ASSESSMENT OF NUTRITIONAL STATUS AND LIFE STYLE DISEASES AMONG DIFFERENT INCOME GROUPS

by

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THESIS

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DECLARATION

I, hereby declare that this thesis entitled **"ASSESSMENT OF NUTRITIONAL STATUS AND LIFE STYLE DISEASES AMONG DIFFERENT INCOME GROUPS"** is a bonafide record of research work done by me during the course of research and the thesis has not previously formed the basis for the award of any degree, diploma, associateship, fellowship or other similar title, of any other University or Society

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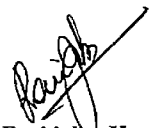

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DEDICATED

TO

MY DEAR

BROTHER

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LIST OF ABBRIVATIONS

WHO	World Health Organization
LSD	Life Style Disease
AOAC	Association of Official Analytical Chemistry
NCD	Non Communicable Disease
BMI	Body Mass Index
CVD	Cardio Vascular Disease
cm	Centimeter
WFP	World Food Programme
CHO	Carbohydrates
NSSO	National Sample Survey Organization
WC	Waist Circumference
HC	Height Circumference
et al	And Co-workers
WHR	Waist Hip Ratio
Fig	Figure
g	Gram
IID	Indian Institute of Diabetes
PPBS	Post Parndial Blood Sugar
ICMR	Indian Council of Medical Research
NSI	Nutritional Status Index
LIG	Low Income Group
MIG	Middle Income Group
HIG	High Income Group
RDA	Recommended Dietary Allowance
Kcal	Kilocaloric
Kg	Kilogram
mg	Milligram

mg/dl	Milligrams per deciliter
mm/Hg	Millimeter of Mercury
%	Percentage
Kcal	Kilo calorie
df	Degree's of Freedom
NFHS	National Family Health Survey
NIN	National Institute of Nutrition
ie	That is

Introduction

1. INTRODUCTION

Relationship among food, nutrition and health is a major universal dare that we are facing these days Hurried changes in the eating pattern and new way of living of the residents because of the arise of new industries replacement from rural to urban areas and monetary progress possess an important collision in the health and nutritional status of the people (WHO Technical Report Series, 2002) Alterations happened in the case of work pattern of the population and variations in consuming habit at the present days had become the reason for the inactive way of living which is considered as the main problem evolved due to the new evaluations happening in the technical industry (WHO, 2002).

In the nearby daytimes, the modifications happened to the day to day living of people along with the trendy diet practices formed from the brisk transformation had become preferential for the enhanced events of diet related disease (Sachan and Mogra, 2004) Park (2000) is of the belief that advancement in technology, start up of new industries and profitable economy have enhanced the usuall ivelihood of the community, which become the reason for the variations happened to the food consumption and existence which make a way for the interruptions of health related issues

According to WHO Technical Report Series (2002), as the principles of exisistance have enhanced, the accessibility food has extended and develop in to a well elaborated area, with increased accessibility A desk bound routine, a life without exercise, surplus amount of nutrient rich diet and in appropriate in take behavior had made a numerous troubles namely, diabetes and hypertension (Moore *et al*, 2001) Similar studies have been reported by Mehta (2013) These changes are because of the huge modifications happened in the daily food habits which is closely associated to socio-economic and ecological circumstances (Hooper *et al*, 2001)

The report of Economic and Social Development Department (2014) declared that un problematic accessibility and easy market price of different food produce have tainted the eating styles of the people worldwide making unwanted consequence on the health plus the taking up of unwholesome behaviors such as drinking of alcohol, use of cigarette and use of narcotic products These all had become the reason for the governance of the so called 'life style diseases' Lifestyle diseases(LSD) are a set of diseases which shows alike intimidation for the reasons like high carving for non nutrient tasty foods, use of tobacco, be short of exercise and nervous tension, which induce elevated death within the specific group of people (WHO,2010)

In sanitary life related with tobacco employment, irregular material action, and intake of meals high in saturated fats, sugars, and salt, will results in advanced mode for the development of particular conditions like hypertension, dyslipidaemia, diabetes, and obesity (Hsing *et al*, 2002) More than the problems associated with harmful diet and physical indolence, smoking and alcoholism retinue by different types of stress are measured as the chief occasion for the mounting disease load (Dey, 2015)

By the year 2012, more than half of the grown-up residents will be suffering from any of the health circumstances liked heart disease, stroke, cancer, diabetes and obesity One among the four matured individual will be having any of the above stated diseases (Ward *et al*, 2014) Among the topest ten reasons for the development of diseases which ended up in death of the patient noticed in the year 2010, chronic diseases had occupied the seventh position (Danish, 2006)

According to The Hindu (2013), India is expected to practice large number of deaths due to NCDs more than any of the other countries in coming decades Although generally it is assumed that these diseases are more likely to be seen along with the rich countries than the developing countries like India India by now have conceded the premature stages of this king of disease and grievance contagion (Patel *et al*, 2011)

Daivadanam (2013) observed that between the states of India, non infectious diseases popularity is seen utmost in Kerala people He is also of the opinion that this position is mainly because of the fast changes happened in the way of life of people Sugathan *et al* (2008) opined that the disease which raise due to the unhealthy daily living pattern have become the foremost culprate for the elevated death and diseased conditions in Kerala

In the present scenario, the lifestyles of the people have undergone rapid changes Lifestyle has changed to sedentary along with lack of exercise, use of tobacco and alcoholism and wrong eating habits Diet has undergone a transition from simple homemade food to easy available processed food These all lead to the arise lifestyle diseases Thus taking the above facts into account the present study of 'Assessment of nutritional status and life style diseases among different income groups' was attempted with the objectives to assess food habits, nutritional status and life style diseases among different income groups and impart counseling for a healthy life

Review of literature

2. REVIEW OF LITERATURE

Literature available on different aspects related to the present study entitled "Nutritional status and lifestyle diseases among different income groups" is reviewed under following headings

2 1 Nutritional status

2 2 Factors affecting nutritional status

2 3 Relation of health and nutritional status

2 4 Lifestyle diseases

2 5 Prevalence and cause of lifestyle diseases

2 6 Relation of nutritional status and lifestyle diseases

2 1 NUTRTIONAL STATUS

The state of health enjoyed as a result of nutrition is called nutritional status (Mourya and Jaya, 1997)

Nutritional status is one of the indicators of the development potential and level of a country In many developing countries, the availability of food often related directly to the yearly food production which is quoted as an indicator It also indicates the poverty level of a society based on the type of food available to the people and the traditions or habits that developed on time(Arthur, 2002)

According to Srinath (1999) nutritional status helps to indicate the socio-economic well being of a society

Nutritional status of a population is very important as it reflects the development and well being of a country (Rao, 1996)

A healthy body composition without any physical signs of nutritional deficiency is said as good nutritional status(Field and Alison, 2007)

The intake and utilization of nutrients that influence the conditions of health is called as nutritional status (Thomas, 2009).

Nutritional status of an individual is the effect on body, according to the levels to which food consumed is used by the body (Yeasmin, 2008)

Nutritional status is one operational term that relates to low health which is affected by food and nutrition intake and the way the body uses nutrients in both healthy and diseased states(Premakumari*et al* ,2003)

2 2 FACTORS AFFECTING NUTRITIONAL STATUS

Socio economic status is known to be a key indicator that shows the health status of any of individual as its a factor which affects educational background, food consumption pattern and other lifestyle behaviours (Arora, 1991)

Stress often increases carvings for high fat snacks or comfort foods Small treats that have less fat and sugar that will satiate the carving without adding excessive fat and calories (Gomez, 2003)

Austin *et al* (2008) reported that the socio economic status, level of education and the pattern of living are also connected to the food choices, intake and consumption pattern of an individual

Economic factors could influvance a person's health and nutritional status Food price and income being factors of economic decisions do affects people's food choice For low income families, food costs thus be a barrior to get healthier food choices (Chen*et al* , 2009).

According to Bhat and Wahray (2000),for the poor people particularly the urban poor, the street foods were considered as an important source of economical and nutritious food

Socio economic status is a key indicator of health status of any individual as it influences the food consumption pattern, educational background and other lifestyle behaviours that developed over time (Clay, 2003)

One of the global challenges that we face today is nutrition, health and its relation to food It was accepted by people centuries before that our health depends on the way how people live and what they consume (Amudha, 2007)

The use of convenience foods have increased as change in lifestyle increases in working women population and rapid urbanization (Singh *et al*, 1998)

It is observed that the nutritional status and hfestyle changes are becoming prevalent among population. Lifestyle among a population has been led to a new phase due to the popularity of junk foods (Ambily, 2008)

According to (News and views, 2002), priority for junk food is high among the list if a person who lives in the urban areas and that type of food is gradually becoming a part of the busy lifestyle But the experts in the field of nutrition have observed that the junk foods are rich in calorie, sodium, fat and cholesterol

Sudo and Ohtsuka (2001) reported that the amount of energy and other nutrients consumed by the software shift workers was very low, due to their working time schedule which worsened their nutritional status.

It was reported by AOAC (2000) that the prevalence of under nutrition increases with age among women

Lifestyle trends like shift in food consumption from meals to snacks and less structured eating can influence people's diet (Ramesh, 2010)

Robertson (2000) had opined that a person's nutritional status is greatly influence by his/her dietary habits

The level of education, food habits and food frequency pattern are the important terms which have a direct impact on the nutritional status of school children (Ongore,2011)

2 3 RELATION OF HEALTH AND NUTRITIONAL STATUS

Health is one of the indicators which give the status of a given society The status of an Indian's health is naturally related to its socio- economic status and which influence all the aspect of life (Government of India Census, 2001)

Health is said as an active life route, whichstarts with birth and is govern by inherent, dietetic and ecological terms which followsthroughout the life (Thilakavathi and Purushothaman, 2001)

Nutrition is an important factor which affects the body's ability to itself and also providecontrol from thepossibility for budding diseases Arareship in the case of good nutrient rich food intake is improbable to cause inconvenience, but the consumption of low-grade foods, eventually, can cause problems in health (Hariram *et al* , 2005)

According to a study conducted by Brahman (2006), among the 235 participants, malnourishment were seenfrequently and it was also observed that reduced nutritional status have a relation with the improved health care facilities and reduced involvement in day to day manners by the child and parent

According to Gupta (2008), the food we consume is known as the vital factorin part because our diets does not have the essential stability of nutrients which become the reason for the development of diseases like type II diabetes, obesity, heart disease, and cancers

The good status of health and ability to do work has an impact on the foods consumed by the workers Thediets which is highly unbalanced with low nutrients will reduce the health status of the workers (Barnett and Binnan, 1998).

Yerwarker (2000) observed that, most women who disregard their foods are more prone to the diseases like osteoporosis, back aches, depression and anaemia which occurs due to malnutrition

Diet is one of the important factors which tends the behavioural pattern of an individual to change from being abused or regulate under stress, affects ability to survive from stress Only a good nutritional status contributes the major factor for a healthy body (Gomez, 2003).

Holmes *et al*, (2004) the morbidity and mortality which occurred during old age women increased periodically which indicate it as a major term among the middle aged women. Protem- caloric malnourishment is indicated as the reason for this phenomenon

The community health risks like diminutive growth, restricted mental progress anaemia, difficulties in the pregnancy period and low birth weight babies are due to the nutritional needs which were not satisfied (Abraham, 2000)

The relationship between poverty and nutrition are the growing results of nutritional scarcity which co-exist with infectivity due to the short of food, obligatorycontagion and influx (Leela and Priya, 2002)

Ushadevi and Nath (2003) pointed out that by increasing the intake of nutrients, the day to day need of nutrients and in order to meet the daily requirement for the progressed health and nutritional status

According to Rao (2001), one important nutritional problems which affects the Indians were problems of mothers and child like low birth weight, high mortality and low maternal nutrition.

According to Law (2000), the high-quality food choices have a positive correlation with health and negative correlation with bad diets

Physical and emotional health status was found in people who have followed conventional diets and those who have changed to new diets over time

suffered from a range of physiological and emotional problems in health (Prasanna, 2008)

The report of Economic and Social Development (2014) stated that the malformed food habits of the people which are the cause for the poor health are due to the plenty of accessibility of different food items

According to Siddique & Anusha (2011), fat foods has become a prominent feature of the diet system followed by most of the people throughout the world, which cause the individual to gain more weight and face an increased risk for developing disorders

2 4 LIFESTYLE DISEASES

Lifestyle diseases are the diseases which are related to the means of living of a human being or group of individuals (Allen and Spencer, 2002)

Lifestyle diseases(LSD) are a cluster of diseases that allocatecomparablemenace factors because of the introduction to poor diets, smoking, lack of exercise, and stress, which is a cause for developing elevated mortality rates betweeninhabitants (WHO,2010)

WHO (2005) reported hypertension is one of the leading causes for the development of diseases and deaths

Shetty (2002) revealed that although communicable and non-communicable diseases are the reason for the development of health problems, non –communicable diseases keep on to be the keyfor majority of the communalvigortroubles

Non communicable diseases (NCDs), like heart diseases, cancers, respiratory diseases and diabetes are the reasons for the increased death

worldwide They are accountablefor 63% of deaths, and are the major reason for the disease encumber in low and middle- income countries (WHO, 2011)

Now a day's lifestyle diseases are common in countries similar to India and which is widely seen among the younger generations This become the reason for the decline in efficiency and expansion of the country (Ceska, 2002)

Sandvik *et al* (2000), reported that lifestyle diseases are those which take a long time to become prominent in once life although its onset was done on earlier period of life

The diseases which occurred due to the improper connection of individuals with their surroundings and also due to the ever day routine is known as lifestyle diseases (Lichtensteinet *al* , 2000)

Universaloutbreak of intemperanceheaviness is because of the inequalityamong material activity and nutritional energy intake A diminutivesurplus in energy consumption for a long time can cause the condition like obesity, so it can be said that obesity is a disparity between energy inflow and energy outflow (Elizabeth, 2007).

Cardio vascular diseases are those states of affairs which upsetting the heart and its related infections (Liu *et al* , 2001).

High blood pressure is anextensivesituation in which the enduringpower of the blood aligned withthe artery walls is elevatedinto an adequate level which cansooner or later cause health related problemsfor instance heart disease(Sheldon, 2015)

Obesity is distinct as a form of unusual or abundant fat builds up in adipose tissue, to the degree to which the bodies' normal state may be impaired (WHO,2000)

2 5 PREVALANCE AND CAUSE OF LIFESTYLE DISEASES

According to Kearney *et al* (2005) approximate in 2020, CVD may become one of the major reason for the disability and death in India. The nationalready has 40 9 million persons occurred with diabetes and over 118 million citizens with hypertension, which is likely to enlarge to 69 9 and 213 million correspondingly, by 2025

According to WHO (2011),cardiovascular diseases are the prominent diseases which ranked foremostin the middle of NCDs and add to 48 per cent of deaths all over the globe

Numerous studies among the diverseIndian states observed that, the predominant occurrence of hypertension in the countryside is about 40-50 per cent. Which is a large amount than the west India already has more than 118 million persons with this condition and is projected to rise to 213 million by 2025 (Chobian *et al* , 2003)

It is predicted that on an average the individuals who are suffering from hypertension is said to be about 1 56 billion people internationallyin the year 2025 (WHO Report, 2010)

According to the world health organization WHO (2006), the diseases, diabetes mellitus have an effect on almost 171 million populace and become a reason for 3 2 million demise, six deaths in each diminutive time and 8700 deaths daily.

Thirty five million citizens died in the year 2005 because of the lifestyle diseases which is influenced by the diet, resulting about 60% of entire deaths worldwide This number is likely to go up by 17% in the coming decade (WFP, 2010)

The dominance of fat and fatnessare radicallyincreasing formore than last 20 years, and now the dilemma has fond ofspaternagnitude (Freedman *et al* , 2009)

Aravind *et al* (2005) opined that by the end of 2025, 57 million of individuals in India will be affliction with diabetes mellitus, although the country is already occupied with a loftynumeral of people having the disease

The pervasiveness of NCDs is the outcome of the new way of living that has altered considerably for the past decade (Thankappan *et al* , 2010).

The chance for the occurrence of non communicable persistent diseases such as obesity, hyper tension and diabetes may be because of the excess intake of calories which further leads to over nourishment of nutrients(Tee *et al*, 2012)

The NCD-associated death of 2 7 million people over a year is because of theinadequate ingestion of fruits and vegetables (Hall *et al* , 2008)

Improvedtendency for western sort of elevated fat, high sugarcultured CHO, less fiber foods, crammed foods and beveragesultimately make way for the development of lifestyle diseases (Pingali, 2004)

Qiao (2003) and Teoh *et al* (2007) viewed that Indian's are suffering from non communicable diseases 5-10 years sooner than the people in western countries

The shiftedway of living of peoples in the rationalized India with amplified purchasing control, simpleaccessibihty, more relaxing and comfortablelivelihood with well developed equipment all credited to the hitch known as obesity (Isra *et al* , 2004)

Systematicinformation's reveals that the particular group of people who are categorized as socio-economically deprived population have become theforemostfatalities of CVD (Rastogi, 2004)

Joshi (2006) have noticed that the countryside have become the growing plots for the most important trouble known as CVD.

Rawat (2009) , said that 26 per cent of commercialworkersgo throughthe problems like obesity and 18 per cent suffer fromgloominess which is said as a fraction of lifestyle diseases

Ray *et al* (2011) in their study found out that elevatedpervasiveness of prehypertension (78 8 per cent), high lipid levels (67 per cent) and overweight (29 9 per cent) was seen between Indian armed force people

Deepa *et al* (2007) revealed that abdominal obesity and primitive adiposity are the important means for the development of insulin conflict, which is avitalelement of metabolic disorder, the chief CVD risk factor in all populations

The associationamong the keyadjustable risk factors and the chief lifestyle diseases is comparable in all parts of the globe Present socio economic, intellectual, opinionated and ecological determinants that have a considerablepersuade on lifestyle diseases (WHO, 2005 and 2008)

Based on the Assochum report (2009) among the cooperate workers almost 52 % are prone to lifestyle diseases particularly of food consumption practice, where as 24 % experience persistent diseases and 18 % were suffering from severe sickness

Cardiovascular diseases (CVD) maintain to be the most importantreason for the transienceindicatingon 30 per cent of all deaths universally The important determinant for the development of lifestyle diseases may be hypertension, diabetes and dyslipidaemia. Along with the briskfinancialexpansion and escalating westernization of existence over the last few decades, theof this disorder has occupied upsetting magnitudebetween the Indians (Pappachan, 2011)

Cardiovascular deaths in 2008 the deaths due to heart related problems were 34 per cent of totaltransience in women and 28 2 per cent of humanity in men (Gibbs *et al* , 2009)

Ramesh (2010) , conducted a study in Thiruvanathapuram and found out that the incidence of overweight and obesity is observed to be 18 3 per cent in Kerala kids

Chattopadhayay and Agnihotram (2005) reported that even though Kerala is occupied with the premier (82 8 per cent) predominant pace of heart patients, the other states in the country comprise of people who are more prone to the condition.

2 6 RELATION OF NUTRITIONAL STATUS AND LIFESTYLE DISEASES

Ingestiondeeds is an important etiologic feature for the expansion of lifestyle allied diseases (Lien *et al* , 2001)

Zhao (2001) stated that nowadaysphysical wellbeing is a foremostworry for the ordinarybloke The anxious and frenziedliving is a keyground for pitiable health.

Junk foods, ready to eat foods, unwholesome eating practices, addition of drain calories and also skipping of meals have evolved as a chief communal health unease (Weston, 2002)

A study conducted by (Sugathan *et al* , 2008) shows that the food consumption pattern of most of the individuals werevery poor Alter in consumptionroutine like low fiber and extragreasy food was dominant for severalunrelieved diseases.

Wellintakes of food items have an important impact on every individual's health status A good health status can hinder the development of many diseases A well designed nutrient rich meals can help in the reduction of these diseases (Jones, 2007)

(WHO, 2005) reported that metabolic syndromes have elevated in to a pandemicextent throughout the globe "Diabetes shares a strappingnterconnected with the way of living and also to monetaryalteration

Aydin and Diyeti (2010), reported that the over usage of packed foods with added chemicals can reduce the use of unsullied homely foodstuff, which can cause the development of different non- communicable diseases

The diversions in groceries along with the change in everyday's life like huge decrease in bodily manners and lifestyle habits have increased the occurrenceof lifestyle disorders (Tandulwadiker, 2004)

The current day's dietaryhabits alongside with the consumption of scrap foods and condensed material movement had moved away to the development ofseveral diseases (WHO, 2002)

The WHO (2005) specialistsession on diet, sustenance and pervasiveness of continual diseases hadacknowledged to aninteger amount of daily lifeassociated factors

An unbalance dietary intake along with injurious existence of life habits hadrecognized as a chiefthreatfactor of heart related disorders (Awosan *et al*, 2014).

McGill *etal*, (2008) viewed that metabolic syndrome are a group of heart and diabetes inducing terms which include eminent waist fringes, blood pressure, cholesterol and other items The existence of any of these factors can lead to an unhealthy body condition.

Quickly varying ailments all the way through humankind are directly correlated to shifted daily life, which embrace the ingestion of foods loaded in sugars, extensivemake use of tobacco andenlargeduse of drinks (WHO, 2005)

Other than the nutritional conditions exploit of smoking and alcohol, along with environmental stress were also associated with the elevated disease load (Dey, 2015)

The chance for the occurrence of lifestyle related diseases are due to the changed standard of living over the past few years (Misra *et al* ,2011)

Growingcomfortable circumstances for the increased usage of processed foods had changed thedietetievem categorized by the enlargedutilization of foods high m cholesterol, sugar, and calories can immediately make a way for the development of many diseases (Das *et al.*, 2005)

Shifted everyday life with bad eating practice of the inhabitants' hadamplified the frequency of diabetes for the last 14 years in India (Yusuf *et al* , 2001)

Materials and methods

3. MATERIALS AND METHOD

Methodology followed in the study entitled "Assessment of Nutritional status and lifestyle diseases among different income groups" is presented below

The major objective of the study was to assess food habits, nutritional status and lifestyle diseases among different income groups and to find out the relationship between food habits and lifestyle diseases In order to attain healthy life, diet counselling was also imparted to the subjects

The methodology is discussed under the following headings

3 1 Location of the study

3.2 Selection of the respondents

3 3 Conduct of the study

3 3 1 Assessment of socio- economic status of the respondents

3 3 2 Assessment of nutritional status of the respondents

3 3.3 Assessment of health and morbidity of the respondents

3 3 4 Assessment of lifestyle pattern of the respondents

3.4 Conduct of a nutrition awareness programme

3 5 Data analysis

3 1. LOCATION OF THE STUDY

The study was conducted at College of Agriculture, Vellayani, Thiruvananthapuram

3 2 SELECTION OF THE RESPONDENTS

Ninety respondents both males and females who are working in the campus were selected randomly for the study Care was taken to select the respondents

between the age group of 30 to 45 years because middle age people are more prone to lifestyle diseases and from different income groups like high income, middle income and low income

First a list of employees who were working in the campus was collected from the administrative office From the list the employees were classified into different groups on the basis of their age and income The employees, who were included in the age group between 30-45 years, were again classified into three income groups as low income, middle income and high income group and the classifications was based on NSSO Report (2007 – 2008) From each group, 30 respondents were purposively selected On totality 90 respondents were selected for the present study

3 3 CONDUCT OF THE STUDY

A structured questionnaire was developed for the purpose, which was pretested and used for data collection Socio- economic status and nutritional status of the respondents were studied using the developed questionnaire Diet survey was conducted using the methods like food consumption pattern and 24 hour recall method and by also evaluating the food habits and meal pattern of the respondents

3.3.1. Assessment of Socio- Economic Status of the Respondents

The socio- economic position of the people like societal, financial, spiritual perspectives along with their ancestor's surroundings had an extraordinarily fraction to cooperate for shaping the victuals habits and physical wellbeing of every human being Meer *et al*, (2000) had noticed that the socio-economic situation in which every individuals sustain have a undeviating contact on the dietary practice and nutritional eminence

Socio – economic conditions of the selected respondents were assessed using a suitably structured and pre-tested interview schedule Details such as age,

religion, family composition, educational and employment status, monthly income of the family were assessed (Appendix I)

3.3.2. Assessment of Nutritional Status of the Respondents

Nutritional status is specific condition of good physical state which is enjoyed as a result of superior quality nutrients Therefore, customary nutritional evaluation is vital to uphold the health of the people in the society (Kamath, 1986)

Nutritional status of all the subjects was assessed Various parameters such as diet survey, anthropometry, clinical examination, biochemical assessment were carried out for the assessment of nutritional status

3.3.2.1. Conduct of Diet Survey

A diet survey was conducted to evaluate the food habits, meal pattern, actual food intake, frequency of use of various foods and knowledge of the respondents about food habits Diet survey is said as a significant constituent for every inclusive schoolwork about the nutritional status of any individual or groups, which gives the important essentional knowledge regarding nutritional routine, supply of nutrients and its inflow to the body (Swaminathan, 2003)

A specially designed pre-tested questionnaire was used (Appendix II) to collect information from the ninety subjects, on account of their dietary pattern and food habits The questionnaire consisted of questions regarding the food habits, frequency of purchase meal timings, meal pattern, knowledge on food habits, frequency use of various foods and actual food intake (24 hour recall method)

3.3.2.1.1. <u>Frequency use of various foods (in the dietaries)</u>

The frequency of use of foods from various food groups would give an indication to the adequacy of the daily diet pattern Thus the frequencies of use of

foods from basic food groups were ascertained Food measured on a 7 points scale on the basis of the frequency of use, was used (Appendix II)

Frequency	Score
Never	1
Monthly	2
Fort nightly	3
Weekly	4
Thrice in a week	5
Twice in a week	6
Daily	7

The percentage of food score for each food used by participants as well as the food items were calculated separately using the formula suggested Reburn *et al* (1979). Percentage of total score for each food items

$$= \frac{R_1S_1 + R_2S_2 + R_3S_3 + \quad R_nS_n}{n}$$

S1 – Scale of rating given for frequency of a food item (i = 1,2,3, 7)

R1 – Percentage of respondents coming under each frequency group (1,2,3, .. . 7)

n = Maximum scale rating

The mean score was calculated using the formula given below

Mean score for each group

$$= \frac{R_1S_1 + R_2S_2 + R_3S_3 + \_\_\_\_\_ R_nS_n}{7}$$

The percentage of participants using each food item was then computed

3.3.2.1.2. Actual food intake (24 hour recall method)

In the dietary recall method the respondents were asked to recall the actual food consumed by them in the previous day In this recall method pretested structured questionnaire was used for quantifying this survey A set of cups and spoons were standardized by the investigator and followed the procedure given by Thimmayyama and Rao (2003) The respondents were asked about the types of food preparation they had for breakfast, lunch, tea time and dinner Raw ingredients used for each of the preparations and the quantity consumed by them were assessed using the standardized cups The cups used to aid the respondent to recall the quantity prepared and eaten (Appendix II)

3.3.2.2. Anthropometric Measurements

Nutritional anthropometry can be used to understand whether the person is underweight, overweight or obese (Rao, 1996) Anthropometry measurements namely weight, height, waist circumference (WC) and hip circumference (HC) were recorded in the present investigation to assess the nutritional status Body mass index (BMI) was calculated from weight and height measurements From waist and hip measurements, waist-hip ratio (WHR) was worked out to assess the presence or absence of obesity (Appendix III)

3.3.2.2.1. Weight

Body weight is most widely used sensitive and simplest reproducible anthropometric measurements For weighing, platform weighing balance was used as it is portable and is convenient to use in the field The weighing scale was

checked periodically for accuracy The scale was adjusted to zero before each measurement The subjects having minimum clothing were asked to stand on the platform of the scale, without touching anything and looking straight ahead The weight was recorded to the nearest of 0.5 kg Body weight was taken (kg) twice to ensure correctness of the measurement

3.3.2.2.2. Height

The degree of height scarcity according to the age is compacted with the local principles and the particular value is taken as the gauge for identifying malnutrition (Gopaldas, 2005)

To determine the height, a stadiometer was used The respondents were asked to remove their slippers and to stand with centre of the back touching the wall with feet paralleled and heels, buttocks, shoulders and back head touching the wall The moving head piece of the stadiometer was lowered to reset flat on top of the head in the centre crushing the hair at angles to the wall and the height read off from the lower edge of the ruler to the nearest 0 1cms An average of the three measurements was taken as final measurement of height of the respondents

3.3.2.2.3. Body Mass Index

Body mass index is articulated as the proportion of weight to height square (James *et al*, 1998) This is used as a good parameter to grade chronic energy deficiency and is regarded as the good indicator of nutritional status From the recorded weight and height, Body Mass Index (BMI) was computed Based on the BMI, subjects were classified into underweight, normal and overweight

3.2.2.2.4. Waist-Hip Ratio

The Waist Hip Ratio (WHR) reveals the total amount fat accumulation in the intradominal region contrasting to the subcutaneous section (Lean *et al*, 1995) Waist was measured above the umbilicus meaning the

Plate1 Anthropometric assessment of the respondents

narrowest circumference and hip was measured in the broadest area of the hip After documenting the waist and hip measurements of the respondents their WHR was deliberate by dividing the circumference of the waist by the circumference of the hip (Seetharaman *et al*, 2007)

3.3.2.3. Clinical Examination

Clinical examination is a well known and easy formula which can be used to evaluate a person's nutritional status (Vasan *et al*, 2011) The presence or absence of clinical deficiency symptoms, which is an index of nutritional status, was assessed by a qualified physician, from Indian Institute of Diabetes using a Proforma made for this purpose A medical camp was also conducted by a team of Doctors and experts form I I D, Pulayanarkotta, Thiruvanathapuram (Appendix IV)

3.3.2.4. Biochemical Assessment

Biochemical assessment is another important tool for assessing nutritional status For the biochemical assessment of the respondents a one day camp was conducted in the campus, by the doctors from Indian institute of diabetes Through the camp the haemoglobin level of the respondents were assessed, the blood pressure using sphygmomanometer and also the PPBS levels of the respondents using a glucometer

3.3.2.4.1. Estimation of haemoglobin

Haemoglobin level of a person is considered as a functional index which gives the general situation of nutrition (Park, 1997) The haemoglobin content of the subjects was estimated using cyanmethheamoglobin method (Khanna *et al*, 2012)

Plate 2 Clinical assessment of the respondent

Plate 3 Biochemical assessment of the respondents

3.3.3. Assessment of Health and Morbidity of the Respondents

The health and morbidity of the respondents was assessed using a suitable pre tested checklist (Appendix III) General health of the respondents, prevalence of lifestyle diseases, and the risk factors were assessed using the checklist

3.3.4. Assessment of Lifestyle Pattern of the Respondents

3.3.4.1. Time Utilization Pattern

In order to assess the lifestyle and workload of the respondents and its relation to their nutritional status, the time utilization pattern of the respondents were studied

The energy necessity of a human being is considered as the altitude of energy inflow from food, which will stabilise the energy expenditure of the same person (ICMR, 1992) It is also recommended that energy requirement must be assessed in terms of energy expenditure rather than in terms of energy intake

Time spent for daily activity was assessed using questionnaire by interview methods Time spent for different household and occupational activities per day was recorded. (Appendix V)

3.3.4.2. *Energy Intake and Energy Expenditure Pattern of the Respondents*

The energy intake of the respondents was assessed using 24 hour recall method Total energy intake of the respondents was calculated from the amount of food consumed by the respondents in a day using the food value table (ICMR, 1991) The energy expenditure of the respondents was calculated using the sathyanaranyana method, based on the daily activity schedule of whole day and energy expenditure was calculated

3 4 CONDUCT OF NUTRITION AWARENESS PROGRAMME

Based on the information collected through nutritional status of the respondents, a need based awareness programme was conducted According to Park and Park (2000), the mean of health edification in nutrition is to direct citizens to desire most favourable reasonable diet

A seminar cum awareness class was conducted by experts in the field of Food, Nutrition and Lifestyle diseases Adequate visual aids were used for the active participation of respondents Through the awareness class, the respondents were given a brief explanation about the importance of healthy diet, role of micronutrients as well as the cause, occurrence and adverse effects of lifestyle diseases To know the influence of the awareness class on the respondents, knowledge based pre- test and post-test was conducted to the respondents before and after the awareness class

3 5 DATA ANALYSIS

The data gathered in the present study were analysed using statistical tools like mean, percentage, paired 't' test, chi – square test and NSI

3.5.1. Nutritional Status Index of the Respondents

Nutritional Status Index (NSI) of the respondents was assessed using the parameter such as height, weight, BMI, WHR, energy intake and protein intake of the respondents The formula of NSI developed for the i^{th} sample (respondents) was

$$NSI = \Sigma \quad \frac{[X_{ij} - N_{ij}]}{S_{ij}}$$

Where, X_{ij} = Observations corresponding to j^{th} variable for the i^{th} sample

N_{ij} = Normal value corresponding j^{th} variable for the i^{th} sample

Plate 4. Conduct of nutrition awareness programme

S_{ij} = Standard deviation corresponding to the j^{th} variable

Σ = Indicate sum of all the variables for the j^{th} sample (respondents)

Results

4. RESULT

The results of the present study entitled "nutritional status and lifestyle diseases among different income groups" are presented under the following headings

4.1 Socio- economic and personal profile of the respondents

4 2 Nutritional status of the respondents

4 3 Health and morbidity of the respondents

4 4 Life style pattern of the respondents

4 5 Conduct of nutrition awareness programme

4 1 SOCIO- ECONOMIC AND PERSONAL PROFILE OF THE RESPONDENTS

Personal and socio- economic characteristics of the respondents such as age, gender, religion, family size, marital status, educational status, employment status, social participation, total monthly income of family were assessed

4.1.1. Age of the Respondents

Table1. Distribution of the respondents based on their age

Age	LIG (n =30)		MIG (n = 30)		HIG (n = 30)	
	No	Per cent	No	Per cent	No	Per cent
30-35 yrs	8	27	16	53	2	7
36-40 yrs	8	27	8	27	11	37
41-45 yrs	14	46	6	20	17	56
Total	30	100	30	100	30	100

LIG – low income group, MIG – middle income group, HIG – high income group

The age based distribution of the population as presented in the Table 1 and revealed that in the low income group majority of the respondents (46 %) belonged to the age group of 41-45 years Eight per cent of the respondents belonged to the age group of both 30-35 years and 36-40 years In the case of middle income group, 53 per cent of the respondents belonged to the age group of between 30-35 years, 27 per cent belonged to the age group of 36-40 years and 20 per cent of the respondents belonged to the age group of between 41-45 years Whereas in high income group, majority of the respondents (56 %) belonged to the age group of between 41-45 years Thirty seven per cent of the respondents belonged to the age group of between 36-40 years and 7 per cent constituted those in the age group between 30-35 years

4.1.2. Gender of the Respondents

Table 2. Distribution of respondents based on their gender

Gender	LIG (n = 30)		MIG (n = 30)		HIG (n = 30)	
	No	Per cent	No	Per cent	No	Per cent
Male	3	10	9	30	5	17
Female	27	90	21	70	25	83
Total	30	100	30	100	30	100

Table2, revealed that in the case of low income, middle income and high group majority of the respondents were females (90 %), (70 %) and (83 %) respectively Male respondents were 10 per cent in low income, 30 per cent in middle income and 17 per cent in high income

4.1.3. Personal Characteristics of The Respondents.

4.1.3.1. Religion of the Respondents.

Table3. Distribution of respondents based on personal characteristics

Variables	Category	LIG (n=30)	Per cent	MIG (n =30)	Per cent	HIG (n =30)	Per cent
Religion	Hindu	25	84	22	73	20	67
	Christian	5	16	8	27	9	30
	Muslim	-	-	-	-	1	3
Family Size	1-2	2	7	3	10	1	3
	3-4	25	83	23	77	27	90
	5-6	3	10	4	13	2	7
Marital Status	Single	-	-	2	7	-	-
	Married	30	100	28	93	30	100

The religion wise distribution of the respondents as depicted in table 3, proved that majority (84 %) of the low income group respondents were Hindus Sixteen per cent were Christians and none of them belonged to Muslim community The table also showed that 73 per cent respondents were Hindus and belonged to middle income group Whereas, in high income group also, majority of the respondents (67 %) were Hindus. Thirty per cent of the respondents were Christians and 3 per cent belong to Muslim community

4.1.3.2. Family Size of the Respondents.

As summarized in the table 3, majority ie, 83 per cent of the respondents in the low income group, 77 per cent in middle income group and 90 per cent in the high income group belonged to the category with three to four members Ten per cent of the respondents in LIG, 13 per cent in MIG and 7 per cent in HIG belonged to category with five to six members In the category of one to two members, 7 per cent of the respondents comprised in LIG, 10 per cent in MIG and 3 per cent in the HIG

4.1.3.3. Marital Status of the Respondents.

Marital status of the respondents (Table 3) revealed that, in low income and high income group all of the respondents were married Among the middle income group,93 per cent were married and 7 per cent were unmarried or being single

4.1.4. Educational Status of the Respondents

Table 4. Distribution of respondents based on their educational status

Educational status	LIG (n = 30)		MIG (n = 30)		HIG (n = 30)	
	No	Per cent	No	Per cent	No	Per cent
Primary	1	3	-	-	-	-
Upper primary	1	3	-	-	-	-
High School	13	43	11	37	1	3
Pre – degree	8	27	2	7	-	
Degree	7	24	5	16	3	10
PG	-	-	12	40	11	37
PhD	-	-	-	-	15	50
Total	30	100	30	100	30	100

When the data in table 4, were assessed it was seen that the educational status of the respondents ranged from primary to PhD level The data revealed that only 3 per cent of the respondents belonged to LIG had studied up to primary level This similarity is observed in the case of upper primary level education also Forty three per cent in LIG, 37 per cent in MIG and 3 per cent in HIG had studied up to High school level Twenty seven per cent in LIG and 7 per cent in MIG had studied up to pre- degree. Twenty four per cent in LIG, 16 per cent in MIG and 10 per cent in HIG respondents were studied up to degree level. It was also revealed that 40 per cent of the respondents belonged to MIG and 37 per cent of the respondents belonged to HIG had education up to PG level and only 50 per cent of the respondents in HIG had education level up to PhD

4.1.5. Employment Status of the Respondents

Table 5. Distribution of respondents according to their employment status

Employment status	LIG (n = 30)		MIG(n = 30)		HIG(n =30)	
	No	Per cent	No	Per cent	No	Per cent
Permanent	5	17	18	60	28	93
Part- time	-	-	6	20	-	-
Daily wages	25	83	6	20	2	7
Total	30	100	30	100	30	100

From the Table 5, it was found that, out of the 30 respondents in low income group, majority of the respondents (83 %) were working on daily wages and 17 per cent of the respondents were having permanent jobs In the case of middle income group, majority (60%) of the respondents were having permanent jobs and 20 per cent of the respondents were possessing part- time jobs and this similarity was observed in the case of respondents who were working on daily wage basis Whereas majority of the respondents belonged to high income group, possess permanent jobs, and 7 per cent were working on daily wage

4.1.6. Social Participation of the Respondents

Table 6.Distribution of respondents based on their social participation

(n = 90)

Variables	Category	No	Per cent
Social Participation	Participation in Residence association	21	23
	Participation in Political organization	14	16
	Participation in NGOs	16	18
	Participation in Religious organization	11	12
	No Participation	28	31

As illustrated in the Table 6, 23 per cent of the respondents had a participation in residence association, 16 per cent of the respondents were having a membership in political organizations The data also revealed that 18 per cent of the respondents participated as a member in various NGOs, 12 per cent of the respondents were holding a membership in religious organizations It was also found that 31 per cent of the respondents did not have membership in any of the social organizations

4.1.7. Total Family Income of the Respondents

The classification of respondents into LIG, MIG and HIG was based on the NSSO report (2007 – 2008) The monthly income from 5000 to 25,000 fell into the category of LIG, 26,000 to 46,000 in to MIG and above 46,000 fell into the category of HIG

Table 7. Distribution of respondents based on their monthly family income.

(n = 90)

Variables	Category	No	Per cent
Income range (Rupees)	10000- 30000	41	46
	31000- 50000	17	19
	51000- 70000	8	9
	71000- 90000	4	4
	91000-1,00000	2	2
	Above 1,00000	18	20

It was found that the total family income of the respondents ranged from 10000 to above one lakh/month. From the data, it was noted that majority of the respondents (46 %) were having a monthly income within the range of Rs 10000 to 30000/month Nineteen per cent of the respondents had family income in the range of Rs 31000 to 50000/month. The respondents having the family income within the range of 51000 to 70000 were nine percent and the respondents having the monthly income range from 71000 – 90000 were only 4 per cent The data also revealed that only 2 per cent of the respondents belonged to the income group range from 91000- 1, 00,000lakh, and 20 per cent of the respondents had their income range above 1 lakh (Table 7)

4 2 NUTRITIONAL STATUS OF THE RESPONDENTS

The nutritional status of the respondents was assessed using diet survey, anthropometry, clinical and biochemical assessments

4.2.1. Dietary Profile of the Respondents.

4.2.1.1. Food Habits of the Respondents

Table 8. Distribution of respondents based on their food habits

Food habits	LIG (n = 30)		MIG (n = 30)		HIG (n = 30)	
	No	Per cent	No	Per cent	No	Per cent
Vegetarian	-	-	1	3	1	3
Lacto vegetarian	-	-	-	-	2	6
Ovo vegetarian	-	-	1	3	-	
Non vegetarian	30	100	28	94	27	91
Total	30	100	30	100	30	100

Food habits of the respondents revealed in the above table showed that all the respondents belonged to low income group were non vegetarians Majority of the respondents in MIG (94%) and HIG (91 %) were non vegetarians While only three per cent of the respondents both in MIG and HIG were found to be vegetarians Three per cent of the respondents belonged to the MIG were ovo vegetarians and 6 per cent of the respondents belonged to the HIG were found to be lacto vegetarians.

4.2.1.2. Dietary Habits of the Respondents

Table 9.Distribution of respondents based on their dietary habits

Characteristics	Category	Number of Respondents	Per cent
Regular time for Consumption of meals	LIG	17	57
	MIG	15	50
	HIG	23	77
Skipping of meals	LIG	17	57
	MIG	16	54
	HIG	8	27
Taking of foods outside regularly	LIG	4	13
	MIG	4	13
	HIG	5	16

From the result of table 9, it can be seen that majority of the respondents in LIG (57 per cent) had regular time for meal consumption Fifty seven per cent of the respondents skipped their meals and 13 per cent of the respondents were taking food from outside regularly With regarding to MIG, majority of the respondents (54 per cent) skipped their meals Fifty per cent of the respondents had a regular time for the consumption of meals and 13 per cent of the

respondents were taking foods from outside regularly Whereas, majority of the respondents in HIG (77 per cent) had a regular time for meal consumption Twenty seven per cent of the respondents skipped their meals and 16 per cent were having foods outside home regularly

4.2.1.3. Meal Skipping Pattern of the Respondents

Table 10. Distribution of respondents based on their meal skipping pattern

Meal timing	LIG		MIG		HIG		Total	
	No	Per cent	No	Per cent	No	Per cent	No	Per cent
Breakfast	9	30	8	27	3	10	20	22
Lunch	4	13	2	7	3	10	9	10
Tea	-	-	-	-	-	-	-	-
Dinner	4	13	4	13	2	7	10	11

The above table revealed that 30 per cent of the LIG respondents, 27 per cent of the MIG respondents and 10 per cent of the HIG respondents had a habit of skipping breakfast Thirteen per cent of the LIG respondents, seven per cent of the MIG respondents and 10 per cent of the HIG respondents had a habit of skipping their lunch. Whereas, 13 per cent of both LIG and MIG respondents and seven per cent of the HIG respondents had a habit of skipping their dinner

Table11. Distribution of respondents based on the reason for the skipping of meals

Reasons for meal skipping	LIG		MIG		HIG	
	No	Per cent	No	Per cent	No	Per cent
Lack of time	10	33	10	33	3	10
Aversion	3	10	1	3	2	7
Religious facts	2	7	1	3	2	7
Dieting	2	7	2	7	1	3

When the data in table 11 were assessed, it can be seen that both in LIG and MIG majority of the respondents (33 per cent) skipped their meals due to lack of time where as in HIG it was 10 per cent Ten per cent of the respondents in LIG, three per cent of the respondents in MIG and seven percent of the respondents in HIG were skipped their meals because of the aversion towards food Seven per cent of the respondents in both LIG and HIG and three per cent of respondents in MIG skipped their meals due to religious facts In the case of LIG and MIG, seven per cent of the respondents had skipped their meals due to dieting and in HIG it was only three per cent

4.2.1.4. Outside Dining Pattern of the Respondents

Table12. Distribution of respondents based on their regularity in dining outside

Meal timing	LIG		MIG		HIG	
	No	Per cent	No	Per cent	No	Per cent
Breakfast	1	3	-	-	-	-
Lunch	1	3	2	7	2	7
Tea	2	7	2	7	-	-
Dinner	-		-	-	3	10

As illustrated in the table 12,only three per cent of the respondents in low income group had regularly consumed their breakfast from outside Three per cent had regularly consumed their lunch from outside and seven per cent of the respondents had regularly consumed their tea from outside With respect to middle income group, seven per cent of the respondents had regularly consumed their lunch as well tea from outside. Seven per cent and ten per cent of the respondents consumed their lunch and dinner from outside in high income group

Table13. Distribution of respondents based on the their reasons for dinning outside

Reasons for outside dining	LIG (n = 30)		MIG (n = 30)		HIG (n = 30)	
	No	Per cent	No	Per cent	No	Per cent
Variety	-	-	3	10	2	7
Appetizing foods	-	-	1	3	2	7
Necessity	13	43	10	33	6	20
Convenience	6	20	5	17	6	20
Entertainment	2	7	-	-	3	10
For a change	9	30	11	37	11	37
Total	30	100	30	100	30	100

Majority of the respondents (43 per cent) in LIG were of the opinion that necessity is the reason for dinning outside, 20 per cent of respondents took food due to convenience, seven per cent for entertainment and for 30 per cent for a change Where as in MIG the reason for dinning outside was for a change for 37 per cent of the respondents, for 17 per cent, it was convenience and for the remaining 33 per cent it was for necessity Three per cent of the respondents took it due to taste and another 10 per cent for variety In the case of HIG, seven per cent of the respondents told both verity and appetizing foods as the reason for dinning outside Twenty per cent of the respondents had said both necessity and convenience are the reason for dinning outside, 10 per cent had of the opinion that entertainment as the reason for outside dinning and for 37 per cent of the respondents it was just for a change

4.2.1.5. Daily Meal Pattern of the Subjects

The daily meal pattern of the subjects were further studied using 24 hour dietary-recall method, since it would give information on the food items commonly consumed, as well as the general dietary pattern. Table-14 reveals the daily meal pattern of the subjects surveyed

Table14. Distribution of respondents based on their daily meal pattern

(n = 90)

Sl. No	Type of foods	Meal pattern									
		Early morning		Breakfast		Lunch		Evening		Dinner	
		No	%	No	%	No	%	No	%	No	%
1	Tea	32	36	4	4	-	-	15	17	-	-
2	Tea with Bakery items	58	64	-	-	-	-	75	83	-	-
3	Cereals, Pulse, Vegetables	-	-	52	58	2	2	-	-	-	-
4	Wheat, Pulse, Vegetables	-	-	14	16	-	-	-	-	17	19
5	Rice, Fish, Vegetables	-	-	-	-	40	44	-	-	37	41
6	Rice, Egg, Vegetables	-	-	-	-	35	40	-	-	20	22
7	Rice and Vegetables	-	-	-	-	4	4	-	-	6	7
8	Not taking foods	-	-	20	22	9	10	-	-	10	11
	Total	90	100	90	100	90	100	90	100	90	100

The daily meal pattern of the subjects is presented in the Table 14 It was revealed that 64 per cent of the respondents had a habit of taking tea with bakery items and 36 per cent of the respondents consumed only tea in the early morning As far as the breakfast was concerned, 58 per cent of the respondents had cereal-

pulse-vegetables combination. While16 per cent of the respondents consumed wheat, pulse and vegetables combination as breakfast Where 22 per cent did not have any breakfast

The lunch pattern of the subjects indicated that rice, fish and vegetables formed the major food consumed by 44 per cent of subjects Whereas rice, egg and vegetables preparation was included by 40 per cent of the respondents Four per cent of the respondents had included only rice and vegetable preparations and only two per cent of the respondents included cereal, pulse and vegetable preparation for their lunch and 10 per cent of the respondents did not take lunch at all

In the case of evening tea, 83 per cent of the respondents consumed tea with bakery items and 17 per cent of the respondents consumed tea only in the evenings The dinner pattern of the respondents (41 per cent) revealed included rice, fish and vegetable combination Whereas 22 per cent of the respondents consumed rice, egg and vegetable preparations Nineteen per cent of the respondents had included wheat, pulse, and vegetable combination Only seven per cent of the respondents included rice and vegetable combination for their dinner and 11 per cent of the respondents did not have any dinner

4.2.1.6. Frequency of Use of Various Food Items by the Respondents

Data collected based on the frequency use of various food items are presented in Table 15

Cereals (mainly rice) were used by all of the respondents in LIG and MIG on a daily basis In the case HIG respondents, 93 per cent of them consumed cereals daily and seven per cent of them consumed cereals twice in a week Pulses like black gram dhal, bengal gram dhal were found to be consumed by 13per cent of the respondents on daily basis Thirty three per cent of the respondents consumed twice in a week and 37 per cent consumed thrice in a week Thirteen per cent of the respondents consumed pulses once in a week and 63 percent

Table15. Percentage distribution of frequency use of various food items

Food items	Group	Daily	Twice in a week	Thrice in a week	Weekly	Fortnightly	Monthly	Never	Total
Cereals	LIG	30(100)	-	-	-	-	-	-	30(100)
	MIG	30(100)	-	-	-	-	-	-	30(100)
	HIG	28(93)	2((7)	-	-	-	-	-	30(100)
Pulses	LIG	4(13)	10(33)	11(37)	4(13)	-	19(63)	-	30(100)
	MIG	8 (27)	8(27)	9(30)	5(17)	-	-	-	30(100)
	HIG	15(50)	5(17)	9(30)	1(3)	-	-	-	30(100)
Vegetables	LIG	29(97)	-	1(3)	-	-	-	-	30(100)
	MIG	30(100)	-	-	-	-	-	-	30(100)
	HIG	30(100)	-	-	-	-	-	-	30(100)
Meat	LIG	-	1(3)	3(10)	7(23)	1(3)	16(53)	3(10)	30(100)
	MIG	-	-	-	7(23)	5(17)	14(47)	4(13)	30(100)
	HIG	1(3)	3(10)	7(23)	5(17)	8(27)	5(17)	1(3)	30(100)

*(Figure in parenthesis show percentages of respondents)

Table 15. Continued...

Food items	Group	Daily	Twice in a week	Thrice in a week	Weekly	Fortnightly	Monthly	Never	Total
Egg	LIG	-	`10(33)	6(20)	8(27)	1(3)	3(10)	2(7)	30(100)
	MIG	1(3)	9(30)	3(10)	11(37)	3(10)	1(3)	2(7)	30(100)
	HIG	2(10)	7(23)	4(13)	9(30)	2(7)	1(3)	5(17)	30(100)
Fruits	LIG	6(20)	4(13)	7(23)	6(20)	-	7(23)	-	30(100)
	MIG	8(27)	5(17)	7(23)	8(27)	1(3)	1(3)	-	30(100)
	HIG	16(53)	5(17)	9 (30)	-	-	-	-	30(100)
Milk & Milk products	LIG	12(40)	1(3)	1 (3)	5(17)	-	4(13)	7(23)	30(100)
	MIG	15(50)	3(10)	2(7)	5(17)	1(3)	1(3)	3(10)	30(100)
	HIG	25(23)	1(3)	2(7)	2(7)	-	-	-	30(100)
Coffee/ Tea	LIG	29(97)	-	-	-	-	-	1(3)	30(100)
	MIG	29(97)	-	-	-	-	-	1(3)	30(100)
	HIG	28(93)	-	-	-	-	-	2(7)	30(100)

*(Figure in parenthesis show percentages of respondents)

Table 15. Continued...

Food items	Group	Daily	Twice in a week	Thrice in a week	Weekly	Fortnightly	Monthly	Never	Total
Juices/ Soft drinks	LIG	-	3(10)	1(3)	7(23)	-	10(33)	9(30)	30(100)
	MIG	5(17)	2(7)	1(3)	9(30)	3(10)	6(20)	4(13)	30(100)
	HIG	4(13)	6(20)	5(17)	6(20)	3(10)	5(17)	1(3)	30(100)
Homemade snacks	LIG	1(3)	-	3(10)	5(17)	2(7)	11(37)	8(27)	30(100)
	MIG	1(3)	4(13)	1(3)	5(17)	2(7)	15(50)	2(7)	30(100)
	HIG	1(3)	3(10)	6(20)	8(27)	6(20)	4(13)	2(7)	30(100)
Fast foods	LIG	-	1(3)	-	1(3)	-	11(37)	17(57)	30(100)
	MIG	-	1(3)	-	1(3)	2(7)	9(30)	17(57)	30(100)
	HIG	-	1(3)	-	5(17)	5(17)	16(53)	3(10)	30(100)

*(Figure in parenthesis show percentages of respondents)

consumed it once in a month among LIG With regarding to MIG respondents 27 per cent consumed it daily and equal per cent of the respondents consumed pulses twice in a week The respondents who consumed thrice in a week were 30 per cent and 17 per cent of the respondents used pulses weekly once Where as in HIG 50 per cent included pulses daily in their diet, 17 per cent used it twice in a week, 30 per cent used thrice in a week and only three per cent of the consumed it weekly once

It was found that 97 per cent of the respondents in LIG and all of the respondents in both MIG as well as in HIG consumed vegetables daily and only 3 per cent of the respondents in LIG used vegetables thrice in a week With regarding the meat, only three per cent of the respondents in HIG consumed it daily Three per cent of respondents in LIG and 10 per cent of the respondents in HIG consumed twice in a week, 10 per cent of the respondents in LIG and 23 per cent of the respondents in HIG consumed it thrice in a week Twenty three per cent of the respondents in LIG, MIG and 17 per cent of the respondents in HIG consumed meat weekly Whereas, three per cent of the respondents in LIG, 17 per cent of the respondents in MIG, 27 per cent of the respondents in HIG consumed meat fortnightly Majority of the respondents in both LIG (53 per cent), MIG (47 per cent) and 17 per cent of the respondents in HIG included meat once in a month in their diet Ten per cent of the respondents in LIG, 13 per cent of the respondents in MIG and three per cent of the respondents in HIG never used meat in their diet

The data in the table 15 shows the details regarding the consumption of fish. In LIG, majority of the respondents (70 per cent) consumed daily, 17 per cent of the respondents used it thrice in a week, seven per cent of the respondents consumed twice in a week and equal per cent (7) of the respondents consumed it weekly In the case of MIG, majority of the respondents (83 per cent) included fish daily in their diet, seven per cent of the respondents consumed twice in a week, three per cent of the respondents used thrice in week and seven per cent of the respondents never used fish in their diet Where as in HIG, majority of the

respondents (47 per cent) used daily, 10 per cent used twice in a week, 27 per cent used thrice in a week, three per cent of the respondents used weekly, equal per cent (3) of the respondents used monthly and only 10 per cent of the respondents never included fish in their diet

The frequency use of egg was assessed using the data in the table and it revealed that three per cent of the respondents in MIG, 10 per cent of the respondents in HIG consumed it daily Thirty three per cent of the respondents in LIG, 30 per cent of the respondents in MIG and 23 per cent of the respondents in HIG consumed it twice in a week Around 20 per cent of the respondents belong to LIG, 10 per cent of the respondents in MIG and 13 per cent of the respondents in HIG consumed it thrice in a week Twenty seven per cent of the respondents in LIG, 37 per cent of the respondents in MIG and 30 per cent of the respondents in HIG used egg weekly in their diet Only three per cent of the respondents in LIG, 10 per cent of the respondents in MIG and seven per cent of the respondents in HIG consumed it fortnightly About 10 per cent of the respondents in LIG, and three per cent of the respondents in both MIG and HIG included egg monthly in their diet Seven per cent of the respondents in LIG, MIG and 17 per cent of the respondents in HIG never included egg in their diet

On assessing the data in table 15, it can be seen that 20 per cent of the respondents in LIG consumed fruits daily and equal per cent of the respondents consumed it weekly Thirteen per cent of the respondents included fruits twice in a week, 23 per cent thrice in a week and equal per cent of the respondents consumed fruits monthly In the case of MIG also, 27 per cent of the respondents consumed it monthly and equal (27 per cent) of the respondents consumed it weekly Seventeen per cent of the respondents included fruits twice in a week, 23 per cent of the respondents consumed trice in a week, three per cent of the respondents consumed it fortnightly and same per cent of respondents consumed it monthly Whereas in HIG, majority of the respondents (53 per cent) consumed fruits daily, 17 per cent of the respondents included it twice in a week and 30 percent of them included fruits thrice in a week in their diet

With regarding to the frequency use of milk and milk products, 40 per cent of the respondents in LIG, 50 per cent of the respondents in MIG, and 23 per cent of the respondents in HIG consumed milk and its products on daily basis Three per cent of the respondents in LIG and HIG, ten per cent of the respondents in MIG included those items twice in a week Three per cent of the respondents in LIG, seven per cent of the respondents in MIG and HIG consumed it thrice in a week, 17 per cent of the respondents in both LIG & MIG and seven per cent of the respondents in HIG consumed it weekly Three per cent of the respondents in MIG consumed it fortnightly, where as in the case of monthly consumption 13 per cent of the respondents in LIG and three per cent of the respondents in MIG were using those items Twenty three per cent of the respondents in LIG and 10 per cent of the respondents in MIG never used milk and milk products In the case of coffee/ tea consumption majority of the respondents (97 per cent) in LIG, MIG and 93 per cent of the respondents in HIG consumed them daily and only three per cent of the respondents in both LIG as well as in MIG and seven per cent of the respondents in HIG never consumed tea/ coffee in their diet

The analysis of frequency use of food stuff revealed that, 10 per cent of the respondents in LIG consumed juices/ soft drinks twice in a week, three per cent of the respondents consumed thrice in a week, 23 per cent of the respondents consumed it on weekly basis, 33 per cent of the respondents included them monthly and 30 per cent of the respondents never consumed those food items in LIG In MIG 17 per cent of the respondents used it on daily basis, seven per cent of the respondents consumed it twice in a week, and only three per cent of the respondents included it thrice in a week Thirty per cent of the respondents included juice or soft drinks once in a week, 10 per cent of the respondents consumed it fortnightly, 20 per cent of the respondents included them monthly and 13 per cent of the respondents never consumed it in their diet Whereas in HIG, 13 per cent of the respondents used juices / soft drinks daily, 20 per cent of the respondents consumed it twice in a week, equal per cent of the respondents consumed it weekly, 17 per cent of the respondents included them thrice in a

week and equal respondents used it on monthly basis While, 10 per cent of the respondents consumed it fortnightly and three per cent of the respondents never used juices or soft drinks in their diet

In the case of fast foods, three per cent of the respondents in LIG, MIG and HIG used it twice in a week, also three per cent of the respondents in both LIG as well as in MIG and 17 per cent of the respondents used fast foods on weekly basis In MIG seven percent and in HIG 17 per cent of the respondents consumed it fortnightly Thirty seven percent of the respondents in LIG, 30 per cent of the respondents in MIG and 53 per cent of the respondents in HIG consumed it monthly Majority of the respondents (57 per cent) in both LIG as well as MIG never consumed fast foods and in HIG the per cent of respondents was 10

Table 16. Frequency scores of various food items

Food items	LIG (n = 30)		MIG (n = 30)		HIG (n= 30)	
	Average scores	Percentage of total score	Average scores	Percentage of total score	Average scores	Percentage of total score
Cereals	7	100	7	100	6 9	99
Pulses	5 8	84	5 6	81	6 1	88
Vegetables	6 9	99	7	100	7	100
Meat	2 8	40	2 4	36	3 8	55
Fish	6 4	92	6 4	92	0 2	23
Egg	3 6	52 1	4 4	63 1	4 3	62 4
Fruits	4 5	66	5 2	76	6 2	89
Milk & milk products	4 2	61	5 3	77	2 4	35
Coffee / Tea	6 8	97	6 8	97	6 5	94

Table 16 continued...

Food items	LIG (n = 30)		MIG (n = 30)		HIG (n= 30)	
	Average scores	Percentage of total score	Average scores	Percentage of total score	Average scores	Percentage of total score
Juices / Soft drinks	2 6	38	3 7	54	4 4	63
Homemade snacks	2 6	37	3	44	3 8	55
Fast foods	1 61	23	1 68	24	2 5	36 1

As indicated in table 16, cereals got the average score of 7 in LIG as well as in MIG whereas in HIG the average score obtained was 6 9 In the case of pulses the average score obtained for three groups were 5 8, 5 6 and 6 1 respectively In LIG, vegetables obtained the average score of 6 9 and 7 in MIG and HIG respectively Fish and coffee / tea obtained the average score of 6 4 and 6 8 respectively in LIG, 6 4 and 6 8 in MIG and 0.2 and 6 5 in HIG With regarding to fruits, in all the three income groups the average score obtained were 4 5, 5 2 and 6 2 and the average score obtained for milk & milk products for three income groups were 4 2, 5 3 and 2 4 respectively In LIG, MIG and HIG low average score was obtained for both egg and meat The score for egg was 3 6, 4 4 and 4 3 respectively and for meat the score was 2 8, 2 4 and 3 8 respectively For Juices / Soft drinks and Homemade snacks a very less average score was obtained for three groups and it was for Juices/ soft drinks 2.6, 3 7 and 4 4 and for homemade snacks it was 2 6, 3 and 3 8 and the least score was obtained for fast foods which was 1 61 in LIG, 1 68 in MIG and 2 5 for HIG

Table 17. Classification of various food items based on their percentage of food use frequency score (Low income group and Middle income group)

Most frequently used foods (above 80)	Medium frequently used foods (Between 80 – 50)	Less frequently used foods (between 50– 30)	Least frequently used foods (below 30)
Cereals	Fruits	Meat	Fast foods
Pulses	Egg	Juices / Soft drinks	
Vegetables	Milk & Milk products	Homemade Snacks	
Fish			
Coffee / Tea			

The classification of various foods items based on their percentage of food use frequency score was same for both LIG as well as MIG Hence LIG and MIG classification is distributed in one table On assessing the table 17 the food stuffs like cereals, pulses, vegetables, fish and coffee/ tea was most frequently used in LIG and MIG group with the percentage score above 80 The medium frequently used foods with the percentage score between 80 - 50 were fruits, egg and milk and milk products The foods like meat, juices / soft drinks and homemade snacks were less frequently used with the average score between 50 – 30 The least frequently used food was fast food with the score below 30 in both LIG and MIG

Table 18. Classification of various food items based on food use frequency score (High income group)

Most frequently used foods (above 80)	Medium frequently used foods (Between 80 – 50)	Less frequently used foods (between 50– 30)	Least frequently used foods (below 30)
Cereals Pulses Vegetables Fruits Coffee / Tea	Meat Egg Juices / Soft drinks Homemade Snacks	Milk & Milk products Fast foods	Fish

In the case of high income groups' food stuffs like cereals, pulses, vegetables, fruits and coffee / tea were the most frequently used with the percentage score above 80 The least frequently used food was fish with the score below 30 Meat, egg, juices / soft drinks and homemade snacks were used medium frequently and the average score obtained were between 80 – 50 The less frequently used foods were milk & milk products and fast foods and the average score was between 50 – 30

4.2.1.7. Monthly Food Expenditure Pattern of the Respondents

Table19. Distribution of respondents based on their monthly food expenditure

Items	Expenditure (Rs.)	Number of respondents	Percentage
Cereals	1000 – 3000	62	69
	3001 - 5000	28	31
Pulses	100 -500	61	67
	501 – 1000	23	26
	>1000	6	7
Vegetables	300 – 500	42	47
	501 – 1000	48	53
Green leafy vegetables	<50	29	32
	50 – 100	61	68
Fruits	300 – 500	56	62
	501 – 1000	34	38
Meat	0	5	6
	200 – 500	54	60
	501 – 1000	31	34
Fish	0	5	6
	< 500	7	8
	501 – 1000	32	35
	1001 – 3000	46	51

Table 19. Continued...

Items	Expenditure (Rs.)	Number of respondents	Percentage
Egg	0	4	4
	100 – 50	86	96
	500 – 1000	56	62
Milk & milk products	1001 – 2000	34	38
Roots & tubers	100 – 500	90	100
Fats & edible oils	200 – 500	54	60
	501 – 1000	36	40
Sugar/Jaggery/Honey	100 – 500	90	100
Snacks/Desserts/Beverages	300 – 500	50	56
	501 – 1000	40	44
Processed foods	100 – 500	90	100

Through the 24 hour recall diet survey the expenditure of food items were also calculated The monthly food expenditure pattern of the respondents was calculated by analysing the data collected from the respondents at the time of diet survey Sixty nine percent of the respondents spent Rs 1000 – 3000 and 31 per cent of the respondents spent Rs 3001 - 5000 monthly for cereals like rice and wheat Majority of the respondents(67 per cent) spent Rs 100 – 500,26 per cent spent Rs 501 – 1000 and only seven per cent of the respondents spent Rs 1000 and above for the purchase of pulses The monthly expenditure for other vegetables was ranged between Rs 300 – 1000 In this, 47 per cent of the respondents spent Rs 300 – 500 and 53 per cent spent Rs 501 – 1000 Thirty two per cent of the respondents spent Rs below 50 where as 68 per cent of the respondents spent Rs 50 – 100 for the purchase of green leafy vegetables The money spent for the purchase of fruits was between Rs 300 – 1000 In this,

majority of the respondents (62 per cent)spent Rs 300 – 500 and the rest (38 per cent) spent Rs 501 – 1000 /month. While for the purchase of meat, six per cent of the respondents spent nothing for it because they never used meat in their diet, 60 per cent of the respondents spent Rs 200 – 500 for a month and 34 per cent of the respondents spent Rs 501 – 1000 for meat in a month. In the case of fish also six per cent of the respondents spent nothing for it, eight per cent of the respondents spent Rs below 500 in a month. For 35 per cent of the respondents the expenditure was between Rs 501 – 1000 and majority of the respondents spent Rs 1001 – 3000 for buying fish in a month Four per cent of the respondents never spent any money for the purchase of egg because either they never use it or they have chicks in their home All the other respondents (96 per cent) spent Rs 100 – 500 for the monthly purchase of eggs The amount spent for the purchase milk and milk products ranged from Rs 500 to 2000among this, 62 per cent spent an amount between Rs 500 – 1000 rupees and 38 per cent spent an amount between Rs 1001 – 2000 in a month All of the respondents spent an amount between 100 – 500 for the purchase of roots and tubers monthly

In the case of fats and edible oils the range of Rs spent was between 200 to 1000 and in that 60 per cent spent Rs 200 – 500 and 40 per cent spent Rs 501 – 1000 The case of money spent for the purchase of sugar/ jaggery/ honey was similar to that of roots and tubers because in this case also all of the respondents spent Rs 100 – 500 per month. While for snacks/desserts or beverages the amount spent were between Rs 300 – 1000 In that an amount of Rs 300 – 500 was spent by 56 per cent and the rest of the respondents spent Rs 501 – 1000 rupees in a month The processed food was purchased by all of the respondents and it was between Rs 100 – 500 monthly

4.2.1.8. Mean Food Intake of the Respondents

Table 20. Distribution of respondents based on their mean food intake (Male)

Food items	Mean food intake (g)	RDA (g)	Percentage RDA	Deviation from RDA
Cereals	326	360	91	-34
Pulses	36	60	60	-24
Vegetables	223	300	74	-77
Fruits	52	100	52	-48
Milk & milk products	150	300	50	-150
Meat + fish + egg	90	80	113	+10
Fats & oils	35	25	140	+10
Sugar & jaggery	27	25	108	+2

Sources (NIN, 2010)

The mean food intake of the male respondents were assessed and presented in the table 21 The data on the table revealed that, with regarding to cereals, the staple food of Keralites which is a rich source of carbohydrate and almost 91 per cent of the respondents met their required amount of RDA Where as in the case of pulse which is only supplier of the protein in our diet only 60 per cent of RDA was met Only 74 per cent RDA was met in vegetable consumption which was 223 g against the RDA of 300g When we consider the intake of fruits it was 52g against the RDA of 100g and the per cent was 52, similarly the per cent of RDA met for milk and milk products was also low that was only 50 per cent Whereas in non vegetarian foods like meat, fish and egg the intake was 90g against the RDA of 80g and the per cent of RDA were 113 The intake of fats & oils were much above the RDA and the per cent met was 140 Sugar & jaggery

intake was also much above the RDA which was 27g against 25 g and the RDA was met

Table 21. Distribution of respondents based on their mean food intake (female)

Food items	Mean food intake(g)	RDA(g)	Percentage RDA	Deviation from RDA
Cereals	293	270	109	+23
Pulses	38	60	63	-22
Vegetables	342	300	114	+42
Fruits	36	100	36	-64
Milk & milk products	121	300	40	-179
Meat + fish + egg	75	90	83	-15
Fats & oils	21	20	105	+1
Sugar & jiggery	30	20	150	+10

Sources (NIN, 2010)

As per the details shown in the above table it was found that among the female respondents, the mean intake of cereals was much above the RDA which was 293g against 270 g and per cent was 109 but in the case of pulse, the intake was below the RDA and the met per cent was 63 In the case of vegetables, mean food intake was 342g against 300g and the per cent was 114 It was noted that fruits met only 36 per cent of the RDA which was very low Similarly the per cent of RDA met for milk and milk products were also below the RDA which was 40 per cent In the case of meat, fish and egg, it was observed that the food intake was 75 g against 90g and the per cent of RDA met was only 83 Per cent of RDA met for fats & oils were105 Similar findings were found in the case of sugar and jaggery which was 30 g against 20g and the per cent RDA met was 150

4.2.1.9. Mean Nutrient Intake of the Respondents

Table 22. Distribution of respondents based on their mean nutrient intake (LIG)

Activity	Nutrients	Male			Female		
		Mean intake	RDA	%of RDA	Mean intake	RDA	% of RDA
Sedentary	Energy (Kcal)	-	2320	-	2849	1900	150
Moderate		3126	2730	115	2750	2230	123
Heavy		2602	3490	75	3056	2850	107
Sedentary	Protein (g)	-	60	-	44	55	88
Moderate		36 6		61	51		93
Heavy		60		100	39		71
Sedentary	Fat (g)	-	25	-	57	20	285
Moderate		58 2	30	194	60	25	240
Heavy		69	40	173	50	30	167
Sedentary	Calcium (mg)	-	600	-	326	600	54
Moderate		384 7		64	350		58
Heavy		306		51	305		51
Sedentary	Iron (g)	-	17	-	24	21	114
Moderate		27 8		164	24		114
Heavy		28		165	25		119

Sources (NIN, 2010)

As indicated in the table 22, the case of energy intake of working males (doing moderate activity) was above the RDA levels, the per cent of RDA met was 115 and for heavy workers the per cent of RDA met was 75 Whereas in females in all the activity groups, the energy consumption was above the RDA levels and the per cent met was 150, 123, and 107 for sedentary, moderate and heavy respectively In the case of protein consumption of males, the per cent of RDA met was 61 for moderate workers and it was 100 per cent for heavy workers

ıe, consumptıon was equal to the RDA level. Whıle for the females, ın all the groups the consumptıon was below the RDA and the per cent met was 88 for sedentary, 93 for moderate and 71 for heavy workers With referrıng to fat consumptıon for both male and females, the consumptıon was above the RDA levels With regardıng to calcıum consumptıon the RDA per cent met for males was 64 for moderate and 51 for heavy In females, 54 for sedentary, 58 for moderate and 51 for heavy workers The per cent of RDA met for ıron was above 100 for both male and females ın all the actıvıty groups, ıe the ıntake of ıron were hıgher than the RDA levels There were no sedentary workıng males ın thıs group

Table 23. Distribution of respondents based on their mean nutrient intake (MIG)

Activity	Nutrients	Male			Female		
		Mean intake	RDA	%of RDA	Mean intake	RDA	% of RDA
Sedentary	Energy (Kcal)	2396	2320	103	2222	1900	117
Moderate		1821	2730	67	2634	2230	118
Heavy		1889	3490	54	2160	2850	76
Sedentary	Protein (g)	56	60	93	53	55	96
Moderate		45		75	50		91
Heavy		58		97	36		65
Sedentary	Fat (g)	57	25	228	57	20	285
Moderate		49	30	163	66	25	264
Heavy		62	40	155	57	30	190
Sedentary	Calcium (mg)	221	600	37	287	600	48
Moderate		254		42	327		55
Heavy		350		58	256		43
Sedentary	Iron (g)	27	17	159	17	21	81
Moderate		18		105	21		100
Heavy		19		111	20		95

Sources (NIN, 2010)

As illustrated in the table 23, the energy intake of sedentary working males was above the RDA levels and the per cent of RDA met was 103 and in the case of moderate as well as heavy workers the per cent of RDA met was 67 and 54 respectively Whereas in females both in sedentary and moderate activity groups, the energy consumption was above the RDA levels and the per cent met was 117, 118, for sedentary, moderate respectively While among the heavy workers, the per cent of RDA was 76 In the case of protein consumption of males the per cent of RDA met was 93 for sedentary, 75for moderate workers and 97 for heavy workers ie, consumption was below RDA level With regarding the females, in

all groups the consumption was below the RDA and the per cent met is 96 for sedentary, 91 for moderate and 65 for heavy workers While for the fat consumption, for both male and females was above the RDA levels With respect to calcium consumption, the RDA per cent met was 37 for sedentary, 42 for moderate and 58 for heavy working males and for females, it was48 for sedentary, 55 for moderate and 43 for heavy workers The per cent of RDA met for iron was above 100 for male in all activity groups and for females 81 per cent of RDA was met for sedentary workers, the consumption was equal to RDA for moderate workers and for heavy workers 95 per cent of RDA was met

Table 24. Distribution of respondents based on their mean nutrient intake (HIG)

Activity	Nutrients	Male			Female		
		Mean intake	RDA	%of RDA	Mean intake	RDA	% of RDA
Sedentary	Energy (Kcal)	1743	2320	75	2303	1900	121
Moderate		2018	2730	74	2764	2230	124
Heavy		1887	3490	54	-	2850	-
Sedentary	Protein (g)	61 8	60	103	48	55	87
Moderate		66		110	49		89
Heavy		97 9		163	-		-
Sedentary	Fat (g)	61 8	25	247	61	20	305
Moderate		65	30	217	45	25	180
Heavy		97 9	40	245	-	30	-
Sedentary	Calcium (mg)	373	600	62	300	600	50
Moderate		346		58	296		49
Heavy		693 6		116	-		-
Sedentary	Iron (g)	41 7	17	245	27	21	129
Moderate		33		194	32		152
Heavy		48 2		284	-		-

Sources (NIN, 2010)

The data presented in table 24 revealed that, in the case of energy in all activity groups, the consumption was below RDA level for males while for females it was just the opposite ie, the consumption was above the RDA level With respect to protein consumption of males the per cent of RDA met was 103 for sedentary, 110 for moderate workers and 163 per cent for heavy workers ie, consumption was above the RDA level With regard to females in sedentary group, the per cent of RDA met was87 for sedentary and 89 for moderately active workers The fat consumption for both male and females was above the RDA levels In the case of calcium consumption, the RDA per cent met was, 62 for sedentary, 58 for moderate and 116 for heavy activity male workers and in females, 50 for sedentary, and 49 for moderate workers The per cent of RDA met for iron was above 100 per cent for both male and females in all activity groups, ie the intake of iron was higher than the RDA levels The per cent of RDA met was, 245 for sedentary, 194 for moderate and 284 for heavy working males For females it was 129 for sedentary and 152 for moderately active workers There were no heavy working females in HIG

4.2.1.10. Food Habits of the Respondents

Table 25. Distribution of the respondents based on their food habits

Eating habits	**LIG**		**MIG**		**HIG**	
	No	Per cent	No	Per cent	No	Per cent
Very good (score >25)	6	20	7	23	18	60
Good (25- 20)	18	60	16	54	10	33
Moderate (20 – 15)	6	20	7	23	2	7
Poor (< 15)	-	-	-	-	-	-

The food habit of the respondents was assessed using the answers given by the respondents to ten statements The statements was based on food habits and based on the correct answering of the statement the score was calculated for every person and respondents got a minimum score of 15 and a maximum score of 30 Based on the scores the food habits were divided as very good, good, moderate and poor

In LIG, majority of the respondents (60 per cent) possess good food habits, 20 per cent of the respondents had a very good food habit and equal per cent of the respondents had moderate food habit There were no respondents with a poor food habit Where as in MIG also majority of the respondents (54 per cent) followed good food habit in their life, 23 per cent possessed a very good food habits and equal per cent of respondents had a moderate level of food habits in their daily life In the case of HIG, majority of the respondents (60 per cent) had a very good food habits in their life, 33 per cent of the respondents possess good food habits, only seven per cent had a moderate level of food habits and there was no respondents with a poor food habits in both MIG and HIG respondents

4.2.2. Anthropometric Profile of the Respondents

4.2.2.1. Height and Weight of the Respondents

The data collected based on the height and weight of the respondents was used to find out whether they the respondents have adequate weight for height which is generally used as an indicator of good nutritional status Respondent's weight for height was calculated and compared with the standard weight for height chart prescribed by LIC of India (2003) by comparing the values with the standards, it was categorized as low weight for height, normal weight for height and high weight for height

Table 26. Distribution of the respondents based on their body weight for height (male)

Std Weight (Kg) for Height value	LIG (n = 30)		MIG (n = 30)		HIG (n = 30)	
	No	Per cent	No	Per cent	No	Per cent
Low	1	3	1	3	3	10
Normal	1	3	2	7	2	7
High	1	3	6	20	3	10

Source - (LIC of India, 2003)

Table 26 indicates the weight for height values of male respondents in different income groups From the table, it can be seen that three per cent of the respondents in both LIG as well as in MIG and 10 per cent of the respondents in HIG had low values Whereas three per cent of the LIG, seven per cent of the MIG and HIG respondents was observed with a normal value In the case of high standard weight for height category, it was observed for three per cent of the LIG, 20 per cent of the MIG and 10 per cent of the HIG respondents

Table 27. Distribution of the respondents based on their body weight for height (female)

Std. Weight (Kg) for Height value	LIG (n = 30)		MIG (n = 30)		HIG (n = 30)	
	No	Per cent	No	Per cent	No	Per cent
Low	2	7	2	7	3	10
Normal	5	17	6	20	5	17
High	25	83	13	43	18	60

Source - (LIC of India, 2003)

As illustrated in the table 27, it can be seen that in the case of female respondents in LIG, seven per cent of the respondents was observed with a low value, normal value was obtained for 17 per cent and a high value was observed

for 83 per cent of the respondents With respect to MIG, seven per cent of the respondents were coming under low, 20 per cent was under normal level and 43 per cent of the respondents came under high level Where as in HIG, the per cent of respondents obtained low value was 10 Seventeen per cent of the respondents got normal value and majority of the respondents (60 per cent) came under high category

4.2.2.2. Body Mass Index of the Respondents

Body mass index is considered as a useful index for evaluating physical characteristics and risk of degenerative diseases The BMI of the subjects were computed from their height and weight, based on WHO classification and it is presented in table 28

Table 28. Distribution of the respondents based on their BMI

BMI Classification	LIG (n = 30)		MIG (n = 30)		HIG (n = 30)	
	Male	Female	Male	female	Male	Female
18- 25 (Normal/not Obese)	1(3)	8(27)	5(17)	11(37)	2(7)	9(30)
25 – 29 9 (Grade I Obesity)	1(3)	12(40)	3(10)	6(20)	2(7)	11(37)
30 – 40 (Grade II Obesity)	1(3)	7(23)	1(3)	4(13)	-	4(13)
>40 (Grade III Obesity	-	-	-	-	1(3)	1(3)
Total	30(100)		30(100)		30(100)	

(Figure in parenthesis show percentages of respondents)

The data presented in the table revealed that in the case of male respondents three per cent of the respondents in LIG, 17 per cent of the respondents in MIG and seven per cent of the respondents in HIG had a normal BMI Whereas three per cent of LIG respondents, 10 per cent of MIG respondents

and seven per cent of HIG respondents were observed with Grade I obesity In the case of Grade II obesity three per cent of the respondents in both LIG and MIG was observed and none of had Grade II obesity in HIG Similarly there was no respondent who was observed with Grade III obesity in LIG and MIG groups but only three per cent of the respondents in HIG was observed with Grade III obesity

The data also indicated the BMI values of female respondents in every group, it was found that 27 per cent of the respondents in LIG, 37 per cent of the respondents in MIG and 30 per cent of the respondents in HIG had a normal BMI range Forty per cent of the respondents in LIG, 20 per cent of the respondents in MIG and 37 per cent of the respondents in HIG were observed with Grade I obesity Grade II obesity was noticed among 23 per cent of the respondents in LIG and 13 per cent of the respondents in MIG and HIG In the case of Grade III obesity only three per cent of the respondents in HIG were observed with it and there were no respondents with Grade III obesity among LIG as well as in MIG

4.2.2.3. Waist – Hip Ratio (WHR) of the Respondents

The Waist – Hip ratio of the respondents were assessed to know the chance of obesity among the respondents The Waist – Hip ratio (WHR) values gives the direct information on the prevalence of abdominal obesity The WHR of the male and female respondents were presented on the tables 29 and 30 respectively

Table 29. Distribution of the respondents based on their WHR (Male)

WHR Classification	LIG(n = 30)		MIG (n = 30)		HIG (n = 30)	
	No	Per cent	No	Per cent	No	Per cent
<1 0 (low)	2	7	7	23	2	7
1 0 (Normal)	-	-	1	3	-	-
>1 0 (High)	-	-	1	3	3	10

*Source Srilakshmi, (1997)

As per the details shown in the table 29 it was found that seven per cent of the respondents in LIG as well as in HIG and 23 per cent of the respondents in MIG have a low WHR ratio Only three per cent of the respondents in MIG had a normal WHR value and it was observed that three per cent of the respondents in MIG and 10 per cent of the respondents in HIG had a high WHR value

Table 30. Distribution of the respondents based on their WHR (female)

WHR Classification	LIG (n = 30)		MIG (n = 30)		HIG (n = 30)	
	No	Per cent	No	Per cent	No	Per cent
<0 8 (Low)	4	13	2	7	7	23
0 8 (Normal)	1	3	2	7	-	-
>0 8 (High)	23	77	7	23	18	60

*Source Srilakshmi, (1997)

When the table 30 was assessed, it was found that among the LIG female respondents 13 per cent have a low WHR value, three per cent have a normal value and 77 per cent have a high WHR value In the case of MIG female respondents seven per cent of the respondents have a low WHR, equal per cent of the respondents have a normal WHR value and 23 per cent of the female respondents were observed with a high WHR value Whereas in HIG there were no respondents with the normal value of WHR but 23 per cent of the respondents were observed with a low WHR and 60 per cent had a high WHR value

4.2.2.4. Nutritional Status Index (NSI) of the Respondents

The NSI values for three income groups were found out separately In LIG the NSI value for male respondents ranges from -2 52 to -4 56 and the mean and SD was -5 68 and 1 76 respectively With respect to females, the NSI value range with the minimum value of -2 07 and a maximum value of 11 60 with a mean of 4 0 and a SD of 3 43 In MIG it was observed that the NSI of the male respondents ranged from a minimum value of -3 21 to a maximum of 6 05 and the mean was 1 60 with a SD of 3 01 Where as in females the value of NSI ranged

from -0 49 to 9 17 with the mean of 3 48 and SD of 2 82 In the case of HIG, the male respondents were observed with a NSI value contains the minimum value of -1 17 and maximum value of 4 23 with the mean and SD like 2 65 and 2 22 respectively The NSI of female respondents ranged from -2 16 to 8 31 the mean value was 2 80 with a SD of 2.72 The details regarding NSI of all respondents are given in appendix (VI)

The classification of the respondents based on NSI were made as follows Low (mean – SD) Median (between mean ± SD) and High (mean + SD)

Table 31. Distribution of respondents based on NSI

NSI	LIG (n = 30)		MIG(n = 30)		HIG(n = 30)	
	Male	Female	Male	Female	Male	Female
High(mean + SD)	1(3)	5(17)	1(3)	5(17)	-	4(14)
Medium (Between mean ± SD)	2(7)	17(56)	6(20)	13(43)	5(16)	17(56)
Low (Mean – SD)	-	5(17)	2(7)	3(10)	-	4 (14)
Total	30(100)		30(100)		30(100)	

The data on the table 29 indicates that in LIG three per cent of the male respondents and 17 per cent of the female respondents had a high NSI value, seven per cent of the male and 56 per cent of the female respondents were observed with a medium value and a low NSI value was observed for only 17 per cent of the female respondents Similarly in MIG three per cent of the male respondents & 17 per cent of the female respondents had a high NSI, medium NSI was observed with 20 per cent of the male as well as in 43 per cent of the female respondents Only seven per cent of the male respondents and 10 per cent of the female respondents had a low NSI value In the case of HIG only 14 per cent of the female respondents had a high NSI 16 per cent of the male respondents as well as 56 per cent of the female respondents was observed with a medium NSI and only 14 per cent of the female respondents had a low NSI value

4.2.3 Clinical Status of the Respondents.

Table 32. Distribution of the respondents based on clinical manifestations.

Symptoms observed	Distribution of the respondents					
	LIG (n = 30)		MIG (n = 30)		HIG (n = 30)	
	No	Per cent	No	Per cent	No	Per cent
1 Hair						
a) Lacklustre	5	17	7	23	8	27
b) Dispigmentation	2	7	4	13	8	27
c) Loss of hair	8	27	1	3	3	10
2 Tongue						
a)Pallor of tongue	2	7	5	17	4	13
b)Reddish tongue	3	10	4	13	6	20
3 Glands						
a) Thyroid enlargement	3	10	2	7	2	7
b)Parathyroid enlargement	0	0	3	10	0	0
4 Skin						
a) Dry pale skin	3	10	4	13	2	7
b)Dry and wrinkled skin	1	3	7	23	1	3
5 General						
a) Anaemia	8	27	4	13	12	40

The clinical status of the respondents during the study was assessed using a check list with the help of a physician and the results of clinical examinations are presented in table 32 The clinical examination revealed that, 17 per cent of the respondents in LIG, 23 per cent of the respondents in MIG and 27 per cent of the respondents in HIG were noticed with the lack of lustre in hair Hair

dispigmentation was seen among seven per cent of LIG, 13 per cent of HIG, and 27 per cent of HIG respondents Twenty seven per cent of LIG, three per cent of MIG and 10 per cent of HIG respondents had a problem of hair loss

Symptoms like Pallor of tongue and reddish tongue was noticed among the respondents Seven per cent of the LIG respondents, 17 per cent of the MIG respondents and 13 per cent of the respondents had a pallor tongue and 10 per cent of the LIG, 13 per cent of the MIG and 20 per cent of the HIG respondents had a reddish tongue Ten per cent of LIG respondents and seven per cent of the respondents in MIG as well as in HIG had noticed with a thyroid enlargement and only 10 per cent of the respondents in MIG possessed parathyroid enlargement

Ten per cent of the respondents in LIG, 13 per cent of the respondents in MIG and seven per cent of the respondents m HIG were noticed for dry pale skin and in the case of dry and wrinkled skin it was noticed among three per cent of the respondents in LIG, 23 per cent of the respondents in MIG and three per cent of the respondents in HIG Twenty seven per cent of the respondents in LIG, 13 per cent of the respondents in MIG and 40 per cent of the respondents in HIG were observed with anaemia

4.2.4. Biochemical Assessment of the Respondents

The biochemical assessment of the respondents was done through a medical camp which was conducted as a part of the study Through the medical camp the haemoglobin level, blood sugar level, blood pressure level and the total cholesterol level of the respondents were assessed to know the biochemical parameters to find out the prevalence of hfestyle diseases among the respondents in different income groups

4.2.4.1. Haemoglobin Level of the Respondent

Table 33. Distribution of the respondents based on their haemoglobin level (female)

Haemoglobin level (mg/dl)	LIG		MIG		HIG	
	No	Per cent	No	Per cent	No	Per cent
<7 9 (Sevcre)	-	-	-	-	2	7
8 0 – 9 9 (Moderate)	-	-	-	-	4	13
10 0 – 10 9 (Mild)	6	20	2	7	4	13
11 – 11 9 (Non marginal)	9	30	5	17	5	17
>12 (Non marginal)	12	40	14	47	9	30

Source NIN 1984

The haemoglobin levels of the female respondents were assessed and are presented in the table 31 It was found that in LIG, majority of the respondents (40 per cent) had a haemoglobin value above 12 gm/dl Thirty per cent of the respondents had a haemoglobin level between 11 – 11 9 gm/dl which is non marginal whereas 20 per cent of the respondents had a mild anaemia with a haemoglobin value between 10 0 – 10 9 gm/dl In the case of MIG, seven per cent of the respondents had mild anaemia with a value between 10 0 – 10 9 gm/dl and 17 per cent of the respondents had a haemoglobin value between 11 – 11 9 gm/dl which was a non marginal value and 47 per cent of the respondents had a value above 12 which was also a non marginal value With respect to HIG, seven per cent of the respondents were suffering with severe anaemia, 13 per cent of the respondents had moderate level of anaemia with haemoglobin value between 8 0 – 9 9 In the case of mild anaemia also equal (13) per cent of respondents were observed with the haemoglobin value between 10 0 – 10 9 gm/dl Seventeen per cent of the respondents had a haemoglobin value between 11 – 11 9 gm/dl which

is a non marginal value and 30 per cent of the respondents had a value above 12 which was also a non marginal value

Table 34.Distribution of the respondents based on their haemoglobin level (male).

Haemoglobin level (mg/dl)	LIG		MIG		HIG	
	No	Per cent	No	Per cent	No	Per cent
<8 (Severe)	-	-	-	-	-	-
8 0 – 14 0 (Mild)	2	7	4	13	3	10
14 0 – 16 0 (Non marginal)	1	3	5	17	2	7
>16 0 (Non marginal)	-	-	-	-	-	-

Source NIN 1984

From the table 34, it can be seen that seven per cent of the respondents in LIG, 13 per cent of the respondents in MIG and 10 per cent of the respondents in HIG was observed with a mild anaemia with the haemoglobin value between 8 0 – 14 0 gm/dl Three per cent of the respondents in LIG, 17 per cent of the respondents in MIG and seven per cent of the respondents in HIG had a haemoglobin value between 14 0 – 16 0 gm/dl which was considered as a non marginal value according to (NIN, 1984)

4.2.4.2. Blood Sugar Level of the Respondents

Table 35.Distribution of the respondents based on their blood sugar level

Blood sugar level (mg/dl)	LIG		MIG		HIG	
	No	Per cent	No	Per cent	No	Per cent
70 –140 (Normal)	25	83	25	83	27	90
>140 (Diabetes)	5	17	5	17	3	10
Total	30	100	30	100	30	100

The blood sugar level of the three income group respondents like LIG, MIG and HIG was assessed to know the prevalence of diabetes among the respondents and the data is presented in the table 35 It was observed that majority of the respondents in LIG (83 per cent), MIG (83 per cent) and HIG(90 per cent) had a normal blood sugar level and only 17 per cent of the respondents in LIG as well as in MIG and 10 per cent of HIG had a blood sugar above normal or have the disease condition like diabetes mellitus It was also found that the persons who are affected with the disease condition were very less in all three groups

4.2.4.3.Total Cholesterol Level of the Respondents

Table 36. Distribution of the respondents based on their total cholesterol level

Total cholesterol level (mg/dl)	**LIG**		**MIG**		**HIG**	
	No	Per cent	No	Per cent	No	Per cent
<200 (Normal)	17	57	18	60	15	50
200 – 239 (Border line)	6	20	7	23	13	43
>240 (High)	7	23	5	17	3	7

Source Srilakshmi, (2010)

The total cholesterol levels of the respondents were assessed to know the prevalence of Hyperhpidimia The data in the table 36 revealed that, in LIG majority of the respondents (57 per cent) had a normal level of cholesterol which was below 200 mg/dl, 20 per cent of the respondents had a value between 200 – 239 mg/dl which was the border line Only 23 per cent of the respondents possessed a high total cholesterol level which was above 240 mg/dl In the case of MIG, 60 per cent of the respondents had a normal cholesterol level, whereas 23 per cent were at the border line and 17 per cent of the respondents were having a high cholesterol level While for the HIG, 50 per cent of the respondents were having a normal blood cholesterol level, but 43 per cent were observed as they were at border line and only seven per cent of the respondents were having a total

cholesterol level above the normal It can be concluded that although majority of the respondents in every group was having a normal range and the respondents having the disease condition was very less, the chance of occurrence of diseases is very high because in every group the person's who is at the border line of the disease is high.

4.2.4.4.Blood Pressure Level of the Respondents

Table 37. Distribution of the respondents based on their blood pressure levels.

Blood pressure level (mm/Hg)	LIG		MIG		HIG	
	No	Per cent	No	Per cent	No	Per cent
120/80 (Normal)	19	63	17	57	18	60
120-129/ 80 – 84 (Prehypertension)	3	10	4	13	7	23
130 -139/ 85 – 89 (Borderline)	2	7	6	20	2	7
>140/90 (Hypertension)	6	20	3	10	3	10
Total	30	100	30	100	30	100

As illustrated in the table 37, the blood pressures of the respondents were assessed to know the prevalence of hypertension in the respondents The data indicated that majority of the respondents in three groups like LIG(63 per cent),MIG (57 per cent) and HIG (60 per cent) were having a normal blood pressure level which is 120/80 mm/Hg Ten per cent of the respondents in LIG, 13 per cent of the respondents in MIG and 23 per cent of the respondents in HIG were having a blood pressure level between 120 – 129/ 80-84 mm/Hg which was said as a prehypertension stage Only seven per cent of the respondents in LIG, 20

per cent in MIG and seven per cent in HIG were at the border line and 20 per cent of the LIG respondents, 10 per cent of the MIG as well as HIG were having the value above 140/90 mm/Hg which was considered as hypertension As a whole it can be concluded that even though majority of the respondents were not having the disease hypertension the chance of occurring it in future was high because of the high per cent of respondents in prehypertensive and border line stage None of the respondents were observed with a low blood pressure value

4.2.4.5. Interrelationship between the Variables

Table 38.Interrelationship between NSI and lifestyle diseases

Lifestyle diseases	**NSI**			**Total**
	Low	Medium	High	
Yes	5	17	6	28
No	10	42	10	62
Total	15	59	16	90
χ^2	0 785			

*2df

As depicted in the table 38, the association between lifestyle diseases and NSI were assessed and it was found that the two variables ie, lifestyle diseases and NSI were independent with each other It was also observed that they were non significant at 5% level

Table 39.Interrelationship between food habits and lifestyle diseases

lifestyle diseases	Food habits			Total
	Regular time for Consumption of meals	Skipping of meals	Taking foods outside regularly	
Yes	6	10	5	21
No	32	29	8	69
Total	38	39	13	90
χ^2	0 224			

*2df

The association between food habits and lifestyle diseases were assessed and it was found that there was no association between the two variables and they were independent with each other It was also observed that they were non significant at 5 per cent level

4 3 HEALTH AND MORBIDITY OF THE RESPONDENTS

4.3.1. Exercise Pattern of the Respondents

Table 40. Distribution of the respondents based on their habit of exercise

Groups	Habit of exercise						Total	
	Regular		Irregular		Never			
	No	Per cent	No	Per cent	No	Per cent	No	Per cent
LIG	8	27	5	17	17	56	30	100
MIG	2	7	15	50	13	43	30	100
HIG	6	20	15	50	9	30	30	100

The exercise patterns of the respondents were assessed during the study because undoubtedly exercises have a positive impact on one's nutritional status As per the details shown in the table 40 the exercise pattern of the respondents

were classified as regular, irregular and never Twenty seven per cent of the respondents in LIG, 7 per cent of the respondents in MIG and 20 per cent respondents in HIG exercise regularly Whereas,17per cent of the respondents in LIG, 50 per cent respondents in MIG and HIG had a habit of exercising irregularly While 56 per cent of the respondents in LIG, 43 per cent of the respondents in MIG and 30 per cent of the respondents in HIG do not have the habit of doing exercise

Table 41. Distribution of the respondents based on their type of exercise.

Type of exercise	Groups	Number of respondents	Per cent
Walking	LIG	8	27
	MIG	7	23
	HIG	12	40
Running	LIG	3	10
	MIG	5	17
	HIG	4	13
Exercise using machines	LIG	2	7
	MIG	5	17
	HIG	5	17

The exercise pattern of the respondents was classified as walking, running and exercise using machines When the type of exercise of the LIG was analysed, it was found that 27 per cent of the respondents selected walking, 10 per cent selected running and seven per cent of the respondents were selected workout in gym as exercise pattern. In the case of MIG, 23 per cent selected walking, 17 per cent selected running and equal per cent of the respondents selected workout in gym. Where as in HIG, 40 per cent of the respondents were doing walking as an exercise, running was used by 13 per cent of respondents Seventeen per cent of the respondents were doing exercise using machines

Table 42. Distribution of respondents based on the duration of exercise

Duration of exercise	LIG (n = 30)		MIG (n=30)		HIG (n = 30)	
	No	Per cent	No	Per cent	No	Per cent
30 mints – 1 hour	10	33	7	23	14	47
1 hour – 1 ½ hours	1	3	7	23	5	17
1 ½ hours – 2 hours	2	7	3	10	2	7

The time taken for doing exercise of the respondents was also assessed The distribution of time was divided into 30 mints – 1hr, 1 hr –1 ½ hrs and 1 ½ hr – 2 hrs Thirty three per cent of the respondents in LIG, 23 per cent in MIG and 47 per cent in HIG were spending 30 mints to 1 hr for doing exercise Whereas three per cent of the respondents in LIG, 23 per cent in MIG and 17 per cent in HIG spent 1 hr to 1 ½ hrs for doing exercise Seven per cent of the respondents in LIG, 10 per cent of the respondents in MIG and seven per cent in HIG took 1 ½ hrs to 2 hrs for doing exercise

4.3.2. Interrelationship between Exercise Pattern and Prevalence of Obesity

Table 43.Interrelationship between exercise pattern and obesity.

Obesity	Exercise pattern			Total
	Regular	Irregular	Never	
Yes	7	23	28	58
No	9	12	11	32
Total	16	35	39	90
χ^2	0 140			

*2df

As illustrated in the table 43, the association between obesity and exercise pattern were assessed and it was found that the two variables were independent with each other It was also observed that they were non significant at 5 per cent level

4.3.3. Stress and Strain Pattern of the Respondents

Table 44. Distribution of the respondents based on their stress and strain

Group	Stress and strain pattern							
	Occupational problems		Family problems		Health problems		Financial problems	
	No	Per cent	No	Per cent	No	Per cent	No	Per cent
LIG	6	20	6	20	4	13	8	27
MIG	5	17	6	20	2	7	6	20
HIG	13	43	4	13	4	13	-	-

The stress and strain pattern of the respondents was also assessed The stress and strain of the respondents was classified as four groups like stress due to occupational problem, stress due to family problems, stress due to health problems and stress due to financial problems Twenty per cent of the respondents in LIG, 17 per cent in MIG and 43 per cent in HIG had stress and strains due to occupational problems Whereas 20 per cent of the respondents in LIG and MIG and 13 per cent of the respondents in HIG had said family problems as the reason for stress and strain. For 13 per cent of the respondents in LIG, seven per cent of the respondents in MIG and 13 per cent of the respondents in HIG health problems was the reason for stress and strains Financial problems were the reason for stress and strain for 27 per cent of the respondents in LIG and 20 per cent of the respondents in MIG

4.3.3. Sleeping Pattern of the Respondents.

Table 45. Distribution of the respondents based on sleeping pattern.

Duration of sleep	LIG		MIG		HIG	
	No	Per cent	No	Per cent	No	Per cent
Less than 6 hours	2	7	5	17	7	23
6 – 7 hours	26	86	22	73	20	67
8 hours	2	7	3	10	2	7
More than 8 hours	-	-	-	-	1	3
Total	30	100	30	100	30	100

It was found that in LIG majority of the respondents (86 per cent) had asleep duration of 6 – 7 hrs Seven per cent of the respondents had a sleep less than 6 hrs and seven per cent had a sleep of 8 hrs In the case of MIG, 17 per cent of the respondents had a sleep less than 6 hrs, 73 per cent had a sleep between 6 – 7 hrs and 10 per cent had a sleep duration of 8 hrs Where as in HIG, 23 per cent of the respondents had a sleeping time less than 6 hrs, 67 per cent had a sleeping time between 6 – 7 hrs and seven per cent had sleep duration of 8 hrs Only three per cent of the respondents had sleep duration of more than 8 hrs

4.3.4. Interrelationship between Stress and Sleeping Pattern.

Table 46.Interrelationship between stress and sleeping pattern.

Stress	Sleeping pattern		Total
	Sufficient sleep	Not sufficient sleep	
Yes	45	16	61
No	24	5	29
Total	69	21	90
χ^2	0 456		

*1df

The above table revealed that, there was no association between stress and sleeping pattern or it can be concluded that the two variables were independents with each other and non significant at 5 per cent level

4.3.5. Lifestyle Habits of the Respondents

Table 47. Distribution of respondents based on their lifestyle habits.

Lifestyle habits		LIG	MIG	HIG
Habit of alcohol consumption	Occasionally	3(10)	3(10)	3(10)
	Regularly	0	0	0
	Never	27(90)	27(90)	27(90)
Total		30(100)	30(100)	30(100)
Habit of smoking	Occasionally	0	0	1(3)
	Regularly	1(3)	2(6)	1(3)
	Never	29(97)	28(94)	28(94)
Total		30(100)	30(100)	30(100)
Habit of chewing pan	Occasionally	0	0	0
	Regularly	0	1(3)	0
	Never	30(100)	29(97)	30(100)
Total		30(100)	30(100)	30(100)

(Figure in parenthesis show percentage)

The lifestyle habits of respondents like alcoholism, smoking and habit of chewing pan were assessed because these habits have a direct impact on one's nutritional status and lifestyle diseases In the case of alcohol consumption majority of the respondents in all three groups(90 per cent) were never had the habit Only 10 per cent of the respondents in each group had alcohol occasionally With respect to smoking habit, three per cent of the respondents in HIG had a

habit of smoking occasionally Three per cent of the respondents in LIG as well as in HIG and six per cent of the respondents in MIG had the habit of regular smoking and majority of the respondents in LIG(97 per cent), MIG and HIG (94 per cent) never had a habit of smoking in their life Where as in the case of pan chewing also all the respondents in LIG and HIG and 97 per cent of the respondents in MIG had never used pan in their day today life and only three per cent of the respondents in MIG had a habit of chewing pan regularly

4.3.7. Family History of Lifestyle Diseases

Table 48. Distribution of respondents based on their family history of lifestyle diseases

Diseases	LIG		MIG		HIG	
	No	Per cent	No	Per cent	No	Per cent
Diabetes mellitus	10	33	11	36	12	41
Cardiac problems	6	20	6	20	4	13
Hypertension	10	33	5	17	9	30
Hyperlipidimia	2	7	5	17	4	13
Without any lifestyle diseases	4	13	8	27	7	23

The family history of lifestyle diseases among the respondents were also found out to know the occurrence of lifestyle diseases among the respondents Table 48 indicated that 33 per cent of the respondents in LIG, 36 per cent of the respondents in MIG and 41 per cent of the respondents in HIG had a family history of diabetes mellitus In the case of cardiac problem both in LIG as well as in MIG, 20 per cent of the respondents had a family history and for HIG it was 13 per cent The data also revealed that 33 per cent in LIG, 17 per cent in MIG and 30 per cent in HIG had a family history of hypertension. The family history of hyperlipidimia was reported among 7 per cent of the respondents in LIG, 17 per cent in MIG and13 per cent in HIG Thirteen per cent of the LIG respondents, 27 per cent of the MIG respondents and 23 per cent of the HIG respondents were observed with no or without the family history of any lifestyle diseases

4.3.8. Morbidity Pattern of the Respondents

Table 49.Distribution of the respondents based on their morbidity pattern

Diseases	LIG (n = 30)		MIG (n = 30)		HIG (n = 30)	
	No	Per cent	No	Per cent	No	Per cent
Joint pain	25	83	14	47	12	40
Back pain	25	83	18	60	11	37
Muscle pain	22	73	10	33	8	27
Cold	23	77	15	50	13	43
Viral fever	6	20	5	17	2	7
Chickengunia	-	-	-	-	-	-
H1N1 fever	-	-	-	-	-	-
Dengue fever	-	-	-	-	-	-
Malaria	-	-	-	-	-	-
Headache	20	67	15	50	18	60
Anaemia	3	10	4	13	3	10
Jaundice	-	-	-	-	-	-
Chicken pox	-	-	-	-	-	-
Typhoid	-	-	1	3	-	-
Diarrhoea	1	3	-	-	-	-

The morbidity pattern of the respondents for the last six months was assessed, as per the details shown in the table it was found that 83 per cent of the LIG respondents, 47 per cent of the MIG respondents and 40 per cent of the respondents in HIG reported joint pain With regarding to back pain it was observed for 83 per cent, 60 per cent and 37 per cent of the respondents of LIG, MIG and HIG respectively Muscular pain was observed among 73 per cent of the respondents in LIG, 33 per cent of the respondents in MIG and 27 per cent of the respondents in HIG The prevalence of cold was also high among the groups and it was 77 per cent for LIG, 50 per cent for MIG and 43 per cent of

respondents in HIG Viral fever was also reported among the respondents and it was, 20 per cent, 17 per cent and seven per cent of the respondents in LIG, MIG and HIG respectively Similarly the incidence of headache was also high among the respondents which were 67 per cent of respondents in LIG, 50 per cent of the respondents in MIG and 60 per cent of the respondents in HIG The incidence of anaemia was also reported and it was 10 per cent in both LIG and HIG and for MIG it was 13 per cent Only three per cent of the respondents in MIG had reported typhoid Similarly three per cent of the respondents in LIG were observed with diarrhoea for the past six months

4 4 LIFE STYLE PATTERN OF THE RESPONDENTS

4.4.1. Daily Activity Schedule

Table 50.Daily activity schedule of the respondents. (n = 30)

Activities	Time spent					
	LIG		MIG		HIG	
	Average Minutes (hours)	% of total minutes in a day	Average Minutes (hours)	% of total minutes in a day	Average Minutes (hours)	% of total minutes in a day
House hold activity	360(6)	25	360(6)	25	360(6)	25
Employment outside home	420 (7)	29	480 (8)	33	420 (7)	29
Leisure time	180(3)	13	180(3)	13	180(3)	13
Sleep	480(8)	33	420(7)	29	480(8)	33
Total	1440 (24)	100	1440 (24)	100	1440 (24)	100

The daily activity schedule or time utilization pattern of the respondents in three income group indicated that, in LIG, 25 per cent of the total time was spent for doing household activities while 29 per cent was for doing employment outside home and 13 per cent of the time were spent for leisure time activities It was also observed that33 per cent of the time was spent for sleeping In the case of MIG, 25 per cent of the total time was spent for doing household activities, 33 per cent of the total time was spent for doing employment outside home and 13 per cent spent for leisure time activities and 29 per cent was spent for sleeping Similarly in HIG, 25 per cent of the total time was spent for household activities For doing employment outside home 29 per cent of total time was spent, for leisure time activities

4.4.2. Energy Intake and Energy Expenditure Pattern of the Respondents

The total energy intake of the respondents were calculated from the amount of food consumed by the respondents in a day using the food value table and the energy expenditure of the respondents were calculated based on the daily activity schedule Based on the energy intake and energy expenditure an energy balance sheet was also worked out and is present in the tables 51, 52 and 53

Table 51. Distribution of the respondents based on their energy balance (LIG)

Gender	Type of activity	Percentage	Energy (Kcal)		RDA (Kcal)	Energy balance (Kcal)
			Mean intake	Mean expenditure		
Male	Sedentary	0	0	0	2320	0
	Moderate	3	3126	3349	2730	-223
	Heavy	7	2602	2671	3490	-69
Female	Sedentary	30	2849	2806	1900	+43
	Moderate	50	2750	2603	2230	+147
	Heavy	10	3056	2607	2850	+449

The data's presented in the table 51 revealed that, there were no sedentary working males in LIG In the case of moderate and heavy working males a negative energy balance was observed such as -223 Kcal for moderate and -69 Kcal for heavy workers A negative energy balance means the energy expenditure was higher than energy intake With respect to females, the situation was just the opposite, they were showing a positive energy balance in all activity group like +43Kcal for sedentary, +147 Kcal for moderate and +449Kcal for heavy workers

Table 52.Distribution of the respondents based on their energy balance (MIG)

Gender	Type of activity	Percentage	Energy (Kcal)		RDA (Kcal)	Energy balance (Kcal)
			Mean intake	Mean expenditure		
Male	Sedentary	7	2396	3281	2320	-885
	Moderate	17	2185	3071	2730	-886
	Heavy	7	1889	2509	3490	-620
Female	Sedentary	27	2222	2806	1900	-584
	Moderate	33	2634	3063	2230	-429
	Heavy	10	2160	2592	2850	-432

As depicted in the table 52, it was noted thatin all income groups, both males and females were showing a negative energy balance ie, their energy expenditure was higher than their energy intake The energy balance values, for males – 885 Kcal for sedentary, -886 Kcal for moderate and -620 Kcal for heavy workers In the case of females -584 Kcal for sedentary, -429 Kcal for moderate and -432Kcal for heavy workers

Table 53. Distribution of the respondents based on their energy balance (HIG)

Gender	Type of activity	Percentage	Energy (Kcal)		RDA (Kcal)	Energy balance (Kcal)
			Mean intake	Mean expenditure		
Male	Sedentary	3	1743	2136	2320	-393
	Moderate	10	2018	2086	2730	-68
	Heavy	3	1887	2062	3490	-175
Female	Sedentary	37	2303	2167	1900	+136
	Moderate	47	2764	2440	2230	+324
	Heavy	-	-	-	2850	-

With respect to HIG respondents, a negative energy balance was seen among the males with the values, -393 Kcal for sedentary, -68 Kcal for moderate and -175 Kcal for heavy workers In the case of females the situation was just the opposite Ie, in all activity groups they were showing a positive energy balance like +136 Kcal for sedentary and +324 Kcal for moderate activity There were no heavy working females in high income groups

4 5 CONDUCT OF NUTRITION AWARENESS PROGRAMME

4.5.1. Knowledge of the Respondents on Lifestyle Diseases

The knowledge of the three income group respondents on lifestyle diseases were assessed before the awareness programme and after the awareness programme The knowledge of the respondents was assessed using a questionnaire which comprising 15 statements on lifestyle diseases and scores were allotted to each correct answer Based on the correct answering of the

statement the score was calculated for every person The mean score for each group was calculated and presented in the table below (Table 54)

Table 54.Distribution of respondents based on their knowledge before and after the nutrition awareness programme.

Groups	Mean value		't' value
	Before the awareness programme	After the awareness programme	
LIG	10 9	12 86	8 65**
MIG	11 13	12 76	4 17**
HIG	13 7	14 7	5 78**

** significant at 1 per cent level

From the table 54 it was found that in LIG the mean score for the knowledge of respondents before awareness programme was 10 9 and after the awareness programme it was increased to 12 86 With respect to MIG the mean score before the awareness programme was 11 13 and after the awareness programme it was 12 76 Whereas in HIG the mean score before the awareness programme was 13 7 and after the awareness programme it was increasedto14 7 Statistically there was a significant difference between the knowledge levels of three income group respondents on lifestyle diseases

Table 55.Interrelationship between education level and knowledge on lifestyle diseases.

Knowledge	Educational level			Total
	High school	Pre- degree	Above pre-degree	
Yes	9	11	17	37
No	11	5	7	23
Total	20	16	24	60
χ^2	0 170			

*2df

Table 55 shows the interrelationship between education and knowledge on lifestyle diseases of LIG as well as MIG respondents with the assumption that every respondent in HIG had high education level and also has high knowledge on lifestyle diseases When theses two parameters were statistically assessed, it was found that there were no association between the educational level and knowledge on lifestyle diseases

Discussion

5. DISCUSSION

The results obtained after the conduct of the study entitled "Assessment of nutritional status and life style diseases among different income groups" are discussed in this chapter under the following headings

5 1 Socio- economic and personal profile of the respondents

5 2 Nutritional status of the respondents .

5 3 Health and morbidity of the respondents

5 4 Lifestyle pattern of the respondents

5 5 Conduct of nutrition awareness programme

5 1 SOCIO-ECONOMIC AND PERSONAL PROFILE OF THE RESPONDENTS

Socio – economic status is considered as an important determinant of health status of the individual which is affected by the factors like educational background, food consumption pattern and lifestyle factors (Cheng, 2003) The socio- economic and personal profile of the respondents were found out through the study since they may have a direct influence on the food habits, nutritional status and in the prevalence of lifestyle diseases

Anila (2014) on her study entitled "impact of an intervention programme on food safety among women food business operators in Thiruvanathapuram and Kollam observed that majority of the people working were coming under the category of middle age The results revealed that majority of the respondents in LIG as well as in HIG belong to the age group 41-45 years Whereas in MIG, most of the respondents belonged to the age group between 30-35 years Similar results were observed in a study conducted by Razeena (2000)

According to Andrew (2000), the socio – economic and personal characteristics like age, religion and income has a great influence on ones nutritional status Based on a study conducted by NFHS (2005) and Kerala statistical institute(2000) revealed that majority of the people in Kerala were found to be Hindu followed by Christians and Muslims The present study results were similar to the above studies Similar results were also observed in the studies of Prakash (2005) and Renjini (2008) In the case of family size, as observed by Gupta and Thripathi (2006) majority of the families in Kerala were coming under nuclear family and the term nuclear has become a popular norm in Kerala The present study revealed that most of the respondents in LIG, MIG and HIG were having a family size of 3-4 members The results are supported by the studies conducted by Das (2014) and Anila (2014) in several districts of Kerala

The marital status of the respondents revealed that all the respondents in LIG as well as HIG and most of the respondents in MIG were married This may be due to the fact that all of the respondents were belonged to middle age (30 – 45 years) similar findings were also reported by Suma (2011) in her study

Literacy and educational attainments are the indicators of quantitative improvements in human resources(Razeena, 2000). A study conducted by Geetha (2008) revealed that majority of the respondents were having a high educational level Majority of the respondents had a minimum of high school level education However in the present study, the respondents had a minimum of primary level education to a maximum of doctoral degree A study conducted by Kumari (2004) also revealed that 54 per cent of the anganwadi workers in Thiruvanathapuram were educated up to high school level The finding of the study is supported with the studies reported by Sheela (2004)

The employment status is a major factor which determines the health and nutritional status of a population (Reddy *et al*, 1993) Eapen *et al* (2000) in his study revealed that male as well as females were having a job and most of them were occupied with a permanent job The results of the present study is concurred

with the above results that most of the respondents in MIG and HIG were having a permanent and in LIG majority were working on daily wages According to Rahman and Rao(2002), most of the people who were having a permanent job are coming under middle age group On assessing the social participation of the respondents, it was observed that among the respondents participation in residence associations, political organizations, NGO'S and participation on religious organizations were observed The study is in concurrence with the result of Sheethal (2011) and Bhuvaneshwari (2007)

Income is a major factor which influences the care and services sought by the family (Suma, 2011) According to Das(2014), family income is considered as an important determinant, since it determines the family status and socio economic position in the society to which they belong In the present study it was noted that majority of the respondents (46 %) were having a monthly income within the range of 10000 to 30000and 20 per cent of the respondents having their income range above 1 lakh

5 2 NUTRITIONAL STATUS OF THE RESPONDENTS

Nutritional status is terms which indicate a state of health of an individual which is indicated by the consumption and utilization of nutrients (Venkiah, 2002) Nutritional status generally indicates if the body is getting the right amounts and types of nutrients (Thomas, 2015) According to James (2001),nutritional status is a concept which is having many dimensions which includes dietary, anthropometric, biochemical, and clinical indicators of health

5.2.1. Dietary Profile of the Respondents.

The diet survey is one of the important tools to assess the dietary profile of the respondents The food habits have become the subject of research over the past decade because of the realization that dietary habits of an individual in their different life stages are an important factor for preventing the degenerative diseases The food habits of a person is an act which is repeated by the individual

under the impetus of the need to provide himself with nourishment and also to meet the emotional as well as social needs (Ghassemi, 2003)

5.2.1.1. Food Habits of the Respondents

The results of the diet survey revealed that majority of the respondents in all income groups were non- vegetarians The study is supported by the findings of Kerala Statistical Institute (2000), Unnithan (2008) and Reshmi (2007) As observed by Suma (2011) regular meal times is an essential determinant of sound health Among the three income groups of respondents similar trend was also observed Skipping of meals and habit of taking foods from outside was observed in the studies of Leena (2000) and Seubsman *et al* (2009) The result of the present study also observed the same

The meal skipping pattern of the respondents were further studied and it was noticed that, breakfast as well as lunch was skipped and the reason for skipping was lack of time for majority of the respondents in all income groups The findings of the study is in conformity with the observation of Evans *et al* (2009) who had reported one third of the population skipping breakfast due to lack of appetite and lack of time Similar results were also observed in the studies of Das (2014) and Krishnaroopa(2003) In the case of dinning outside, tea, lunch and dinner was consumed from outside and the reason was necessity as well as convenience for most of the respondents This trend was also observed by Mony (2003) and Moy *etal* (2009)

5.2.1.2. Daily Meal Pattern of the Subjects

The daily meal pattern of the subjects in a study conducted byTaskar *et al* (2007)revealed that the meal pattern followed by the respondents were tea with snacks in early morning as well as in evening and for the breakfast cereal-pulse combination was seen while in the case of lunch, rice, vegetables along with any of the non vegetarian items was observed For dinner, it was almost similar as

that of lunch Similar trend was observed in the present study as well as in the study of Gupta and Prakash (2004)

5.2.1.3. Frequency of Use of Various Food Items

Education, food consumption pattern and food frequency pattern are the important items which were identified as the factors which have a positive correlation on nutritional status (Ongore, 2005). The findings of the study conducted by Deshpandey*et al* (2003) about the food consumption pattern revealed that most frequently used foods by the respondents were cereals, nuts and oil seeds, fats and edible oils followed by milk and milk products, fruit and sugar and jaggery The food items like meat and egg were used occasionally while the fish consumption was common Similar results were also observed in the present study Earlier studies by Shiny (2004), Shanmukhapriya(2005) and Nirmala (2002) in their study also reported that consumption of fish was high and may be due to easy availability in Kerala With regard to the pulse consumption, it was observed thrice in a week which was concurred with the findings of Roopa (2003) and Suma (2011) The juices/ soft drinks, homemade snacks and fast foods frequency of use was comparatively lesser than other food items Similar results were reported by Gayathri (2002) and Hamulka *et al* (2000) However Popkin (2001) also observed that working adults consumed more servings of fruits and fruit juices

5.2.1.4. Monthly Food Expenditure Pattern

Food is a major vehicle for improving the nutrition of people and is markedly influenced by income level (Chandran, 2005) The findings of the study conducted by Nirmala (2002) and Prakash (2005) among the women workers in rubber plantations revealed that, respondents spent most of the money for the purchase of cereals followed by fish and vegetables and a very low amount of the money was spent for the purchase of milk, green leafy vegetables and fruits A liberal amount was spent for purchasing the fleshy foods According to Rahman (2000) and Vijayan (2003) on an average an amount below 500/- was spent by

the agricultural labourers for purchasing food items like sugar, roots and tubers, nuts and oil seeds and processed foods like jam, squash and pickles In the present study it was revealed that most of the money was spent for the purchase of cereals and fish followed by milk and milk products, vegetables, fats and oils, snacks/desert/ beverages and fruits Low amounts were spent for the purchase of pulses, meat, egg, roots and tubers, sugar/jaggery/ honey and processed foods and green leafy vegetables Similar results were reported by Gayathri (2002) and Thara (2002)

5.2.1.5. Mean Food Intake of the Respondents

According to Goutham and Prathanavishwakarma (2004) a person's health status as well as nutritional status is greatly affected by the quality as well as quantity of the food items and the bodies' efficiency to exploit the nutrients in it The findings of the study by Srinivasan *et al* (1991) revealed that the consumption of cereals, vegetables, pulses, milk and milk products and oils werevery low among the occupational groups like agricultural Labours and Artisans The food which met RDA nearly was other vegetables followed by sugar and jaggery, green leafy vegetables and roots and tubers In the present study the mean food intake of the respondents indicated that,in the case of male respondents the mean intake of the food items like cereals, pulses, vegetables, fruits and milk and milk products were below the RDA The consumption of food items like flesh foods, fats and oils and sugar and jaggery was above the RDA ICMR (1994) observed that inThiruvanathapuram district the mean intake of cereal met about 74 to 95 per cent of its RDA. Earlier studies of Bishnoi (1999), Nirmala (2002) and Shanmukhapriya (2005) reported that the intake of fish was above the RDA

In the case of female respondents,the intake of cereals, vegetables fats and oils and sugar and jaggery was above the RDA and the other food items like pulses, fruits, milk and milk products and flesh foods were below RDA The result was supported with the result of Karuna (1993) that the intake of fruits and green

leafy vegetables were below the RDA level for the adult women engaged in fish vending in Thiruvanathapuram district and the findings of Rauma (2001) and Gopalan *et al* (2002) However in a study conducted by Morland and Filomina (2007) the aversion towards vegetarian foods among the respondents was noted

5.2.1.6.Mean Nutrient Intake of the Respondents

Nutrient adequacy in the diet is of paramount importance to physical and mental health (Suma, 2011) To know the nutrient deficiency among the respondents, the overall nutrient intakes of the respondents were assessed The nutrients like energy, protein, fat, calcium and iron were assessed Singh and Kaur, (1997) observed that the consumption of nutrients like protein and energy was increasing day by day in urban population from lower to higher consumption level A study on nutritional status of working women in jaipur city revealed that the mean nutrient intake was slightly above the RDA (Jain and Singh, 2003) However the result of the study revealed that, in the case of LIG, the intake of energy, fat and iron was above the RDA for females and males and the intake of protein and calcium was below the RDA With respect to MIG, the energy and fat consumption was above the RDA and other nutrients were below the RDA level The study was supported by the results published by NNMB (2002). Krishnaroopa (2003) also observed in her study among the IT professionals in Thiruvanathapuram revealed that, the intake of nutrients was higher than the RDA levels In HIG, intake of calcium and iron was above the RDA for both males and females Energy consumption was above RDA for females and the nutrients like protein and calcium was below the RDA Similar results were observed by Sujatha (1990) and Nagi and Mann (1991) and Shanmukhapriya (2005) in their studies

In the present study, when the food habits of the respondents were assessed and it was found that, majority of the respondents in LIG as well as in MIG had a good food habits While among the HIG respondents, it was observed that majority of the respondents possessed a very good food habits Similar results

were observed by Varun *et al* (2008)and Renjini (2008) in their studies conducted among the software professionals in Thiruvanathapuram A good food habits (eating habits) were seen among the respondents

5.2.2. Anthropometric Profile of the Respondents.

Nutritional anthropometry is based on the concept that on appropriate amount should reflect any morphological variation due to significant functional and physiological changes by measuring the human body at various ages (Rao, 1999) According to WHO (2011) anthropometry provides a non invasive technique to access the size, proportion and composition of our body, where the technology is universally accepted Anthropometric measurements such as weight, height, waist- hip ratio(WHR) and body mass index (BMI) were taken into account for assessing the nutritional status of the respondents

Weight for height and age is said as one of the important aspect for assessing nutritional status (Khader, 2004) In the present study, it was revealed that majority of the respondents in all income groups both male and females were having a high weight for height value According to Christakis (2002), the changes in weight for height is an important factor which refers the nutritional status and growth performance of an individual(Fig 1 &2)

Body Mass Index was calculatedfor classifying the individuals into different categories of health like normal, grade I, grade II and grade III obesity (Han *et al*, 2000) The findings of the study conducted by Chandran (2005) revealed that body mass index of majority of the subjects were having a normal BMI between 20-25, whereas Grade I and Grade II obesity were detected in 17 33 and 2 67 per cent of population However the results of the present study indicated that majority of the male respondents were having normal BMI ranges while in the case of females most of them were having a grade I obesity Similar result was obtained in a study conducted by Sathyanaranyana (1991)

In the case of Waist – Hip Ratio(WHR) majority of the male respondents in LIG as well as HIG were having a low value and most of the MIG respondents

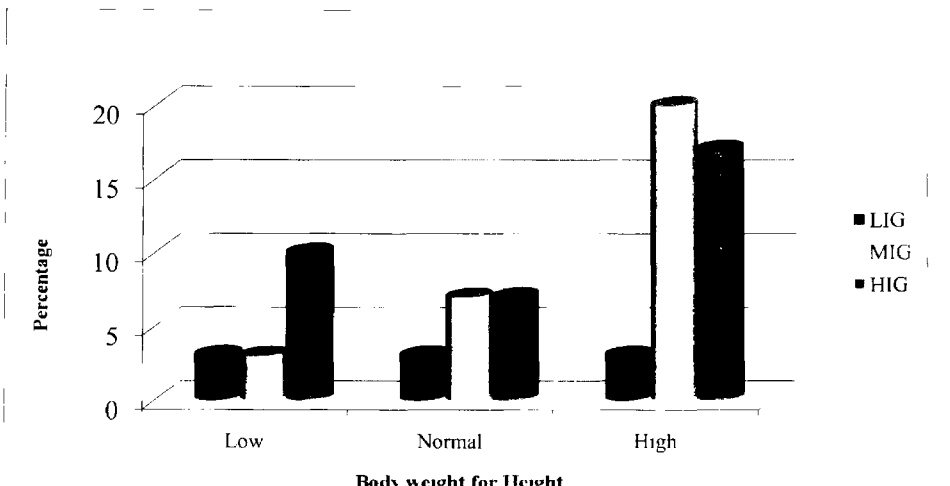

Fig.1. Body weight for height of male respondents.

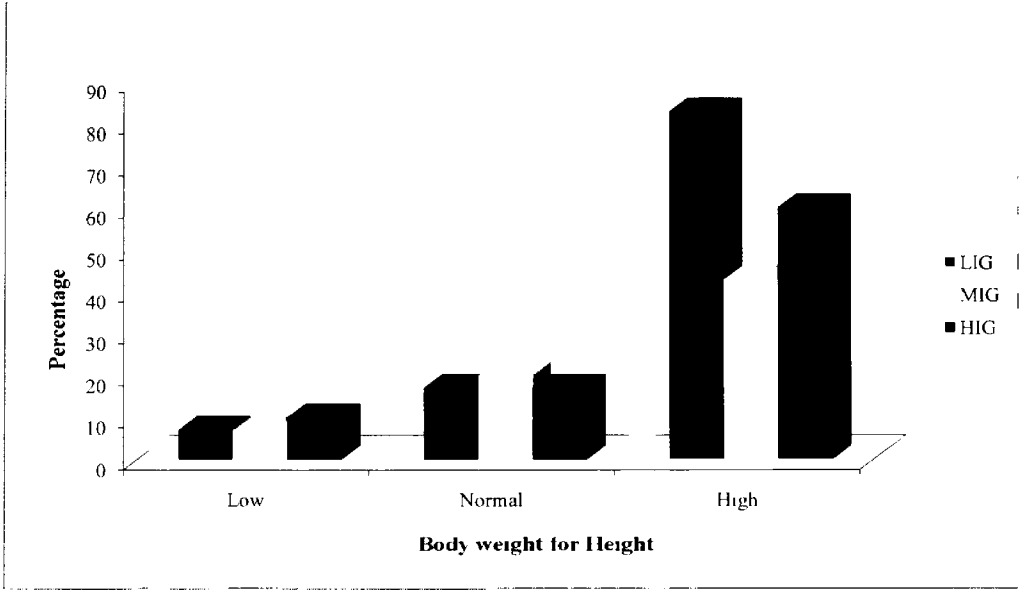

Fig.2. Body weight for height of female respondents.

were having a high value (Fig 3) A study conducted by Bhadra *et al* (2000) reported that 42 39 per cent of the urban women living in Kolkata, where observed with a high waist – hip ratio, which is an indication of abdominal obesity Similar result was observed in the present study (Fig 4)

The findings of the study conducted by Renjini (2008) revealed that the male and females who were working in IT field were observed with a medium NSI The result of the present study is concurred with the above results However it was observed that the NSI of the lactovegetarians were found to be normal in a study conducted by Gayathri (2002)

5.2.3. Clinical Status of the Respondents

Clinical examination is stated to be one of the most essential and simplest tool used in the evaluation of nutritional status (Prakash, 2005) The results showed that, deficiency symptoms like lack of lustre, dispigmentation and loss of hair was seen among 51 per cent of LIG, 39 per cent of MIG and 64 per cent of the HIG respondents Seventeen per cent of LIG, 30 per cent of MIG and 33 per cent of the HIG respondents were observed with pallor of tongue and reddish tongue Apart all theses, thyroid and parathyroid gland enlargement were observed among the 10, 17, and 7 per cent of the LIG, MIG and HIG respondents respectively Dry pale skin, dry and wrinkled skins wereobserved among the 13 per cent of LIG, 36 per cent of the MIG and 10 per cent of the HIG respondents Anaemia was observed among the respondents The results of the study done by Karuna (1993) and Nirmala (2002) revealed that the deficiency problems like anaemia, dental carries and spongy bleeding gums were seen among the respondents

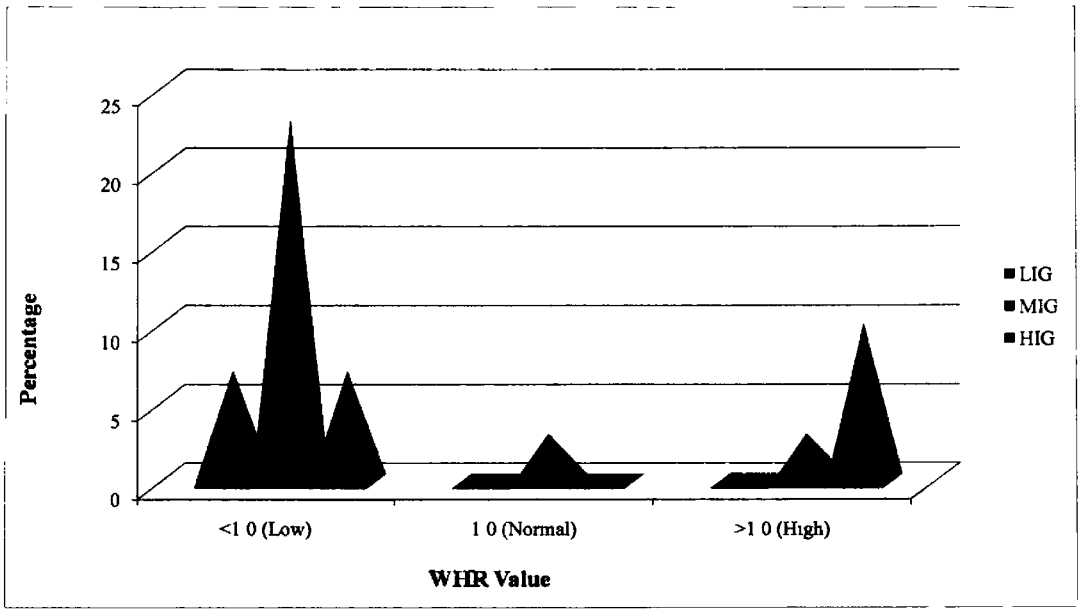

Fig.3. Waist – Hip ratio of male respondents

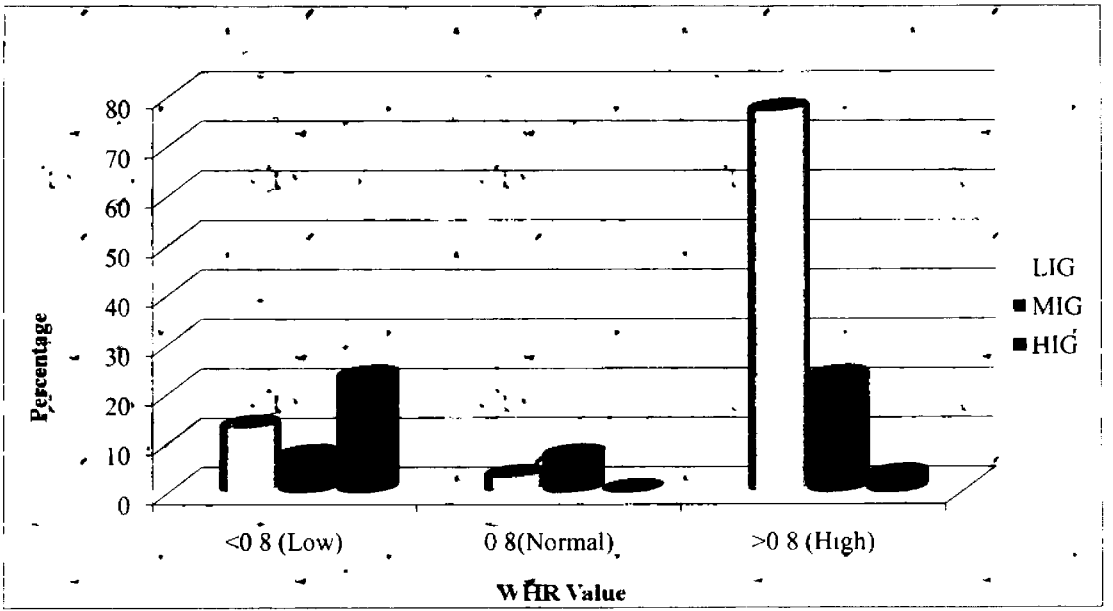

Fig.4. Waist – Hip ratio of female respondents

5.2.4. Biochemical Assessment of the Respondents

5.2.4.1. Haemoglobin Level of the Respondent

The haemoglobin levels of the respondents were studied to know the prevalence of anaemia (Fig 5) In the case of females, majority of the respondents in all income groups were having a haemoglobin value above 12 mg/dl A mild anaemia was observed among 20 per cent of the LIG, seven per cent of the MIG as well as 13 per cent of the HIG respondents Similar result was observed by Das (2014) among the study conducted in school children in Alappuzha district In the case of male respondents it was observed that, seven per cent of the LIG, 13 per cent of the MIG and 10 per cent of the HIG respondents were having a mild anaemia (Fig 6) The study was supported by the results of Augustine (1993), Ranganath (1996) and Shunmukhapriya (2005)

5.2.4.2. Blood Sugar Level of the Respondents

According to Srilakshmi (2014),the diabetes is increasing in India The prevalence of the diseases is 2 5 per cent in the urban and 1 8 per cent in the rural population above the age of 15 years According to Centres for Disease Control and Prevention (2011), in the year 2005–2008 35% of U S adults aged 20 years or older had pre diabetes About 9 1 million people aged above 20 were having diabetes However, the presentstudy revealed that majority of the respondents in three income group were having a normal blood sugar level (Fig) The study is supported by the results of Reddy *et al* (2006) and Mohan *et al* (2007)

5.2.4.3.Total Cholesterol Level of the Respondents

The results on hyperlipidemia showed that majority of the respondents were having a normal range of total cholesterol and only a few per cent of the respondents were observed with hyperlipidemia (Fig 8) Study conducted by Gupta *et al* (2002) and Gupta *et al* (2004)also found higher prevalence of hyperlipidemia among the urban Indian population

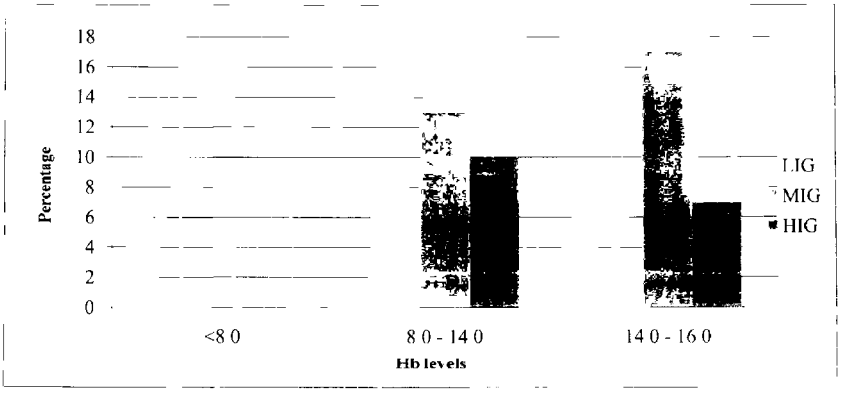

Fig.5. Haemoglobin levels of male respondents.

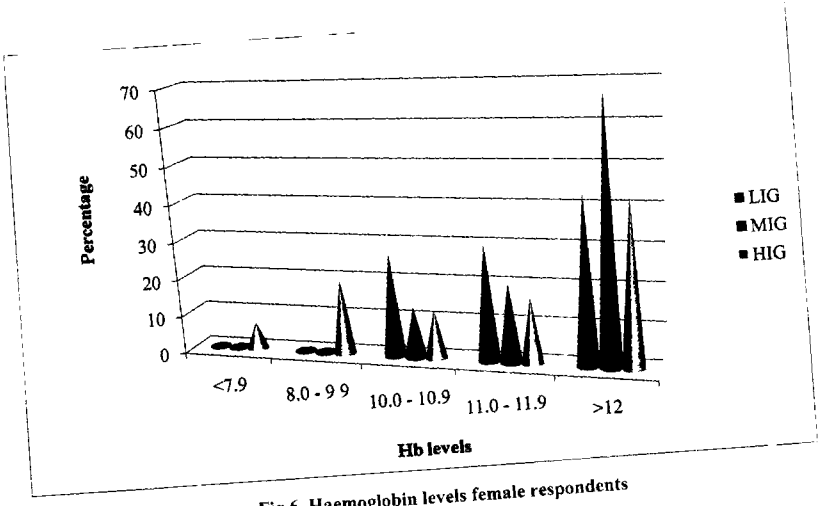

Fig.6. Haemoglobin levels female respondents

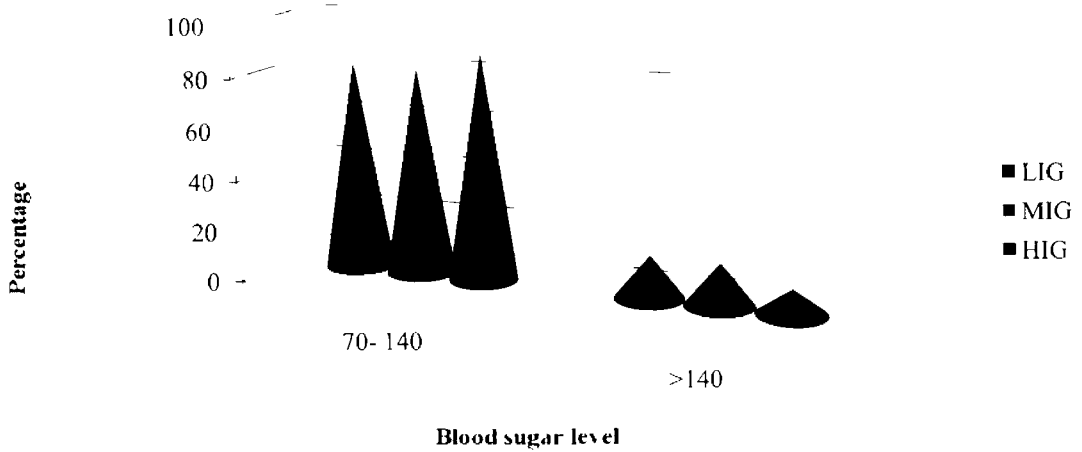

Fig.7. Blood sugar levels of the respondents.

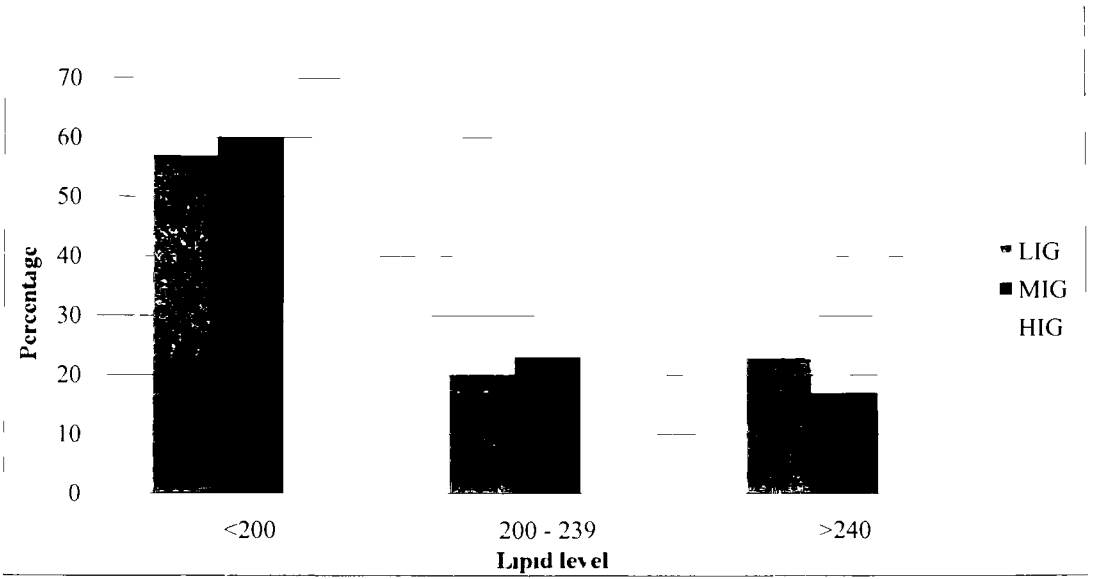

Fig.8. Total cholesterol levels of the respondents.

study results revealed that the respondents were experiencing stress due to occupational, family and financial problems Similar results were also observed by the studies conducted by Chandran (2005) and (Ellis,2002)

5.3.3. Sleeping Pattern of the Respondents

John (2015) observed that among the Indian adults 46 per cent of the adults have a sleep less than 6 hours and remaining 54 per cent had sleep for less than seven hours in a day The result of the present study revealed that, majority of the respondents were having a sleep between 6 to 7 hours Similar result was observed in a study conducted byThe Times of India (2013) The inter relationship between stress and sleeping pattern were further studied and the result showed that the two variables were mdependent from each other

5.3.5. Lifestyle Habits of the Respondents

According to Whitney *et al* (2002) nutritional status will not vary with alcoholism. The lifestyle habits like habit of alcohol consumption, smoking and pan chewing were assessed among the respondents through the study and it was found that, majority of the respondents in all income groups had never had a habit of alcohol consumption, smoking or chewing pan. The study is supported by the study conducted by Chandran (2005) and Parasuramalu*et al* (2010) The result ofGlobal Adults Tobacco Survey (2010)also revealed habit of smoking which include 10 3 per cent of males and 0 8 per cent of females

5.3.6. Family History of Lifestyle Diseases

According to Valdez *et al* (2010) family history is considered as a high risk factor for many lifestyle diseases such as cancer, cardiovascular disease and diabetes Epidemiological studies revealed that family history is considered as an important and independent risk factor for cardiovascular diseases, type 2 diabetesand many cancers (Nasir *et al* ,2004) In the present study, respondents were observed with a family history of lifestyle diseases like diabetes mellitus

5.2.4.4.Blood Pressure Level of the Respondents

As per the report of Economic Review (2004) it was observed that the people in Kerala are more prone to the high blood pressure condition Another study conducted by The New Indian Express (2005) also revealed that, one out of three adults in Kerala was having a hypertensive condition The result of the present investigations contradictory to the above results (Fig 9) Although similar findings were observed in the study byAugustine (1993)

The interrelationship between NSI and lifestyle diseases,food habits and lifestyle diseases were found to be non significant

5 3 HEALTH AND MORBIDITY OF THE RESPONDENTS

5.3.1. Exercise Pattern of the Respondents

The studies conducted by Suma (2011) showed only 7 2 per cent of male and 7 6 per cent of the female professionals engaged in teaching undertook regular exercise in her study conducted at Bangalore The result of the present study is similar to the above results Majority of the respondents in all income groups used to walk as an exercise and the time taken for doing it was 30 mints to 1hour The findings of the results were supported by the study conducted by NNMB (2002) The study also revealed that variables like exercise pattern and obesity was mdependent from each other

5.3.2. Stress and Strain Pattern of the Respondents

Stress can be defined as the reaction of one's body to the external environment and to the internal thoughts and feelings (Themes and Variations, 2002) According to Devadas (1999), the stress and strain of an individual have a good influence on one's nutritional status Sharma (2000) stated that, stress have a strong relation with back pain, coronary heart diseases and immune disorder and personal and family problems induce the chance for the occurrence of stress and strains According to Ukkuru (2002), the women who were doing job were suffering from employment related stress at medium to high level The present

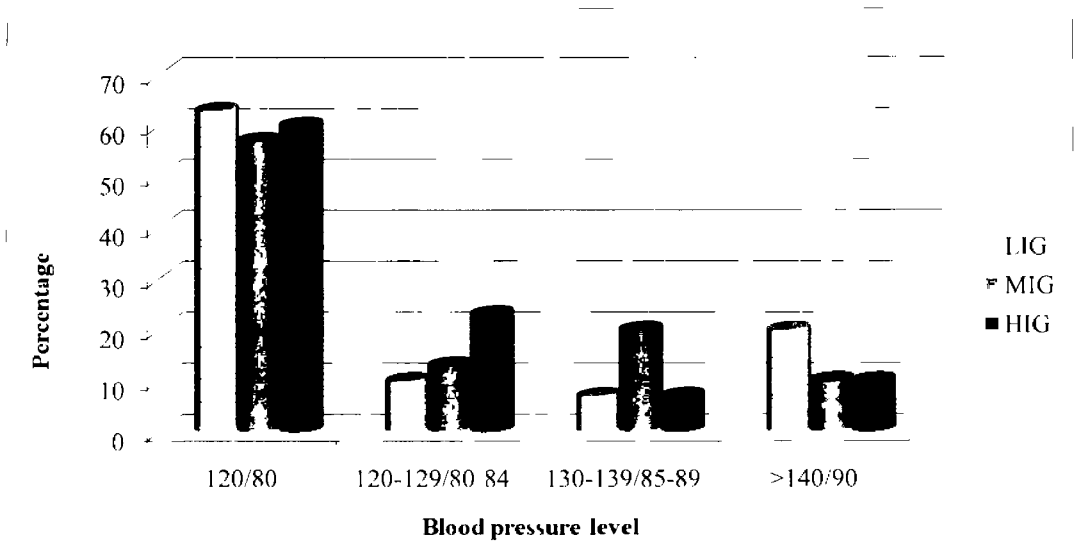

Fig.9. Blood pressure levels of the respondents.

cardiac problem, hypertension and hyperlipidemia The study is line with the findings ofKey *et al* (2002)and Misra and Khorana (2009)

5.3.7. Morbidity Pattern of the Respondents

The findings of the study conducted by Nahit*et al* (2000) among the software professionals revealed that, diseases like joint pain, back pain, fever, headache, muscle pain, cold and anaemia were observed among the respondents. The present study is concurred with the above results Similar results were also observed by Shunmukhapriya (2005) Valdez*et al* (2010) and Suma (2011) (Fig 10)

5 4 LIFESTYLE PATTERN OF THE RESPONDENTS

5.4.1. Daily Activity Schedule

Through the present study an attempt was made to assess the daily activity schedule of the respondents to known the influence of workload with respect to their nutritional status and prevalence of lifestyle diseases A study conducted by Chandran (2005) among the middle aged women of below poverty line indicatedthat 25 per cent of the total time in a day was spent for employment outside home, while 33 33 per cent of their time was spent for doing house hold activities and 29 17 per cent for sleep It was also observed that women got 12 50 per cent of the total time for leisure time activities in a day The time utilization pattern of the respondents revealed that, in a day major part of the respondents time was spent for doing work outside home in three income groups, followed by the time taken for doing household activities The study was supported by the findings of Seema (2001) and Kumari (2004)

5.4.2. Energy Intake and Energy Expenditure Pattern

A person's occupational activity is strongly associated with the type of foods they consume, physical activity and nutritional status (Jain and Singh, 2003) The energy intake and energy expenditure pattern of the respondents were studied separately using 24 hour recall method and Sathyanaranyana method The

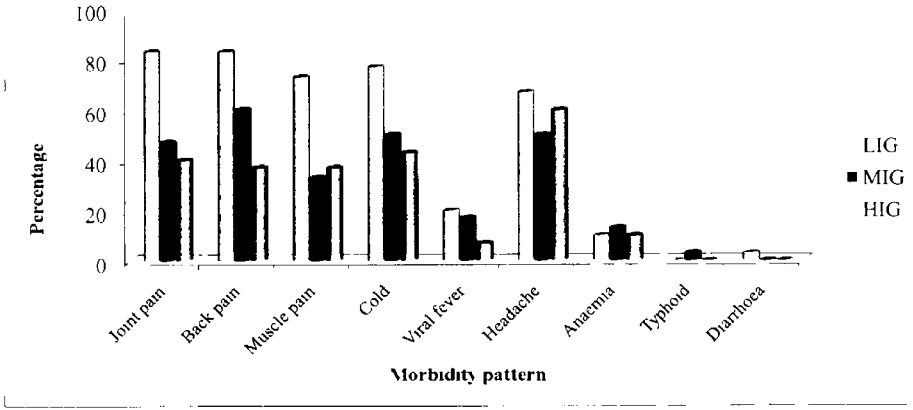

Fig.10. Morbidity pattern of the respondents.

energy balance was calculated Bamjiet *al* (2003)observed that the dietary habits and physical activities have a significant association in the energy balance of an individual and it can be observed as an important factor The results of the present study showed that the males in three income groups and doing three type of activities namely sedentary, moderate and heavy work were observed with a negative energy balance this may be due to their lesser intake of energy or may be due to their work pattern which becomes a reason for higher expenditure In the case of females, the MIG females possessed a negative energy balance while LIG as well as in HIG respondents in three activity groups were observed with a positive energy balance This shows a positive energy difference and this positive energy difference may be the reason for the increased trend of obesity and high waist- hip ratio among the females Similar trends were observed in the studies of Luni (2004), Sajitha (2000) and Chandran (2005)

5 5 CONDUCT OF NUTRITION AWARENESS PROGRAMME

5.5.1. Knowledge of the Respondents on Lifestyle Diseases

Several studies have shown that the nutrition education and intervention programme can increase the nutritional knowledge of the respondents (Razeena, 2000) Krishnendhu (2012) observed an improvement in the nutritional knowledge after the nutrition education programme Similar results were noticed in the current study The study is supported bythe findings of Parlato *et al* (1992) and Das (2014) The inter relationship of educational status and knowledge on lifestyle diseases were analysed and the result showed no significant difference among these two variables

Summary

6. SUMMARY

The present study entitled "Assessment of nutritional status and life style diseases among different income groups" was conducted with the objective to assess food habits, nutritional status and life style diseases among different income groups and impart counselling for a healthy life COA, Vellayani campus was selected for the study Ninety respondents both males and females who were working in the campus between the age group of 30 to 45 years from different income groups were selected purposefully Assessment of nutritional status was done through different methods including socio –economic and personal profile, diet survey,anthropometry, clinical, biochemical, health and morbidity and lifestyle pattern of the respondents

Results of the socio- economic and personal survey showed that, majority of the LIG and HIG respondents belonged to the age group of 41 – 45 years and in MIG most of them belonged to the age group between 30- 35 years Most of the respondents in all the income groups were Hindus and having a family size of 3-4 members Most of the respondents were females and were married The educational status of the respondents revealed that43 per cent of the respondents in LIG studied up to high school, 40 per cent of the MIG respondents had PG degree and 50 per cent of the HIG respondents had occupied with a doctoral degree Majority of the respondents in MIG as well as in HIG were doing permanent job while most of the LIG respondents were working as daily wages The family income of the respondents revealed that 46 per cent of the respondents had a family income between Rs 10000 – 30000

The results of the diet survey revealed that most of them belonged to the category of non vegetarian Fifty seven per cent of LIG, 50 per cent of MIG and 77 per cent of HIG had a regular time for meal consumption. In the case of meal skipping, 57 per cent, 54 per cent and 27 per cent of LIG, MIG and HIG respondents had skipped their meals Most of the respondents skipped their breakfast andthe reason for skipping was lack of time Thirty per cent of the LIG

as well as MIG and 16 per cent of the HIG respondents had a habit of dinning outside and the reason suggested was both necessity and convenience

The daily meal pattern of the respondents was assessed and it was noticed that 64 per cent of the respondents had early morning tea with bakery items In the case of breakfast, the menu followed for 58 percent of the respondents was cereal, pulse and vegetables combination Where as in the case of lunch, 44 per cent of the respondents had rice, fish and vegetable combination. Tea with bakery items was the evening tea menu for most of the respondents With respect to dinner, 41 per cent of the respondents followed the menu same as that of lunch. In the case of frequency use of food items the most frequently used food items by LIG and MIG were cereals, pulses, vegetables, fish and coffee/tea, followed by the food items like fruits, egg, milk and milk products The less frequently used foods were meat, juices/soft drinks and homemade snacks Fast foods were least frequently used With regarding to HIG it was similar to that of the LIG as well as MIG exceptfor the fish consumption which was least used by the respondents

In the present study, it was revealed that most of the money was spent for the purchase of cereals and fish followed by milk and milk products, vegetables, fats and oils, snacks/desert/ beverages and fruits A less amount was spent for the purchase of pulses, meat, egg, roots and tubers, sugar/jaggery/ honey and processed foods in all the three income groups of respondents The mean food intake of the respondents revealed that, 91 per cent of the RDA was met in the case of cereals and for pulses it was 60 per cent The intake of vegetables, fruits , milk and milk products was below the RDA level and the consumption above RDA level was observed for the food items likeflesh foods, fats and oils and sugar and jaggery for males In the case of females, it was noticed that positive deviation from RDA was seen among the food items like cereals, vegetables, fat and oils and sugar and jaggery. The consumption of foods like pulses, fruits, milk and milk products and flesh foods were below the RDA level

The intake of energy fat and iron was above the RDA for females and males and the intake of protein and calcium was below the RDA for LIG In the case of MIG, the energy and fat consumption was above the RDA and other nutrients were below the RDA level In HIG, intake of calcium, iron was above the RDA for both male and female Energy consumption was above for females and the nutrients like protein and calcium was below the RDA Majority of the respondents in LIG as well as MIG were observed with a good food habits and 60 per cent of the HIG respondents were noted with very good food habits

The anthropometric parameters of the respondents revealed that majority of the both male and female respondents had a high value than standard weight for height With respect to body mass index (BMI), three per cent of the male and 40 per cent of the female respondents had a BMI between 25 – 29 9 In the case of MIG, majority of respondents both male and females had a normal BMI For both male and female grade I obesity was seen among majority of the HIG respondents A low WHR was observed among the LIG as well as MIG males and in the case of HIG high WHR was noted With regard to the female respondents, majority of the respondents had a high value in all the income groups In the case of NSI a medium value was observed among both males and females respondents in all the income groups

Clinical examination of the three income groups respondents revealed that symptoms of malnourishments were observed in hair, tongue and skin Mild anaemia and gland enlargements were also observed The results of the biochemical assessments revealed that, mild anaemia was seen among females and male respondents in LIG, MIG and HIG A normal blood sugar, total cholesterol and blood pressure levels were seen among majority of the respondents in all income groups

The exercise patterns of the respondents were noted and the results showed that majority of the three income group respondents didn't had a habit of doing exercise Among the respondents who had the habit of doing exercise choose

walking and the time taken for doing it was 30 minutes to 1 hour among majority of the respondents Twenty seven per cent of the LIG respondent experienced stress and strain due to financial problems while for 20 per cent of the MIG respondents the reason was due to both financial as well as family problems In the case of HIG, 43 per cent of the respondents had suffered stress and strain due to occupational problems The sleeping pattern of the respondents showed that 86 per cent of the LIG, 73 per cent of the MIG and 67 per cent of the HIG respondents had a sleep between 6 – 7 hours.

The lifestyle habits of the respondents revealed that most of the respondents in all income groups never had a habit of alcohol consumption, smoking or chewing pan The respondents in all income groups were observed with a family history for diabetes, cardiac problems, hypertension and hyperlipidimia. The respondents in all income groups were observed with joint pain, back pain, muscle pain, cold, viral fever, headache and anaemia. The daily activity schedule of the respondents revealed that other than sleep, majority of the time was spent for doing employment outside home followed by house hold activities

In LIG, a negative energy balance was seen among the male respondents doing moderate and heavy work While among the female respondents a positive energy balance was observed In the case of MIG, a negative energy balance was seen among both males and females doing sedentary, moderate and heavy works Where as in HIG, the results were similar to that of LIG respondents The results of the knowledge test revealed that the respondents belonged to three income groups had improved their knowledge after the awareness programme

Thus it can be concluded that although the prevalence of lifestyle diseases among the respondents were very less, but the chance for their occurrence in future is very high, because of the hidden risk factors likegrade I obesity, hyperlipidimia, prehypertension, hereditary factors and stress related lifestyle problems among the respondents

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Appendices

APPENDIX I

INTERVIEW SCHEDULE TO COLLECT SOCIO- ECONOMIC & PERSONAL DATA

1 Name & address of the respondent
2 Age (years)
3 Sex
4 Religion — Hindu / Christian / Muslim
5 Place of residence
6 Marital status — Single / Married
7. Details of the family

Sl No	Name	Sex	Age	Education	Occupation	Income	Relationship to the respondent

8 Type of work . Permanent / Part-time Daily wages

9 Duration of work

10 Income from other sources

11 Total monthly income of family .

12 Expenditure for health care for the last six months

1 Doctor fees

2 Hospitalization charges

3 Medicine charges

13 Does your family have social participation

a Participate in Residents Associations

b Participate in Political Organizations

c. Participate in Voluntary Organizations

d Participate in Religious Organizations

e No participation

14 Monthly expenditure pattern

Sl No	Item	Amount
1	Food	
2	Clothing	
3	Housing (Rent, Repaying loan, Maintenance)	
4	Health	
5	Education	
6	Travel	
7	Recreation	

15 Do you have house maid

a If yes

Full time / Part time

16 How do you spend most of your leisure time, rank according to priority.

Activity	Ranks	Time spent(hr)
Watching TV		
Watching movies		
Listening to music		
Day dreaming		
Computer games		
Hobby		
Social networking		

APPENDIX II

INTERVIEW SCHEDULE TO ELICT INFORMATION IN DIETARY HABITS AND FOOD CONSUMPTION PATTERN

1 Name of the respondent

2 Age

3 Sex

4 Vegetarian / Lacto- vegetarian / Ovo- Vegetarian / Non- vegetarian

5 food expenditure pattern

Food item	Monthly	Quantity purchased	Quantity spent in a month
Cereals			
Pulses			
Vegetables			
Green leafy vegetables			
Fruits			
Meat			
Fish			
Egg			
Milk & milk products			
Roots & tubers			
Fats & edible oil			
Sugar/Jaggery/Honey			
Snacks/ Desserts/Beverages			
Processed foods			

6 Frequency use of different food commodities

Sl No	Food items	Daily	Twice m a week	Thrice m a week	Weekly	Fort nightly	Monthly	Never
I	Cereals							
II	Pulses							
III	Vegetables							
IV	Meat							
V	Fish							
VI	Egg							
VII	Fruits							
VIII	Milk &milk products							
IX	Coffee/ Tea							
X	Juice / soft drinks							
XI	Homemade snacks							
XII	Fast foods							

6 No of meals taken per day?

Two times / three times / four times / above

7 Meal pattern followed for last 3 days

No	Meals	1st day menu	Ingredients used	2nd day menu	Ingredients used	3rd day	Ingredients used
1	Breakfast						
2	Snacks						
3	Lunch						
4	Tea						
5	Dinner						

8. Actual intake of the respondent (24 hr recall method)

Meal pattern	Menu	Raw quantity of each ingredient	Individual intake
Breakfast			
Lunch			
Tea time			
Dinner			

9 Do your family maintain a regular time for taking meals?

Yes / No

10 Do you have a habit of skipping meals?

Yes / No

a If yes, which?

Breakfast / Lunch / Tea / Dinner

b State the reason for skipping?

Lack of time / Aversion to food / Laziness / Religious facts / Dieting / Any other

11 Name your most preferred foods

1

2

3.

4

12. Name your disliked foods

1

2

3

4.

13 Do you take meals outside home regularly?

Yes / No

a If yes, which?

Breakfast / Lunch / Tea / Dinner

14 Why do you prefer eating outside?

Variety / Appetizing food / Necessity / Convenience / Entertainment / Change

15 Knowledge on Food habits

1	I try out new foods	Yes / No
2	Homely food is more healthier than foods from outside	Yes / No
3	There is no harm to consume left over foods	Yes / No
4	Skipping meals is not advisable	Yes / No
5	Inclusion of raw fruits& vegetables provides various vitamins and minerals	Yes / No
6	Eating outside increase occurrence of illness	Yes / No
7	Dieting is a good habit	Yes / No
8	Balanced diet is inclusion of five food groups in the diet	Yes / No
9	I consume more amount when i get my favourite foods	Yes / No
10	Junk foods are the cause of overweight	Yes / No
11	Nibbling is a bad habit	Yes / No
12.	Bakery food contains transfat	Yes / No
13	Eating healthy foods in public and unhealthy foods in private is an advisable habit	Yes / No
14	There is no need to maintain a balance diet as long as exercising every day	Yes / No
15	Consumption of fried food enhance the lipid level in the body	Yes / No

APPENDIX III

INTERVIEW SCHEDULE TO COLLECT DETAILS REGARDING HEALTH STATUS AND MORBIDITY

1 Name of the respondent
2 Body weight(Kg)
3 Height(Cm)
4 Body mass Index(BMI)
5 Waist- Hip ratio
6. Do you have the habit of doing exercise?

Regular / Irregular / Never

If yes, specify

Type of exercise

Duration

Time

7 Do you have any stress & strain in your day to day life?

Yes / No

If yes, type

a Occupational / Family problem

b Health problem

c Financial problem

d Old age problem

e Any others

8. Do you practice any relaxation techniques?

Yes / No

If yes, which of the following?

1 Yoga

2 Meditation

3 Music therapy

4. Any other

9 Duration of sleep at night

Less than 6 hrs / 6-7 hrs / eight hours / above 8 hours

10 Do you consume alcohol?

Occasionally / Regularly / Never

11 Do you have the habit of smoking?

Occasionally / Regularly / Never

12 Do you have the habit of chewing pan?

Occasionally / Regularly / Never

13 Health indicators of the respondents (last 3 months)

A Common illnesses

1. Joint pain
2 Back pain
3. Muscle pain
4 Cold
5 Virus fever
6 Chickengunia
7 H1N1 fever
8 Dengue fever
9 Malaria
10 Head ache
11 Anaemia
12 Jaundice
13 Chicken pox
14 Typhoid
15 Diarrhoea

B Lifestyle diseases

Lifestyle diseases	Yes	No	If yes, how many years	Are you under medication	Which type of medication (Allopathy/Ayurvedam / Homoeopathy)	Do you make any dietary modification
Diabetes						
Cardiac problem						
Hypertension						
Hyper lipidemia						
Arthritis						
Cancer						
Obesity						
Osteoporosis						

14 Do you have a family history for any of the above listed lifestyle diseases ? Specify?

15 Have you undergone any clinical tests regarding lifestyle diseases?

Yes / No

a If yes, When

19 Knowledge on lifestyle diseases

1 High glycaemic index food is advisable for diabetic patient Yes / No
2 Selection of food item is one of the important factor for the development of lifestyle diseases Yes / No
3 Use of unsaturated fatty acid rich foods reduces the occurrence of cardiovascular diseases Yes / No

4	Practicing relaxation techniques (like yoga, medication etc) Have no effects on one's health	Yes / No
5	Exercising regularly is a good habit	Yes / No
6	Alcohol cause no harm on health	Yes / No
7	Smoking is a bad habit and it causes ill health	Yes / No
8	Routine health checking is not necessary if there is no illness	Yes / No
9	Consumption of processed foods is the reason for the increasing cancer	Yes / No
10	Intake of animal foods rich in triglycerides increase heart disease	Yes / No
11	Over eating and sedentary lifestyle is the cause of overweight	Yes / No
12	Persons need special diet on different stages of lifecycle (like childhood, adolescent, pregnancy, old age etc)	Yes / No
13	Consumption of fiber rich foods leads to Cardiovascular diseases	:Yes / No
14	Hypertension, diabetes and obesity are the risk factors for the development of Heart diseases	· Yes / No
15	Diets low in sodium, rich in potassium and Magnesium is advisable for people having hypertension	Yes / No

APPENDIX IV

SCHEDULE TO ASSESS CLINICAL STATUS OF THE RESPONDENTS

Name

Age

Clinical symptoms

Symptoms	Severe	Moderate	Mild	Nill
1 Hair a) Lacklustre b) Dispigmentation c) Easy pulkability				
2 Lips a)Angular stomatitis b) Chelosis				
3 Eyes a)Bitot's spot b) Conjuctival xerosis				
4 Tongue a)Pallor of tongue b)Reddish tongue				
5 Teeth a)Dental caries b) Teeth decay				
6 Glands a) Thyroid enlargement b) Parathyroid enlargement				
7 Skin a) Dry pale skin b)Dry and wrinkled skin				
8 Gums a) swollen spongy gum b) Bleeding gum				
9 General a) Anaemia b) Bending of ribs				

APPENDIX V

TIME UTILIZATION PATTERN / DAILY ACTIVITY SCHEDULE

Sl No	Activity	Time spent (mints)
1	Time of waking up	
2	Personal activity	
3	Time spent for exercise/ yoga/ meditation etc	
4	Time spent for household work before going to work	
5	Time spent for travelling from home to work place	
6	Total time spent in the work place	
7	Time taken to reach home	
8	Average time spent for house hold activities	
9	Average time spent for watching TV /listening music / gardening etc	
10	Time at which you will return to bed	

APPENDIX VI

NUTRITIONAL STATUS INDEX OF THE RESPONDENTS

Low income group		Middle income group		High income group	
Sl No	NSI	Sl No	NSI	Sl No	NSI
1	-0 86345	1	-0 49382	1	-1 17886
2	1 590978	2	6 456277	2	2 649889
3	5 259203	3	-0 07931	3	4 231916
4	0 997927	4	0 754371	4	4 060675
5	8 028162	5	-3 21859	5	0 046305
6	5 483096	6	2 157548	6	0 118665
7	-2 07015	7	6 572957	7	7 5778
8	1 005299	8	1 412975	8	3 655113
9	1 001478	9	3 442548	9	1 772687
10	-5 50	10	-0 6386	10	4 608456
11	3 938144	11	3 594288	11	1 448133
12	5 952234	12	-0 05873	12	3 943796
13	3 288633	13	2 0485	13	5 412267
14	0 194165	14	9 177098	14	-2 16907
15	-1 23959	15	6 687477	15	2 722382
16	2 752128	16	6 05425	16	3 431844
17	2 93484	17	2 125859	17	2 700137
18	5 149916	18	7 761312	18	2 070434
19	9 361436	19	3 785888	19	3 149792
20	7 764428	20	0 749208	20	1 299358
21	0 467336	21	1 398144	21	-1 00306
22	11 60992	22	5 268609	22	8 314127
23	8 070745	23	-1 94837	23	3 102469
24	5 396553	24	3 401196	24	1 567167
25	-5 68	25	3 354361	25	1 001377
26	-2 53	26	2 830553	26	7 387883
27	5 689377	27	3 414469	27	-1 22434
28	6 222776	28	1 03382	28	3 269751
29	5 953182	29	5 375439	29	3 396159
30	4 201421	30	5 186305	30	5 96873

ASSESSMENT OF NUTRITIONAL STATUS AND LIFE STYLE DISEASES AMONG DIFFERENT INCOME GROUPS

by

PRIYA. P

(2014-16-104)

Abstract of the thesis

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COLLEGE OF AGRICULTURE

VELLAYANI, THIRUVANANTHAPURAM- 695 522

KERALA, INDIA

2016

Abstract

ABSTRACT

The study entitled "Assessment of nutritional status and lifestyle diseases among different income groups" was carried out at the Department of Home Science, College of Agriculture, Vellayani during the period, 2014-2016 The main objective of the study was to assess food habits, nutritional status and life style diseases among different income groups and impart counselling for a healthy life Ninety employees (male and female) 30 members in high income group (HIG), 30 members in middle income group (MIG) and 30 members in low income group (LIG) belonging to the age group of 30 to 45 years was selected randomly. The classification of respondents in to different income groups was done according to NSSO report, 2007-2008

Evaluations of the socio-economic characters of the respondents found that majority of the respondents in all groups were females They were mostly Hindus and majority of them were married Educational status revealed that43% of LIG respondents were studied up to high school, 40 % of MIG were PGs and 50 % of HIG got Doctorate degree

On evaluating the food habits of the respondents it was found that majority of the respondents in all the three groups were non vegetarian, majority of the respondents(57 % of LIG, 50% of MIG and 77% of HIG) had regularity in their meal timings Whereas 57% of LIG, 54% of MIG and 27% of HIG respondents had a habit of meal skipping Thirteen per cent of both LIG as well as MIG and 16% of HIG respondents regularly consumed food from outside. On considering the meal patterns majority of the respondents had cereal, pulse and vegetable combination for their breakfast, lunch and dinner with the inclusion of non vegetarian foods like egg and fish The food consumption pattern indicates that consumption of fast food was very low The nutrient intake study revealed that among the three groups energy, protein and calcium intake was below Recommended Dietary Allowance (RDA)

The weight for height values showed that majority of the male and female respondents were having a value higher than the standard value In the case of BMI also it was found that only 3% of males, and 27% female in LIG, 17% of males and 37% female in MIG and 7% of males and 30% of female respondents in HIG had normal values The WHR of the respondents also indicated higher values than normal The clinical status of the respondents revealed that symptoms of malnutrition in hair, skin and tongue were observed, thyroid gland enlargement and anaemia were observed

The biochemical assessment conducted by a clinical expert revealed that majority of the respondents in all groups of males (7%, 13%, 10% for LIG, MIG & HIG respectively) were having mild anaemia Were in the case of females majority of the respondents (40%, 47%, and 30%) were observed in normal level The blood sugar level of the respondents revealed that (83%) of the respondents in LIG & MIG and 90% of the respondents in HIG were having the normal blood sugar level Lipid levels also showed similar trends With regarding the blood pressure values 63 per cent of LIG, 57 per cent of MIG and 60 per cent of the HIG respondents had a normal value

When the health and morbidity pattern of the respondents were assessed, it was found that majority of the respondents in LIG (56%) were not having the habit of exercise and 50% of the respondents in both MIG and HIG were exercising irregularly. The stress pattern of the respondents revealed that majority of the respondents in LIG (27%) were experienced stress due to financial problems, in the case of MIG respondents majority of them expressed the reason for stress as both financial and family problems (20%) In the case of HIG the major reason for the stress was due to occupational problems

The sleeping pattern revealed that majority of the respondents in all groups were having an adequate amount of sleep and there was no relation between stress and sleeping pattern The lifestyle habits of the respondents like alcoholism, smoking and pan chewing was also assessed and it was found that majority of

them did not have these habits in their day today life The morbidity pattern of the respondents indicates that majority of the respondents had occupational health problems like joint pain, back pain, muscle pain and head ache

The energy intake and energy expenditure of the respondents were assessed and it was found that although energy intake was less from the standards, energy deficit was not observed because the energy expenditure was less than the energy intake and due to the same reason the prevalence of obesity among the respondents was found to be high

An education class on the occurrence, prevalence and importance of lifestyle diseases was conducted for the respondents for a healthy life A counselling class regarding healthy life was also imparted to the respondents It was found that the knowledge of the respondents about lifestyle diseases had improved significantly after the conduct of the class

Hence, it can be concluded that although the prevalence of lifestyle diseases among the respondents was not obvious, the chances for their occurrence is very high, because of the hidden risk factors like grade I obesity, hyperhpidimia, prehypertension, hereditary factors and stress related lifestyle problems

സംഗ്രഹം

2014-16 കാലയളവിൽ വെള്ളായണി കാർഷിക കോളേജിലെ ഗൃഹ ശാസ്ത്ര വിഭാഗത്തിൽ വെച്ച് ''അസസ്മെന്റ് ഓഫ് ന്യൂട്രിഷണൽ സ്റ്റേറ്റസ് ആന്റ് ലൈഫ് സ്റ്റയിൽ ഡിസീസസ് എമംഗ് ഡിഫറന്റ് ഇൻകം ഗ്രൂപ്പ്സ്'' എന്ന വിഷയത്തിൽ ഒരു പഠനം നടത്തുകയുണ്ടായി വിവിധതരം വരുമാന ത്തിൽപ്പെട്ടവരുടെ ഭക്ഷണശൈലി, ആരോഗ്യ സ്ഥിതി, ജീവിതശൈലി രോഗ ങ്ങൾ എന്നിവയെക്കുറിച്ച് പഠിക്കുന്നതിനും, ആരോഗ്യ പൂർണ്ണമായ ജീവിതം നയിക്കുന്നതിനായ് അവരിൽ ഒരു അവബോധം ഉണ്ടാക്കിയെടുക്കുക എന്നിവ യായിരുന്നു പഠനത്തിന്റെ പ്രധാന ലക്ഷ്യങ്ങൾ കുറഞ്ഞ വരുമാനത്തിൽപ്പെട്ട (എൽ ഐ ജി) 30 ജീവനക്കാർ, ഇടത്തരം വരുമാനത്തിൽപ്പെട്ട (എം ഐ ജി) 30 ജീവനക്കാരും ഉയർന്ന വരുമാനത്തിൽപ്പെട്ട (എച്ച് ഐ ജി) 30 ജീവനക്കാരും മൊത്തം 90 ജീവനക്കാരിലായിരുന്നു പഠനം നടത്തിയത് 30 മുതൽ 45 വയസ്സി നിടെ പ്രായത്തിൽ ഉള്ള സ്ത്രീകളേയും പുരുഷന്മാരേയും ആയിരുന്നു പഠന ത്തിനു വിധേയമാക്കിയത് 2007-2008, എൻ എസ് എസ് ഒ റിപ്പോർട്ടിന്റെ അടി സ്ഥാനത്തിലായിരുന്നു 90 ജീവനക്കാരെയും മൂന്ന് വരുമാനവിഭാഗത്തിലായി തരം തിരിച്ചത്

ജീവനക്കാരുടെ സാമൂഹിക-സാമ്പത്തിക സ്ഥിതി പഠനത്തിൽ നിന്നും എല്ലാ സാമ്പത്തിക വിഭാഗത്തിലും ഭൂരിപക്ഷം പ്രതികർത്താക്കളും സ്ത്രീകൾ ആണെന്നും, കുറഞ്ഞ വരുമാനത്തിൽപ്പെട്ട 43 ശതമാനം ആളുകളും ഹൈസ്കൂൾ തലം വരെയും ഇടത്തരം വരുമാനത്തിലെ 40 ശതമാനം ആളു കൾ പോസ്റ്റ് ഗ്രാജുവേറ്റ് തലം വരെയും, ഉയർന്ന വരുമാനത്തിൽപ്പെട്ട 50 ശത മാനം ആളുകൾ ഡോക്ടറേറ്റ് തലം വരെയും പഠിച്ചിട്ടുണ്ട് എന്ന് വ്യക്തമായി

പഠന വിധേയരുടെ ഭക്ഷണ ശൈലി വിലയിരുത്തലിൽ നിന്നും 3 വരു മാന വിഭാഗത്തിൽപ്പെട്ട ഭൂരിഭാഗം ജീവനക്കാരും മിശ്രഭുക്കുകളാണ്, 57 ശത മാനം എൽ ഐ ജി , 50 ശതമാനം എം ഐ ജി , 77 ശതമാനം എച്ച് ഐ ജി ജീവനക്കാരും കൃത്യമായ ഭക്ഷണസമയം പാലിക്കുന്നവരാണെന്നും കണ്ടെ ത്തി എന്നാൽ 57 ശതമാനം എൽ ഐ ജി , 27 ശതമാനം എച്ച് ഐ ജി 54 ശതമാനം എം ഐ ജിയിൽ പെടുന്നവർക്കും ഭക്ഷണം ഒഴിവാക്കുന്ന ശീലം ഉണ്ടെന്നും, എൽ ഐ ജി , വിഭാഗത്തിലേയും എം ഐ ജി വിഭാഗത്തിലേയും 30 ശതമാനം ആൾക്കാർക്കും എച്ച് ഐ ജി വിഭാഗത്തിലെ 16 ശതമാനം

ആൾക്കാരും സ്ഥിരമായി പുറത്തു നിന്ന് ഭക്ഷണം കഴിക്കുന്നവർ ആണെന്നും പഠനം വഴി വ്യക്തമായി പഠനേതാക്കളുടെ ഭക്ഷണക്രമ പഠനത്തിൽ നിന്നും കൂടുതൽ പേരുടേയും പ്രഭാത ഭക്ഷണത്തിൽ ധാന്യങ്ങളും പയറുവർഗങ്ങളും പച്ചക്കറികളും ഉൾപ്പെടുന്നു എന്നും, എന്നാൽ അവരുടെ ഉച്ചഭക്ഷണത്തിലും അത്താഴത്തിലും മേൽ പറഞ്ഞവ കൂടാതെ മുട്ടയും മത്സ്യവും ഉൾപ്പെടുന്നു എന്നും കണ്ടെത്തി ഭക്ഷണരീതി പഠനത്തിൽ നിന്നും ഫാസ്റ്റ് ഫുഡിന്റെ ഉപ യോഗം വളരെ കുറവാണെന്ന് ഉള്ള വസ്തുതയും വ്യക്തമായി ഇവ കൂടാതെ പോഷകങ്ങളെ കുറിച്ചുള്ള പഠനത്തിൽ നിന്നും ഊർജ്ജം, മാംസ്യം, കാത്സ്യം തുടങ്ങിയ പോഷകങ്ങൾ നിർദ്ദിഷ്ടമായ അളവിൽ നിന്നും വളരെ കുറവാ ണെന്നും മനസിലായി

പൊക്കത്തിന്റെയും തൂക്കത്തിന്റേയും അളവുകളുടെ പഠനത്തിൽ നിന്നും കൂടുതൽ ആൾക്കാരും നിർദ്ദിഷ്ട തൂക്കത്തിനുള്ള പൊക്കത്തിൽ നിന്നും വളരെ ഉയർന്ന അളവുള്ളവരാണെന്നും എൽ ഐ ജി വിഭാഗത്തിലെ 3 ശത മാനം പുരുഷന്മാർക്കും 27 ശതമാനം സ്ത്രീകൾക്കും എം ഐ ജി വിഭാഗ ത്തിലെ 17 ശതമാനം പുരുഷന്മാർക്കും 37 ശതമാനം സ്ത്രീകൾക്കും, എച്ച് ഐ ജി വിഭാഗത്തിലെ 7 ശതമാനം പുരുഷന്മാർക്കും 30 ശതമാനം സ്ത്രീകൾക്കും മാത്രമേ ശരിയായ ബി എം ഐ അളവ് ഉള്ളു എന്നും കണ്ടെ ത്തി ഇവ കൂടാതെ പഠന വിധേയരുടെ ശരീരത്തിന്റെ നേരിട്ടുള്ള നിരീക്ഷണ ത്തിൽ നിന്നും പോഷകാഹാര കുറവിന്റെ ലക്ഷണങ്ങൾ അവരുടെ മുടിയിലും തൊലിപുറത്തും, നാവിലും കണ്ടുപിടിക്കാനായി കൂടാതെ തൈറോയിഡ് ഗ്രന്ഥിയുടെ വീക്കവും, വിളർച്ചയും പ്രതികർത്താക്കളുടെ ഇടയിൽ നിരീക്ഷി ക്കുകയുണ്ടായി

പഠനേതാക്കളുടെ രക്ത പരിശോധനാ പഠനത്തിൽ നിന്നും 7 ശതമാനം എൽ ഐ ജി 13 ശതമാനം എം ഐ ജി വിഭാഗത്തിലേയും 10 ശതമാനം എച്ച് ഐ ജി വിഭാഗത്തിലെ പുരുഷന്മാരിലും നേരിയ അളവിൽ വിളർച്ച കണ്ടെത്തി എന്നാൽ സ്ത്രീകളുടെ കാര്യത്തിൽ 3 വിഭാഗത്തിലേയും ഭൂരിഭാഗം ആൾക്കാ രിലും ശരിയായ അളവിൽ ഹീമോഗ്ലോബിൻ ഉള്ളതായി കണ്ടെത്തി രക്ത ത്തിലെ പഞ്ചസാരയുടെ അളവ് പരിശോധനയിൽ നിന്നും 83 ശതമാനം എൽ ഐ ജിയിലേയും എം ഐ ജിയിലെയും 90 ശതമാനം എച്ച് ഐ ജി വിഭാഗം ആളുകൾക്ക് നിർദ്ദിഷ്ട അളവ് ഉള്ളതായി കണ്ടെത്തി രക്ത കൊളസ്ട്രോൾ പഠനത്തിലും സമാനമായ വസ്തുത കണ്ടെത്തി എന്നാൽ രക്ത സമ്മർദ്ദ പഠന

ത്തിൽ നിന്നും നോർമൽ അളവുകൾ 63 ശതമാനം എൽ ഐ ജി 57 ശതമാനം എം ഐ ജി 60 ശതമാനം എച്ച് ഐ ജി വിഭാഗത്തിൽപ്പെടുന്നവരിലും നിരീക്ഷിച്ചു

ജീവനക്കാരുടെ രോഗ പ്രകൃതി പഠനത്തിൽ നിന്നും 56 ശതമാനം എൽ ഐ ജി വിഭാഗത്തിൽപ്പെട്ടവർ വ്യായാമം ചെയ്യുന്നില്ല എന്നും എന്നാൽ ഇടത്തരം വരുമാന വിഭാഗത്തിലേയും ഉയർന്ന വരുമാന വിഭാഗത്തിലേയും 50 ശതമാനം ആളുകളും ക്രമരഹിതമായ വ്യായാമം പരിശീലിക്കുന്നവരാണെന്നും കണ്ടെത്തി മാനസിക പിരിമുറുക്ക പഠനങ്ങളുടെ ഫലങ്ങൾ പഠിക്കുക വഴി 27 ശതമാനം എൽ ഐ ജി ആൾക്കാർക്കും സാമ്പത്തിക പ്രശ്നങ്ങളും എം ഐ ജി വിഭാഗത്തിലെ ഭൂരിഭാഗം പേർക്കും സാമ്പത്തികവും കുടുംബപരമായ പ്രശ്നങ്ങളും, 20 ശതമാനം എച്ച് ഐ ജി വിഭാഗത്തിൽപ്പെടുന്നവരിൽ ജോലി സംബന്ധമായ പ്രശ്നങ്ങളും മാനസിക പിരിമുറുക്കത്തിന് കാരണമാകുന്നു എന്ന് കണ്ടെത്തി

ജീവനക്കാരുടെ ഉറക്കശീല പഠനം വഴി എല്ലാ വിഭാഗത്തിലേയും അധിക പക്ഷ ആൾക്കാർക്കും ആവശ്യത്തിനനുസൃതമായി ഉറക്കം ലഭിക്കുന്നുണ്ട് എന്നും ഇവരിൽ മാനസിക പിരിമുറുക്കവും ഉറക്കവും തമ്മിൽ യാതൊരു ബന്ധവും ഇല്ലെന്നും കണ്ടെത്തി മദ്യപാനം, പുകവലി, മുറുക്ക് തുടങ്ങിയ ജീവിതശൈലി പഠനത്തിൽ നിന്നും ഭൂരിഭാഗം ജനങ്ങളും ഇവയൊന്നും ഉപയോഗിക്കുന്നവരല്ല എന്നുള്ള വസ്തുതയും മനസിലാക്കി പഠനേതാക്കളുടെ രോഗ പ്രകൃതി പഠനത്തിൽ നിന്നും കൂടുതൽ ആൾക്കാർക്കും ജോലി സംബന്ധ പ്രശ്നങ്ങളായ സന്ധിവേദന, നടുവേദന, പേശി വേദന, തലവേദന എന്നിവ നിരീക്ഷിക്കുകയുണ്ടായി

പഠനേതാക്കളുടെ ഊർജ്ജ സ്വീകരണവും ഊർജ്ജ ഉപയോഗവും പഠിക്കുക വഴി ഊർജ്ജത്തിന്റെ സ്വീകരണം നിശ്ചിത മാനദണ്ഡത്തേക്കാൾ കുറവാണെന്ന് കണ്ടെത്തി എന്നാൽ മൊത്തത്തിൽ ഊർജ്ജ കമ്മി നിരീക്ഷിക്കാൻ ആയില്ല കാരണം ഊർജ്ജത്തിന്റെ ഉപയോഗം സ്വീകരണത്തിനെക്കാളും കുറവായിരുന്നു ഇതേ കാരണം കൊണ്ടു തന്നെ ആളുകളിൽ അമിത വണ്ണത്തിന്റെ ലക്ഷണങ്ങളും പ്രകടമായിരുന്നു

ജീവിതശൈലി രോഗങ്ങളുടെ പ്രാധാന്യം, ആധിക്യം എന്നിവയെക്കുറിച്ചുള്ള ഒരു പഠന ക്ലാസ് എല്ലാ പഠനേതാക്കൾക്കും നൽകുകയുണ്ടായി ഇതിനോടൊപ്പം തന്നെ ആരോഗ്യപരപരമായ ജീവിതത്തെ കുറിച്ചുള്ള ഒരു ക്ലാസും

നൽകുകയുണ്ടായി പഠന ക്ലാസിനു ശേഷം പഠനേതാക്കളുടെ ഇടയിൽ ജീവിതശൈലി രോഗങ്ങളെക്കുറിച്ചുള്ള അറിവ് വർദ്ധിച്ചതായി കണ്ടെത്തുകയും ചെയ്തു

മേൽ പറഞ്ഞ കാര്യങ്ങളിൽ നിന്നും പഠനേതാക്കളുടെ ഇടയിൽ നിലവിൽ ജീവിതശൈലി രോഗങ്ങൾ കുറവാണെങ്കിലും ഇനി ഭാവിയിൽ അവ ഉണ്ടാവാനുള്ള സാധ്യത കൂടുതൽ ആണെന്നും മനസിലാക്കി ഈ നിഗമനത്തിനു കാരണം ഒളിഞ്ഞിരിക്കുന്ന അപകട സാധ്യതകളായ അമിതവണ്ണം, കൊളസ്ട്രോൾ, അമിത രക്ത സമ്മർദ്ദത്തിന് മുന്നോടിയായിട്ടുള്ള അവസ്ഥ എന്നിവയും പാരമ്പര്യം, മാനസിക പിരിമുറുക്കത്തിന് കാരണമാകുന്ന ജീവിത പ്രശ്നങ്ങളും പഠനേതാക്കളിൽ നിരീക്ഷിക്കുകയുണ്ടായി എന്നതാണ് ജീവിത ശൈലി രോഗങ്ങൾ ഇപ്പോൾ കുറവാണ് എങ്കിലും മേൽ പറഞ്ഞ വസ്തുതകൾ കൊണ്ട് ഭാവിയിൽ വരാനുള്ള സാധ്യത കൂടുതലാണ്