8. SUMMARY
Diets provide the essential nutrients required for deriving energy for various metabolic activities and building up the body parts. Nutrition is an important factor in the promotion and maintenance of good health through the entire life course of a person. Their role as determinants of chronic non-communicable diseases is well established and they therefore occupy a prominent position in prevention activities. For this a diet should provide adequate amount of all the nutrients. To avoid the deficiency of various nutrients, intake of balanced diet is inevitable for human beings. A balanced diet may be defined as one which contains the various groups of food stuff such as energy yielding, body building and protective food in correct proportion. Lack of balanced diet, over diet as well as under nutrition may lead to the occurrence of several diseases such as obesity, diabetes, cardiovascular diseases, anemia, hypertension and under weight problems. The components of a balanced diet differ according to age, sex, physical activity, economical status and the psychological state of the individuals. The proportion of components also differs in persons suffering from specific diseases and leads to alteration of numerous physical and biochemical parameters. The levels of these parameters play a significant role in reducing the risk factors associated with the disease.

Quite a large number of changes are noticed in persons suffering from various diseases. These include physical, psychological and biochemical changes. Each disease is characterized by specific alteration of any or all of these parameters. Thus the level of these parameters could act as indicators of the severity of a particular disease. The increased level of blood glucose and urine sugar, triglyceride, lipase, free fatty acid, albumin-creatinine ratio, lactate dehydrogenase (LDH) and homocysteine as well as decreased high density lipoprotein cholesterol and anti-oxidative bilirubin in diabetes mellitus (DM) patients should be cautious and considered as risks for increasing DM complications. Similarly homocysteine might be associated with longer diabetic duration and micro vascular complication of retinopathy in diabetes.

The Body Mass Index (BMI) measured as weight in Kg/height in m² is an internationally used measure of obesity. The BMI limit less than 18.5 is considered as underweight; 18.5-24.9 is normal; 25.0-29.9 is overweight and more than 30 as obese. Level of thyroid hormone (T3, T4 and TSH), blood glucose level, lipid profile etc. are some of the parameters which are clinically significant for obese patients.
Cancer patients are generally advised for various tests by oncologists for clinical analysis and diagnosis. Some of these include liver function test (LFT), renal function test (RFT), electrolytes and protein composition and LDH etc. In addition to these, specific enzymatic tests are also carried out in different categories of patients such as oral cancer, breast cancer, prostrate cancer, ovary cancer, lung cancer etc. Proper analysis of these parameters is useful to find out the associated risk factors.

Measurement of blood pressure (BP) and lipid profile are very common clinical tests in persons suffering from hypertension. Blood pressure of 140/90 mm Hg or above is considered high and increases the risk of developing cardiac disease, renal diseases, hardening of arteries and brain stroke etc.

Anemia is a condition in which there is a decrease in number of red blood corpuscles (RBCs) or less than the normal quantity of hemoglobin in the blood. People with anemia report feelings of weakness, or fatigue, general malaise, and sometimes poor concentration. Anemia is diagnosed through counting the number red blood cells and the hemoglobin level. Anemic patients are characterized by a marked reduction of hemoglobin from the normal levels.

Diet plays an important role in the prevention and control of various non communicable chronic diseases. Dieticians recommend balanced diet to patients according to the diseases they suffer from. For a diabetic patient required calories (as per the BMI of the patient) consisting of high protein, moderate carbohydrate, low fat, vitamin and mineral rich diet are suggested. Likewise, the suitable diet for obese patient consists of low fat, normal required protein, moderate carbohydrate and is fiber rich. Cancer patients are recommended for foods comprising high protein, low fat, moderate carbohydrate, antioxidant and fiber rich diet. A similar type of diet as that of diabetic patients with low salt is considered as the standard diet for persons with hypertension. The diet for anemic patients usually consists of normal fat, high protein, iron and fiber rich food.

Thus this study has been undertaken with the following objectives:

i) Determination of the effect of balanced diet on various physical parameters such as height, weight and blood pressure etc. of diabetes, obese, cancer, hypertension and anemic patients
To measure and analyze the changes in biochemical parameters of these patients under the influence of balanced diet in a time and does dependent manner.

To design planned balanced diet for the patients to prevent them from other related diseases.

An overall comparison of the degree of change of common parameters in the patients recommended for same type of diet.

The study was carried out among selected patients of Dr. B. R. Amedkar Memorial Hospital (BRAMH) and Ramakrishna Mission Vivekananda Ploy Clinic (RMVPC) both located in Raipur, the capital city Chhattisgarh. The effects of diet on various parameters of five categories of patients: obese, diabetic, hypertension, anemia and cancer were measured and analyzed. The patients included both male and female sexes of various age groups (15-70 years). Certain criteria were used for selection of the patients. In total an average of 1085 patients from all the five categories of diseases were studied. The diets for each category of diseases were designed based on certain principles by an expert dietician. A group of patients were treated with disease specific drugs as prescribed by the physicians and were considered as control. The normal calories required were determined according the age, sex, occupation and condition of the patients. Each category of patients was restricted one or the other type foods in their diet. The recommended calorie was 20-25 kcal/kg of body weight or was slightly modified as and when required according to the sex, age, occupation and BMI of the individual persons. The diet chart was designed such that it contains low calories, high protein, moderate carbohydrate, low fat and rich in vitamins and minerals. Certain foods such as deep fry foods, sweets, cream, ghee etc. were restricted.

The information of the various parameters of the patients was collected and recorded from the pathological reports of the patients that were advised by the concerned physician. These reports were collected on first visit (0 d), after one month (30 d) and two months (60 d) of treatment.

The data presented in this study is the mean of three independent measurements taken from three groups of studies for each category of diseases at different times. The standard deviation (SD) was calculated using MS Excel and the
data were presented as mean ± SD. Student’s t test was used to evaluate the significant of differences between the parameters.

The result revealed that diet has a significant effect on various parameters of patients of all the five categories of patients. The BMI of diabetic patients that were treated with both drug and diet for 60 d decreased from higher value to normal range in about 60% patients. Similarly, the blood glucose level both fasting and post pondial also declined or maintained in about 80% of the patients after diet treatment. The effect of diet on BMI and Hb level of anemic patients was also measured and compared with that of patients that were only drug treated. It was found that the body weight of many of the anemic patients that were in the underweight category increased and BMI was found to be in normal range. The Hb level increased in 64% patients after 30 d of treatment and further increasing the treatment to 60 d, the Hb level increased in 78% of the patients. The mean Hb levels of the patients were measured as 7.82 mg/dl, 9.14 mg/dl and 10.24 mg/dl at 0, 30 and 60 d of treatment respectively.

The diet was found to have no significant effect on the body weight of hypertensive patients. When treated with prescribed drug and recommended diet simultaneously for 60 d, it was found that there was no noticeable change in the BMI of the patients. The blood pressure of hypertensive patients treated simultaneously with drug and diet declined to a greater extent from higher value towards the normal. The blood pressure of these patients on 0 d of treatment was above the normal value in case of about 97% patients. The mean blood pressure of these patients was found to be 206/142 mgHg. However, when treated with prescribed drugs and diet continuously for 30 d, the blood pressure of almost all the patients declined and the mean blood was recorded as 156/92 mgHg. When the treatment was continued up to 60 d the mean blood pressure of the patients further declined and was recorded as 140/84 mgHg.

The BMI of all the obese patients were above the normal range (overweight) irrespective of the sex, food habit, income and other living styles. To reduce the body fat the patients were kept under treatment of recommended diet for 60 d. The BMI of the patients were measured after 30 d to determine whether the diet has any effect. It was found that the diet has a significant effect on BMI. The mean
BMI of the patients decreased and was recorded as 26.43. The BMI further decreased to 24.26 after 60 d of treatment. The effect of diet on BMI of male and female obese patients were also studied and was found that the diet has a great effect on reducing the BMI of both male as well as female patients. However, the effects of diet on bodyweight vegetarian patients were more as compared to patients with non-vegetarian food habit.

The carcinoma patients that were treated with only drugs varied in their BMI. About 63% patients were in the normal range with mean BMI value 21.26. On treatment with drugs for 30 d there was no appreciable change in BMI of these patients showing that the drugs have no marked effect on reduction of body weight. When the treatment was continued for 60 d, there was almost no change in the BMI. The mean BMI of these patients was found to be 27.31 after 60 d of treatment. The second category of carcinoma patients were having BMI vale below the normal range. The mean BMI vale was measured as 15.96 before treatment with drugs and did not undergo any change after treatment with drugs for 60 d. The BMI value after 30 d and 60 d of treatment were recorded as 15.79 and 15.68 respectively. Some of the carcinoma patients were having BMI above the normal range. The mean BMI of these patients in the beginning of the treatment was observed as 27.63. On treatment with drugs for 30 d the BMI of these patients was measured as 27.42. When the treatment was continued for 60 d the BMI was not changed and was found to be 27.31.

The effect of diet when treated along with drug on second category of patients with BMI below the normal range was very significant. It was noticed that for these patients there was an increment of body weight and the BMI on 30 d of treatment. The BMI increased from 16.53 to 17.28 on 30 d of treatment and on continuing the treatment for 60 d the BMI further increased and reached to normal range. The BMI on 60 d of treatment was found to be 18.25. The third category patients with BMI above the normal range also responded to the treatment and showed a decrease in BMI from 28.93 to 27.82 and 25.79 on 30 d and 60 d of treatment respectively.

The effect of drug on the Hb content of carcinoma patients were studied separately for male and female patients. The level of Hb changed only in 8% and 15% of male patients after 30 d and 60 d of treatment and the mean concentration was observed as 7.37, 8.01 and 8.54 mg/dl at 0 d, 30 d and 60 d of treatment respectively.
Similarly, the Hb concentration changed in 10% and 17% of female patients after 30 d and 60 d of treatment. The mean Hb concentration was noticed to be 6.21, 7.12 and 8.02 mg/dl at 0 d, 30 d and 60 d of treatment respectively.

Changes in the level of Hb in response to combined treatment of drug and diet was studied both in male and female patients. It was observed that the Hb level after 30 d and 60 d of treatment changed in 15% and 21% male patients as compared to 8% and 15% males those were treated only with drugs. The Hb level was found to be 7.96, 9.2 and 9.65 mg/dl after 0 d, 30 d and 60 d of treatment respectively. Likewise, the Hb level of female carcinoma patients also increased in 32% and 48% patients after 30 d and 60 d of combined treatment respectively. The mean Hb contents of the patients were measured as 6.01, 7.51 and 9.1 mg/dl at 0 d, 30 d and 60 d of treatments respectively.

In this study, low blood pressure was observed in 70% carcinoma patients. The blood pressure was high only in 7% patients and was normal in rest of the patients. When subjected to drug treatment, the blood pressure of 25% patients increased from lower to normal value. However the mean blood pressure of the patients did not show any change before and after the treatment. On the other hand, when the patients were treated with both drug and diet simultaneously, it was observed that the blood pressure of about 62% that were having lower blood pressure increased to normal value. There was a significant increase in mean blood pressure of these patients. The blood pressure of those patients that were normal remained almost unchanged under treatment.

In conclusion, diets designed for obese, diabetic, hypertension, anemic and carcinoma patients could be prescribed for these patients in controlling the body weight, blood glucose level, blood pressure, Hb level etc. These diets when taken along with the prescribed drug have a better effect as compared to the patients that are only drug treated. Therefore, the role of diet in prevention as well as control of various diseases is noteworthy and cannot be undermined. Thus, the type of diets, quantity and its menu designed by experts based on the severity of the disease, age, sex and other conditions would have immense effect both in prevention and control of various chronic diseases. The mechanism of action of the diet on various parameters warrants further investigation.