Chapter-3: Methodology
METHODOLOGY

Study design refers to the logical manner in which units of the study are assessed and analyzed for the purpose of drawing generalizations. The methodology of the present investigation entitled, ‘Age-related differences in lifestyle, dietary patterns and their impact on health and nutritional status of male police constabulary of district Jhunjhunu, Rajasthan’, has been discussed under following sections-

1. Research Plan
2. Locale and sample selection
3. Statement of hypothesis and variables
4. Tools and techniques of data collection
5. Methods of data analysis.

A brief description of above parameters is as follows-

1. Research Plan

The research plan provides the bird’s eye view of any research describing its ideas and outlining the process of investigation from beginning to end. The research plan of the present study is depicted on the following page.
RESEARCH PLAN

Fig. 3.1 Research Plan
2. **Locale and Sample Selection**

The study was carried out in district Jhunjhunu, which lies in the Shekhawati belt of Rajasthan and is divided into 19 police stations (as shown in Figure 3.2). The total strength of constables in the district was 709, out of which 659 were males and 50 females. The minimum age of joining the service is 18 years and age of retirement is 60 years. The places of duty included police station, police line, office, guard duty, traffic and control room.

![Map of Jhunjhunu District](source: Crime in Rajasthan, 2012)
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Criteria for selection

- The subjects were in the age range of 20-60 years.
- They were willing to participate.
- Their place of duty, type of residence and source of daily diet was not controlled.

Sampling technique

The list of police constables with their names, belt numbers, date of birth and date of joining the service was taken from the office of the Superintendent of Police and was sorted according to the age to divide the subjects into two groups as follows-

- Group I consisting of subjects 20-40 years of age
- Group II consisting of subjects 40-60 years of age

150 subjects from each category were selected at random with the sampling technique as follows.

Fig. 3.3 Sampling Technique
3. **Statement of Hypothesis and Variables**

**Hypothesis**- As the age and years of service advance, lifestyle and dietary patterns change which affect the health and nutritional status of male police constable.

Different parameters of the present study have been classified into-

a. **Independent Variables**
   - General information including age, caste, religion, education, place of residence, marital status, size and type of family, monthly income etc.
   - Occupational information including place of posting, years of service etc.

b. **Dependent Variables**
   - Lifestyle parameters including physical activity pattern, occupational stress and other non-food habits like alcohol drinking, smoking, tobacco chewing and other substance use.
   - Dietary patterns and food habits including frequency of food consumption.
   - Health and nutritional status including anthropometric assessment, food and nutrient adequacy, clinical assessment and health history, biochemical estimation and biophysical examination.

4. **Tools and Techniques of Data Collection**

   Various tools for different aspects of data collection included questionnaires and appropriate equipments. All the questionnaires were designed and pre-tested on a sub-sample (n=10) to make necessary
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modifications before administering on the total sample in each group (n=150). Similarly, the equipments used for nutritional status assessment were standardized and then administered.

The tools used for collection of data according to above listed variables are as follows-

a. General and Occupational Information-

Tool- Structured interview schedule/ questionnaire (Appendix-I) was designed, pretested and administered as described below.

Designing - A questionnaire was designed to elicit the following-

• General information including age, caste, religion, education, place of residence, marital status, size and type of family, total family income, profession of spouse etc.

• Occupational information including place of posting years of service, other engagements etc.

Pre-testing - The designed questionnaire was pre-tested on a sub-sample of 10 policemen each from the two age groups. After analyzing the responses obtained and considering the difficulties faced, it was modified to make it more functional.

Administration - The pre-tested schedule was administered on the subjects (n=150) in each of the two groups after explaining them the required objectives.
b. **Lifestyle-** The study has classified lifestyle parameters into-

i. **Physical Activity Pattern**

    • Physical activities on basis of their type as defined by FAO/WHO/UNU (1985) are as follows:
      • Sleep
      • Occupational activities
      • Discretionary activities
        ➢ Household activities
        ➢ Leisure-time / socially desirable activities
      • Activities for cardio-vascular maintenance / exercise
      • Residual

    • Physical activities on basis of their intensity as defined by FAO/WHO/UNU (1985) are as follows:
      • Sedentary activities - 75% of time sitting or standing
        25% of time standing and moving
      • Moderate activities - 25% of time sitting or standing
        75% of time spent on specific occupational activity
      • Heavy activities - 40% of time sitting and standing
        60% of time spent on specific occupational activity
Tool- Activity profile of subjects (Appendix-II) along with a structured schedule (Appendix-III) reflecting the physical activity pattern including activities performed by the subjects, both occupational and non-occupational (FAO/WHO/UNU, 1985) along with their duration was used to obtain information.

Designing, Pretesting and Administration- The activity profiles, both occupational and non-occupational, of the subjects in the two groups was assessed in detail and thereafter classified according to their types and intensities as per FAO/WHO/UNU (1985) (Appendix-II). Then, a structured schedule (Appendix-III) was developed to reflect the physical activity pattern of the subject along with their duration. The designed questionnaire was pretested and administered as explained in the previous section.

ii. Occupational Stress

Tool-To measure occupational stress, Occupational Stress Index developed by Srivastava and Singh (1984) for Indian conditions (Appendix-IV) was used. The scale consists of forty six items, each to be rated on the five-point scale. Of the total of 46 items, 28 items are 'true-keyed and rest 18 are false-keyed'. The items related to relevant components of the job life which causes stress in some way or the other, such as role overload, role ambiguity, role conflict, unreasonable group/political pressure, responsibility for person, under participation, poor peer relationship, powerlessness,
intrinsic impoverishment, low status, strenuous working condition and unpredictability. Based on the norms developed for the occupational Stress Index, the total scores obtained on all the twelve subscales were categorized into high (156-230), moderate (123-155) and low (46-122) occupational stress. Scoring of the test is mentioned in Appendix-IV.

iii. Other Non-Food Habits

Tool- Structured interview / questionnaire (Appendix-V) was used to elicit this information on other non-food habits like drinking alcohol, smoking, tobacco and substance use etc. The tool was pre-tested and administered.

c. Dietary Patterns-

Tool- Structured interview schedule/ questionnaire (Appendix-VI, Part I) which contained information on meal patterns, meal frequency, meal skipping, fasting, eating out, food likes and dislikes, nutrition knowledge, source of drinking water, type of fat and milk consumed etc. Further, the frequency of consumption of various food groups was obtained individually. It was administered after its pre-testing.

d. Health and Nutritional Status -

Health profile included the recent history of disease along with the incidence of degenerative diseases like hypertension, dyslipidemias and diabetes were also reflected.
Nutritional status can be assessed by:

- Indirect including recording of a variety of vital statistics like mortality and morbidity rates along with other ecological factors, and
- Direct including measuring certain indicators on representative samples of community like body measurements, dietary intake, clinical and biochemical parameters (Jelliffe, 1989).

A single method of nutritional status assessment is incomplete by itself, thus a combination of methods should be employed for more accurate and reliable results (Jelliffe, 1989).

The present study applied the following methods of direct assessment of nutritional status as follows-

i. **Anthropometric Assessment**

ii. **Food and Nutrient Adequacy**

iii. **Clinical Assessment and Health History**

iv. **Biochemical Estimation**

v. **Biophysical Assessment**

**i. Anthropometric Assessment**

For adult males, to gain information about general and abdominal obesity, indices of Body Mass Index (BMI) and Waist-to-Hip Ratio (WHR) are commonly used (WHO, 2004; WHO, 2008). These were derived from the following measurements-
a) Weight

Body weight is mainly made up of muscles, fat, bone, and interior organs (Jelliffe, 1989). It reflects current nutritional status.

Tool- A bathroom scale with a least count of 0.5 Kg was used for recording weight, for its portability, inexpensiveness and convenience for field work.

Standardization- The accuracy of balance was checked from time to time with known weights.

Technique- The subject was with minimal clothing. The time of recording was fixed for each day between 10:00 AM to 12.30 PM. After correcting zero error, two readings were taken and the mean was calculated.

b) Height

The height of an individual is made up of sum of four components- legs, pelvis, spine and skull (Jelliffe, 1989). It reflects past nutritional status.
Tool- An anthropometric rod was used to measure height as it is easier to operate and more reliable than non-stretch fibre-glass tape.

Technique- The subject was asked to stand barefoot on a flat floor with feet parallel to it and head in the Frankfurt's plane, i.e. the imaginary line joining the ear and eyes parallel to ground. The top piece of the anthropometer was slid down till it made a contact with the head. Two readings were taken and mean calculated.

c) Waist and Hip Circumferences

The ratio of waist to hip circumference gives an indication of abdominal adiposity (Jelliffe, 1989).

Tool- A non stretch fibre-glass tape was used.

Technique- The person stood straight. The two circumferences were measured by including the maximum girth respectively, i.e. at the navel point for waist and buttocks for hip circumference (Houmard et al, 1991). The tape lied parallel to the floor.

ii. Food and Nutrient Adequacy

For this parameter, food and nutrient intake was calculated first. Marr (1971) has suggested various methods to obtain information on the dietary intake which include dietary history, inventory or log book method, oral
questionnaire (24-hour recall) method, weighment method and chemical analysis.

In the present study, 24-hour dietary recall method for 3 days including 2 weekdays and 1 holiday were taken.

Tools

- An oral questionnaire (Appendix-VI, Part II) for eliciting information on 24-hour dietary recall for three days, considering the intake of therapeutic supplements, was used as it is simple, quick feasible, flexible and at the same time accurate.

- A 24-hour dietary recall kit containing a set of standardized utensils and food models to facilitate recall was also used.

Standardization of household measures- Known amounts of raw foods for various recipes were cooked and weights of the cooked foods were taken for each item. This facilitated to calculate amounts of raw foods in the cooked preparations consumed by the subject. Standardization of utensils, raw and cooked food stuffs and food models was carried out (Appendix-VII, VIII).

Pre-testing of the questionnaire was done using the 24-hour recall kit and then it was administered on subjects for 3 days including 2 weekdays and 1 holiday.
iii. **Clinical Assessment and Health History**

Clinical signs are changes in the body which are indicative of nutrient deficiency or excess. For the present study, the clinical examination was carried out with the help of a qualified physician. The subjects were examined in sunlight and observed for signs and symptoms of nutritional deficiencies. Health information including past history of illnesses, record of sickness absence etc. were also noted.

**Tool** - A pro-forma (Appendix-IX) consisting of information on health including past history of illnesses, record of sickness absence etc. was designed. Signs and symptoms of various nutritional deficiencies, both macro- and micro-nutrients were also seeking the help of a physician.

**Administration** - The subjects in the two groups were checked for presence or absence of signs and symptoms of nutritional deficiencies, if any, in the presence of a qualified physician.

iv. **Biochemical Estimation**

The hematological tests were performed to assess the following-

- Serum lipids
- Fasting blood glucose
- Hemoglobin

The help of a qualified technician was sought for collection of blood samples as subjects could be more comfortable and assured with his services.
Hematological estimation requires invasive techniques and proper precautions were taken. All the tests were carried out and analyzed in the laboratory of Birla Institute of Technology and Science (BITS), Pilani, Jhunjhunu. The details of the tests are presented in Appendix-X.

v. Biophysical Assessment

Blood pressure was measured using a sphygmomanometer by the help of a qualified technician. Duplicate readings were taken.

5. Methods of Data Analysis-

The collected data was classified into various categories. The methods employed for analysis of collected data are discussed according to different parameters as follows-

a. General Information

Based on the information obtained from general information pro-forma (Appendix-I):

- Mean ± s.d. of subjects in various enlisted categories was calculated
- % of subjects in each category was represented

b. Lifestyle

i. Physical Activity Pattern

- From the information obtained on physical activity (Appendices- II and III), the time spent per day in different activities was calculated for both the groups as follows (FAO/WHO/UNU, 1985):
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- According to type of activity
  - Sleep
  - Occupational activities
  - Discretionary activities
    - Household activities
    - Leisure-time / socially desirable activities
      - Activities for cardio-vascular maintenance / exercise
      - Residual
  - According to intensity of activity
    - Sedentary
    - Moderate
    - Heavy
- Mean ± s.d. of subjects in each category was calculated
- % of subjects in each category was represented

ii. Occupational Stress Index

Occupational Stress Index (Srivastava and Singh, 1984) (Appendix-IV) consists of forty six items, each to be rated on the five-point scale. Of the total of 46 items, 28 items are 'true-keyed and rest 18 are false-keyed'. Based on the norms developed for the Occupational Stress Index, Srivastava and Singh (1984) categorises the total scores obtained on all the twelve subscales into 3 categories as follows (unit=individual score):

- Low - 46-122
- Medium - 123-155
- High - 156-230
The information obtained was analysed as follows:

- Calculation of Occupational Stress Index for each subject in both the groups.
- Mean ± s.d. of subjects in each category.
- % of subjects in each category.

iii. Other Non-Food Habits

From the information obtained from pro-forma on non-food habits (Appendix-V), following aspects were analysed:

- Smoking and its frequency
- Alcohol drinking and its frequency
- Tobacco & substance use
- Others

  - Mean ± s.d. of subjects in each category was calculated
  - % of subjects in each category was represented.

c. Dietary Patterns

From the information obtained from pro-forma on non-food habits (Appendix-VI, Part I), the analysis is categorized as under:

- Meal patterns (no. of meals/day)
- Meal skipping and frequency
- Fasting patterns and frequency
- Eating out patterns and frequency

  - Mean ± s.d. of subjects in each category was calculated.
  - % of subjects in each category for both the groups was highlighted.
d. **Health and Nutritional Status**

Following parameters were analyzed-

i. **Anthropometric Assessment**

ii. **Food and Nutrient Adequacy**

iii. **Clinical Assessment and Health History**

iv. **Biochemical Estimation**

v. **Biophysical Assessment**

vi. **Prevalence of Metabolic Syndrome**

i. **Anthropometric Assessment**

Various indices of physical assessment are analyzed as under:

a) **Body Mass Index (BMI)**

- Categories (WHO, 2004) Unit Kg/m²
  
  - \(< 18.5\) - Underweight
  
  - \(18.5 - 24.99\) - Normal range
  
  - \(25.0 - 29.99\) - Overweight
  
  - \(\geq 30.0\) - Obesity

- Calculation of BMI from weight (Kg) and height (m) for each subject.

- Mean ± s.d. of subjects in each category.

- % of subjects in each category.
b) **Waist-to-Hip Ratio (WHR)**

- Categories (WHO, 2008)
  - < 0.90 - Normal
  - ≥ 0.90 - At risk of metabolic complications
- Calculation of WHR from waist and hip circumferences for each subject.
- Mean ± s.d. of subjects in each category.
- % of subjects in each category.

ii. **Food and Nutrient Adequacy**

From the data gathered from 24 hour recall (Appendix-VI Part II) and standardization (Appendices VII and VIII), the following was calculated:

- Group mean ± s.d. of food intake for each food group was compared with the RDI (NIN/ICMR, 2011) and expressed as % of RDI.
- Group mean ± s.d. of nutrient intake for each nutrient to be compared with RDA (ICMR, 2010) and expressed as % of RDA.

iii. **Clinical Assessment and Health History**

As reflected by the information on clinical assessment and health history pro-forma (Appendix-IX),

- Mean ± s.d. of subjects in each category of nutritional deficiency was seen.
- % of subjects in each category of nutritional deficiency was represented.
iv. **Biochemical Estimation**

The following hematological parameters were analysed:

a) Serum lipids  
b) Fasting blood glucose  
c) Hemoglobin  

**a) Serum Lipids**

The following lipid levels were tested:

- Triglycerides  
- VLDL-C  
- LDL-C  
- HDL-C  
- Non-HDL Cholesterol  

Values of above indices were compared with their normal values (NCEP-ATP III, 2001) and were classified as normal or high as follows:

**Total Cholesterol (mg/dl)**

- <200  Desirable levels  
- 200-239  Borderline high risk  
- ≥240  High risk  

**LDL (mg/dl)**

- <100  Optimal  
- 100-129  Near optimal
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- 130-159 Borderline high
- 160-189 High LDL
- ≥190 Very high LDL

**HDL (mg/dl)**
- <40 Very low
- 40-49 Borderline
- 50-59 Near optimum
- ≥60 Optimum

**TG (mg/dl)**
- <150 Normal range; low risk
- 151-199 Borderline High
- 200-499 High
- ≥500 Very high; high risk

- Mean ± s.d. of subjects in each category.
- % of subjects in each category.

b) **Fasting Blood Glucose**

- Categories (ADA, 2004) Unit= mg/dl
- Normal < 100
- Impaired Fasting Glucose 100-125
- Diabetes Mellitus > 126

- Mean ± s.d. of subjects in each category.
- % of subjects in each category.
c) **Hemoglobin**

- Categories (WHO/UNICEF/UNU, 2001) Unit= gm% 
  - Normal >13 
  - Anemic < 13 
- Mean ± s.d. of subjects in each category. 
- % of subjects in each category for both the groups

v. **Biophysical Assessment**

a) **Blood Pressure**

   The reference for analysis taken is according to the seventh report of the joint national committee on prevention, detection, evaluation and treatment of high blood pressure (JNC VII, 2003).

- Categories SBP/DBP (JNC VII, 2003)
  - <120 and <80 - Normal 
  - 120-139/80-89 - Prehypertension 
  - 140-159/90-99 - Hypertension, Stage 1 
  - ≥160/≥100 - Hypertension, Stage 2 
- Mean ± s.d. of subjects in each category. 
- % of subjects in each category for both the groups
vi. **Prevalence of Metabolic Syndrome**

Frequency Distribution of Respondents According to Prevalence of Metabolic Syndrome Risk Factors and Metabolic Syndrome (NCEP-ATP III for South Asians, 2001) was represented as under:

- **Risk Factors (NCEP-ATP III, 2001)**
  - Abdominal Obesity (≥ 90 cms)
  - TG ≥ 150mg/dl
  - HDL-C (<40mg/dl)
  - Blood Pressure (≥ 130/ ≥ 85)
  - Blood Sugar Fasting (≥ 110)
- Further, presence of any three criteria of metabolic syndrome was also assessed.

**Statistical Analysis**

The data was entered in a database and was analyzed using SPSS program (SPSS Inc, Chicago, USA Version 16.0). Data was checked randomly to find out any errors in the entered data. It was analyzed as follows:

1. Test of significance between two independent means of various parameters for two groups (inter-group analysis).
2. Coefficient of correlation between relevant independent and dependent variables in each group (intra-group analysis).

Nominal and ordinal variables were calculated as frequencies and continuous variables were presented as mean ± SD. The prevalence rates were
reported as percentage. Inter group analysis of nominal and ordinal variables were done using chi square test while mean values of two groups were compared using independent t-test.

Dietary and nutrient intake data of the subjects was compared with the recommendations given by Indian Council of Medical Research using z-test.

Coefficient of correlation between relevant independent and dependent variables was calculated to assess the relationship between different variables. P-value less than 0.05 was considered significant.

**Graphical Representation**

Bar graphs, pie charts and other relevant graphs were plotted highlighting the differences between the two groups of subjects under study.