MATERIALS AND METHODS

Phase I: SURVEY
1. Locale of the Study
2. Sample Selection

Phase II
EXPERIMENTAL PHASE IMPACT ASSESSMENT
1. Pre-intervention
2. Intervention
3. Post intervention

Nutrition and complete lifestyle modification package
The chapter furnishes methodological details of the present investigation with a view to assessment of weight reduction in overweight adult people with a combination treatment of electronic devices, diet and physical exercise. This methodology refers to the logical manner in which units of the study were assessed and analyzed for the purpose of drawing conclusion methodological details are as follows:

**OPERATIONAL DESIGN**

Study was conducted in two phases so as to accomplish the objectives of the study.

**Phase I : Survey**

1. **LOCALE OF THE STUDY**

   The study was conducted within the municipal limits of Udaipur City, Rajasthan. One of the weight reduction centers, perfect point care Ltd. was selected for the purpose of study, in Udaipur City, Rajasthan.

2. **SAMPLE SELECTION**

   **For Survey:** A survey was conducted so as to gather information about various methods adopted by overweight population for weight loss for the purpose one hundred eighty adult (180) peoples. (90 male and 90 female) in the age group of 30-40 year. For the selection of subject, head of the perfect point weight reduction center was contacted and a list of all members/client was prepared. The selection of subjects based on the following criteria:

   - Age between 30-40 year.
   - Persons with body weight 10 percent in excess of the ideal weight/ BMI between 25-30 kg/m².
   - Those involved in sedentary activity.
- Not suffering from any service and moderate form of non-communicable disease.
- Willing to participate and co-operate during the course of investigation.

**Phase II**

**Experimental Phase Impact Assessment**

1. Pre-intervention

2. Intervention

3. Post intervention

1. **Pre-intervention**

   **Development of tool and data collection:** For the assessment of overweight, an interview schedule was developed to collect the information as per the objectives of study, covering following section:-

   Section I : Background information of study

   Section II : Specific information of the subject

   Section III : Assessment of Nutritional Status

   a) Dietary Survey

   b) Anthropometric Measurement

   c) Body Mass Index (BMI)

   d) Body Composition Analysis. (BCA)

**Section I – Background information:** This section gathered information related to personal particulars. This part included information about respondent's age, religion, caste, type and size of family, education, family occupation, marital status.
**Measurement of Variables:** Independent variable in the study refers to personal particulars of the respondent’s viz. age, caste, type and size of family, education, family occupation, and marital status. The details of these attributes with their respective measures are as follows:-

- **Age:** Age of the respondents was defined as the numbers of years completed by the respondents at the time of interview
  
  30-40 years

- **Education:** On the basis of education level, respondents were grouped under following categories:
  
  (a) Illiterate
  
  (b) Can sign
  
  (c) Can read and write
  
  (d) Primary
  
  (e) Middle
  
  (f) Secondary
  
  (g) Graduation & above

- **Caste:** Information regarding caste of the respondents was recorded under four categories:
  
  (a) SC
  
  (b) ST
  
  (c) OBC (Other backward castes)
  
  (d) General or upper caste

- **Marital Status:** Marital status was categories into these groups:
  
  (a) Unmarried
  
  (b) Married
  
  (c) Widows
  
  (d) Divorced
• **Type of family:** Depending upon the composition of the family. Respondents were categorized into two categories:

(a) Joint family 
(b) Nuclear family

**Section II: Specific information of the subject:** This part included information about respondent's medical history, life style and information about adopting weight reduction technologies.

**Section III : Assessment of Nutritional status:**

Adequate dietary intake is fundamental for good health & good quality of life. Inadequate nutrition ranks as one of the major problems of overweight people. There is a strong association between nutrition and many digestive diseases that commonly affect the adult people. Nutritional status of an individual is assessed by several methods. In includes dietary survey, anthropometric, clinical, biochemical assessment.

Methods of nutritional status assessment used in the present invesgation are given below:

(a) **Dietary survey:** Detailed information on dietary intake of adult people was gathered by "24 hours recall method". Actual diet consumed by the subjects was found out with the help of standard set of cups. From the cooked and raw amount of foods, the raw amount of foods consumed by each subject was then calculated.

<table>
<thead>
<tr>
<th>Raw amount of a particular food stuff consumed by the individual from a preparation (g.)</th>
<th>Individual Intake of cooked amount of the pre amount of the preparation (g.)</th>
<th>Total raw quantity of food stuff in the preparation (g.)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>=   \times</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total Cooked quantity of the preparation (g.)</td>
</tr>
</tbody>
</table>

Information thus obtained was converted in terms of nutrients with the help of food composition tables (Gopalan *et. al.*, 1998) and was compared with dietary recommendations for adult population suggested by ICMR (2010).From
the cooked and raw amount of foods, the raw amount of foods consumed by each subject was then calculated.

**Food habits:** On the basis of foods generally consumed adult men & women were categorized into following categories:

i. **Vegetarian:** A vegetarian is a person who uses a diet that includes plant food but eliminates one or more of these foods, meat, poultry, fish & egg.

ii. **Non – vegetarian:** Non – vegetarian person includes plant food, milk, eggs, meat, poultry, fish in the diet.

iii. **Ovo – vegetarian:** Consuming egg along with plant foods, milk & milk products, they abstain from meat, poultry & fish.

iv. **Non-vegetarian but usually vegetarian:** Consuming egg, meat, poultry rarely but plant food and milk etc. usually.

(b) **Anthropometric Measurements:** The pattern of growth and physical state of the body are profoundly influenced by diet and nutrition. Hence anthropometric measurements are useful criteria for assessing the nutritional status. Some possible body measurements which are simple and easy at the same time giving maximum information on nutritional status were chosen for present study. The measurements which were taken are as follows:

i. **Weight:** It is most commonly used anthropometric measurement. Weight indicates the current nutritional status. It is made up of muscle, fat, skeleton & internal organs & gives a fairly good idea of nutrition (Jellife, 1966).

**Technique:** A electronic digital weighing balance was used for measuring weight. The subject was asked to stand in the center of the platform barefoot, with minimum clothes without touching anything else. The measurements were observed to the nearest of 0.5 kg. The balance was standardized and adjusted to zero every time to avoid error
Fig 3.1 & 3.2: Checking body weight using electronic digital weighing balance
ii. **Height:** The Height of an individual is sum of four components i.e. leg, pelvis, spine and skull (Beal, 1980). It is less fluctuating than weight and can be used as a criterion to quantify chronic malnutrition.

**Technique:** The height was measured with a vertical anthropometric measuring tape. After removing the shoes, the subjects were asked to stand on a flat floor, erect with both the heels together and hands hanging by the sides. The subject was made to look straight and it was ensured that the inferior orbital margins and the tragus of the ear fall in the same horizontal plane parallel to the ground. The head piece of the rod which consisted of a metal bar was gently lowered touching the hairs making its contact with the top of the head. The measurement was noted down to the measurement of 0.1 cm.

![Fig 3.3 : Checking Height using vertical anthropometric measuring tape](image)
iii. **Waist hip Ratio (WHR):** It is a measurement or visceral obesity and it is a strong indication of the risk of hypertension, cardiovascular diseases, diabetes etc. Fiber glass tape was used for Waist hip Ratio circumference measurement with the minimum count of 0.1 cm. Waist circumference will be measured between the lower rib margin and iliac crest. Hip circumference will be measured at the yielding the maximum circumference over the buttocks.

\[
\text{Waist Hip Ratio (WHR)} = \frac{\text{Waist circumference (cm.)}}{\text{Hip circumference (cm.)}}
\]
Fig 3.5 & 3.6 : Taking body measurement by using anthropometric measuring tape
C. **Body Mass Index**

The Body Mass Index or Quetelet's Index, a measurement of body weight adjusted for height was used as measure of adiposity in the subject (Garrow, 1996)

The BMI indicates both fat and lean tissues. The index was calculated by dividing the absolute weight (kg.) with absolute, height (meter) square. These figures then matched with the classification given by James et al. (1988).

**Table 3.1 : BMI Weight / Height (Kg./m$^2$)**

<table>
<thead>
<tr>
<th>BMI Class</th>
<th>Type of Malnutrition</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;16</td>
<td>Chronic energy deficiency III</td>
</tr>
<tr>
<td>16-17</td>
<td>Chronic energy deficiency II</td>
</tr>
<tr>
<td>17-18.5</td>
<td>Chronic energy deficiency I</td>
</tr>
<tr>
<td>18.5-20</td>
<td>Low weight normal</td>
</tr>
<tr>
<td>20-25</td>
<td>Normal</td>
</tr>
<tr>
<td>25-30</td>
<td>Obese grade I</td>
</tr>
<tr>
<td>&gt;30</td>
<td>Obese grade II</td>
</tr>
</tbody>
</table>

(D) **Body composition Analysis (BCA)**

The BCA is a fast and convenient way of determining a person's percentage body fat, lean weight, water content & ideal weight, thereby determining the quality of bones body weight. For the estimation of BCA, the individuals height, weight and age are entered into the BCA machine, sensor pads are placed on the test subjects right wrist and ankle, a sensor cable attaches to the sensor pads & plugs into Analyzer. Thus within 3 minutes, the analyzer calculates the % body fat, fat and lean weight, basal metabolic rate and total body water. The analyzer can also provide personal weight loss a weight gain recommendations. It has its own inbuilt printer which provided a printed copy of the test results.

The body as a whole is made up of lean body mass and fat. Lean body mass consists of Muscles, bone, organ, connective tissue etc. The lean body mass of functional tissue is similar to the engine in a car. The bigger the engine, the more gas it consumes even when resting. With more muscle mass you burn more calories during the day in addition to having higher capacity to burn more calories then exercising.
Fig 3.7 : Using Body Composition analyzer (BCA) on person
When we go for diet programmes we decrease some amount of muscle tissue if we are not careful about it then we lose a proportional amount of calorie from muscle protein.

**Fig. 3.8 : Using Body Composition analyzer (BCA) on person**

**Fat Weight** :- Most people have an idea of fat as the non essential and unwanted thing. However, a certain amount of fat is essential to the buffer against the weather and is an energy reservoir when glucose energy resources are depleted.

Total ideal fat % in :-

a) Men 10.18%.

b) Female 15.22%

**Essential Fat :-**

a) Female – 9.12%

b) Male – 3.8%
Body fat is deposited

Body fat is deposited by the imbalance between the intake of calories and output of calories. Either the intake is more than input or output is less than the normal input. The excess calories are stored as Fat.

750 Calories = 100 gm of Fat

How is fat Lost

Fat tissue stores energy and lean tissue burns energy. Therefore the more lean we have the more energy will be burnt. So to increase lean tissues is as to decrease fat tissue for weight loss.

For decreasing fat tissue we have to create the **Negative Calorie Balance** in the body i.e. to give less calories then the body burns. Rest of the calories not taken orally will be used up from the fat tissue (stored fat).

For increasing the muscle tissue, we have to take more protein and water and at the same time exercise the muscles to increase the muscle bulk.

Interpretation

The value obtained for body fat percent were interpreted as per the categories suggested by Gallageset. al. (2000).

Table 3.2: Percent body Fat (%)

<table>
<thead>
<tr>
<th>Categories</th>
<th>20-30 years</th>
<th>40-50 years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Essential</td>
<td>8-12</td>
<td>8-12</td>
</tr>
<tr>
<td>Low/Athletic</td>
<td>13-20</td>
<td>13-22</td>
</tr>
<tr>
<td>Recommend</td>
<td>21-32</td>
<td>23-33</td>
</tr>
<tr>
<td>overweight</td>
<td>33-39</td>
<td>34-34</td>
</tr>
<tr>
<td>Obese</td>
<td>≥ 39</td>
<td>≥ 40</td>
</tr>
</tbody>
</table>
1. **Total Body Fat %**: Body fat in the amount of fat in a person's body. A high degree of excess body fat, which indicates obesity, has been linked to high blood pressure, heart disease, cancer and other disability condition (Craft et al. 1993).

2. **Body Fat %**: It is the total weight of person fat divided by the person weight and consist of essential body fat and storage body fat (Anonyman, 2010).

3. **Fat free mass**: All body tissue except storage. Fat is fat free mass (FFM). It is made up of structural and functional elements in the cells, Body water, muscles, bones and other body organ such as heart, liver, Kidney, (Ferranio et al. 1995).

4. **Total Body Water**: Total body water (TBW) is all the water in the body including water inside and outside the cells, including water in the gastrointestinal and urine/tracta (Wikipedia, 2005) total body water is distribute in the two major component as spaces based on differential concentration of the two major cations – Sodium-potassium. The two major compartment intracellular and extra cellular water (ECW) and (ICW).

**2. Intervention**

After pre-intervention subject were divided into 2 group – male (90) and Female (90).

(a) **Assessment of caloric requirement of individual subject**

On the basis of the Height and weight and the subject, the energy required of individual subject were computed by method give by Khanna et al. (2003).

1. Weight and Height of subject were measured.

2. Ideal Body weight for height was calculated.

3. Energy requirement of a normal weight subject was comported and on the basis of the activity level as given below:
Table 3.3 : Assessment of caloric requirement of individual subject

<table>
<thead>
<tr>
<th>Activity Level</th>
<th>Energy Required (Kcal/Kg IBW/Day/of Normal we.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sedentary</td>
<td>30 kcal/day/kg</td>
</tr>
<tr>
<td>Moderate</td>
<td>35 kcal/day/kg</td>
</tr>
<tr>
<td>Heavy</td>
<td>40 kcal/day/kg</td>
</tr>
</tbody>
</table>


5. Estimating energy required to maintain present weight by adding to step III, 8.8 kcal far energy kg above IBW.

6. Estimating energy required for weight loss by subtracting 500 Kal from step V.

**Determined approximate distribution of calorie among proximate principle :**

1. Protein – 20% of energy.

2. FAT – 20% of Energy.

3. CHO- 60% of Energy.


On the basis of energy requirement of the subject for weight loss diet plan was prepared for one week and then given to the subject. Furthermore individual counseling was also given to the subject so solve their queries. During intervention phase, Anthropometry measurement (WT, BMI, WHR) were recorded weekly.

After seven days similar diet plan was given to the subject, when weight was reduced. If weight was same as earlier measurement and the intake was further reduced by 100 Kal/day.
Fig. 3.9 Diet Counseling Session
Fig. 3.10 Nutrition Education session
(b) Electronic Muscles Exercise (FAT loss Body therapy)

These programs are based on the principle of the creation of a negative caloric Balance in the body. The body stores excessive calories in the form of fat. This fat reserve can be used to provide energy whenever INPUT (Calorie Consumption) is less than Output (Calories used for body functions). These therapy given by following steps:-

1. Vacuum Therapy

The vacuum therapy is used to mobilize the fat in the body. This is the reason why it is called fat mobilizer.

The machine used for vacuum therapy is a simple device which comes with a glass cup. When machine is turned on it creates a vacuum. The cup is used like a suction to mobilize the fat on the given areas of the body.

![真空疗法](image)

**Fig 3.11 : Vacuum Therapy**

Functions of vacuum therapy

1. It loosens up the fatty deposits on the body.

2. It helps in pushing the fat metabolites towards the lymphatic drainage system.

3. It gives a rhythmic massage to the body.
2. Electronic muscle exercise treatment

The E.M.E. is an electronic device that is used to exercise the muscle by passing an impulse through the muscle, which stimulates the muscle (motor nerves control muscle activity).

The impulse is passed through a wire connected to 2 pads. The wire has a negative and a positive end. The 2 pads are placed on either ends of the muscle in direct contact with the skin. It is very low voltage gadgets that can give no shock. The resulting contractions are similar to the voluntary contractions in physical exercising, but at a much faster pace. There are 2 types of E.M.E.

Monophasic : The muscle movement is simple and brings about better fatloss.

Multiphasic : The muscle movement is complex and is pyramidal. It brings about better inch-loss and some fatloss.

![Electronic Muscle Exercise Machine](image)

**Fig. 3.12 : Electronic Muscle Exercise Machine**

**Functions of E.M.E.**

1. Exercise the person without straining the person.
2. It also burns a few calories in one session.
3. Keeping BMR high to sustain adequate fat loss pace for a longer period.
4. Tone up the muscles and skin tissues.
5. Helps in achieving an inch loss also. The E.M.E. utilizes fatty deposits from specific body area, giving the body the desired shape.
Contraindications

1. It should not be used by clients having pace makers or on epileptic patients.

2. It should not be given on bones, heart, any cuts, wounds, neck, head or any recent surgery scar.

3. Stop the therapy immediately if anything abnormal happens to the machines.

4. It should not be given to pregnant women.

There are 3 Kinds of Body Therapy given during the weight loss programed.

a. Fat Loss Therapies: These are given from neck to leg. They help in the breakdown of deep fat layer all over the body.

b. Inch loss therapies: These are given over specific body areas which are sagging or flabby. These result in intensive muscle tanning and skin tightening.

C. Dual therapies: Whole body fat reduction with shaping.

Time Duration for body therapy

In the beginning of the program the client is given a zero session of one hour. it includes 30 minutes of diet counseling and 30 minutes of body therapy. The sessions that follow are of one hour duration. Each fat loss session consists of 10 minutes of diet counseling and 40 minutes of body therapy (10 minutes of vacuum and 30 minutes of E.M.E.).

(c) Active Exercise

Health, vitality and long life are desirable goals for everyone, but they are not achieved without efforts. Because many of the habits of modern life do more to diminish health than to increase it, fitness has to be asked at if you are resolved to take a positive attitude toward your health and well-being, and to prevent problems rather than simply treating them as and when they occur, these physical fitness must be an essential part of your life.
Walk helps you look and feel you whatever be the age, whatever be the level fitness walking is the simplest and most effective from of activity for fitness and health way or living. While walking always wear loss clothes and well-fitting canvas shots. Starts slowly and then increase your speed gradually walk briskly with moving your arms and feet rhythmically. Walk fast enough to become a little breath an and slightly tired but never get completely exhausted. You should be comfortable enough to carry on a conversation while walking. Preferably walk on an empty stomach or 2-3 hour after the last meal. Regular walk will slowly improve you. Heat beat. Walking builds lean muscle, while help in burning calories all the time. Take light and rhythmic steels for 10-15 min after every meal.

Fig. 3.13 : Active Exercise (Walking and Running)

Easy Way to Boost up Your Activity Level

1. Walk as much as possible.
2. Park you vehicle as far away/ as possible.
3. Use stairs instead of life's / elevator.
4. Involve in gardening.
5. Spend your time outdoor with you children.
7. Whenever possible stand instead of sitting.
8. Enjoy household activities.
9. Operate things manually instead using remote control.
10. Try to do as much work as parable.
YOGA

Yoga has been practiced for thousands of years in the east and embodied many different systems. The yoga posture and breathing exercise are designed to help people achieve harmony through balance, as well as improved flexibility, release from store, and a new body awards yoga is an excellent adjourn to any physical activity, for it teaches the integration of body, mind and spirit.

3. Post intervention

Experiment phase: All the nutritional, biochemical and anthropometric measurements, that were assured prior to the intervention period were assessed again and recorded in the – "Nutrition and complete lifestyle modification package", used in the pre experiment phase, after 3 months.

Follow up was conducted for 3 month in both group. During follow up, weekly observation of anthropometric measurement (WT, BMI, WHR) was recorded.

Analysis of Data:- The data were statistically analyzed as per the objectives of the study. Information about subjects and their families were expressed as percentage. Mean ± standard error value were also calculated for dietary intake, anthropometric and body composition.
**Standard deviation and Standard error**: Standard deviation and standard error of all the variables were computed.

**Standard Deviation**

\[ SD = \sqrt{\frac{\sum (x - \bar{x})^2}{n-1}} \]

Where,

- S.D. = Standard deviation
- \( \bar{x} \) = Mean of observation
- n = Number of observation

**Standard Error**

\[ S.E. = \frac{\sigma}{\sqrt{n}} \]

Where,

- S.E. = Standard error
- \( \sigma \) = standard deviation
- n = number of observation

Student ‘t’ test used to compare the values with effectiveness of nutrition and complete life style modification package on nutritional status of overweight adult people, the formula was:-

\[ \text{Student ‘t’ test} = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{n}}} \]

\[ S = \sqrt{\frac{1}{n-1} \sum (x_1 - \bar{x})} \]

Where,

- \( \bar{x} \) = Sample mean
- \( \mu \) = Standard / Population mean
- \( s \) = Standard deviation of individual group
- n = Number of observation