to cancer patients.

**Check your progress 4**

1. Which are the primary preventive measures of cancer?
2. Among the secondary prevention methods --------forms the most effective one.
3. Which are the usual treatments given to cancer patients?
3.5 Let us sum up

We have discussed about cancer, its main symptoms and occurrence. Among the main causes of cancer tobacco forms the most important one as lung cancer came first in the list of different types of cancers. Primary prevention of cancer includes many measures like alcohol and tobacco restriction, pollution control and personal hygiene. The most important way of secondary prevention is early detection of cases by cancer screening.

Assignments
1. Conduct a survey and prepare a table showing the types of Cancer and year wise incidence of the Disease.
2. Prepare a brief report on the causes of Cancer.
3. Conduct a seminar on Cancer control and prepare reports based on it.

Unit 4
Diabetes Mellitus

4.0 Objectives

In this unit we will discuss the prominent chronic disease Diabetes Mellitus

At the end of this unit you will be able to.

(i) Aware about the life style that leads to this disease.
(ii) Understand the rate of occurrence of Diabetes
(iii) Analyze the preventive measures of Diabetes.
4.1 Diabetes Mellitus - Introduction

Diabetes is a disease affecting at least 30 million people throughout the world. It is usually associated with obesity, hypertension and coronary heart disease.

The underlying cause of diabetes is insulin deficiency. This may be due to a variety of conditions

(d) Pancreatic disorders (infection or inflammation of Pancreas)
(e) Defects in the formation of insulin
(f) Genetic defects etc.

Fig: 84  Pancreas with Islets of Langerhans

The overall effect of these mechanism will lead to reduced utilization of glucose which leads to hyperglycemia (increased glucose level in blood) accompanied by Glycosuria  (glucose in urine).
(Note: - Insulin is a hormone produced in the pancreas by the beta cells of the Islets of Langerhans. This helps in the metabolism or absorption of glucose present in the food)

Check your progress 1

1. The Deficiency of ----- leads to Diabetes Mellitus.
2. Insulin is produced from----------
3. Which are the specific conditions of Diabetes Mellitus?
4.2 Risk factors

The risk factors in Diabetes Mellitus include

(i) Sedentary life style,
(ii) Diet - high intake of sugar and fat,
(iii) Malnutrition.

Malnutrition in infancy and childhood may result in the partial failure of the function of pancreas especially the insulin producing cells.

(iv) Viral infections
(v) Chemical agents affecting the beta cells of pancreas.
(vi) Stress

High and low rates of diabetes have been linked to a number of social factors such as occupation, marital status, religion, economic status, education, change in life style etc. 50 years ago diabetes was the disease of the higher class of the society and now the gradient get reversed. This may be because of the rapid changes in the life style of lower classes.

Check your progress 2

1. State four risk factors of Diabetes Mellitus.
2. How does malnutrition cause Diabetes?
3. Diabetes is considered as a disease of the higher class Why?

4.3 Prevention and Control

1. Urine test for glucose, 2 hours after a meal and
2. Blood sugar test are usually used for detecting diabetes.

Preventive measures include maintenance of normal body weight through adoption of healthy nutritional habits and physical exercise. Nutritional habits include.

(i) Adequate protein intake.
(ii) High intake of dietary fibers.
(iii) Avoidance of sweet food.
1. Which are the two tests used for screening Diabetes?
2. Give two preventive measures to avoid Diabetes.

4.4 Let us sum up

We have discussed Diabetes Mellitus and the causes of this chronic disease. The main cause of Diabetes mellitus is found to be insulin deficiency. The risk factors for this disease are sedentary lifestyle, malnutrition and high intake of sugar and fat. Hereditary factors also have some role to play in this aspect. This can be controlled by adequate nutritional intake and proper physical exercise.

Assignments

1. Prepare a short note on the causes and risk factors of Diabetes Mellitus.
2. Visit a Diabetes clinic and find out how patients lead successful life with Diabetes.
3. Make a colourful poster showing ways of life in order to avoid the diseases Diabetes.
Unit – 5

Blindness

5.0 Objectives

In this unit you will get information about a major public health problem- blindness.

At the end of this unit you will be able to

(i)  Find out the causes of blindness
(ii) Understand the preventive measures of blindness
(iii) Select and use food items to avoid blindness due to nutritional deficiency.

5.1 Blindness

Blindness is one of the significant social problems in India. About 80% of blindness is avoidable (treatable or potentially preventable). Blindness leads not only to reduced economic and social status but may also result in premature death. It is estimated that there is an annual incidence of 2 million cataract-induced blindness in the country.

Check your progress 1

1. The Blindness may lead to some unfortunate life situations. State briefly.

5.2 Causes of Blindness

The major causes of blindness are Cataract, Glaucoma, Trachoma, Malnutrition, Accidents and other causes such as congenital disorders, diabetes, hypertension, leprosy etc.
Table-8 Causes of blindness in India

<table>
<thead>
<tr>
<th>Disease</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cataract</td>
<td>81 %</td>
</tr>
<tr>
<td>Trachoma</td>
<td>0.2 %</td>
</tr>
<tr>
<td>Corneal opacity</td>
<td>3 %</td>
</tr>
<tr>
<td>Vitamin A deficiency (Malnutrition)</td>
<td>0.04 %</td>
</tr>
<tr>
<td>Glaucoma</td>
<td>2 %</td>
</tr>
<tr>
<td>Refraction error</td>
<td>7 %</td>
</tr>
<tr>
<td>Other causes</td>
<td>6.76%</td>
</tr>
</tbody>
</table>

Check your progress 2

1. What is the major cause of blindness in India?
2. Deficiency of Vitamin..... cause blindness
3. Give the names of some diseases, which cause blindness in India.

5.3 Prevention and Control

A Primary Prevention

Primary protection can be undertaken at two levels.

1. Eye Health Promotion

   It aims at
   (a) Improved personal hygiene, especially washing the face washing for control of trachoma.
   (b) Improved child nutrition so as to prevent Vitamin A deficiency.
   (c) Early identification and management of cataract and glaucoma cases.

2. Specific Protection

   (a) Measles immunization given to reduce measles related blindness.
   (b) Massive dose of Vitamin A to prevent Xerophthalmia.
Improved environmental sanitation and safe water reduce the cases of trachoma.

**B Secondary Prevention**

Secondary prevention involves definite management of common blinding condition such as cataract, glaucoma etc. This care is provided by PHCs and district hospitals where eye departments are established. The eye camps conducted by these institutions not only treat the cases but also undertake general health surveys for the early detection of visual defects and educate the masses.

1. Which are the two levels of prevention of blindness?
2. What are the programmes that promote eye health?
3. Briefly state the secondary prevention programme of blindness in India.

**5.4 Let us sum up**

In this unit we have discussed a major public health problem. The main blinding diseases are Cataract, Trachoma, Glaucoma, Nutritional Blindness (Xerophthalmia) etc. By proper planning of primary and secondary prevention, the number of cases can be reduced and controlled.

**Assignments**

1. Conduct a survey in your locality to find out the most prevalent blinding diseases.
2. Prepare a brief report on the measures taken for the prevention and control of blindness.
Unit – 6
Asthma

Objectives
Asthma and its Symptoms
Causes of Asthma
Treatment of Asthma
Let us sum up

6.0 Objectives
In this unit you will get information about a major public health problem- Asthma.

At the end of this unit you will be able to
i. Identify the main symptoms of asthma.
ii. Know the causes of asthma.
iii. Understand the preventive measures of asthma.

6.1 Asthma

Fig:85 Lungs

Asthma is a chronic disease in the developed world that is becoming increasingly common. It is now the commonest reason for childhood admission to hospital. Asthma is a condition that affects the lungs and airways. Sufferers with asthma often find it difficult to
breathe and may experience coughing, wheezing and tightness across their chest.

**Symptoms of Asthma**

a) **Shortness of breath** - Breathing difficulties, tightness in the chest and shortness of breath are the main symptoms of asthma.
b) **Wheezing** - This is a whistling sound heard most often when breathing out.
c) **Coughing** - The characteristic cough of asthma is well known, and is often more common at night.
d) **Night-time** - All the symptoms of asthma worsen at night. As the symptoms worsen through the night, the patient may have a restless night and feel very tired and low the next day.
e) **Exercise** - Inhaling cold dry air when exercising leads to changes in the fluid lining of the lungs. This can lead to an asthma attack lasting 10 -20 minutes, having a devastating effect on a child who join games and sport.

**Check your progress 1**

1. Which part of the human body gets affected with Asthma?
2. What is the main condition of asthma?
3. State some of the main symptoms of asthma?
4. Why does exercising worsen the conditions of asthma?

**6.2 Causes of Asthma**

The exact causes of asthma are not clearly known. It does run in families along with other allergic conditions such as eczema (allergic dermatitis), hay fever (allergic rhinitis) and itchy eyes (allergic conjunctivitis). Some asthma sufferers may experience one or more of these related disorders. Smoking during pregnancy increases asthmatic symptoms in babies after birth.
Things that make the asthma worse are called trigger factors. The most common trigger factors are - Colds and flu, Allergies, House dust mites, Cigarette smoking, Occupations, Weather changes, Emotions, Exercise and activity, Fumes, Medication, Pets etc.

Fig:86  Trigger factors of Asthma

**Check your progress 2**

1. Which are the conditions that exist along with asthma?
2. What is a trigger factor?
3. What are the common trigger factors of asthma?
6.3 Treatment of Asthma

Asthma cannot be completely cured but it can be managed by using the proper medications correctly. This can be achieved by
- To make lungs and airways as normal as possible.
- To stay symptom free.
- To lead a full active life.
- To suffer no nighttime symptoms.

Modern treatment involves two types of drugs. The first, a bronchodilator, acts within seconds and causes the airway to relax and the second are the anti inflamatories, which block the effects of irritants but cannot be used for instant relief.

Check your progress 3

1. How can asthma be properly managed?
2. Which are the two types of drugs used for the treatment of Asthma?

6.4 Let us sum up

Asthma is difficulty in breathing due to narrowing of the small airways in the lungs called bronchioles. It is a chronic disease in the developed world that is becoming increasingly common, probably due to rising levels of pollution. It is now the commonest reason for childhood admission to hospital. The muscles in the airways of asthmatics are abnormally sensitive and will contract at the least provocation. The three main provocations are infection, allergy and emotion.

Assignments

1. Prepare a short note on the main symptoms of Asthma.
2. Make a poster showing the trigger factors of Asthma.
3. Visit an Asthma clinic and find out how people live successfully along with the diseases.
Evaluate Yourself

1. Explain the reasons for the occurrence of a disease

2. Which are the life style conditions that lead to the occurrence of the non-communicable diseases like Coronary Heart Diseases, Diabetes etc.

3. Explain the life style condition which lead to the development of Hypertension

4. Rheumatic Heart Disease can be effectively prevented. How?

5. What are the main risk factors of stroke?

6. Which are the habits and conditions that are considered as the main causes of Lung Cancer?

7. State the primary preventive measures of Cancer.

8. Analyse the preventive measures of Diabetes mellitus

9. State the main causes of blindness in India

10. Briefly state the programmes that come under Eye Health Promotion
BLOCK – IV
HEALTH AND HYGIENE

Unit 1 - Health and Hygiene-General Introduction
Unit 2 - Maintenance and Promotion of health
Unit 3 - Personal Hygiene
Unit 4 - Rest, Exercise and Recreation

Block Introduction

There are four units in this block. Unit I is about health and hygiene, its meaning, definition etc. Unit 2 deals with different ways for maintenance and promotion of health, Unit 3 personal hygiene and unit 4 rest, exercise and recreation.

In this block you come across actual meaning of health and hygiene and correct practices for personal hygiene. Thus you can avoid many misconceptions about health practices. Health is on one hand highly personal responsibility and on the other hand a major public health concern. It thus involves joint efforts of individual, community and state to protect and promote health.

Hope you will enjoy working through the units of this block.

Assess Yourself

1. Which are the different dimensions of Health?
2. What do you mean by optimum health?
3. State the different aspects of environmental health.
4. “Healthy environment is a product of personal and environmental hygiene”. Evaluate.
5. What is the main advantage of conducting personal health care tests?
6. State some measures to keep the skin healthy.
7. As Eye is a major sense organ, suggest some measures for the care of eyes.
8. Suggest steps to be taken for the care of Ear.
9. Which are the preventive measures taken to protect Dental Health?
10. Why is foot considered as “an indicator of health”?
11. List any 5 advantages of exercises.

Unit – 1

Health and Hygiene - General Introduction

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**1.0 Objectives**

In this unit we will have a discussion on the important aspects of health and hygiene.

At the end of this unit, you will be able to:

(i) Know the actual meaning of health
(ii) Understand the need of personal hygiene
(iii) Identify the concept of optimum health
(iv) Analyse the definition of health by WHO

**1.1 Health – Meaning**

WHO (World Health Organization) defines health in 1948 as “A state of complete, physical, mental and social well being, and not merely an absence of diseases or infirmity”.

It is said that spiritual dimension has got great influence on mental health. Besides this, emotional, vocational, economic, philosophical and cultural dimension have got immense influence on having a sound health.

The recent concept of Health put forward by WHO (Health for all by the year 2000) is achievement of “a level of health that will permit people to lead a socially and economically productive life”.

Health for all means that health is to be brought within the reach of everyone in a given community. It includes elimination of communicable diseases, better housing, improvement in agriculture and industry, education, family planning, safe water supply, adequate nutrition, facilities for disease cure, health education etc. It gives the concept of socially and economically productive life with care for individual and community health. A person who maintains an optimum level in all these dimension of health is said to be in a state of positive or optimum health.

Check your progress I

1. State the definition of Health put forward by WHO in 1948.
2. What are the different dimensions of health?
3. What are the different aspects of “Health for all” statement?
4. Who is a person with optimum health?

1.2 Hygiene

Hygiene is “the science of preserving and promoting health” or it is the “science of health that covers all factors which contribute to healthy living”.

Hygiene has two aspects, personal and environmental.

Personal Hygiene

Personal hygiene of a person includes the cultivation of healthy habits and life styles. Clean habits are basic to good health. Habits of cleanliness should be developed from early childhood.

Environmental Hygiene

The aspects of environmental hygiene include the proper cleanliness and maintenance of environment. Community and individual efforts to promote environmental hygiene includes, prevention of communicable diseases, immunization, family
planning environmental sanitation, controlling environmental pollution etc.

**Check your progress 2**

1. What do you mean by Hygiene?
2. What are the different aspects of environmental hygiene?

**1.3 Let us sum up**

In this unit we have discussed about the meaning and concept of health and hygiene. Both are interconnected and health can be maintained only through personal and environmental hygiene.

**Assignments**

1. Prepare a short note on the concept of optimum health.
2. Conduct a seminar and make a report on how personal and environmental hygiene promote health of the individual.

**Unit – 2**

**Maintenance and Promotion of Health**

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Let us sum up
2.0 Objectives

In this unit you are going to learn about the factors, which help in the maintenance and promotion of health. At the end of this unit you will be able to

(i) Get knowledge about the factors for the maintenance of health
(ii) Practice the knowledge in daily life
(iii) Avoid wrong practices in your life
(iv) Educate others about the need for leading a healthy life

2.1 Factors influencing health

Health promotion and maintenance enables individuals, families and communities to develop their full health potential. It includes the cultivation of healthy habits and life-style, and other social, economic, environmental and personal factors influencing health. This includes a broad spectrum of activities.

2.1.1 Nutrition

Adequate nutrition is the foundation of good health. Nutritional needs of infants, children, pregnant and lactating women and elderly must be met. Special attention must be given to promote breast feeding. In order to prevent deficiency diseases, special nutrition programmes must be launched in the community. Proper nutrition is considered today as an essential ingredient for the quality of life.

Check your progress 1

1. Special nutrition programmes launched in the community to prevent ________.

2. Which are the groups in the community to whom special nutritional care should be given?
2.1.2 Healthy Environment

A healthy environment is possible only through personal and environmental hygiene. Several diseases are due to poor personal hygiene eg., skin diseases, trachoma, leprosy, conjunctivitis etc and many more diseases due to poor environmental hygiene from contamination of water, food or soil, e.g., cholera, typhoid, polio etc.

In short, much of the ill health in our country is due to poor sanitation and lack of proper water supplies, crowded living condition etc. Indirectly the key to man's health lies in his environment.

Check your progress 2

1. It is said that man’s health is very much connected to his environment. Can you agree with this statement? Why?

2.1.3 Good Health Habits

Health, to a large extent, is the result of many good habits and practices, which are now called as life style. The use of tobacco, cigarettes, alcohol and drugs has increased tremendously the past few decades throughout the world. There are numerous other habits related to eating, sleeping, physical exercise, cleanliness and recreation that affect health. People must assume responsibility for their own health by cultivating food habits.

Check your progress 3

1. Which are the major bad habits now prevailed throughout the world affecting health?
2. Which are the aspects of life closely related to good health?
2.1.4 Health Examination and screening

Fig: 87 Health examination and screening
An important aspect of the maintenance of health is regular health check up of weight and height of children, blood pressure, glucose tolerance, hemoglobin, blood cholesterol and other tests, which assess the health status of one person. These examinations and screening will help the early detection of many chronic diseases and are referred as personal health care.

**Check your progress 4**

1. Name some tests to be undergone as part of personal health care.
2. What is the main advantage of conducting personal health care tests?

### 2.1.5 Accidents

Accidents rank among the fair leading causes of death in the world. For every death, several hundred injury cases occur. Accident rate is very high in India. More than 10,000 persons can be saved every year in India by following road safety precautions like use of helmet and seat belt, use of proper glass in windscreen, limiting speed etc. Prevention of accidents is an important health promotion measure.

**Check your progress 5**

1. State some road safety precautions to reduce accidents

### 2.1.6 Immunization

The resistance to certain bacterial and rival infection can be artificially produced by immunization. The details of immunization during infancy are given in Block 5. Immunization will not only protect the individual receiving immunization, but also others in the community.
2.1.7 Health Education

Health education is a broad movement with 3 major objectives.

1. Giving information to public to create awareness and discard ignorance and misconception.
2. Helping people to face problems intelligently and take necessary action.
3. Induce people to make use of the health services available in the community.

Health education has been described as ‘cement’ that binds together the ‘bricks’ of the health programme.

Check your progress 7

1. What are the major objectives of health education?

2.2 Let us sum up

In this unit we have discussed the maintenance and promotion of health. For this we should know the major factors, which affect health. Nutrition, personal and environmental hygiene, healthy habits, health examination and early diagnosis of disease, immunization etc. are some of the factors which affect our health status.

Assignments

1. State briefly the main factors influencing the health.
2. Good health habits and healthy environment determine the health of an individual. Substantiate the statement with your views.
3. Prepare a short note on the aspects of health which come under Health examination and screening.
4. Prepare a chart showing the major objectives of Health Education.
3.0 Objectives

This unit is about personal hygiene and details regarding the care to be given to each part of the body. At the end of this unit you will be able to

(i) Identify different aspects of personal hygiene
(ii) Avoid wrong practices
(iii) Explain the need of keeping personal cleanliness
(iv) Get knowledge about good habits and danger of wrong habits.

3.1 Personal Hygiene-Introduction

Personal Hygiene of a person is his ‘physical and mental health’. Physical health is an important component of total health. It includes care of different parts of the body such as hair, teeth, eyes, ears, skin, feet etc. It also includes rest and sleep, exercise and recreation.
3.1.1 Care of skin

Skin forms the outer covering of the body. The important functions of the skin are: -

(i) **Protective**
Skin protects the body against physical, chemical and biological agents of diseases.

(ii) **Sensory**
Skin is the sensitive organ of touch, heat, cold, pain etc.

(iii) **Heat regulation**
Skin plays an important role in regulating the body temperature.

(iv) **Excretory**
The excretory function of skin is carried out by the sweat glands, which remove the waste along with secretion of sweat. The sebaceous (oil) glands secrete sebum (oil), which keeps the skin soft and lubricated, and prevent it from drying.

(v) **Source of Vitamin D**
Vitamin D is produced in the skin by the action of UV rays of the sun.

**Hygiene of the skin**
Skin is in contact with external environment, so it accumulates dirt. So proper cleaning and protection is necessary to maintain a healthy skin.

**Protection of skin**

1. **Regular bath**
A daily bath is essential to keep the skin clean and prevent infections such as scabies, boils, ringworm etc.
2. **Oil bath**

   Periodical oil bath is good especially in cold weather.

3. **Balanced diet** - diet containing all necessary nutrient factors.

4. **Mosquito net** – to prevent communicable diseases like Malaria and Filariasis.

5. **Protective clothing**

   Necessary for people working in industries and factories.

---

**Check your progress 1**

1. What are the major functions of skin?
2. State four measures to keep the skin healthy.

### 3.1.2 Care of hair

The condition of the hair reflects the nutritional status and general health of the body. Premature breaking, falling and graying of hair is always connected with deficiencies in diet, unhygiene, stress, etc. Dandruff (excessive scaling of scalp skin), which affects the scalp skin, leads to hair fall. If dandruff is permitted to remain on the scalp and if the scalp is oily it may lead to other diseases like fungus infections and scabies.
Care of hair consists of regular washing with soap or shampooing. Massaging the scalp with oil once in a week is another useful procedure. It stimulates blood flow and improves the nutrition of the hair. Good scalp hygiene prevents skin infection such as dandruff, ringworm, lice infestation etc.

**Check your progress 2**

1. Premature scaling of scalp skin is _____________________
2. What are the conditions lead to premature falling of hair?
3. State briefly how hair can be maintained healthy.

**3.1.3 Care of teeth**

Dental care or oral hygiene is an important aspect of personal health of an individual. Good oral hygiene implies

(i) Good teeth

(ii) Healthy gums

(iii) Healthy surrounding tissues

Teeth are essential not only for chewing of food but also for good appearance and clear speech.

The two most common dental diseases are;

(A) Dental caries (tooth decay)

(B) Gum diseases (pyorrhoea)

Another condition of poor oral hygiene is Halitosis or bad breath. This is due to poor oral hygiene, gum disease, sinus infections, tonsillitis and infection of nose and throat.
Dental caries is a dental disease leading to cavity formation and tooth decay. This is due to the action of acids on tooth enamel and these acids are produced by certain bacteria present in mouth, which act upon food particles. Once damaged, enamel cannot repair itself. It is now accepted that dental caries is due to poor oral hygiene.

Gum disease (Pyorrhoea) is found as pockets of pus around the teeth. This affects the tissue around the teeth and eventually the teeth fall off.
Care of teeth includes the following measures

1. **Brushing of Teeth**

![Fig: 91 Tooth brushing](image)

Brushing of teeth at least twice a day is ideal for cleaning the teeth. The tongue should be scraped or brushed and the mouth gargled with luke warm water to keep the throat clean.

2. **Use of fluorides**

Fluorides in drinking water (0.5 – 0.8 mg per litre) and toothpastes reduce the occurrence of dental caries.

3. **Regular dental check up**

Dental check up twice a year is recommended for early diagnosis and treatment of dental ailments.

4. **Diet**

Avoid excessive intake of sugar, sweets, pastries, cakes, chocolates etc. On the other hand intake of “natural tooth brushes” such as fruits and vegetables reduce the frequency of dental caries.

5. **Habits**

Habits like;

(i) Holding sweets in the mouth

(ii) A baby holding feeding bottle with milk or sweetened juice, in its mouth.
(iii) Eating snacks in between meals
(iv) Chewing betel leaves and tobacco should be avoided

Hygiene of the mouth is therefore essential for the control and prevention of dental diseases.

**Check your progress 3**

1. What are the 3 main aspects of oral hygiene?
2. Name two common dental diseases.
3. What is Dental caries?
4. Which are the measures to be taken in order to preserve dental health?

### 3.1.4 Care of Eyes

Good eyesight is essential for the proper development of all the faculties of a person.

The conditions, which may affect the eyes, are

1. **Infections**
   - eg. Conjunctivitis, Trachoma

2. **Injuries**
   - e.g. Corneal ulcers

3. **Malnutrition**
   - eg. Night blindness, Xerophthalmia

4. **Errors of refraction**
   - e.g. Short sightedness (myopia),
     Long sightedness (Hypermetropia)

5. **Others**
   - e.g. Cataract, Glaucoma

All the above conditions if neglected leads to visual handicaps and blindness.

Care of eyes consists of
A. Prevention and control of infection

This can be achieved by

(i) Maintaining proper eye hygiene
(ii) Early diagnosis and treatment of eye infections
(iii) Control of flies
(iv) Health education

B. Protection from injuries

Wear protective glasses at work. During celebrations children must be advised to use fire crackers and fire works safely. Immediate washing of foreign bodies in the eye can protect the eye from injuries to some extend.

C. Eye strain

Reading must be done in good light and at an angle of 45° to 70° from horizontal. Eye must be protected from direct sunlight, glare and excessive brightness. It is desirable to wear sunglasses or tinted glasses to avoid excessive brightness.

D. Good diet

Eye diseases like Xerophthalmia (dryness of the conjunctiva), Night blindness can be prevented by a well balanced diet. Protective food such as green leafy vegetables, fruits, milk, butter etc. which contain Vitamin ‘A’ should be included in the daily diet.

E. Regular check up

Signs of eye disease such as watery discharge, collection of pus, soreness of eyes or lids, blurred vision, spots before eyes, headache, eye fatigue, seeing coloured holes around lights etc. should be given immediate medical attention.
**F. Exercise and harmful practices**

Exercise is good for eyes and tones the muscles of the eyelid. Blinking the eyes 10 times quickly, then shutting eyes for a moment and then blinking again 10 times may do this.

The practice of applying kajal or black soot mixed in oil for beautification of eyes is a harmful practice especially when these are prepared unhygienically.

**Check your progress 4**

1. What are the major conditions, which affects the health of the eye?
2. Name two eye diseases caused due to malnutrition.
3. The ideal viewing angle is _______degrees from horizontal
4. Suggest some measures to prevent eye infections.

**3.1.5 Care of Ears**

Ear is the sense organ for hearing. It is also helps in maintaining the body equilibrium. Infections of nose and throat usually spread to the middle ear and cause inflammation (Otitis media).

The main symptoms of ear disease are
(i) Ear ache
(ii) Discharge from ear
(iii) Foreign bodies like insects, objects etc in the ear.

The care of ear includes
(a) Keeping the ear clean.
(b) Removal of excess wax carefully (should be done by an expert)
(c) Preventing water entering the ear during bathing.
(d) Protection of the ear from loud noise
(e) Treating all nose and throat infections
(f) Teaching good habits like

Not to put sharp objects like pencils or matchsticks into the ear for cleaning or scratching.

Check your progress 5

1. What are the main signs of ear diseases?
2. Name two main functions of ear
3. Suggest some steps taken for the care of ear

3.1.6 Care of hands

Hands and nails pick up dirt and bacteria easily because they come in contact with a number of things. They should be kept clean at all times, before eating food and after defecation or urination.

Cleaning of hands can be best done with soap and water. The fingernails should be cut short and kept clean by gentle scrubbing with a nail brush. The habits of biting nails, putting fingers in the nose or ears is unhygienic and should be discouraged.

Check your progress 6

1. Suggest the steps taken for the care of hands?
3.1.7 Care of feet

Human foot is one of the most highly structured part of the body. If the foot is allowed to stay in a wrong portion for a long time, the bones are twisted leading to limping, poor posture and eventually foot deformities. During 20th century man has neglected his feet because of the automobile and other means of transport.

Foot is considered as an ‘indicator of health’ of the entire body, if we know about the number of diseases affecting it. Some of them are hookworm infection, elephantiasis (filariasis), leprosy, fungal infection, cornes, clubfoot, oedema due to kidney and heart failure etc.

Special care must be taken in the selection of footwear. We must avoid tight fitting shoes and sandals in order to prevent ‘cornes’. Sandals are preferred in warm and humid climate. The socks should be clean and dry and should not be too tight. Walking bare feet is unhygienic. Cuts on the feet should be treated immediately. So the feet must get the same attention as the rest of the body.

Check your progress 7

1. Name any to diseases which affect the foot.
2. Why foot in considered as “an indicator of health”?
3. Tight fitting sandals should be avoided to prevent the development of ____________

3.2 Let us sum up

In this unit we have dealt with personal hygiene. It is the practical aspect of health. Its main aim is the prevention of disease and the promotion and preservation of health. Most of our pupils know the hygienic rules but due to their carelessness, they do not
put it into practice which leads to many ailments and diseases. If hygienic or good habits are developed in the students, they can lead a successful life.

Assignments

1. Prepare a short note on the major functions of skin and measures to keep it healthy.
2. Make posters showing the methods to keep hair healthy.
3. Conduct seminars under the sponsorship of IDA (Indian Dental Association) and prepare reports on the maintenance of good oral hygiene.
4. Prepare a report on the major conditions that affects the health of the eyes and suggestions to prevent eye infections.
5. Suggest some measures taken for the care of ear.
6. Care of hands and feet are very important for the maintenance of good health. Justify.

Unit – 4

Rest, Exercise and Recreation

Objectives

Rest and Sleep
Exercise
Recreation
Let us sum up

4.0 Objectives

This unit will tell you about rest, exercise and recreation.

At the end of this unit, you will be able to

(i) Identify the need of exercise in daily life
(ii) Explain the importance of rest to rejuvenate the body
(iii) Assess how recreation helps to maintain a balanced mental state.
(iv) Analyse how exercise can affect and maintain the systems in perfect condition.

4.1 Rest and Sleep

![Fig: 93 Rest and Sleep](Image)

The body needs rest and sleep for the maintenance of health. During sleep, the body and mind are relaxed; repair and growth take place; fatigue disappears.

The amount of sleep varies with age; sex, environment, the nature of work and the behaviour of each individual.

- Infants (under one month) - 20-22hrs
- Child (1-5 years) - 12-14 hrs
- School boy/girl (6-15 years) - 9-10 hrs
- Adult (18 year onwards) - 7-9 hrs

The room used for rest and sleep should be well ventilated and bed used for sleep should be firm and flat. Above all, one should cultivate regular sleeping habits. The saying “Early to bed and early to rise keeps one healthy wealthy and wise” explains the importance of this.

**Check your progress 1**

1. What are the main advantages of rest and sleep?
2. What are the ideal conditions to be observed while selecting a place for rest and sleep?
4.2 Exercise

The aim of exercise is to promote harmonious development of the whole body. Exercise is the basis of physical fitness. It

(i) Tones up the muscles.
(ii) Improves the strength of the heart
(iii) Improves blood and lymph circulation
(iv) Ventilates the lung
(v) Stimulates appetite
(vi) Promotes excretion of wastes through kidney and skin
(vii) Facilitates relaxation and sleep.

Fig: 94 Exercises

The type of exercise should be selected based on the age and physical condition of the person. Walking in early morning is one of the best exercises that anybody can adopt.

4.2.1 Effect of exercise on various body systems

Effect of exercise on the circulatory system

Due to regular exercise there is an increase in the flow of blood to the heart. It increases the stroke volume, cardiac output and coronary circulation, strengthens heart muscles, increases oxygen supply and carbon dioxide removal from the muscles, decreases in resting heart rate and increases availability of nutrients to different parts of the body.
Effect of exercise on respiratory system

Due to exercise the efficiency of the complete respiratory system improves. It also increases the availability of oxygen and elimination of carbon dioxide, increases the area of exchange of gases, better functioning of the smooth muscles of lungs, increased purification of blood, maintenance of body temperature and pH and increased ability to function at low oxygen levels.

Effect of exercise on nervous system

Regular exercise will increase the speed of information process in brain center and the result is better co-coordinated movement, better functioning and efficiency, better transmission of impulses, improved functioning of sense organs, better motor abilities and pain tolerance.

Effect of exercise on digestive system

Exercise will increase the digestive power, food is absorbed well, appetite increases, constipation is prevented and make the excretory organs like skin and kidney function efficiently.

4.2.2 Techniques of Relaxation

Yoga

Yoga is another type of exercise. Yogic physical exercises are designed to develop not only the body but also to broaden the mental facilities and the spiritual capacities. It includes Asanas (Physical postures)
1. Pranayamas (regulated breathing)
2. Kriyas (cleaning processes)

Yogic exercises focus on the health of the spine, its strength and flexibility. It also affects the internal organs and the endocrine system. Yoga tones up the muscles of the body and trains the mind to relax. Thus it gives mental relaxation and self-confidence.

**Meditation**

Meditation is a simple but extraordinary method of expanding our experience of our creative potential for allowing in the broadest possible participation in life itself.

Using various techniques, meditation turns our senses and our awareness even deeper within ourselves, and our attention becomes more and more focused. Thus we realize that the personal part of us is universal in nature – there is no difference between our essence and all essence. Research has verified that regular meditation lower blood pressure and improves physical health and thereby reduce the level of stress in your life.

**Check your progress 2**

1. List any five advantages of exercise.
2. _____ is a simple and safe exercise that anybody can adopt.
3. Exercise can do magic in our body. Substantiate your answer with necessary points.
4. What is Yoga? What is its main advantage?
5. Meditation is one of the best method of relaxation. Evaluate.
4.3 Recreation

Recreation means relaxation and amusing oneself. It relieves mental tension & fatigue and contributes to a feeling of well being.

Recreation may be active or passive. Physical exercise is an active form of recreation. Passive form of recreation include listening to radio, watching TV, going for a picnic, watching cinema, playing cards, reading and all kinds of hobbies. It is man’s principal opportunity for enrichment of life. Thus recreation helps in the improvement of physical and mental health.

Recreational activities are mainly classified into two, namely Indoor and Outdoor activities. These classifications differ from country to country, place to place and in the same place time to time.

Check your progress 3

1. What are the main benefits of recreational activities?
2. Name some recreational activities that release mental tension.

Let us sum up

In this unit we have discussed the importance of rest, exercise and recreation in one’s life. Exercise and physical activity help one to keep the body fit. Proper rest and relaxation are also needed by the body to avoid fatigue and regain working efficiency. Rest after physical and mental activity is refreshing. It is also very
important to cultivate hobbies or any other recreational activities in order to add colour and variety to life.

**Assignments**

1. Conduct a survey and prepare a report on the effect of exercise in minimizing the occurrence of life style diseases like Diabetes, Cardiovascular diseases etc.
2. Visit a Yoga center and observe the exercises for relaxation.

**Evaluate yourself**

1. What are the different aspects of “Health for all” statement?
2. What are the major aspects to be checked during a regular health checkup?
3. State any four functions of the skin.
4. Suggest some measures to prevent Eye infection
5. What are the three main aspects of Oral Hygiene?
6. What are the conditions lead to be premature graying and falling of hair?
7. Explain the importance of exercise in keeping the body fit.
8. Yoga and Meditation have a vital role to play in the life of modern man. Evaluate.
9. What are the main benefits of recreational activities?
**BLOCK – V**

**FOOD AND NUTRITION**

Unit I - Nutrition
Unit 2 - Nutritive factors of food
Unit 3 - Foods and food groups
Unit 4 - Balanced diet
Unit 5 - Preservation and storage of foods
Unit 6 - Malnutrition

**Block Introduction**

This block contains 6 units which are interconnected. First unit gives you information about the concept of nutrition; the second Unit tells you about the important nutritive components of food. Unit 3 talks about different food groups and their nutritive profiles and units 4 deals with balanced diet. Unit 5 discusses the preservation and effective storage of foods and Unit 6 about malnutrition.

This block touches every aspect of food and nutrition. Hope you will enjoy working through the units of this block.

**Assess Yourself**

1. What do you mean by nutrition?
2. How is food classified based on its function?
3. Why pulses are called “Poor man’s meat”?
4. Give three main sources of carbohydrate.
5. How is animal fat different from vegetable fat?
6. What is the main function of vitamins in human body?
7. Which trace element is necessary in order to prevent Dental Caries?
8. Give four functions of water in our body.
9. What is parboiling? What is its advantage?
10. Soya bean is considered as the richest of all pulses. Why?
11. We should include green leafy vegetables in our daily diet. Why?
12. What is vegetable milk?
13. What is the main function of spices and condiments?
14. Soft drinks have no nutritive value. Do you agree?
15. What is balanced diet?

Fig: 97 Food Pyramid
Unit I

Nutrition

Objectives

- Concept of nutrition
- Classification of food

Let us sum up

1.0 Objectives

In this unit we will discuss the concept and meaning of nutrition.

After reading this unit, you will be able to

(i) Understand the meaning of nutrition
(ii) Explain the classification of food based on its origin and function.
(iii) Apply the knowledge in daily life.

1.1 Concept of Nutrition

Nutrition is the science of food and its relationship to health. Good nutrition means maintaining nutritional status that enables us to grow and enjoy good health.

Our bodies are made up of molecules of food extract. Our body requires continuous energy supply for its function which is derived from food.

Check your progress I

1. What is nutrition?
2. Food supply ________ for the body for its function

1.1.1 Classification of foods

There are many ways of classifying foods. Based on its origin, foods are classified into

(a) Foods of animal origin eg. Milk, Egg, Meat, Fish
(b) Foods of plant origin eg: Cereals, Pulses, Vegetables
But more reliable classification of foods are based on their functions such as

(i) Provision of energy
(ii) Body building and repair
(iii) Maintenance and regulation of tissue function.

On the basis of above functions foods are classified into.

1. Energy yielding foods
2. Body building foods
3. Protective foods

**Check your progress 2**

1. Give the classification of food based on its origin.
2. Give two examples of food item of animal origin.
3. ________ is a food item of plant origin.
4. What are the three main functions of food?
5. State the classification of foods based on its function

1.2 **Let us sum up**

Good nutrition is the basis of good health. Based on the functions foods are classified into energy yielding, body building and protective foods. The foods may be of plant origin or animal origin.

**Assignments**

1. Write a short note on the concept of nutrition.
2. Prepare a chart showing the main classification of food items based on their function.
Unit 2
Nutritive Factors of Foods

Objectives
Nutritive factors of food – Introduction
- Protein
- Carbohydrates
- Fats
- Vitamins
- Minerals
- Water

Let us sum up

1.0 Objectives
This unit presents the important aspects of nutritive factors of food.

At the end of this unit you will be able to
(i) Identify the important nutritive factors of food items.
(ii) Recognize the sources of different nutritive factors.
(iii) Assess the nutritive value of food items.
(iv) Analyze the function of nutritive factors.
(iv) Apply the knowledge while fixing a diet programme.

2.1 Nutritive factors of foods – Introduction
We know foods are classified into three based on their function. They function differently because of the nutrients present in each. The nutritive factors or nutrients present each category are given below.
Fig: 98 Nutritive factors of foods

1. **Energy yielding food.**
   - Nutrients – Carbohydrates, fats.

2. **Body Building food.**
   - Nutrients – Protein

3. **Protective food**
2.1.1 Protein

Proteins are complex nitrogenous compounds containing, carbon, hydrogen, oxygen, nitrogen & sulphur in varying amounts.

Proteins are made up of smaller units called amino acids. Human body needs about 24 amino acids, of which 9 cannot be synthesized in our body. These 9 amino acids are to be obtained from the food we eat. They are called Essential Amino acids. (EAA). The remaining amino acids which can be synthesized in our body are called Non essential Amino acids.

Functions

Proteins are needed by the body for
(a) Body building
(b) Repair and maintenance of body tissue
(c) Synthesis of antibodies, enzymes, hormones, hemoglobin etc.

Protein can also supply energy viz. 4K cal per are gram (1gm of protein can give 4K cal of energy)

Average daily requirement of proteins is 1gm per kg body weight. In growing age this requirement may change.

Sources

Two main sources of protein are
(1) Animals Sources
(2) Plant Sources

Animals Sources

Milk, Meat, Eggs, Fish, etc are the main sources. These contain all the Essential Amino Acids (EAA) in adequate amounts. Among these Egg proteins due to their high biological value and digestibility
are considered to be the best. They are superior to plant proteins but more expensive.

**Plant sources**

Plant or vegetable proteins are found in Pulses, Beans, Nuts, Cereals etc. They are poor in EAA. So they must be consumed in bulk. Moreover, certain communities in India do not take animal proteins on religious grounds. The vegetable protein sources like pulses are rich in protein & so they are called as ‘poor man’s meat’.

**Table: 9 Protein content in 100gm of some food items**

<table>
<thead>
<tr>
<th>Food items</th>
<th>Percentages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cow’s milk</td>
<td>3.2%</td>
</tr>
<tr>
<td>Meat</td>
<td>22.5%</td>
</tr>
<tr>
<td>Fish</td>
<td>22.0%</td>
</tr>
<tr>
<td>Egg</td>
<td>13.3%</td>
</tr>
<tr>
<td>Groundnut</td>
<td>25.3%</td>
</tr>
<tr>
<td>Rice</td>
<td>7.5%</td>
</tr>
<tr>
<td>Pulses</td>
<td>20.25%</td>
</tr>
<tr>
<td>Soya bean</td>
<td>43%</td>
</tr>
</tbody>
</table>

**Check your progress 2**

1. Proteins are made up of small units called ............
2. Which are the two types of amino acids required for human body?
3. Give three main functions of proteins.
4. ............ is the daily protein requirement of our body.
5. List 3 vegetable sources of proteins.
6. Why are animal proteins considered to be superior to plant proteins?
7. Why are pulses called ‘Poor man’s meat’?

2.1.2. Carbohydrates

Carbohydrates form the main source of daily energy need. It is composed of carbon, hydrogen and oxygen. Carbohydrates form the main bulk of our diet. Carbohydrates are necessary for fat metabolism and synthesis of certain Non-essential amino acids. 1gm of carbohydrate provide 4k cal of energy.

Sources

There are three main sources of carbohydrates

1. Starch
2. Sugars
3. Cellulose

**Starch** is basic to the human diet. Starch after digestion yield energy. It is found in abundance in

(b) Cereals (eg. Rice & Wheat)
(c) Roots (eg. Tapioca)
(d) Tubers (eg. Potato)

**Sugars** include monosaccarides & disaccharides. They are ready sources of energy. They are

(b) Glucose
(c) Fructose
(d) Sucrose
(e) Lactose
(f) Maltose

**Cellulose** includes fibres which are indigestible in human beings and yields no energy at all. They are found in fruits and vegetables.

Even if cellulose has no nutrition value, it has an important role in maintaining the health. It increases the bulk of faeces which prevents constipation, lowers cholesterol level and reduces body weight.
Check your progress 3

1. What are the main functions of carbohydrates?
2. Give, three main sources of carbohydrate.
3. ________ is a food item which contain starch.
4. Cellulose or dietary fibre must be an essential component in our daily diet. Why?
5. A carbohydrate source which from a ready source of energy is ________

2.1.3. Fats

Fats are high energy foods and composed of carbon, hydrogen and oxygen. Fats are solid at 20°C. They are called oils if remain as liquid at that temperature. Fats and oils contain fatty acids and glycerol. Fatty acids are again divided as saturated and unsaturated fatty acids.

**Fatty acids**

Saturated fatty acids are found in animal fats and unsaturated fatty acids in vegetable oils. Coconut oil and palm oil although vegetative origin, contain highly saturated fatty acids. Similarly fish oil even if animal origin contain unsaturated fatty acids.

**Essential Fatty Acids (EFA)**

Essential fatty acids cannot be synthesized in human body and hence must be supplemented by food. (eg. linoleic acid). This serves as a basis for the production of other essential fatty acids.
Table: 10 Sources of EFA

<table>
<thead>
<tr>
<th>EFA</th>
<th>Dietary sources</th>
<th>Content (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Linoleic acid</td>
<td>Safflower oil</td>
<td>73</td>
</tr>
<tr>
<td></td>
<td>Sunflower oil</td>
<td>56</td>
</tr>
<tr>
<td></td>
<td>Soya bean oil</td>
<td>51</td>
</tr>
<tr>
<td></td>
<td>Groundnut oil</td>
<td>39</td>
</tr>
<tr>
<td></td>
<td>Mustard oil</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>Palm oil</td>
<td>9</td>
</tr>
<tr>
<td></td>
<td>Coconut oil</td>
<td>2</td>
</tr>
</tbody>
</table>

Animal fats                  Vegetable fats
Ghee, Butter, Cheese, Fat of  Oils of groundnut,  
meat & fish etc.             Mustard, Coconut, Cotton  
                            seed etc.

Small quantities of fat are found in bean of cereals, pulses, nuts etc. (Eg. Rice bran oil)

**Hydrogenation**

Hydrogenation is a process by which liquid vegetable oils are converted into semi solid ghee like consistency. The best example is ‘Vanaspathi’. During this process the unsaturated fatty acids are converted into saturated fatty acids and level of EFA is drastically reduced. The only advantage is that it can maintain its ghee like consistency and keep its quality in hot humid climates.

**Functions**

1. Fats & oils are high energy yielding food, supplying 9k cal per gram.
2. The fat present in food items supply fat soluble vitamins.
3. Fat insulate the body from cold.
4. Cholesterol prepared from fat is essential for body functions.
Check your progress 4

1. What are the two main components of fats and oils?
2. How is animals’ fat different from vegetable fat?
3. What is EFA? Give one example.
4. Give two functions of fat
5. 1gm of fat gives .......... Kcal of energy
6. What is hydrogenation? What are its draw backs?

2.1.4. Vitamins

Vitamins are organic compounds that cannot be synthesized in human body. So they must be provided by food. They never yield energy, never build body and are required in very minute quantities.

Instead of all the above facts they are very essential because body cells can utilize carbohydrate, proteins, fats and minerals only with the help of these vitamins.

Vitamins are classified into fat soluble and water soluble vitamins. Vitamin A, D, E, K are fat soluble and Vitamin B group and Vitamin C are water soluble.

Some other Vitamins like

- *Biotin (Vitamin H)*
- *Choline*
- *Para-amino benzoic aid (PABA)*
- *Inositol*
- *Bioflawonoids (Vitamin P)* are also identified. But their functions in human body are not completely studied. So they are not included here.
Table: 11 VITAMIN CHART

<table>
<thead>
<tr>
<th>Name</th>
<th>Sources</th>
<th>Functions</th>
<th>Deficiency Diseases</th>
<th>Daily requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water soluble vitamins</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Vitamin B1 (Thiamine)</td>
<td>Richest source Unmilled cereals, pulses and nuts. Present in small amounts in all natural foods.</td>
<td>Necessary for 1. Carbohydrate metabolism 2. Proper functioning of the nervous system.</td>
<td>1. Beri beri 2. Wernick’s encephalopathy Moderate deficiency results in the form of ankle and knee jerks and in the presence of calf tenderness.</td>
<td>0.5 mg/1000 kcal of energy intake</td>
</tr>
<tr>
<td>2. Riboflavin (Vitamin B2)</td>
<td>1. Wheat, millets &amp; pulses 2. Milk &amp; milk products egg, liver and green leafy vegetables</td>
<td>Help in energy metabolism</td>
<td>Cracks at the corner of mouth, soreness of tongue, redness &amp; burning sensation of the eyes, dermatitis, sensitivity to light</td>
<td>2 mg</td>
</tr>
<tr>
<td>3. Niacin (Nicotinic acid Vitamin B3)</td>
<td>Whole grain cereals, pulses, nuts, meat liver and chicken</td>
<td>Necessary for the utilization of carbohydrate &amp; Tissue respiration</td>
<td>Pellagra- soreness of tongue, pigmented scaly skin &amp; diarrhea. In severe cases it leads to mental disorders</td>
<td>15-25mg</td>
</tr>
<tr>
<td>4. Panthotenic acid (Vitamin B4)</td>
<td>Animal &amp; vegetables foods</td>
<td>Needed for energy metabolism</td>
<td>Rarely seen</td>
<td>10mg</td>
</tr>
<tr>
<td>5. Pyridoxine (Vitamin B5)</td>
<td>Liver, meat, fish, whole grain cereals and legumes</td>
<td>Essential for the metabolism of amino acids, fats, carbohydrates</td>
<td>Skin soreness, smooth tongue, abnormal brain activity</td>
<td>2 mg</td>
</tr>
</tbody>
</table>
| **6. Folic acid** | Green leaves, liver pulses, nuts and whole grain | Essential for the synthesis of DNA | 1. Anaemia  
2. Diarrhea  
3. Smooth tongue | Adult  
100 mg  
Pregnancy  
400 mg |
|------------------|---------------------------------------------|---------------------------------|-------------------------------|---------------------|
| **7. Vitamin B₁₂** | Liver, egg, fish & milk (only in animal foods) | Necessary for the synthesis of DNA | 1. Anaemia (Pernicious Anaemia)  
2. Nerve degeneration | Adult-1 mg  
Pregnancy- 1.5 mg |
| **8. Vitamin C (Ascorbic Acid)** | **1. Fruits**.- All fresh fruits Amala, Gooseberry, Guavas are some of the richest sources  
2. Vegetables- Green leafy vegetables  
3. Animal Foods- Milk and meat | 1. It is required to form ‘Collagen’ needed for the healing of wounds)  
2. Helps in increasing absorption of iron  
3. Increase the general resistance of the body to fight infection | Scurvy  
Minor bleeding and delayed wound healing, general weakness, swollen joints, loose teeth Hemorrhages under the skin (Bleeding) | 40-6- mg |

**Fat Soluble Vitamins**

| **1. Vitamin A (Retinol) and (B- Carotene)** | **Animal Sources** - Butter, Ghee, Egg, Milk, Liver & Fish  
**Vegetables & Fruits.** - Green Leafy vegetables, Carrot, Pumpkin, Ridge Fruits | Needed for  
1. Normal vision  
2. Health of Skin mucous membrane  
3. Growth  
4. Protection of | **Night blindness** - Inability to see in dim light  
**Xerophthalma** - Dryness of the eye  
**Bitot’s Spots** - Brownish raised patches seen on the white portion of the eye. | **Adults** - Man-750 (mg)  
Woman-750 (mg)  
Lactation-950 (mg)  
**Children** - 1-6 years-400 (mcg) |
<table>
<thead>
<tr>
<th><strong>Fish Live Oil</strong></th>
<th>Body against infection</th>
<th>Keratomalacia- <strong>Cornea (black portion) of the eye becomes soft and loses its transparency</strong></th>
<th>7-12 Years-600 (mcg)</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Richest natural source of vitamin A</em></td>
<td><strong>Synthetic</strong></td>
<td><strong>Available in Synthetic form also</strong></td>
<td></td>
</tr>
</tbody>
</table>

**2. Vitamin D (Calciferol)**

- **Sunlight**
  - The amount of Melanin (pigment) determines the rate of vitamin synthesis
  - **Foods**
    - Egg yolk, Liver, Fish, Fish oils

- **Required for**
  1. Formation of healthy bones and teeth
  2. Promotes intestinal absorption of calcium and phosphorus

- **Rickets** in children
- **Osteomalacia** in adults
  - The essential abnormality is that bones contain less calcium than normal.

<table>
<thead>
<tr>
<th><strong>Adults</strong></th>
<th>2.5 (mcg)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pregnancy, lactation, growing children</strong></td>
<td>-10 (mcg)</td>
</tr>
</tbody>
</table>

**3. Vitamin E (Tocopherol)**

- **Richest source**
  - Vegetable oils
  - Widely distributed in many foods.

- **Role of vitamin E in human nutrition is not clearly understood.**

- **No clear indication of dietary deficiency.**

<table>
<thead>
<tr>
<th><strong>Adults</strong></th>
<th>0.03 mg/kg of body weight</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pregnancy, lactation, growing children</strong></td>
<td>0.8 mg/g of essential fatty acids.</td>
</tr>
</tbody>
</table>

**4. Vitamin K**

- **1. Fresh green vegetables**
- **2. Fruits**
- **3. Synthesized by intestinal bacteria**

- **Necessary for**
  1. Proper clotting of blood
  2. Correcting defects of absorption due to lack of bile salts.

- **Rarely occurs due to the presence of the vitamin in many food items.**

<table>
<thead>
<tr>
<th><strong>Adults</strong></th>
<th>0.03 mg/kg of body weight</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pregnancy, lactation, growing children</strong></td>
<td>0.03 mg/kg of body weight</td>
</tr>
</tbody>
</table>
Check your progress 5

1. What are the main functions of Vitamins?
2. Name 4 fat soluble vitamins.
3. Vitamin C is a .......... soluble vitamin.
4. Beri beri is a disease cause due to the deficiency of .......... 
5. ............... is a disease caused due to the deficiency of Nicotinic acid (Vitamin B4).
6. Gooseberry is a rich source of .......... 
7. ............... is the vitamin acquired through sunlight.
8. ............... is the richest source of Vitamin A & D.
9. Name two diseases caused due to the deficiency of Vitamin A.

2.1.5 Minerals
There are about 50 minerals found in human body. They are divided into 2 major groups 
(1) Major Minerals and 
(2) Trace elements
Major minerals – Calcium, phosphorus, sodium, potassium and magnesium

Table: 12 Major minerals - sources & functions

<table>
<thead>
<tr>
<th>Major mineral</th>
<th>sources</th>
<th>Functions</th>
<th>Deficiency</th>
</tr>
</thead>
</table>
| 1 Calcium     | Milk, Fish, Egg, Green leafy vegetables, Fruits | 1. Maintenance of bone and teeth  
2. Clotting of blood  
3. Regulation of neuromuscular irritability | 1. Osteoporosis 
Fragility of bones  
2. Stunned growth |
| 2. Phosphorus | Many food stuffs             | Formation of bones and teeth                   | Rare                           |
3. Sodium  Salt, Many food stuffs  Regulate fluid content of the body  Rare  Excess leads to water retention

4. Potassium  Banana, Orange, Tomatoes  Maintenance of normal heart beat  Mental confusion

5. Magnesium  Pulses, cereals, leafy vegetables  Activator of enzymes  Depression muscular weakness

**Trace elements**

They are required by the body in quantities less than few milligrams per day. Iron, iodine, zinc, fluorine, copper, cobalt, manganese etc are some of the trace elements.

**Table: 13 Trace elements - sources & functions**

<table>
<thead>
<tr>
<th>Trace elements</th>
<th>Sources</th>
<th>Functions</th>
<th>Deficiency</th>
</tr>
</thead>
</table>
| 1. Iron        | Animal foods  
Liver, meat egg  
Vegetable foods  
Cereals & pulses and some fruits and vegetables | Formation of hemoglobin helps in ‘Oxygen’ transport | Anemia |
| 2. Iodine      | Salt (iodized) Sea foods | Helps in the formation of ‘Thyroxin’ | Goiter, enlarged thyroid gland |
| 3. Fluoride    | Water (Fluoridated), Sea fish | Normal formation of bones and teeth | Dental caries (tooth decay) Excess leads to skeletal fluorosis - a crippling disease |
Check your progress 6

1. What are the two types of minerals needed for our body?
2. Give three functions of calcium in human body.
3. Which is the main source of iodine for the body?
4. Dental caries can be prevented using a trace element .......... 
5. Deficiency of iron will leads to .......... 

2.1.6. Water

Water is a basic human requirement. The main sources of water are drinking water and water present in the food.

Functions
1. Essential constituent of many body fluids eg. blood, lymph
2. Regulate body temperature.
3. Helps in the transport of nutrients.
4. Necessary for many body processes eg. digestion, absorption, elimination of waste. etc.

Requirement

A normal healthy person needs to drink an average of 8 glasses (2-3 litres) of water per day. Excessive water loss results in dehydration and water retension results in Oedema. Both conditions cause physiological problems.

Check your progress 7

1. Give four functions of water in our body
2. Excessive loss of water is called ______
3. A healthy person should drink ______ litres of water per day.

2.2. Let us sun up

We have discussed the nutritive factors of foods. Foods are mainly classified based on their functions as energy yielding, bodybuilding and protective. Carbohydrates and fats come under
energy yielding, protein under bodybuilding and vitamin and minerals come under protective foods.

**Assignments**

1. Prepare a detailed report on the important nutritive factors of food items and their sources.
2. Prepare a table showing nutritive value of different food items.
3. Prepare posters and charts with colourful pictures showing the functions of nutritive factors.

### Unit 3

**Food and Food Groups**

**Objectives**

<table>
<thead>
<tr>
<th>Nutritive value of principal foods</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Cereals &amp; Millets</td>
</tr>
<tr>
<td>• Pulses, Oilseed and nuts</td>
</tr>
<tr>
<td>• Vegetables</td>
</tr>
<tr>
<td>• Fruits</td>
</tr>
<tr>
<td>• Milk &amp; milk products</td>
</tr>
<tr>
<td>• Meat, fish and egg</td>
</tr>
<tr>
<td>• Fats and oils</td>
</tr>
<tr>
<td>• Sugar and Jaggery</td>
</tr>
<tr>
<td>• Spices and condiments</td>
</tr>
<tr>
<td>• Beverages</td>
</tr>
</tbody>
</table>

Let us sum up

**3.0 Objectives**

In this unit we will have a discussion about the important aspects of food and food groups.

After you finish this unit, you will be able to

(i) Get knowledge about the nutritive value of each type of food.
(ii) Identify the actual nutritive contents in our daily diet.
(iii) Select food items based on the energy out put.
(iv) Avoid unnecessary food habits

3.1 Nutritive value of principal foods

Each food item has a different nutritional profile. In order to get the diet balanced, we must know the actual nutritive value of each food item.

Fig: 99 Major Food Groups

We know that foods are of plant or animal origin. First we take foods of plant origin.

3.1.1 Cereals & Millets

<table>
<thead>
<tr>
<th>Cereals</th>
<th>Millets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice</td>
<td>Bajra (Pearl millet)</td>
</tr>
<tr>
<td>Wheat</td>
<td>Ragi</td>
</tr>
<tr>
<td>Maize (corn)</td>
<td>Jowar (sorghum or kaffir corn)</td>
</tr>
</tbody>
</table>

Cereals and Millets form the bulk of the daily diet of Indians.
Table: 14 Nutritive values of cereals (values per 100gm)

<table>
<thead>
<tr>
<th></th>
<th>Rice</th>
<th>Wheat</th>
<th>Maize</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy (Kcal)</td>
<td>34.5</td>
<td>34.6</td>
<td>34.2</td>
</tr>
<tr>
<td>Protein (g)</td>
<td>6.8</td>
<td>11.8</td>
<td>1.1</td>
</tr>
<tr>
<td>Carbohydrates (g)</td>
<td>78.2</td>
<td>71.2</td>
<td>66.2</td>
</tr>
<tr>
<td>Fat (g)</td>
<td>0.5</td>
<td>1.5</td>
<td>3.6</td>
</tr>
<tr>
<td>Minerals</td>
<td>0.6</td>
<td>1.5</td>
<td>1.5</td>
</tr>
</tbody>
</table>

**B group Vitamins**

<table>
<thead>
<tr>
<th></th>
<th>Rice</th>
<th>Wheat</th>
<th>Maize</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thiamine</td>
<td>0.06</td>
<td>0.45</td>
<td>0.42</td>
</tr>
<tr>
<td>Niacin</td>
<td>1.9</td>
<td>5.0</td>
<td>1.8</td>
</tr>
<tr>
<td>Riboflavin</td>
<td>0.06</td>
<td>0.17</td>
<td>0.1</td>
</tr>
</tbody>
</table>

**Par boiling**

Parboiling (partial cooking in steam) is an ancient Indian technique of preserving the nutritive value of rice. During this process, majority of the vitamins and minerals in the outer portion of the grain percolate into the inner portion and thus get protected. Therefore parboiled rice with bran is a rich source of Vitamin B and minerals.

Table: 15 Nutritive values of Millets (values per 100gm)

<table>
<thead>
<tr>
<th></th>
<th>Jowar</th>
<th>Bajra</th>
<th>Ragi</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein (g)</td>
<td>10.4</td>
<td>11.6</td>
<td>7.3</td>
</tr>
<tr>
<td>Fat (g)</td>
<td>1.9</td>
<td>5.0</td>
<td>1.3</td>
</tr>
<tr>
<td>Carbohydrates (g)</td>
<td>72.6</td>
<td>67.5</td>
<td>72.0</td>
</tr>
<tr>
<td>Minerals (g)</td>
<td>1.6</td>
<td>2.3</td>
<td>2.7</td>
</tr>
<tr>
<td>Calcium (mg)</td>
<td>25.0</td>
<td>42.0</td>
<td>344.0</td>
</tr>
<tr>
<td>Iron (mg)</td>
<td>4.1</td>
<td>8</td>
<td>3.9</td>
</tr>
<tr>
<td>Energy (Kcal)</td>
<td>349</td>
<td>361</td>
<td>328</td>
</tr>
</tbody>
</table>
Check your progress 1

1. Which are the food items included in the group cereals?
2. Why are cereals considered as energy giving foods?
3. What is parboiling? What is its advantage?
4. ________ is the millet which contain highest amount of calcium.
5. ________ is the cereal which has highest carbohydrate content.

3.1.2 Pulses (Legumes)

Pulses are rich in protein. They also form main sources of B group vitamins and minerals. Germinating pulses contain vitamin C also. Soya bean is one of the richest source of protein. Another pulse ‘Khesari Dhal’ is prohibited here because of its toxic factor

Table: 16 Nutritive value of Pulses (per 100gm)

<table>
<thead>
<tr>
<th></th>
<th>Energy (Kcal)</th>
<th>Proteins (g)</th>
<th>Fat (g)</th>
<th>Calcium (mg)</th>
<th>Iron (mg)</th>
<th>Thiamine (mg)</th>
<th>Riboflavin (mg)</th>
<th>Niacin (mg)</th>
<th>Vitamin C (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bengal gram</td>
<td>360</td>
<td>17.1</td>
<td>5.3</td>
<td>202</td>
<td>4.6</td>
<td>0.30</td>
<td>0.15</td>
<td>2.9</td>
<td>3</td>
</tr>
<tr>
<td>Black gram</td>
<td>347</td>
<td>24.0</td>
<td>1.4</td>
<td>154</td>
<td>3.8</td>
<td>0.42</td>
<td>0.20</td>
<td>2.0</td>
<td>0</td>
</tr>
<tr>
<td>Red gram</td>
<td>335</td>
<td>22.3</td>
<td>1.7</td>
<td>73</td>
<td>2.7</td>
<td>0.45</td>
<td>0.19</td>
<td>2.9</td>
<td>0</td>
</tr>
<tr>
<td>Soya bean</td>
<td>432</td>
<td>43.2</td>
<td>19.5</td>
<td>240</td>
<td>10.4</td>
<td>0.73</td>
<td>0.39</td>
<td>3.0</td>
<td>0</td>
</tr>
</tbody>
</table>

Nuts & Oil seeds

This include groundnut, cashew nut, walnut, almonds, pistachio, mustard seeds, coconut, cotton seeds, sunflower seeds, maize germ etc from which cooking oils are extracted.

Nuts are good source of fats, proteins, vitamin B complex and minerals like calcium, phosphorus and iron. We know vegetable oils are rich in EFA. After oil extraction the residue (oil seed cake) can be used as good animal food.
### Table: 17 Nutritive values of Nuts & oil seeds (Per 100gm)

<table>
<thead>
<tr>
<th>Oil seeds and Nuts</th>
<th>Protein (g)</th>
<th>Fat (g)</th>
<th>Carbohydrate (g)</th>
<th>Minerals (g)</th>
<th>B-Group Vitamin (mg)</th>
<th>Energy (Kcal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Almonds</td>
<td>20.8</td>
<td>58.9</td>
<td>10.5</td>
<td>2.9</td>
<td>0.57</td>
<td>655</td>
</tr>
<tr>
<td>Cashew nut</td>
<td>21.2</td>
<td>46.9</td>
<td>22.3</td>
<td>2.4</td>
<td>0.63</td>
<td>596</td>
</tr>
<tr>
<td>Coconut</td>
<td>6.8</td>
<td>62.3</td>
<td>18.4</td>
<td>1.6</td>
<td>0.08</td>
<td>662</td>
</tr>
<tr>
<td>Ground nut</td>
<td>25.3</td>
<td>40.1</td>
<td>26.1</td>
<td>2.4</td>
<td>0.90</td>
<td>567</td>
</tr>
<tr>
<td>Walnut</td>
<td>15.6</td>
<td>64.5</td>
<td>11.0</td>
<td>1.8</td>
<td>0.45</td>
<td>687</td>
</tr>
<tr>
<td>Linseeds</td>
<td>20.3</td>
<td>37.1</td>
<td>28.9</td>
<td>2.4</td>
<td>0.23</td>
<td>530</td>
</tr>
</tbody>
</table>

**Check your progress 2**

1. Why is Soya bean considered as the richest of all pulses?
2. Germinating pulses contain ______ vitamin.
3. Name some nuts used for oil extraction.

**3.1.3. Vegetables**

Vegetables are grouped as ‘protective foods’. Their value lies in high vitamin, mineral content and varying amounts of dietary fibre.
Vegetables are divided into 3 groups.

**Table: 18 Groups of Vegetables**

<table>
<thead>
<tr>
<th>Green leafy vegetables</th>
<th>Roots &amp; tubers</th>
<th>Other vegetables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palak (spinach)</td>
<td>Potato</td>
<td>Brinjal</td>
</tr>
<tr>
<td>Amaranth</td>
<td>Sweet potato</td>
<td>Tomatoes</td>
</tr>
<tr>
<td>Cabbage</td>
<td>Tapioca</td>
<td>Cauliflower</td>
</tr>
<tr>
<td>Fenugreek etc.</td>
<td>Carrots</td>
<td>Pumpkin etc.</td>
</tr>
<tr>
<td></td>
<td>Onion</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Radish</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Yam</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Colocasia etc.</td>
<td></td>
</tr>
</tbody>
</table>

Green leafy vegetables are the excellent and cheapest sources of Carotene, B group vitamins, calcium, iron, vitamin C etc. They are rich in dietary fibre. Recommended daily intake is about 40gm for an adult.

Roots and tubers are rich in carbohydrates. Some of them like carrot, radish are high in vitamin A. Majority of them are rich in minerals such as calcium and potassium. Recommended daily intake is 50-60gm.

Other vegetables like brinjal, tomatoes, cauliflower etc are good sources of minerals and vitamins. Recommended daily intake- 60 to 70grms.

1. How are vegetables classified?
2. ‘We should include green leafy vegetables’ in our daily diet. Why?
3. _____ is a vegetable which is rich in beta-carotene (Vitamin A)
4. _____ is a root which can replace rice in our daily diet.
### 3.1.4 Fruits

Fruits are protective foods. They are good source of vitamins and minerals. Fruits can be eaten fresh & raw and this makes the vitamins (especially vitamin C lost when heated) and minerals directly available. Fruits contain rich source of dietary fibre also. Recommended daily intake in 85gm. The aim of nutrition education should be to promote the intake of seasonal fruits which are cheaper and easily available.

**Table: 19 Nutritive values of some common fruits**
*(per 100gm of edible portion)*

<table>
<thead>
<tr>
<th>Name</th>
<th>Calories (Kcal)</th>
<th>Calcium (mg)</th>
<th>Iron (mg)</th>
<th>Vitamin A (µg)</th>
<th>Vitamin C (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Fresh fruits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Banana</td>
<td>104</td>
<td>10</td>
<td>0.5</td>
<td>124</td>
<td>7</td>
</tr>
<tr>
<td>Grapes</td>
<td>71</td>
<td>20</td>
<td>1.5</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Guava</td>
<td>51</td>
<td>10</td>
<td>0.27</td>
<td>0</td>
<td>212</td>
</tr>
<tr>
<td>Mango</td>
<td>74</td>
<td>14</td>
<td>1.3</td>
<td>2210</td>
<td>16</td>
</tr>
<tr>
<td>Orange</td>
<td>48</td>
<td>26</td>
<td>0.32</td>
<td>2240</td>
<td>68</td>
</tr>
<tr>
<td>Papaya</td>
<td>32</td>
<td>17</td>
<td>0.5</td>
<td>2740</td>
<td>57</td>
</tr>
<tr>
<td>Custard apple</td>
<td>104</td>
<td>17</td>
<td>4.31</td>
<td>0</td>
<td>37</td>
</tr>
<tr>
<td>Gooseberry</td>
<td>58</td>
<td>50</td>
<td>1.2</td>
<td>9</td>
<td>600</td>
</tr>
<tr>
<td><strong>Dry fruits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dates</td>
<td>317</td>
<td>120</td>
<td>7.3</td>
<td>44</td>
<td>3</td>
</tr>
<tr>
<td>Raisins</td>
<td>308</td>
<td>87</td>
<td>7.7</td>
<td>2.4</td>
<td>1</td>
</tr>
</tbody>
</table>

*mg – milligram
µg – microgram*
Check your progress 4

1. What are the two important nutritive factors present in fruits?
2. Among the fresh fruits given in the table which one has the highest content of Vitamin C?
3. _______ is a fresh fruit which has high calcium content.

3.1.5 Milk & Milk products

Milk

Milk is the best and most complete of all foods. Milk is a good source of protein, fats, sugars, vitamins & minerals. It contains almost all vitamins except Vitamin C.

Table: 20 Nutritive Values of milks (Value per 100gm)

<table>
<thead>
<tr>
<th></th>
<th>Buffalo</th>
<th>Cow</th>
<th>Goat</th>
<th>Human</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fat (g)</td>
<td>6.5</td>
<td>4.1</td>
<td>4.5</td>
<td>3.4</td>
</tr>
<tr>
<td>Protein (g)</td>
<td>4.3</td>
<td>3.2</td>
<td>3.3</td>
<td>1.1</td>
</tr>
<tr>
<td>Lactose (g)</td>
<td>5.1</td>
<td>4.4</td>
<td>4.6</td>
<td>7.4</td>
</tr>
<tr>
<td>Calcium (mg)</td>
<td>210</td>
<td>120</td>
<td>170</td>
<td>28</td>
</tr>
<tr>
<td>Iron (mg)</td>
<td>0.2</td>
<td>0.2</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>Vitamin C (mg)</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Minerals (g)</td>
<td>0.8</td>
<td>0.8</td>
<td>0.8</td>
<td>0.1</td>
</tr>
<tr>
<td>Water (g)</td>
<td>81.0</td>
<td>87</td>
<td>86.8</td>
<td>88</td>
</tr>
<tr>
<td>Energy (K cal)</td>
<td>117</td>
<td>67</td>
<td>72</td>
<td>65</td>
</tr>
</tbody>
</table>

Milk products

Milk products include butter, ghee, cheese, dried & condensed milk, khoa, ice cream etc. Milk from which fat has been removed is known as ‘Skimmed milk’.

Vegetable milk

Milk prepared from vegetable foods viz ground nut, soyabean, is termed as vegetable milk. It can be used as a substitute of animal milk.
1. Why is milk considered as a complete food?
2. _______ is the vitamin least present in all milks.
3. How is skimmed milk different from whole milk?
4. What is vegetable milk?

3.1.6. Meat, Fish, Egg

**Meat** is flesh of cattle, sheep and goats. It is a protein rich food. The energy provided by meat depends upon its fat content. Liver of many animals is extremely rich in many nutrients. It is rich in iron and phosphorus.

**Fish** is a nutritious food rich in proteins. The fish liver oil is rich in unsaturated fatty acids and vitamin A & D. Fish bones are excellent sources of calcium, phosphorus and fluorides. Sea fishes are rich in iodine content. The fish proteins are easily digestible.

**Egg** contains all nutrients except carbohydrate and Vitamin C. Egg proteins have all the nine essential amino acids needed by the body in right proportions. Important minerals such as calcium, phosphorus, iron, zinc and other trace elements are present in egg. Next to milk egg is considered as a complete food.

**Table: 21 Nutritive values of Meat, Fish, Eggs (per 100gm)**

<table>
<thead>
<tr>
<th>Name of food stuff</th>
<th>Protein (g)</th>
<th>Fat (g)</th>
<th>Minerals (g)</th>
<th>Vitamin A (µg)</th>
<th>Thiamine (mg)</th>
<th>Energy Kcal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beef</td>
<td>22.6</td>
<td>2.6</td>
<td>1.0</td>
<td>18</td>
<td>0.15</td>
<td>114</td>
</tr>
<tr>
<td>Mutton (goat)</td>
<td>18.5</td>
<td>13.3</td>
<td>1.3</td>
<td>9</td>
<td>0.18</td>
<td>194</td>
</tr>
<tr>
<td>Fowl</td>
<td>25.9</td>
<td>0.6</td>
<td>1.3</td>
<td>--</td>
<td>--</td>
<td>109</td>
</tr>
<tr>
<td>Fish</td>
<td>19.5</td>
<td>2.4</td>
<td>1.5</td>
<td>40</td>
<td>--</td>
<td>87</td>
</tr>
<tr>
<td>Lion (goat)</td>
<td>20.0</td>
<td>3.0</td>
<td>1.3</td>
<td>690</td>
<td>0.36</td>
<td>150</td>
</tr>
<tr>
<td>Egg (hen)</td>
<td>13.0</td>
<td>13.3</td>
<td>1.0</td>
<td>140</td>
<td>0.10</td>
<td>173</td>
</tr>
</tbody>
</table>
Check your progress 6

1. Fish liver oil is rich in vitamin __________ & __________
2. Why is Egg considered as a complete food?
3. ______________ is the vitamin not present in egg.
4. Sea fishes are rich in _________________mineral.
5. Examine the above table and state, from which food item we get maximum energy output.

3.1.7 Fats and Oils

Fats and oils supply energy and fat soluble vitamins besides making the food tasty and palatable. From the point of human nutrition, vegetable fats are superior to animal fats. We have already discussed about it is detail in the subunit Fat of Unit – 2.

3.1.8 Sugar, Jaggery and Honey

These are carbohydrate foods. Refined sugar is pure sucrose and contains no other nutrients. Sugar and jaggery are prepared from sugarcane. Jaggery contains some amount of carotene and iron. Honey consists of about 75% sugar, mostly fructose and glucose.

Check your progress 8

1. Sugar and Jaggery are prepared from ______________
2. Jaggery contains ________________and ___________in addition to sugar.

3.1.9 Spices and condiments

These include asafoetida, cardamom, chilies, garlic, cloves, ginger, mustard, pepper, tamarind, turmeric, saffron, coriander, cinnamon etc. They are mainly used to increase the taste of foods and stimulate appetite. The essential oils present in them may aid or help in digestion. It has anti-bacterial properties.
Check your progress 9

1. Name some spices used in our daily food.
2. What are the main function of spices and condiments?

3.1.10 Beverages

Beverages are drinks used as accessories. They may be classified as

1. Non-alcoholic beverages
   Eg. coffee, tea and cocoa

2. Alcoholic beverages
   Eg. Whisky, rum gin, beer

3. Soft drinks
   Eg. Aerated water, cola, fruit juice.

Table: 22 Composition of Coffee, Tea & Cocoa
(per cup of 150ml)

<table>
<thead>
<tr>
<th></th>
<th>Coffee</th>
<th>Tea</th>
<th>Cocoa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein (g)</td>
<td>1.8</td>
<td>0.9</td>
<td>7.2</td>
</tr>
<tr>
<td>Fat (g)</td>
<td>2.2</td>
<td>1.1</td>
<td>8.8</td>
</tr>
<tr>
<td>Carbohydrate (g)</td>
<td>17.8</td>
<td>16.4</td>
<td>26.2</td>
</tr>
<tr>
<td>Energy (K cal)</td>
<td>98.0</td>
<td>79.0</td>
<td>213.0</td>
</tr>
</tbody>
</table>

Soft drinks may be carbonated (aerated) or fruit juices. Carbonated soft drinks consist of CO₂, sugars & acids such as citric acid or tartaric acid, colouring & flavouring agents. Majority of them have no nutritive value.

Alcoholic beverages are of wide variety. The alcohol content varies widely from 5 to 6% in beer to 40 to 45% in whisky, run & brandy. Alcohol supplies 7K cal per gram.

Check your progress 10

1. Cocoa gives ___________ Kcal of energy per 150ml.
2. Why are soft drinks said to have no nutritive value?
3. Which are the contents unusually present in an aerated soft drink like cola?

3.2 Let us sum up

In this unit we have discussed different foods & their nutritive profiles. Foods are classified based on their origin as plant foods and animal foods. From the details given in the unit, you may now realize the actual nutritive value of different food items.

Assignments

1. Prepare different tables showing the nutritive values of each type of food item.
2. Identify the actual nutritive contents in your daily diet.
3. Select food items based on your energy output and calculate its nutritive value.

Unit – 4

Balanced Diet

Objectives

Let us sum up

4.0 Objectives

This unit deals with Balanced diet. At the end of this unit you will be able to;

(i) Know what is balanced diet
(ii) Summarise the knowledge which is already acquired from previous units.
(iii) Practice a well balanced diet.
(iv) Avoid unnecessary food habits.

I am sure you will enjoy working through this unit.
4.1 Balanced Diet - Introduction

A Balanced diet is defined as one which contains a variety of foods in such quantities & proportions that we need for Energy, Amino Acids, Vitamins, Minerals, Fats, Carbohydrate and other nutrients is adequately met for maintaining health, vitality, and general well being. It also makes a small provision for extra nutrients to withstand short duration of leanness.

A balanced diet will protect the population from nutritional deficiencies. The food pattern varies in different parts of the world depending upon climatic conditions, economic capacity, religion, customs, tastes & habits.
1. What is balanced diet?
2. Which are the nutritive factors that must be included in a balanced diet?
3. Which are the conditions under which a nutritional pattern changes?

4.1.1 Energy Requirements

Energy requirements vary from one person to another depending upon interrelated variables such as age, sex, working conditions, body composition, physical activity, physiological state etc. Balanced diet formulated by Indian Council of Medical Research (ICMR) for all groups are given below.
Table: 23 Balanced Diets (in grams)

<table>
<thead>
<tr>
<th>Food item</th>
<th>Adult Man Sedentary</th>
<th>Adult Woman Sedentary</th>
<th>Adult Man Moderate work</th>
<th>Adult Woman Moderate work</th>
<th>Adult Man Heavy work</th>
<th>Adult Woman Heavy work</th>
<th>Children 1-3 years</th>
<th>Children 4-6 years</th>
<th>Boys 10-12 years</th>
<th>Girls 10-12 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereals</td>
<td>460</td>
<td>670</td>
<td>410</td>
<td>575</td>
<td>175</td>
<td>70</td>
<td>420</td>
<td>380</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pulses</td>
<td>40</td>
<td>60</td>
<td>40</td>
<td>50</td>
<td>35</td>
<td>35</td>
<td>45</td>
<td>45</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Leafy vegetables</td>
<td>40</td>
<td>40</td>
<td>100</td>
<td>50</td>
<td>40</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other vegetables</td>
<td>60</td>
<td>80</td>
<td>40</td>
<td>100</td>
<td>20</td>
<td>30</td>
<td>50</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roots &amp; tubers</td>
<td>50</td>
<td>80</td>
<td>50</td>
<td>60</td>
<td>10</td>
<td>20</td>
<td>30</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Milk</td>
<td>150</td>
<td>250</td>
<td>100</td>
<td>300</td>
<td>300</td>
<td>250</td>
<td>250</td>
<td>250</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oil &amp; Fat</td>
<td>40</td>
<td>65</td>
<td>20</td>
<td>40</td>
<td>15</td>
<td>25</td>
<td>40</td>
<td>35</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sugar &amp; Jaggery</td>
<td>30</td>
<td>55</td>
<td>20</td>
<td>40</td>
<td>30</td>
<td>40</td>
<td>45</td>
<td>45</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table: 24 Suggested Nutritional substitutions for Non-Vegetarians

<table>
<thead>
<tr>
<th>Food item which can be deleted from non-vegetarian diets</th>
<th>Substitution that can be suggested for deleted item or items.</th>
</tr>
</thead>
</table>
| 50% of pulses (20-30 gm) | 1. One egg or 30g of meat or fish.  
2. Additional 5gm of fat or oil. |
| 100% of pulses (40-60 gm) | 1. Two eggs or 50g of meat or fish. One egg plus 30gm meat.  
2. 10g of fat or oil. |

Check your progress 2

1. State any four factors which determine the energy requirement of a person?
2. Why do men & women of heavy work need more food?
<table>
<thead>
<tr>
<th>Group</th>
<th>Particulars</th>
<th>Body weight Kg.</th>
<th>Net energy Kcal/d</th>
<th>Protein g/d</th>
<th>Fat g/d</th>
<th>Calcium mg/d</th>
<th>Iron mg/d</th>
<th>Vitamin A μg/d</th>
<th>Thiamin mg/d</th>
<th>Riboflavin mg/d</th>
<th>Nicotinic acid mg/d</th>
<th>Pyridoxine mg/d</th>
<th>Ascorbic acid mg/d</th>
<th>Folic acid μg/d</th>
<th>Vitamin B12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Man</td>
<td>Sedentary work</td>
<td>60</td>
<td>2425</td>
<td>60</td>
<td>20</td>
<td>400</td>
<td>28</td>
<td>600</td>
<td>2400</td>
<td>1.2</td>
<td>1.4</td>
<td>16</td>
<td>2.0</td>
<td>40</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Moderate work</td>
<td></td>
<td>2875</td>
<td>60</td>
<td>20</td>
<td>400</td>
<td>28</td>
<td>600</td>
<td>2400</td>
<td>1.4</td>
<td>1.6</td>
<td>18</td>
<td>2.0</td>
<td>40</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Heavy work</td>
<td></td>
<td>3800</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1.6</td>
<td>1.9</td>
<td>21</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Woman</td>
<td>Sedentary work</td>
<td>50</td>
<td>1875</td>
<td>50</td>
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<td>+3</td>
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Table: 25 Recommended Daily Allowance mg/day
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<th>Height</th>
<th>BMI</th>
<th>Protein</th>
<th>Energy (kcal)</th>
<th>Fat (g)</th>
<th>Cholesterol (mg)</th>
<th>Iron (mg)</th>
<th>Zinc (mg)</th>
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<td>108/mg</td>
<td>2.05/kg</td>
<td>500</td>
<td>350</td>
<td>1200</td>
<td>55μg/kg</td>
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<td>6-12 months</td>
<td>8.6</td>
<td>98/kg</td>
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<td>350</td>
<td>1200</td>
<td>50μg/kg</td>
<td>60μg/kg</td>
<td>650μg/kg</td>
</tr>
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<tr>
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<td>2190</td>
<td>54</td>
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<td>34</td>
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<tr>
<td>Girls</td>
<td>10-12 years</td>
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<td>1970</td>
<td>57</td>
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<tr>
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<td>70</td>
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<td>41</td>
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<td>1.5</td>
</tr>
<tr>
<td>Girls</td>
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<td>46.7</td>
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<td>65</td>
<td>600</td>
<td>28</td>
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<td>2400</td>
<td>1.0</td>
<td>1.2</td>
</tr>
<tr>
<td>Boys</td>
<td>16-18 years</td>
<td>57.1</td>
<td>2640</td>
<td>78</td>
<td>500</td>
<td>50</td>
<td>600</td>
<td>2400</td>
<td>1.3</td>
<td>1.6</td>
</tr>
<tr>
<td>Girls</td>
<td>16-18 years</td>
<td>49.9</td>
<td>2060</td>
<td>63</td>
<td>30</td>
<td>30</td>
<td>600</td>
<td>2400</td>
<td>1.0</td>
<td>1.2</td>
</tr>
</tbody>
</table>
4.2 Let us sum up

We have discussed about balanced diet in this unit. In various tables given in this unit the actual energy necessary for a person can be clearly understood. A balanced diet will help a person to remain healthy for long time.

As a teacher you must be able to give instruction to your students and some times parents about balanced diet and thus overcome the problem of under-nourishment. It will be appreciable if provision of a balanced mid day meal is made by school authorities.

Assignment
1. Prepare a table showing balanced diet for adult man, woman and children.

Unit 5
Preservation & Storage of Foods

<table>
<thead>
<tr>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objectives</td>
</tr>
<tr>
<td>Food Preservation</td>
</tr>
<tr>
<td>• Household methods</td>
</tr>
<tr>
<td>• Commercial methods</td>
</tr>
<tr>
<td>Food additives</td>
</tr>
<tr>
<td>Fortification of foods</td>
</tr>
<tr>
<td>Adulteration of foods</td>
</tr>
</tbody>
</table>

Let us sum up

5.0 Objectives

In this unit we will have a discussion on the important methods of preservation of foods.

At the end of this unit you will be able to

(i) Know how to keep foods fresh and free from contamination.
(ii) Make foods available when out of season
(iii) Avoid wastage when food is in excess
(iv) Supply foods to areas where there is scarcity.
5.1 Food Preservation

Food is preserved in order to keep it fresh, wholesome and free from contamination. It also helps to make food available in all seasons and prevents wastage when it is in excess. There are different methods for food preservation and storage.

5.1.1. Household methods

(a) Cold storage or refrigeration

The home refrigerator has now made it possible to store and preserve a variety of foods. Cold kills some parasites and reduces the growth of harmful bacteria.

![Diagram showing growth of bacteria at body temperature and refrigeration temperature](image)

Fig: 102 Growth of bacteria in different temperatures

Fruits and vegetables should be kept just above the freezing point i.e. 0°C. Meat, egg, milk and fish start decomposing when the temperature rises above 10°C. Food values are not affected as a result of correct refrigeration. Foods should not be refrigerated for more than 5 days.

(b) Drying or dehydration

Drying removes water and in the absence of water microorganisms cannot grow. Fruits, Fish, Meat are preserved by drying.

(c) Smoking

Meat, Fish and some vegetables after salting are dried and smoked. The phenols present in smoke is germicidal (germ killing).
However, parasites present in meat may not die because the smoke does not penetrate deep.

d. **Salting and pickling**

Salt is a preservative. By adding certain continents and spices along with salt certain foods like mangoes, vegetables, meat and fish may be preserved.

e. **Preparing jams**

Sugar syrup is used to preserve fruits in the form of jams. It prevents bacterial growth.

---

**Check your progress 1**

1. What are the main advantages of preservation of food?
2. How does refrigeration keep food fresh?
3. During refrigeration the temperature should not rise above ____ °C.
4. Drying will increase the shelf life of food items why?
5. _____ present in smoke make it a preservative.
6. Give two common methods used in our houses for preserving fruits.

---

**5.1.2 Commercial methods**

(a) **Canning**

Various foods (eg. fruit juices, milk, soups, fish) are preserved by canning. The food is first sterilized at high temperature (135°– 175°C) for a short time (few seconds), then cooled and filled in pre-sterilized containers in a sterile atmosphere. There is some loss of heat sensitive vitamins during canning.

(b) **Freezing**

A number of foods (eg. Fruits, vegetables, meat, fish) are preserved by the freezing technique. At –17.8°C vegetables can be preserved for 8-10 months and meat for about 3 months.
(c) Addition of chemicals

Contain chemicals helps in preservation. Those permitted are benzoic acid, benzoates, sulphur dioxide and sulphites, methyl bromide is widely used fumigant (as fumes) for controlling agricultural pests. The use of this is now banned.

(d) Irradiation

Microorganisms are destroyed by gamma rays. Wheat, potatoes and onions may be preserved by irradiation.

Check your progress 2

1. Briefly explain the process of canning
2. How is freezing different from refrigeration?
3. Name some chemicals used for preservation.
4. __________ rays are used for preservation by irradiation.

5.2 Food Additives

Food additives are “non nutritious substances which are added to food in small quantities to improve its appearance, flavour, texture or storage properties.”

Modern science of food technology employs more than 3000 substances - some natural and others synthetic – as food additives. Today majority of the processed foods such as bread, biscuits, jams, jellies, soft drinks and ketchup contain food additives. Some well-known and less harmful additives are saffron, turmeric, vanilla essence etc. Majority of them are harmful in someway or other. Therefore the use of food additives is controlled by law viz. The Prevention of Food Adulteration Act, the Fruit Products Order (FPO).
5.3 Fortification of foods

The word ‘fortification’ means the addition of one or more food factors or nutrients to a food which does not contain it in natural way. Some examples of fortification are
(1) Addition of Vitamin A & D to Vanaspathi
(2) Fortified Atta (Wheat flour fortified with vitamins and minerals)

5.4 Adulteration of Foods

Adulteration of foods consists of a large number of practices:
(1) Mixing
(2) Substitution
(3) Concealing the quality
(4) Reducing the quantity
(5) Putting up decomposed foods
(6) Misbranding or false labeling
(7) Addition of poisons

Some of the adulterations are injurious to health. But most forms of adulteration have only economic significance, as for example, addition of water to milk.

The Prevention of Food Adulteration Act (1954)

The latest amendment of this act is of 1986. Standards are fixed for various food items based on this act. Any food that does not confirm the minimum standards is said to be adulterated. The
The purpose of the Act is to protect the health of the consumer and to assure food of honest nutritive value.

**Bureau of Indian Standards (BIS)**

They formulated Indian standards for processed foods with respect to raw material, hygiene, packaging and labeling. One who obtain the BIS can obtain Indian Standard Institute (ISI) mark

Ag mark – Agricultural Produce (grading & marketing) Act 1937 provides standards for grading and marketing agricultural commodities.

---

**Check your progress 5**

1. List four common adulteration practices.
2. What is the main function of Food Adulteration Act?
3. What is BIS?
4. Ag mark is used for _______

**5.5 Let us sum up**

In this unit, preservation & storage of foods, we have come across a number of preservation methods like refrigeration, drying, smoking, pickling etc. which are household methods and canning, freezing, irradiation like industrial methods. All these methods help to increase the shelf life of various food materials.

In order to increase the colour and taste of food items, additives are added and this is controlled by the govt. of India through an Act which give BIS mark and ISI marks to standard products. Ag Mark is given to standard products from the agriculture area. Fortification is usually done to increase the quality of food products.

**Assignments**

1. Write a brief report on different methods of food preservation.
2. Conduct a survey to identify practices usually adopted in food adulteration and prepare a detailed report on it.
3. Conduct a seminar on legislative measures for preventing food adulteration and prepare a detailed report about it.

4. Identify different food additives which are widely used today and find out its recommended quantities.

Unit 6

Malnutrition

Objectives

Malnutrition – Introduction
- Under Nutrition
- Over Nutrition

Let us sum up

6.0 Objectives

This unit deals with Malnutrition, its symptoms, problems & preventive measures.

After working through this unit you will be able to

(i) Know the seriousness of malnutrition.
(ii) Assess the symptoms & signs of malnutrition.
(iii) Prevent the occurrence of malnutrition
(iv) Apply the knowledge in daily life.

6.1 Malnutrition – Introduction

Malnutrition is a condition when we take food which is deficient or in excess of one or more nutrients. We are liable to suffer from under nutrition or over nutrition in respect to the specific nutrients.

Malnutrition covers both under-nutrition and over-nutrition.

6.1.1. Under Nutrition

A large number of children between 6 months and 3 years of age are under nourished.
A. Signs & Symptom

1. Growth failure i.e. the child loses weight
2. Oedema
3. Anaemia
4. Skin changes – skin dry, scaly & loss of elasticity
5. Eye changes – dryness of eye
6. Hair changes – light colour & brittle

B. Screening

Several techniques used to identify under nourished children are

(1) Height & Weight check up

Height and weight check up once in a month, in the case of small children and 3 to 6 months in older children. (The growth chart or road to health chart in Block 6 will help to monitor the child’s nutritional status).

(2) Mid arm circumference

A child between 1 to 5 years is considered to be malnourished if this measurement is less than 12.8cm.

(3) Clinical & laboratory examination

Laboratory tests & examination of a child from head to foot to find out if there is any deficiency.

C. Problems of malnutrition (Diseases)

The common diseases that occur due to under nutrition are

(i) Low birth weight

Low birth weight (less than 2.5kg) is developed due to under nourishment of mother.

(ii) Protein Energy Malnutrition (PEM)

This is due to inadequate intake of carbohydrate and protein. Poverty is a major factor. PEM presents in two forms.
(a) Kwashiorkor

Develop in young children between 1-3 years of age. This is due to deficiency of proteins, carbohydrate & fat. The main features are oedema, growth failure, diarrhoea, hair and skin changes.

(b) Marasmus

Energy deficiency (carbohydrate & fat) is more marked than protein deficiency in this case. The main symptoms are marked wasting of muscles, and less of fat under skin. The child appears as “Skin and bones”.
Kwashiorkor and Marasmus affects the mental development also and may lead to death.

**D. Preventive Measures**

1. Proper ante natal care of mothers.  
   Healthy mothers give birth to healthy baby.
2. Promotion of breast feeding.
3. Proper nutrition given to children starting around the age of 4 to 6 moths in order to prevent malnutrition during the weaning period (stopping of breast feeding).
5. Immunization of the child at correct ages.
6. Food hygiene practices.
7. Oral rehydration.
8. Mid day meals in schools.

**Check your progress 1**

1. What is malnutrition?  
2. State four symptoms of under nutrition.  
3. Give two methods to assess an under nourished child.  
4. Which are the two prominent disease of protein energy malnutrition (PEM)?  
5. State any 5 preventive measures of malnutrition

**6.1.2 Over Nutrition**

Over nutrition results from excessive consumption of nutrients over a long period. When excessive energy yielding foods like fats and carbohydrates are consumed along with poor physical work, it will lead to many health hazardous conditions like.

1. Obesity: Over weight with excessive deposition of fat.
2. Arteriosclerosis leads to cardiac arrest.
3. Stroke and paralysis lead to death.
5. Diabetes mellitus.
7. Menstrual disorders and infertility.

Fig: 105 Obesity

Check your progress 2

1. Over nutrition and lack of exercise is health hazardous? Why?
2. ________ is a disease caused due to over nutrition

6.2 Let us sum up

We have discussed malnutrition and condition which leads to malnutrition. Over nourishment and under nourishment are equally health hazardous. Balanced diet and optimum physical activity will help a person to stay fit for long time.

Assignments

1. Conduct a seminar on the topic malnutrition and prepare a detailed report about it.
2. Write a brief report on the preventive measures of malnutrition.
3. Conduct a survey to find out the preventive measures taken by the Government to reduce malnutrition in Kerala.
Evaluate Yourself

1. What is nutrition? State the classification of food based on its function.
2. What are the main functions of food?
3. Which are the main nutritive factors present in a food item?
4. Give three main sources of protein and their main functions.
5. ‘Cellulose has no nutritive value, but it is important in our daily diet’. Why?
6. What is EFA? Give one example.
7. Which are the main vitamins?
8. Give four functions of water in our body.
9. Why is Soya bean considered as richest of all pulses?
10. We should include green leafy vegetables in our daily diet. Why?
11. Why is milk considered as a complete food?
12. Which are the nutritive factors that must be included in a balanced diet?
13. Explain briefly any four household methods of food preservation.
14. What is meant by Fortification of food?
15. What is the main function of Food Adulteration Act?
16. State four symptoms of under nutrition.
17. State some preventive measures for mal nutrition.
BLOCK - VI

CHILD CARE

Unit 1 – Stages of development of a child
Unit 2 – Immunization
Unit 3 – Nutritional Requirements

Block Introduction

In this block there are three units. The first unit is about birth and infancy of a child, the second unit deals with immunization schedules and the third unit tells you about the nutritional requirements of children (0-12 years).

To rear happy and healthy children parents have to face lots of challenges. Only composed calm and self-confident parents can understand their child’s uniqueness. Remember you are an expert when it comes to your child. As a future teacher and a parent you are going to face similar challenges in your classrooms and at home. This unit will provide information on how to meet these challenges. A caring, self-confident parent or a teacher and a happy, healthy child with a high level of self esteem go hand in hand.

Hope you will enjoy working through the units of this block.

Assess Yourself

1. What are the main processes of infant deaths in developing countries like India?

2. How can you make a growth chart of an infant?

3. What are the precautions to be taken to avoid kitchen accidents?
4. How is active immunity different from passive immunity?

5. What are the principles involved in a Midday Meal programme?

Unit – I

Stages of Development of a Child

Objectives

- Birth and Infancy
- Health Indicators of a child
- Child Safety

Let us sum up

1.0 Objectives

In this unit we will have a discussion about the important aspects of birth and infancy. At the end of this unit, you will be able to

(i) Get knowledge the different stages of childhood.
(ii) Understand the health indicators of a child.
(iii) Apply the knowledge of child safety in order to prevent accidents.
(iv) Develop interest in reading more about child development.

1.1. Birth and Infancy

Stages of a development of a child involves

1. Infancy (up to 1 year of age)

It is divided into

a. Neonatal period (first 28 days)

b. Post natal period (28 days – 1 year)
2. Pre school age (1-4 years)
3. School age (5-14 years)

The first week of life is the most crucial period in the life of an infant. In India 50-60% of infant deaths occur within the first month of life. On these, more than half may die during the first week of birth. The risk rate of death is the greatest during the first 24-28 hours after birth. This is because the newborn has to adapt itself rapidly and successfully to the external environment. And also because of

1. Low birth weight
2. Respiratory infection and diarrhoea
3. Prolonged labour

Taking attention to the following areas can minimize infant deaths.

1. Establishment and maintenance of cardio-respiratory function.
2. Maintenance of body temperature of infants.
3. Avoidance of infection.
(4) Establishment of satisfactory feeding practices (breastfeeding).
(5) Early detection and treatment of congenital (by birth) and acquired diseases and disorders.

**Breastfeeding**

Breastfeeding should be initiated within an hour of birth. The first milk is called ‘colostrum,’ which is the most suitable food for the baby during this early period because it contains a high concentration of protein and other nutrients the body needs. It is also rich in anti-infection factors which protect the baby against the respiratory infections and diarrhoeal diseases. Moreover, it also establishes a close mother-child relationship (bonding).
Fig: 108 Milestones of development
<table>
<thead>
<tr>
<th>Periods</th>
<th>Motor development</th>
<th>Language development</th>
<th>Adaptive development</th>
<th>Socio personal development</th>
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</thead>
<tbody>
<tr>
<td>6 – 8 weeks</td>
<td></td>
<td></td>
<td></td>
<td>Looks at mother and smiles</td>
</tr>
<tr>
<td>3 months</td>
<td>Holds head erect</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 – 5 months</td>
<td></td>
<td>Listening</td>
<td>Begin to react out for objects</td>
<td>Recognizes mother</td>
</tr>
<tr>
<td>6 – 8 months</td>
<td>Sits without support</td>
<td>Experimenting with noises</td>
<td>Transfer objects hand to hand</td>
<td>Enjoys hide and seek</td>
</tr>
<tr>
<td>9 – 10 months</td>
<td>Crawling</td>
<td>Increasing range of sounds</td>
<td>Releases objects</td>
<td>Suspicious to strangers</td>
</tr>
<tr>
<td>10 – 11 months</td>
<td>Stands with support</td>
<td>First words</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12 –14 months</td>
<td>Walks wide base</td>
<td></td>
<td>Builds</td>
<td></td>
</tr>
<tr>
<td>18 – 21 months</td>
<td>Walks narrow base, beginning to run</td>
<td>Joining words together</td>
<td>Beginning to explore</td>
<td></td>
</tr>
<tr>
<td>24 months (2 years)</td>
<td>Runs and climb stairs</td>
<td>Short sentence</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Check your progress 1

1. What are the main causes of infant deaths in developing countries like India?

2. State four precautions to be taken in order to reduce the infant mortality rate.

3. Why is breast milk considered as an ideal food for infants?

4. Briefly state the motor development of a child during its development from 6 weeks to 24 months (2 years)

1.2 Health Indication of a child

The health and maturity of a baby is evaluated by means of measuring

(a) Birth weight

(b) Length (height)

(c) Head circumference

Fig: 109 Measuring Weight & Height
The birth weight of an infant is one of the most important determinant of its survival, healthy growth and development. Infants with birth weight less than 2.5 kg is considered as "at risk" infants. The birth weight should be taken within the first hour of life.

The height of the baby should be recorded within first 3 days. These measurements are taken to assess the baby’s size against human standards.

Fig: 110  WHO Growth Chart

The WHO growth chart has two reference curves. The space between the two growth curves has been called as 'Road-to-health'. This will include the zone of normality i.e., the weight of 95% of normal healthy children fall within this area.
A mother to monitor her child’s growth can use the growth chart. The weight of the child is taken monthly during the first year, every 2 months during the second year and every 3 months thereafter up to the age of 5-6 years. These recordings are plotted on the growth chart against his/her age. This will give a clear indication of the growth of the child.

Healthy babies on an average double their birth weight by 5 months and 3 times by the end of first year.

Table- 27 Average weight and height increase of a child during the first 5 years

<table>
<thead>
<tr>
<th>Age</th>
<th>Increments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Weight increments per week</td>
</tr>
<tr>
<td>0 – 3 months</td>
<td>200gm</td>
</tr>
<tr>
<td>4 – 6 months</td>
<td>150gm</td>
</tr>
<tr>
<td>7 – 9 months</td>
<td>100gm</td>
</tr>
<tr>
<td>10 – 12 months</td>
<td>50-75 gm</td>
</tr>
<tr>
<td></td>
<td>Weight increments per year</td>
</tr>
<tr>
<td>1 – 2 years</td>
<td>2.5 kg</td>
</tr>
<tr>
<td>3 – 5 years</td>
<td>2.0 kg</td>
</tr>
<tr>
<td></td>
<td>Length increments per year</td>
</tr>
<tr>
<td>1st year</td>
<td>25cm</td>
</tr>
<tr>
<td>2nd year</td>
<td>12cm</td>
</tr>
<tr>
<td>3rd year</td>
<td>9cm</td>
</tr>
<tr>
<td>4th year</td>
<td>7 cm</td>
</tr>
<tr>
<td>5th year</td>
<td>6cm</td>
</tr>
</tbody>
</table>

Check your progress 2

1. Which are the three measurements taken to assess the health of a newborn?
2. How can you make a growth chart of an infant?
3. Healthy babies _______ their birth weight by the time they are 5 months old.
1.3 Child Safety

As children grow, so do their abilities. Between the ages of 1 and 2, the child will learn to walk, run, climb, jump and explore. Between the ages 2 and 4, the child learns new skills, quickly. And while these abilities are exciting, they can also lead to serious injuries – if you are not prepared.

The three most common causes of serious childhood injuries involve automobiles, drowning and home fires. The following suggestions will help you prevent injuries due to these causes, as well as injuries due to falls, kitchen accidents and poisons.

Automobile safety (Safety on the Road)
1. Let the infant and child be seated in the back seat of your car.
2. Always use seat belts and child safety seats.
3. Encourage your child to sit quietly in the car, so you will not be distracted.
4. Never place an infant in the front seat of a vehicle with passengers.
5. Escort a child when he walks along the road
6. Obey all traffic rules
7. Walk on footpath.

**Drowning**

Young children drown primarily at home (wells without walls, buckets, bathtubs, pools etc.).

1. Have constant adult supervision for children in or near water.
2. Surround well with 5 foot fencing or wall.
3. Buckets and large vessels should be kept empty when not in use.

![Fig: 112 Home fire and Kitchen accidents](image_url)

1. Keep your child away from hot items and burning stove in kitchen
2. Don’t allow to play with matchbox and lighter.
3. Keep infants secured in a high chair while you are in the kitchen.
4. Keep sharp items like knives and forks locked up, and edges should be covered.

**Poison**

1. Make sure all poisonous products come in child resistant packaging.

2. Read all products and medication labels clearly.
3. Place poison warning stickers.
4. The most important and safest means is, keeping poisonous substances locked up.
5. Remove any poisonous plants from your yard.
6. Never give any drug without the prescription of a doctor.
**Falls**

The risk of falls increases as your child grows. Children at the ages 1 to 2 are prone to fall and seriously injure themselves on sharp furniture edges. Any thing your child can climb can be dangerous.

The only thing is to keep a vigilant eye on your little ‘busy body’.

**Check your progress 3**

1. Which are the most common causes of childhood injuries?
2. What are the precautions to be taken to avoid kitchen accidents?
3. What are the steps taken in order to increase automobile safety for an infant or child?
4. Which is the safest means to keep poison at home?

**1.4 Let us sum up**

Child safety is one of the most important areas of Child care. The common causes of childhood injuries involve automobiles, drowning, fires, falls, kitchen accidents and poisons. The main thing to be followed in all the cases is ‘Never leave the child or infant alone – even for a minute”. Always keep a vigilant eye on your child and prevent childhood injuries.

**Assignments**

1. Make a table showing ‘Milestones of development’ of a child.
2. Make growth chart of an infant by pasting pictures.
3. Suggest your own measures to protect your child from childhood injuries.
Unit – 2

Immunization

Objectives

Immunization- Introduction

- Active Immunization
- Passive Immunization

National Immunization Schedule

Let us sum up

2.0 Objectives

In this unit you will come across the important aspects of immunization.

At the end of this unit, you will be able to

(1) Understand active and passive immunization

(2) Identify the need and importance of immunization

(3) Apply this knowledge in daily life
2.1 Immunization

Immunization is the process by which a person is given artificial immunity against a particular disease (a virus or bacteria). Immunity of a body is its ability to resist an infection.

Immunization can be Active or Passive

Active Immunization

This type immunization will give long-term immunity to the body. The body itself will provide antibodies to resist. This type of immunity will get through vaccination. (eg. vaccines for BCG, Polio, Measles, Rubella)

Passive Immunization

This type of immunization will give only short-term immunity to the body. Here the ready made antibodies are directly injected into the body. This will be given when there is an immediate situation of exposure to particular infection. [eg. Injections for Tetanus, Rabies, Cholera].
**Active immunization**

I Vaccination (contain dead or modified organism)

II Immune system develops antibodies against the vaccine

III In actual attack of the organism the already created antibodies protect the body

Fig: 114 Active Immunization
**Passive Immunization**

I Antibodies are taken from an already immune person

II Antibodies directly injected into the person to be protected

III At the time of attack of organism, these antibodies protect the body.

---

**Check your progress 1**

1. What is immunization?
2. What are the two types of immunization?
3. How is active immunity different from passive immunity?
4. _____________ is an active immunization vaccine.
5. Give one example for passive immunization injection.
2.2 National Immunization Schedule

Immunization is the best and cheapest investment in the health of children. Immunization should be done according to the schedule recommended by the government of India.

**Table- 28 Immunization Schedule**

<table>
<thead>
<tr>
<th>Age</th>
<th>Vaccine</th>
</tr>
</thead>
<tbody>
<tr>
<td>At birth (for hospital deliveries)</td>
<td>- BCG, OPV, O-dose HB₁</td>
</tr>
<tr>
<td>At 6 weeks</td>
<td>- DPT – I and OPV – I HB₂</td>
</tr>
<tr>
<td>At 10 weeks</td>
<td>- DPT – 2 and OPV – 2</td>
</tr>
<tr>
<td>At 14 weeks</td>
<td>- DPT – 3 and OPV – 3</td>
</tr>
<tr>
<td>At 6-9 months</td>
<td>- HB₃</td>
</tr>
<tr>
<td>At 9 months</td>
<td>- Measles</td>
</tr>
<tr>
<td>At 15 – 18 months</td>
<td>- MMR</td>
</tr>
<tr>
<td>At 18 – 24 months</td>
<td>- DPT (Booster 1) and OPV</td>
</tr>
<tr>
<td>5 years</td>
<td>- DPT (Booster 2) and OPV</td>
</tr>
<tr>
<td>10 years</td>
<td>- Tetanus Toxoid, HB booster₁</td>
</tr>
<tr>
<td>16 years</td>
<td>- Tetanus Toxoid, HB booster₂</td>
</tr>
</tbody>
</table>
BCG - Vaccine for Tuberculosis
OPV - Oral Polio Vaccine
HB - Hepatitis B vaccine
DPT - Diphtheria, Pertusis (Whooping cough) Tetanus
MMR - Measles, Mumps, Rubella (German Measles)

Check your progress 2

1. _______is the vaccine given for immunization against TB.
2. Which are the three diseases prevented by MMR vaccine?
3. OPV is given to prevent ________infection.

2.3 Let us sum up

Immunization protects your child against many serious life threatening infectious diseases. For this reason, it is very important for your child to receive all immunization at the recommended time. New vaccines, such as chicken pox vaccine and various combination vaccines, are being added to the routine schedule every year.

Assignments

1. Make a table of Immunization Schedule including the latest developments.
2. How is active immunity different from passive immunity? Discuss and prepare a report about its importance and scope in the field of Health.
Unit – 3

Nutritional Requirements

3.0 Objectives

This unit deals with nutritional requirements of infants and children. At the end of this unit you will be able to

(a) Recognise the nutritive factors present in food items.
(b) Identify the energy requirement of a healthy child.
(c) List out the food items to prepare a balanced diet for children.
(d) Assess the nutritive value of mid day meals given in schools.

3.1 Energy requirements of a healthy child

Good nutrition provides energy for a growing child and is important to ensure normal growth, development and physical activity. When you grow up, nutrition is divided among the following categories; Meats, poultry and dairy, Breads and cereals, Fruits and vegetables, Pulses, Sugar or jaggery.

These food items contain proteins, carbohydrates, fats, minerals, and vitamins, which form the essential nutritive factors of food.

Children at the age of 1-5 years needs special attention. They show high physical activity and growth. They need extra nutrients
in their food. The approximate energy requirements of infants and children are given below.

**Table- 29 Approximate Daily Energy Requirements of Infants and Children**

<table>
<thead>
<tr>
<th>Age group</th>
<th>Body weight</th>
<th>Energy (K Cal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-6 months</td>
<td>3 – 7</td>
<td>600</td>
</tr>
<tr>
<td>6 months – 1 year</td>
<td>7 – 9</td>
<td>800</td>
</tr>
<tr>
<td>1 – 3 years</td>
<td>9 – 13</td>
<td>1200</td>
</tr>
<tr>
<td>4 – 6 years</td>
<td>15 – 17</td>
<td>1500</td>
</tr>
<tr>
<td>7 – 9 years</td>
<td>18 – 21</td>
<td>1800</td>
</tr>
<tr>
<td>10 – 12 years</td>
<td>23 – 28</td>
<td>2100</td>
</tr>
</tbody>
</table>

1. Which are the important nutritive factors of the food necessary for the healthy growth of a child?
2. ________________K cal energy is the daily need of a child in the age group 1- 3 years.

**3.2 Balanced diet for children**

A balanced diet is one which contain a variety of foods in such quantities and proportion that supply all the nutritive factors which adequately meet for maintaining health, vitality and general well being.

The amount and quantities in balanced diet vary with individuals. Infants and children, where growth is vital, extra protein, calcium, iron etc. are demanded. The following table gives a balanced diet for children.
Table- 30 Balanced diet for children (in grams)

<table>
<thead>
<tr>
<th>Food items</th>
<th>1 - 3 yrs.</th>
<th>4-6 yrs.</th>
<th>7-9 yrs.</th>
<th>Girls 10-12 yrs.</th>
<th>Boys 10-12 yrs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereals</td>
<td>175</td>
<td>270</td>
<td>300</td>
<td>380</td>
<td>420</td>
</tr>
<tr>
<td>Pulses</td>
<td>35</td>
<td>35</td>
<td>40</td>
<td>45</td>
<td>45</td>
</tr>
<tr>
<td>Leafy vegetables</td>
<td>40</td>
<td>50</td>
<td>50</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Other vegetables</td>
<td>20</td>
<td>30</td>
<td>40</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Roots and tubers</td>
<td>10</td>
<td>20</td>
<td>25</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Fruits</td>
<td>100</td>
<td>100</td>
<td>150</td>
<td>150</td>
<td>150</td>
</tr>
<tr>
<td>Milk</td>
<td>300</td>
<td>250</td>
<td>250</td>
<td>250</td>
<td>250</td>
</tr>
<tr>
<td>Oil and fat</td>
<td>15</td>
<td>25</td>
<td>30</td>
<td>35</td>
<td>40</td>
</tr>
<tr>
<td>Sugar and jaggery</td>
<td>30</td>
<td>40</td>
<td>40</td>
<td>45</td>
<td>45</td>
</tr>
</tbody>
</table>

When meat, fish and eggs are included in the diet, the amount of pulses and milk can be reduced as both these set of items contain high proteins.

**Check your progress 2**

1. What is balanced diet?
2. Name five important food items in a balanced diet.
3. Why the amount pulses can be reduced when meat and fish are included in the diet?

**3.3 Mid-day meal programme**

Children of the school age (5-15 years) form a very important section of the population. In India, they form 1/3rd of the total population. Studies have shown that deficiency diseases are frequent among school children. The School Health Committee (1960) appointed by the Govt. of India emphasized the need for providing mid-day school meals.
**Principles involved in Organizing Mid-day meal programme**

1. The meal should supplement home diet.
2. It should supply at least $1/3$ of total daily calorie and $1/2$ of the protein requirements.
3. It can be easily prepared in schools.
4. The cost of meals should be reasonably low.
5. As far as possible locally available foods should be used.

**Table- 31 A model menu of mid day school meal**

<table>
<thead>
<tr>
<th>Menu</th>
<th>Gram</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereals</td>
<td>80 – 100</td>
</tr>
<tr>
<td>Pulses</td>
<td>30</td>
</tr>
<tr>
<td>Leafy vegetables</td>
<td>30</td>
</tr>
<tr>
<td>Non leafy vegetables</td>
<td>30</td>
</tr>
<tr>
<td>Oils and fats</td>
<td>8</td>
</tr>
<tr>
<td>Milk or substitute</td>
<td>150-200ml</td>
</tr>
</tbody>
</table>

**Check your progress 3**

1. What are the principles involved in organizing a mid day meal programme?
2. Why is mid day meal programme arranged in schools?
3. Which are the main food items in a mid day meal?

**3.4 Let us sum up**

In this chapter we have discussed the nutritional requirements of children, balanced diet and mid day meal in schools to compensate the nutritional deficiencies. If your child exhibit poor eating habits or regularly skips meals, you better consult a doctor for a nutrition screening and assessment. In
addition, make choosing, preparing and eating food a pleasurable experience.

**Assignments**

1. Suggest and prepare a balanced diet for school going children.
2. Suggest and prepare a balanced mid day meal for a school going child of 10-12 years.

**Evaluate Yourself**

1. ‘Breast milk is considered as an ideal food for infants”. Substantiate your answer with scientific evidence.
2. Give four precautions taken in order to reduce infant death rate.
3. How will you assess the health of a newborn?
4. Which are the most common causes of childhood injuries?
5. What is immunization?
6. Which are the main food items to be included in a Mid day meal?

**Activities**

1. Make a table showing the immunization schedule for an infant from birth up to two years.
2. Draw a chart showing a model Mid day meal menu that can be adopted in schools.
3. Arrange a balanced diet for a child up to three years on a table.
4. Make postures and labels with necessary signs and symbols to avoid childhood accidents and injuries.
BLOCK - VII

BLOOD GROUPS

Unit 1  –  Blood groups in Man
Unit 2  -  Blood Transfusion
Unit 3  -  The Rhesus Factor

Block Introduction

You are now entering into one of the most interesting content areas of this learning package. This block contains 3 units. Unit 1 is about the different blood groups in man, Antigens and Antibodies. Unit 2 deals with blood transfusion and the basic things to be observed during a blood transfusion. Unit 3 tells you about the Rhesus factor, an important Antigen present in human blood.

Hope you will enjoy working through the units of this block.

Assess yourself

1. Which are the four major blood groups in man?
2. What are the major components of human blood?
3. What is meant by Agglutination?
4. What is meant by Cross matching?
5. What is Erythroblastosis Foetalis?
Unit 1

Blood Groups in Man

Objectives

Blood groups
Components of Blood
Agglutination
Let us sum up

1.0 Objectives

This unit deals with blood groups in man. At the end of this unit, you will be able to;

(i) Get knowledge about different blood groups in man.
(ii) Understand that blood is grouped based on the presence or absence of Antigens and Antibodies
(iii) Identify the process of agglutination (clumping)

1.1 Blood groups

The science of blood grouping is a branch in medicine and technology, known as serology. Human blood is classified generally into four main groups, A, B, AB and O. This grouping is based on the presence or absence of certain substances called Antigens and Antibodies.

Check your Progress I

1. Branch of medicine and technology which deal with blood grouping is __________________
2. Blood grouping is based on the presence or absence of ______________ and ______________
3. Which are the four major blood groups in man?

1.2 Components of Blood

Human blood consists of basically four components, RBC (Red Blood Cells), WBC (White Blood Cells), Platelets and a liquid portion called Plasma.
Antigens are located on the surface of RBC. There are mainly 2 types of Antigens, Antigen A and Antigen B. Antibodies are present in the blood plasma. They are of two types, Antibody A and Antibody B. Blood groups and their corresponding Antigen and Antibodies are shown in the table below.

**Table-32  Blood groups and Antigen and Antibody present in each group**

<table>
<thead>
<tr>
<th>Blood Groups</th>
<th>Antigen in RBC</th>
<th>Antibodies plasma</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>B</td>
<td>B</td>
<td>A</td>
</tr>
<tr>
<td>AB</td>
<td>A &amp; B</td>
<td>Nil</td>
</tr>
<tr>
<td>O</td>
<td>Nil</td>
<td>A &amp; B</td>
</tr>
</tbody>
</table>
Check your progress 2

1. Which are the major components of blood?
2. Name two major Antigens present in human blood.
3. Prepare a table on different blood groups in humans with corresponding antigen and antibody.

1.3 Agglutination

You have already heard about blood clotting especially when different blood groups mix together. This happens because of the clumping of blood cells. When a person with blood group A gets blood from a person belonging to blood group B, Antigen A present in the A groups blood reacts with Antibody B from the received blood. The Antigen – Antibody reaction is called Agglutination (clumping). This is otherwise called blood clotting. Antigen A always reacts with Antibody A and Antigen B with Antibody B.

Check your progress 3

(1) What is meant by Agglutination?
(2) _______ is the antigen present in Blood group A
(3) _______ is the antibody present in blood group B

1.4 Let us sum up

Human blood is grouped as A, B, AB, O based on the presence or absence of A and B Antigens and A and B Antibodies. One can receive blood only after checking the correct group of the donor. Unmatched groups of blood will agglutinate because of Antigen, Antibody reaction.
Assignments
1. Prepare a colourful chart showing different blood cells in humans.
2. Make a table with different blood groups and the antigen and antibody present in each group.

Unit – 2
Blood Transfusion

2.0 Objectives
This unit talks to you about blood transfusion and at the end of this unit, you will able to
(i) Comprehend the seriousness of blood transfusion,
(ii) Understand cross matching,
(iii) Apply the knowledge in real life situation.

2.1 Blood transfusion – Introduction

Fig: 118 Blood transfusion
Blood transfusion is the injection of blood, taken from one person, given to another person to compensate for the loss of blood due to injuries, operations, diseases etc.

The person who donates (gives) blood is the Donor and the one who receives it is the Recipient. Blood transfusion can be done only after a series of blood tests. These tests are done in order to avoid agglutination or clumping, as these clumps will block blood vessels preventing the flow of blood. This may even lead to kidney failure and death.

Check your progress 1

1. What is Blood transfusion?
2. _________ is the person who donates blood
3. _________ is the person who receives blood
4. Before blood transfusion, a series of tests are done in order to avoid _________

2.2 Cross matching

Before blood transfusion, the compatibility (matching) of donor’s blood with recipient’s blood is done. This set of tests is called cross matching. The compatibility of different blood groups are shown below:

Table-33 Compatibility of Blood groups

<table>
<thead>
<tr>
<th>Blood of Donor</th>
<th>A</th>
<th>B</th>
<th>AB</th>
<th>O</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>B</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>AB</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>O</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
</tbody>
</table>

Key + = Compatible (matching)
- = Incompatible (not matching)
From the above table, it is clear that group ‘O’ can donate blood to any other groups and group ‘AB’ can receive blood from any other group.

Now you examine table 1& 2 clearly. You may now clear about the reason why a person with A group blood cannot receive B group blood and vice versa. It will also make you clear why group ‘O’ is considered as ‘unusual donor’ and group AB as ‘unusual recipient’. But now a days, only same blood group is given to a person, in order to avoid the risk factors.

1. What is meant by cross matching?
2. Why is group ‘O’ considered as ‘Universal donor’?
3. Cross matching is done in order to avoid ______
4. ______ group is considered as Universal recipient.

2.3 Let us sum up

In this unit we have discussed blood transfusion. Blood of donors and recipients are cross-matched before transfusion in order to avoid agglutination. Any mistake in these tests may lead to the death of the recipient. The matching or compatibility of the blood is due to the presence or absence of antigens and antibodies. Based on the presence of A and B antigens and absence of both A and B antibodies AB group is considered as ‘Universal recipient’. Group ‘O’ is considered as ‘Universal donor’ based on the absence of A and B antigens.

Assignments
1. Prepare a short note on the importance of Blood transfusion.
2. Draw a chart showing the compatibility of different blood groups.
Unit – 3

The Rhesus Factor

Objectives

The Rhesus factor (Rh antigen)

Erythroblastosis foetalis

Let us sum up

3.0 Objectives

This unit deals with the Rhesus factor (Rh factor). At the end of this unit you will be able to

(i) Get knowledge about Rhesus factor (Rh factor).
(ii) Understand the meaning of Rh- (Rh negative) Rh+ (Rh positive).
(iii) Analyse the condition that leads to Erythroblastosis foetalis.
(iv) Apply the knowledge in life situation.

3.1 The Rhesus factor

The Rhesus (Rh) factor is an Antigen that is commonly found in blood of humans. If the blood contains the Rh factor, it is Rh+ (Rh positive) and if it does not contain the Rh factor, it is Rh- (Rh negative).

The most important difference of Rh antigen from A and B antigens is that its normal antibodies are not found in human blood. The most interesting fact is that this antigen was first identified in Rhesus monkeys and was named after it. The presence or absence of this Rh factor is decided by the genes. 85% of the population are Rh+, while 15% are Rh-.
1. Rh factor is otherwise called ------factor
2. What is the main difference between Rh+ blood group and Rh- blood group?

3.2 Erythroblastosis foetalis (Rhesus Incompatibility)

This is a usual difficulty caused by Rh antigen. It results in maternal (mother)-foetal (child) incompatibility.

When the mother is Rh- and the father is Rh+, and if their foetus is Rh+, then arises the complication. The foetal blood containing the Rh antigen enters into the maternal blood and induces the formation of the Rh antibodies in the mother’s blood. This is a slow process and by the time the first child may born normally.

But if the mother conceives Rh+ foetus again, the Rh antibodies (already present in the mother’s blood) reach the foetal blood circulation through the placenta, and the foetal blood begins to agglutinate (RBC of foetus destroyed). This condition is Erythroblastosis foetalis or Rhesus Incompatibility. The child may die before or after birth.
A mother with Rh-blood carries her first child who has Rh+ blood inherited from its father. At the time of birth, some of the baby’s blood leak into the mother blood stream. The mother’s immune system develops antibodies to defend her against it. In the second pregnancy, if the baby is Rh+ the antibodies already in mother’s body attack the new foetus’s red cells.

In order to prevent Rhesus incompatibility developing, the rhesus negative woman who has already Rh antibody should take Anti-D immunization. If the injection is given within a couple of days of delivery of her first child (or after an abortion or a miscarriage), the injection will remove the baby’s cells before the mother can produce any antibodies against them. If the diseases (with symptoms of anaemia and jaundice) does develop in subsequent babies, it can be treated by exchanging the baby’s blood with fresh blood from a donor.
3.3 Let us sum up

This unit is about the Rh factor. The Rh antigen commonly found in human blood, usually lack antibodies. Rh antibodies will develop only if there is a chance to mix the Rh+ and Rh- blood. This may happen when Rh- mother conceives Rh+ foetus, which leads to maternal foetal incompatibility (Erythroblastosis foetalis). Taking Anti D immunization can prevent this condition.

Assignment

1. Draw diagrams to explain clearly the condition ‘Erythroblastosis foetalis’.

Evaluate yourself

1. Make a chart showing Antigens and Antibodies present in four groups of human blood.
2. What is blood transfusion? Which are the things to be tested before blood transfusion?
3. Why is Group O considered as Universal Donor?
4. What precautions can be taken in order to prevent Rhesus incompatibility?
BLOCK - VIII

POSTURAL DEFECTS AND CORRECTION EXERCISES

Unit 1 - Posture
Unit 2 - Fundamental Positions
Unit 3 - Postural Defects and Correction Exercises

Block Introduction

There are 3 units in this block. Unit I is about what posture is, unit II tells you about fundamental positions to maintain a good posture and Unit III discuss the important and commonly occurring postural defects and few simple exercises to correct these defects.

Hope you will enjoy working through the units of this block.

Assess Yourself

1. What is meant by posture?
2. What are the main sources of stimuli for postural reflex?
3. State four main factors that lead to the development of poor postures.
4. What is meant by the fundamental position of human body?
   Name any three.
5. What is Kyphosis? Suggest one exercise to correct this defect.
6. What are the main causes behind the formation of Flat foot?
Unit I
Posture

Objectives

<table>
<thead>
<tr>
<th>Contents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Posture – Introduction</td>
</tr>
<tr>
<td>Postural reflexes</td>
</tr>
<tr>
<td>• Static Posture</td>
</tr>
<tr>
<td>• Dynamic posture</td>
</tr>
<tr>
<td>Good &amp; Poor Posture (Causes of poor posture)</td>
</tr>
</tbody>
</table>

Let us sum up

1.0 Objectives

In this unit we will have a discussion on the important aspects of posture.

At the end of this unit, you will be able to

1. Assess the influence of neuromuscular co-ordination in maintaining a good posture.
2. Postural reflexes
3. Good posture and Poor posture

1.1 Posture – Introduction

Posture has been defined as position in which you hold your body upright, against gravity while standing, sitting or lying down. Proper body posture indicates a healthy and strong body, which is due to the co-ordination of nerves and muscles (neuromuscular co-ordination).

1.2.1 Static posture

When a person is in a standing or sitting or any other static position (without movements) a group of muscles will interact in
order to maintain that position in an equilibrium (stable position). Then we can say, that person is in static posture.

1.2.2 Dynamic Posture

When a person is moving, the pattern of posture is constantly modified and adjusted to meet the changing circumstances (movements). Then we can say that person is in dynamic posture.

1. What is posture?

2. How is dynamic posture different from static posture?

1.2 Postural reflexes

Postures are maintained or adapted as a result of neuromuscular co-ordination. The muscles of the body are responding to various stimuli from the environment. Reflexes are the sudden responses to a stimulus.

Postural reflexes are the responses of the body towards stimuli from various sources of the body such as muscles, eyes, ears, skin, joints etc. This will affect the posture of each person as the muscles of the body may stretch or relax based on the stimuli. The diagram below shows the postural reflexes of a person.
1. What is a postural reflex?

2. What are the main sources of stimuli for postural reflex?
1.3 Good Posture and Poor Posture

Posture is said to be good when it fulfills the purpose for which it is used with maximum efficiency and minimum effort. It involves training your body to stand, walk, sit and lie in position where the least strain is necessary to muscles and joints. The proper posture reveals a sound mind, self-confidence, happiness and determination.

Good posture develops as a result of good health, correct development of muscles and the postural reflexes. More over
(a) A stable psychological background (emotions & mental attitude)
(b) Good hygienic conditions
(c) Opportunity for plenty of natural movements will also affect the posture of a person.

**Poor Posture**

Posture is poor when it fails to serve the purpose for which it is designed, or if an unnecessary amount of muscular effort is used to maintain it.

The factors that lead to the establishment of a poor posture may be

(a) Mental attitude of the person
(b) Poor hygienic conditions
(c) Prolonged illness
(d) Localised pain
(e) Lack of physical exercise
(f) Occupational stress
(g) Lack of nourishment (balance diet) etc.
Poor fortune leads to anxiety, unhappiness & pessimism.

Check your progress 3

1. What is a good posture?
2. What are the main factors that fall behind a good posture?
3. What is poor posture?
4. Name four main factors that lead to poor posture.

1.4 Let us sum up

We have discussed the posture, postural reflexes, good and bad postures. A good posture is developed as a result of neuromuscular co-ordination. And this is facilitated by good health, emotional stability and proper hygienic conditions. As far as possible avoid the conditions that lead to poor posture, we can develop and maintain a good posture.

Assignments

1. Write a short note on Postural reflexes.
2. Prepare posters showing good and bad postures.
3. Prepare a brief report on factors that lead to the development of poor posture.
Unit 2

Fundamental Positions

Objectives

2.0 Objectives

In this unit we will have a discussion on the important aspects of fundamental positions.

At the end of this unit you will be able to understand.

1. The fundamental positions of human body.
2. Correct reading and writing postures.
3. Importance of fundamental positions in maintaining a good posture.

2.1 Introduction

The postures from which movements are initiated or started are known as starting positions or Fundamental positions. There are five basic or fundamental positions and all others are derived from them i.e. standing, kneeling, sitting, lying and hanging.

2.1.1 Standing

This is the most difficult among the fundamental positions to maintain. While standing, the body weight should rest on both the legs and feet equally. There should be a balance and the whole body should be vertical and erect. The head should be in between the two shoulders, chin drawn in, the chest show forward with shoulders in balance and the back should be erect with natural curves. The arms hang loosely to the sides, palms facing inwards towards the body.
Fig: 123 Standing Posture

*Walking*

Fig: 124 Walking Postures
A good standing posture has certain influence on good walking. A person has to be erect while walking. When the left leg moves forward the right hand must be swung backward and vice-versa. In walking the heel should touch the ground first.

2.1.2 Sitting

Fig: 125 Sitting Posture

In a good sitting posture, the head, shoulders and the hip are in a straight vertical line. The backbone should be in its natural curve. The body is placed symmetrically on the pelvis (hip bone) and the hip is properly placed at the seat and supported by backrest. The arms are balanced and the legs should rest vertically on the feet, the thighs horizontal. The head must be placed in such a manner as to give relief to the neck muscles in the front.

2.1.2.1 Reading

For correct reading posture, the principles of sitting posture is to be followed. In addition to that, the holding of the book should form 45° with the eyes and the distance of the book to the eyes should be 12 inches.
2.1.2.2 Writing

One should write in an upright manner. In a good posture of writing, the thighs must be horizontal, legs vertical and rest comfortably on the ground. The height of the table should be according to the height of the person.
The right arm should rest comfortably on the desk and the hand, wrist and little finger will make writing effortless. The thumb and the two fingers near it should hold the pen.

2.1.3 Kneeling

Fig: 128  Kneeling Posture

In kneeling position, the body is supported on the knees which may be together or slightly apart. The lower leg rests on the floor with the feet bend.

2.1.4 Lying

Fig: 129  Lying Posture

This is the easiest of the fundamental positions as the body can be completely supported and is very stable.
2.1.5 Hanging

Fig: 130  Hanging Posture

The body is suspended by grasping over a horizontal bar, the arms straight and at least shoulder width apart. The head is held high the neck appears as long as possible. The trunk and legs hang straight, with the heels together and the ankles bend to the floor.

Check your progress 1

1. What are the fundamental positions or starting positions of a human body?
2. Briefly state the correct posture of reading position.
3. In order to maintain a correct posture, what are the points to be kept in mind while walking.
4. Briefly state the correct posture of writing position.
5. Which is the easiest of the fundamental positions? Why?
6. Explain the correct hanging position of a human body.
2.2 Let us sum up

The five fundamental or starting positions of the body are standing, sitting, kneeling, lying and hanging. Equilibrium and stability are maintained in these positions by a balance of forces acting upon the body (muscular contraction). Postural reflexes usually control this.

Assignments

1. Check the postural positions of your classmates and try to correct the faulty postures.
2. Draw pictures of fundamental positions.

Unit 3

Postural Defects and Correction Exercises

Objectives

Let us sum up

3.0 Objectives

In this unit we will discuss the important postural defects and certain simple exercises to correct these postural defects.

From this unit you will be able to know about
1. Kyphosis and its correction exercises
2. Lordosis and its correction exercises
3. Scoliosis and flat foot
4. Correction exercises for scoliosis and flat foot.
3.1 Postural defects & correction exercises - Introduction

This unit presents the important aspects of postural defects and correction exercises. The important postural defects discussed here are Kyphosis, Lordosis, Scoliosis, Flat foot, Flat chest, Potbelly, Stiff neck, Stoop shoulders, Knock knees, etc are some other postural defects.

We have already discussed the poor posture and factors of which leads to it. Now we are going to deal with major postural defects. These defects are the following.

3.1.1 Kyphosis

This is the forward bending of the spine. It is otherwise called 'humpback'.

Fig: 131 Kyphosis
The main causes for Kyphosis are found to be weak muscles, malnutrition, long illness, wrong furniture, unhygienic environment etc. This postural defect usually develops during childhood because of wrong postures they adopt during their school hours.

There are some simple exercises to correct these postural defects during its early stages.

**Correction exercises**

**Exercise No.1**

(i) Lying on the back with knees drawn up and feet flat on the floor and hands at sides.

(ii) Then move arms side horizontal, then along the floor to position our head, palms still up.

(iii) Hold for a few minutes & repeat.
Exercise No. 2

(i) Prone lying (lying on the floor with face downwards)
(ii) Place hands on hips.
(iii) Then raise head & trunk several inches from floor, then down.
(iv) Repeat.

Fig: 133 Correction Exercise No.2 - Kyphosis

Exercise No: 3

(i) Sitting portion, neck firm & fingers laced behind head.
(ii) Then stretch trunk, neck, head and elbows upward keeping back straight and trunk erect.

Check your progress 1

1. A postural defect with forward bending of spine is called ------
2. Give four main causes of Kyphosis.
3. State any one exercise to correct the postural defect Kyphosis.

3.1.2 Lordosis

This is the backward bending of spine

Round shoulders and prominent abdomen accompany this deformity. This deformity may be due to under-development of legs, dislocation of hips, faulty standing posture, malnutrition etc.
Like Kyphosis, Lordosis can also be corrected through some simple exercises in its early stages.

**Correction exercises**

**Exercise No.1**

(i) Stride standing (legs are straightened and heels are two foot length apart.)

(ii) The feet remain at the same angle and the weight is equally distributed between them.

(iii) The trunk flexed and grasp left ankle with both hands and pull the trunk upward for three counts.

(iv) Repeat to opposite side.

Fig: 134  Lordosis

Fig: 135 Correction Exercise No.1 - Lordosis
**Exercise No: 2**

(i) Sitting positions, knees extended, feet together, and hands at sides.
(ii) Then bend forward touching fingers to toes, hold for three counts.
(iii) Relax and repeat.

Fig:136  Correction Exercise No.2 - Lordosis

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**Check your progress 2**

1. How is Lordosis different from Kyphosis?
2. Briefly state one correction exercise for Lordosis.

**3.1.3 Scoliosis**

This is the lateral curvature of spine to one side.

Fig:137  Scoliosis
This defect can start in childhood which gradually becomes worse until the child stops growing. It may also occur as congenital (by birth) or acquired from poor posture. This may appear in children who have legs of different lengths.

Juvenile Scoliosis can be treated by fitting a brace or jacket. When this happen because of poor posture, some correction exercises are there like the earlier cases.

**Correction Exercises**

**Exercise No.1**

(i) Prone lying, right arm upward, left arm at side.
(ii) Then move right arm in an arc towards the left over head.
(iii) Press the right arm with left arm and slide left hip up.
(iv) Repeat on other side.
Exercise No.2

(i) Standing with feet few inches apart.
(ii) Then raise left heel and left hip.
(iii) Extent right arm on an arc over head to the left.
(iv) Press left hand against ribs on left side.

Fig: 139  Correction Exercise No.2 - Scoliosis

Check your progress 3

1. What is Scoliosis?
2. Give three conditions which may lead to Scoliosis
3. State any one correction exercise for Scoliosis.

3.1.4 Flat foot

Fig: 140  Flat Foot

This postural defect may occur by birth or acquired. In a normal foot there are two curves or arches, one longitudinal and the other transverse in between the big toe & the little toe.
Flat foot is a condition in which both these arches are missing, so that whole sole of the foot rests on the ground. The foot muscles & ligaments supporting the long arch become weak & the foot is flattened.

The main causes identified for flat foot are putting on heavy shoes, long standing position without rest, jumping on hard surface and carrying over weight.

**Correction Exercises**

**Exercise No.1**

(i) Sitting position with knees fixed, feet together and flat on the floor.
(ii) Then place hands on the floor behind the back.
(iii) Raise inner border of feet, keeping toes and heels on floor.
(iv) Relax and repeat.

Fig: 141 Correction Exercise No. 1 – Flat Foot

**Exercise No.2**

(i) Standing position, with toes turned in.
(ii) Then rise on balls of feet, shifting weight to outside of each foot.
(iii) Hold position and then return heels to floor.
1. Describe briefly the symptoms of Flat foot.
2. What are the main causes behind the formation of Flat foot?
3. Give the steps for one correction exercise for Flat foot.

3.2 Let us sum up

In this unit you have come across four major postural defects such as Kyphosis, Lordosis, Scoliosis, Flat foot and one or two simple exercises to correct these defects. One of the major point you should keep in mind is that "prevention is better than cure" i.e., practicing good habits, taking balanced diet, proper physical exercise. Moreover, maintaining a good posture will prevent you from developing postural defects.

You know childhood is the most formative period of everyone's life. As the children spend six to seven hours in a day in school, it is the school that will provide knowledge of good posture to its pupils. And it is the teacher who must understand it and transmit it to the pupils.

Most of the schools have faulty sitting arrangements due to improper furniture. So the teacher should draw the attention of headmaster with regard to light, ventilation, continuous and long sitting periods. The teacher should promote daily exercise, drill, yogasanas and give correction exercises for those students who need it. Thus the role of teacher is vital in all these aspects.

Assignments

1. Prepare short note on the main postural defects like Kyphosis, Lordosis and Scoliosis.
2. Prepare detailed sketches regarding the correction exercises for Postural Defects like Kyphosis, Lordosis, Scoliosis and Flat foot.
Evaluate Yourself

1. How is Dynamic posture different from Static postures?
2. What is a good posture? Which are the main factors necessary for the development of a good posture?
3. Briefly state the correct posture of reading position.
4. In order to maintain a correct posture, what are the main points to be kept in mind while walking?

Activities

1. Perform one exercise to correct postural defect Kyphosis.
2. Perform one exercise to correct postural defect Lordosis.
3. Perform one exercise to correct postural defect Scoliosis.
4. Perform one exercise to correct postural defect Flat foot.