

**Consumption Pattern of Dietary Fat and Fibre among
Women with Risk for Cardiovascular Disease**

Neethu K.P

(14PFD008)

Thesis Submitted to

**Avinashilingam Institute for Home Science and Higher Education
for Women Coimbatore – 641043**

**In Partial Fulfilment of the Requirements for the Degree of
Master of Science in Food Service Management and Dietetics**

April, 2016

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P. Rasaramanani
28/4/16

**Signature of the
Head of Department**

S. Thathy

Signature of the Supervisor

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1. INTRODUCTION

Cardiovascular diseases have no geographic and disease boundaries. They occur throughout the world in all races and in all strata of society, without variation between sexes, ages and socio-economic status. They are life threatening and are responsible for ill health and death in many countries (**Ghafoorunisa and Krishnaswamy, 2014**).

An epidemiological study by **Mitra et al.,2009** reported that the cardiovascular disease burden continues to rise in developing countries including India. The projected rise in disease burden due to cardiovascular disease is expected to make it the prime contributor of total mortality and morbidity. Almost 2.6 million Indians are predicted to die due to coronary heart disease which contribute to 54.1 percent of all cardiovascular diseases death in India by 2020 .

Cardiovascular mortality in Asian Indian population is likely to climb up 90 percent in women by 2015. It has been estimated that by 2020, Cardiovascular disease will be the largest cause of disability and death in India with 2.6 million Indians predicted to die due to Cardiovascular disease (**Mag and Ghosh, 2015**).

Cardiovascular disease is the significant cause of mortality in women. Cardiovascular disease is the most common death in the UK due to sedentary life style and unhealthy dietary habits of the women. The Global Burden of disease study 2013 estimated that almost 30 percent of all deaths worldwide were caused by cardiovascular disease (**Bhatnagar et al.,2015**).

Cardiovascular diseases are the major cause of mortality and disease in the Indian population causing more than 25 percent of deaths. It has been predicted the cardiovascular disease will increase rapidly in Indian and our country will be host to more than half the cases of heart diseases in the world within the next 15 years (**Gupta et al .,2008**).

Genetic factors and age are important in determining the risk with intermediate risk factors such as hypertension, hypercholesterolemia, dyslipidaemia, insulin resistance, diabetes, obesity and lifestyle factors such as

lack of physical activity and diet are also major risk factors associated with the development of cardiovascular disease (**Joshi and Parikh, 2007**)

A nutrient rich diet could assist to maintain a healthy body and mind. In diets, increase in saturated fat and sodium, and decrease in vitamins, minerals and fibre are all those that implicate in chronic diseases (**Plastic et al., 2011**).

Globally, Cardiovascular diseases are the number one cause of mortality in the world. An estimate of 17.5 million people died from cardiovascular disease in 2005, representing 30 percent of all global deaths. Of these deaths, 7.6 million were due to heart attacks, 5.7 million due to stroke and 4.2 million due to hypertension and other heart conditions. About 80 percent death occurred in low and middle income countries. World Health Organisation, 2008 cautioned that by 2015, an estimated 20 million people will die from cardiovascular disease (**Boutayeb, 2006**).

India which face rapid urbanisation due to globalisation and higher income levels, 31.8 per cent of people are living in urban areas which induced a nutritional shift resulting in the rise of unhealthy food and decreased intake of fruits and vegetables and also led to a number of issues like reduced physical activity, unhygienic and overcrowded living conditions, growing levels of stress and higher exposure to pollution (**Gupta et al., 2011**) leading to the increase in cardiovascular disease risk factors.

A recent study found that nearly 75 percent of coronary heart disease case in women can be prevented with better lifestyle choices, such as exercise and eating healthy diet. This study found that women who lead healthy lifestyle in their young adult years were 92 percent less likely to have a heart attack, women with low socio economic status are disproportionately affected by coronary heart disease (**American Heart Association, 2015**).

Proper ranges of cholesterol are important in the prevention of heart attack or stroke. Total blood cholesterol above 200 mg/dl, LDL cholesterol above 130 mg/dl, HDL cholesterol below 35 mg/dl and lipoprotein A level greater than 30 mg/dl are indicators of problematic cholesterol. Cholesterol is not actually a

damage mechanism but is more an indicator of compromised liver function and increased risk of heart attack (**US Center for Disease Control, 2010**).

Many epidemiological studies indicated the traditional Mediterranean lifestyle pattern with diets rich in fruits and vegetables, olive oil, fish, nuts, complex grains and carbohydrates and red wine along with physical activity had a protective role against the development and progression of cardiovascular disease which is one of the leading cause of morbidity and mortality worldwide. The other reasons are physical inactivity and unhealthy eating conditions (**Sofi et al., 2010**).

Eating habits and lifestyle practice play a large role in determining the risk of heart disease. Animal products like meat and dairy products, fried foods and vegetable oils are rich in fat. Cheese contain 60 to 80 percent of calories from fat, ice creams contain 45 to 65 percent calories from fat and butter and oils of all types typically contain 95 to 100 percent of calories from fat. A few vegetable oils are also high in saturated fats such as palm oil, palm kernel oil and coconut oil. Oats, barley, beans and some fruits and vegetables are good sources of fibre and reducing risk of cardiovascular disease (**Barnard, 2014**).

Traditional diets varies in fat content from thirty percent to eighty percent of calories but only about four percent of calories comes from polyunsaturated oils naturally occurring in grains, legumes, nuts, fish, animal fats and vegetables. The balance of fat calories in the form of saturated and monosaturated fatty acids (**Murray et al., 2013**).

Changes in food choices that would need to more from average consumption to amounts recommended in the food groups. Increase in consumption of fruits and vegetables, whole grains and milk are recommended to meet nutrient recommendation. While recommended changes in intake for total grain consumption are modest, with in that category, increase in whole grain consumption are recommended to meet the fibre needs (Nicklas et.al ,2005). The lifestyle of the population change a lot mostly in the nineteenth and twentieth century. The unhealthy living condition along with a change from traditional

dietary habits, with a sedentary lifestyle has made women vulnerable to lifestyle diseases (**Padmakumar, 2007**).

Changes in our diet, food intake and energy expenditure increase the level of metabolic disease, such as diabetes and obesity lead to cardiovascular diseases (**Peter and Merk, 2006**).

Saturated fats are found in animal products. Trans fats are oils that have been hydrogenated to form into semi-hard fats. Intake of trans fatty acids lead to risk of cardiovascular disease. Replacement of partially hydrogenated oils with unhydrogenated oil produces sustainable reduction in coronary heart disease incidence (**Moraffarian et al .,2007**).

Dietary fibre or fibre rich foods have significant role to reduce total cardiovascular risk factor such as hypertension, obesity, insulin sensitivity, and elevated plasma cholesterol. Beneficial compounds in high fibre foods could have protective effects against cardiovascular disease. Diets high in fibre, especially from cereals or vegetables sources and rich in soluble type fibre are significant by associated with lower risk of cardiovascular and greater intake of fruit fibre was also associated with lower cardiovascular risk (**Darren, 2013**)

A dietary portfolio of plants based cholesterol lowering foods reduce blood pressure significantly, related to almonds intake and dietary portfolio approach of combining a range of cholesterol lowering plant foods are benefits for risk of cardiovascular disease both by reducing serum lipids and blood pressure (**Jensen et al .,2008**).

Sixteen Million (1percent) daily and 1.7 million (2.8 percent) of death worldwide are due to low consumption of fruits and vegetables in daily diet. High dietary intake of saturated fat, trans-fat cholesterol and salt, and low intake of fibre rich foods and fish lead to cardiovascular disease (**Mendis et al., 2011**)

Nutraceutical and functional foods are use to describe extract and whole foods that have the characteristic of providing protective and preventive and curative effective in the cardiovascular disease, which are natural and commonly found in bioactive foods or whole plants to keep energy balance in the body and

promise sustainable therapeutic value in cardio-protection (**Sharma and Ram, 2010**).

Young adult women should pay special attention for getting a balanced diet to get enough vitamins and minerals for leading the healthy life. Foods with a lot of fats, salt or sugar, that not have much of good stuff like vitamins and fibre. Eating well and feeling good is about more than just putting “healthy” food into our mouth (**Stone et al., 2011**)

Hence the present study entitled “consumption pattern of dietary fat and fibre among Women with Risk for Cardiovascular disease is carried out with the following objectives.

Primary Objectives:

- To assess the role of dietary fat and fiber intake among women and assess the risk for cardiovascular disease.

Secondary Objectives:

- To educate the women regarding the role of dietary fats and fibre in prevention of cardiovascular disease and
- To compare the pre and post impact of the health education to the women on risk reduction for cardiovascular disease.

3. METHODOLOGY

The methodology pertaining to the study titled "**Consumption Pattern of Dietary Fat and Fibre among Women with Risk for Cardiovascular Disease**" is discussed in the following heads.

- A. Selection of the area and study participants**
- B. Health assessment of the women for the risk of cardiovascular disease**
- C. Analyse the consumption pattern for fat and fibre intake among women**
- D. Education tools for the conduct of the study**
- E. Association of Health education with Health profile of the Study participants**

A. Selection of the area and study participants

The area selected for the conduct of the study was Coimbatore. The sample selected were young women between the age group of 21 and 40 years. A total of 165 women from households and institutions were selected as the study participants. The area selected were the households from Sivanandha colony and Women working at Avinashilingam Jan Shikshan Sansthan due to easy accessibility of the study participants .The study participants therefore comprised of working women and non working women in Coimbatore city .

"A sampling design is called as purposive sampling, where the samples are drawn on the basis of personal judgement of a person" (Mohamed *et. al*, 2014).The baseline data was elicited from the study participants through purposive sampling among the working and non working women in the age group of 21 and 40 years.

The inclusion criteria for the selection of study participants were women between the age group of 21 and 40 years and women willing to contribute to the present study. The exclusion criteria was women with any congenital diseases ,physiological

conditions such as pregnancy, lactation and other contagious infections. The proposal for the conduct of the research was approved by the Institutional Human Ethics Committee of our University (Appendix I).

B. Health assessment of women for the risk of cardiovascular disease.

A well designed questionnaire was used to assess the health risk of the study participants. According to Abawi 2013, A questionnaire is a data collection instrument consistent of a series of questions and others that prompt for the purpose of gathering information from respondents.

Assessment of health status was done with Health Risk Assessment Index based on the anthropometric measurements, biochemical estimations, dietary pattern and lifestyle practices. Anthropometric measurements comprising Body Mass Index, Waist to Hip Ratio and Biochemical Assessment included the complete lipid profile examination. Dietary pattern of women with specific details on meal pattern ,quantity of fats and oil used, fibre intake and consumption of fast foods were collected .The lifestyle pattern was assessed with exercise and meditation pattern.

Anthropometric assessment

"Anthropometry deals with physical measure that provide an indirect assessment of body composition, growth and development. This is considered to be the most sensitive parameter for assessing the nutritional status" (National Institute of Nutrition 2009).

Anthropometric measurements comprised of Body Mass Index(BMI) and Waist Hip Ratio (WHR). The height of the selected individual was recorded by the flexible measuring tape. The women were requested to stand erect to the wall and the height was marked on the wall. The height was than recorded. The body weight of the women was inscribed using the bathroom scale. The procedure was done with the weight followed by zeroing the scale before the subject stepped on to the machine. The subject was asked to remove the foot wear, stand straight and stay still on the scale and then the reading was recorded.

Body Mass Index (BMI)

The height and weight recorded from the study participants were used to calculate the Body Mass Index. Body Mass Index helps to estimate the body fatness and health risk of women (Srilakshmi, 2014). The Body Mass Index was calculated with the height and weight recorded using the formula,

$$\text{Body Mass Index (BMI)} = \frac{\text{Weight (kgs)}}{\text{Height (m}^2\text{)}}$$

Based on the BMI the women were categorised to various degrees of fat adiposity as guided by Indian Council of Medical Research (2012).

TABLE I
Body Mass Index of the women

Body Mass Index	Category	Risk Category
18.5-22.9	Normal	No risk
23.0-25.0	Risk of obesity	Low risk
25.1-29.9	Grade I-obesity	Medium risk
>30	Grade II-obesity	High risk

Waist Hip Ratio (WHR)

The waist to hip ratio was calculated by waist circumference divided by the hip circumference

$$\text{Waist Hip Ratio} = \frac{\text{Waist (centimeters)}}{\text{Hip (centimeters)}}$$

Waist circumference was measured at the midpoint between lower costal margin and superior iliac crest in the mid axillary line. Hip circumference was measured at the level of greater trochanter femur. Based on the waist hip ratio, the women were assessed and categorized as in table II .

TABLE II
Waist to Hip Ratio of the women

Waist to hip ratio	Category
<0.8	Normal
>0.81-0.85	Low risk
0.86-0.9	Medium risk
>0.9	High risk

The waist to hip ratio less than 0.8 indicate normal stature and above 0.8 indicates risk for lifestyle disorders especially cardiovascular disease. The height, weight, waist and hip recorded for any women is given in plate 1.



Measurement of height



Measurement of weight



Measurement of waist circumference



Measurement of hip circumference

PLATE I

From the dietary record, the diet pattern namely vegetarian, non vegetarian or ova vegetarian were categorised as low risk, medium risk and high risk for cardiovascular disease respectively.

Biochemical tests which were conducted on easily accessible body fluids such as blood was done to diagnose the total cholesterol, very low density lipoprotein, high density lipoprotein, low density lipoprotein and triglyceride level .

Dietary assessment comprise aspects of food consumption including information on the type of food people eat, and frequency with their opinion and attitudes towards food (Krishnaswamy , 2012). Hence the dietary pattern included type of diet, type and quantity of fat consumed, consumption of fibre rich foods, dairy products and junk foods consumption and consumption of beverages were elicited.

The lifestyle pattern was elicited with the practice of physical activity such as exercise, yoga and meditation. The type of stress pattern were used as the risk factor at various scale for the lifestyle factors such as personal, occupational , environmental, physical stress and biological stress.

Based on the different parameters in the Health Risk Assessment Index comprising of familial tendency for lifestyle diseases, anthropometric measurements, biochemical assessment, dietary pattern and lifestyle practices. Scores were allotted with zero for normal, scores were allotted with 3 for low risk, 5 for medium risk and 10 for high risk for cardiovascular disease. The scores allotted for various parameters of the Health Risk Assessment Index is given in Table III.

TABLE III
Health Risk Assessment Index

S.No.	Criteria	Normal (0)	Low risk (3)	Medium risk (5)	High risk (10)
1	Body Mass Index	18.5-22.9	23.0-25.0	25.1-29.9	>30
2	Waist Hip ratio	<0.8	0.81-0.85	0.86-0.90	>0.9
3	Dietary pattern	Vegetarian	Ova-vegetarian	Non-vegetarian	Non-vegetarian
4	Dairy products	Daily	Monthly Once	Weekly	No
5	Junk foods	No	Monthly Once	Weekly	Daily
6	Consumption of beverages	No	<3 cups	>3 cups	>5 cups
7	Consumption of fibre rich foods	Daily	Weekly	Rarely	No
8	Consumption of fat and oils	Combination of oils PUFA,MUFA,SFA	PUFA,SFA	MUFA,SFA	SFA
9	Total amount of fat used per day	1-2 Teaspoons	<3 Teaspoons	3-5 teaspoons	>5 teaspoons
10	Exercise pattern	60 minutes Per day	30 minutes Per day	15 minutes Per day	No
11	Yoga	Daily	Thrice a Week	Once a Week	Rarely
12	Meditation	Daily	Thrice a Week	Once a Week	Rarely
13	Stress	Rarely	Sometimes	Mostly	Always
TOTAL SCORE		0	<39	40-65	>65

Based on the scores obtained, women was categorised as normal, low risk, medium risk and high risk for the risk of cardiovascular disease . An overall score less than 39 were categorised as low risk, the score between 40 and 65 belonged to medium risk and the scores more than 65 to the high risk category. The individual intake and frequency of fibre rich foods from each food groups was also determined to assess health risk among the women.

C. Analyse the consumption pattern for fat and fiber intake among women

In addition to the data in the Health Risk Assessment Index ,consumption pattern of dietary fats and fibre was studied in order to associate with the heart health profile. Dietary fat intake of women was taken in the form of combination of oils used and quantity of oils used for cooking per day, intake of processed and convenience foods, dine out pattern , snacking pattern and consumption of fried foods was recorded with the help of structured questionnaire.

The quantity of oils consumed per day was calculated from the total oils purchased for use by the family for all the members and then divided by number of family members per capita consumption was taken. Health risk for cardiovascular disease in women was indicated by portion size and frequency of high fats foods (meat, dairy products, fried foods and convenience foods, and beverage) was indicated as the health risk in women.

Low intake of fibre rich foods contribute the risk for cardiovascular disease. Dietary fibre intake of women were ascertained using different dietary assessment method such as 24 hours dietary recall for three consecutive days ,quantitative food frequency method and consumption of fibre rich foods with all five food groups.

Twenty four hour recall method for three consecutive days was used for health assessment. The health assessment method was used to determine all the food and beverage consumed by a participants in the three consecutive days . The recall method provided an account of the raw ingredients used for preparation by using the nutritive value of Indian foods by Indian Council of Medical Research, the nutritive value of food intake was calculated and was compared with the Recommended

Dietary Allowance(Indian Council of Medical Research ,2011) to find out the nutritional adequacy and total cooked amount of each preparation was noted in terms of standardised measures.

Food frequency method was used to elicited portion size and frequency of consuming foods from broad food groups. This was a record to compare with Recommended Dietary Allowance of each food group. The three day food record and quantitative food frequency was used to assess the disease risk of women for cardiovascular disease.

D. Health education tools for the conduct of the study

"Health education offers a great opportunity to individual to learn about the essentials of nutrition for the health and to take steps to improve the quality of their diets and this their well being" (Robinson et al, 2007).

Education on diet and lifestyle modifications were imparted to all selected women. Educational modules were designed for group counseling. Four health education session approximately 30 minutes each was conducted to impart education to all the study participants .The benefits aimed from the designed health education modules are:

- They should be able to know as to how to manage and prevent cardiovascular disease
- To manage risk of cardiovascular disease in women by educating them regarding the dietary fat and fibre intake.

A total of 17 Women with risk for cardiovascular disease were included for imparting health education. In order to create awareness among the selected study participants, interactive aids were used such as charts, power point, pamphlets and also demonstration of healthy foods in five different modules.

Module 1 : Healthy Food Choices for Heart

This module was supported with pamphlet as an educational aid. Pamphlet was used to impart individual counseling to study participants. The module comprised the information on healthy foods choices from all the food groups and food guide pyramid, food to be included, restricted and avoided. The duration of presentation was 30 minutes (Appendix II) .

Module 2 : Your Heart and Health

This module was presented for health education to the target groups using Power Point presentation. This module consisted information on healthy food choices and videos on the importance of physical activity. Information with the images was displayed on the screen. Duration of power point presentation was 30 minutes and is given in Appendix IV.



Imparting Health Education to the women

PLATE II

Module 3 : Fat Vs Fibre

In this module, charts were used to impart health education through group counseling to the study participants. The aid comprised the details of fibre rich foods, way to use of fats and oils. The first session was done for 15 minutes with pictorial representation of fiber rich foods, good and bad fats and is given in Appendix V.

Module : 4 Heart Healthy recipes

The recipes were demonstrated as a part of health education and this comprised of fibre rich and low fat recipes. It was prepared using seasonal foods and those that provide better nutrients. The healthy recipes used for demonstration was categorised as soups, salad, main dish accompaniment and snack. A total of 15 recipes were compiled in the standardised format with details on category, cooking time, yield, ingredients, method of preparation and nutritive value per serving. The compiled recipes were designed as a booklet and distributed for all the selected study participants (Appendix VI).

TABLE IV
Educational tools for the study

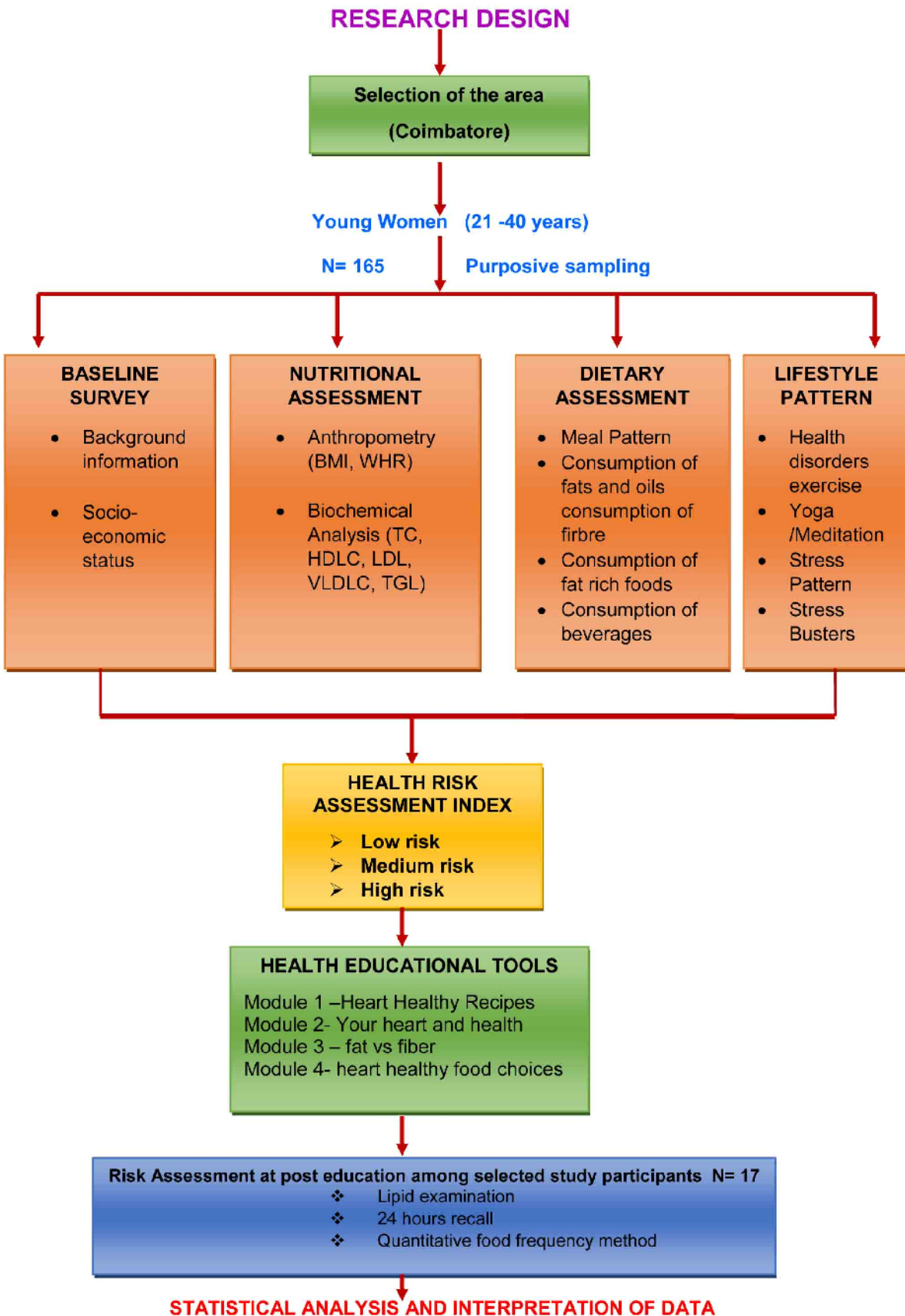
Modules	Education Aid	Duration
Module 1 :Heart healthy recipes	Demonstration	30 minutes
Module 2 :Your heart and health	Power Point	30 minutes
Module 3 : Fat vs Fiber	Charts	30 minutes
Module 4 :Heart healthy food choices	Pamphlet	30 minutes

A total of four sessions were conducted to impart awareness on the health aspects to the selected study participants. A total of one and half hours with twenty minutes sessions for four times were conducted for health education once a week and was repeated for a period of one month.

E. Association of health education with health profile for study participants.

The impact of the health education and its reflection on the health profile among the women was assessed using mean nutrient intake from 24 hour food recall for 3 consecutive days and lipid profile examination at pre and post education (Appendix VII).

'T' test based on t-distribution and is considered an appropriate test for judging the significance of difference between the mean of two samples (Kothari, 2009). Hence t- test was used in the study to assess the significant difference between mean nutrient intake of the selected study women with risk for cardiovascular disease. The normal value of various lipid levels were statistically analysed for comparison between the difference among women at pre and post education of all the seventeen women in order to associate the health education with health profile of the women.



4. RESULTS AND DISCUSSION

The results pertaining to the study entitled " **Consumption pattern of Dietary Fat and Fibre among women with risk for cardiovascular disease** is discussed under the following headings

- A. Baseline data of the study participants
- B. Assessment of Health Risk for cardiovascular disease among the selected Women
- C. Analysis of the Health status of the Women
- D. Health education and Health profile at pre and post education among the Women

A . Baseline data of the study participants

The baseline data of the study participants comprising the age, type of family, marital status, occupational status and monthly income of the selected women are discussed in Table V.

TABLE V
Baseline data of the study participants

N=165

Baseline details	Variables	No.	Percentage
Age in years	21-25	82	50
	26-30	23	14
	31-35	29	17
	36-40	31	19
Types of family	Nuclear family	110	66.5
	Joint family	54	33.5
Marital status	Married	102	62
	Unmarried	63	38.0
Occupational status	Working	67	40.6
	Non working	98	59.3

Among the study participants 50 per cent were in the age group of 21 to 25 years, 14 per cent in the age group of 26 to 30 years , 17 per cent in the age group of 31to 35 and 19 per cent in the age group of 36 to 40 years. As the age increase the total cholesterol and LDL cholesterol level (Kathleen, 2005)

However , it was very obvious to note that 66.5 per cent belonged to nuclear family while 33.5 per cent adopted joint family system. Sabarwal(2005) reported that the data on types of families revealed that 80 per cent were in the nuclear type of family system. The study related to the trend in increased nuclear family system by families due to influences such as education, work, independence and other social and environmental parameters.

Sixty two per cent of the respondents were married and 38 percent were unmarried. In assessing the occupational status of the respondents,60.6 per cent were full time house makers while 39 per cent were working women. The figure 2 clearly presents the economic status of the family.

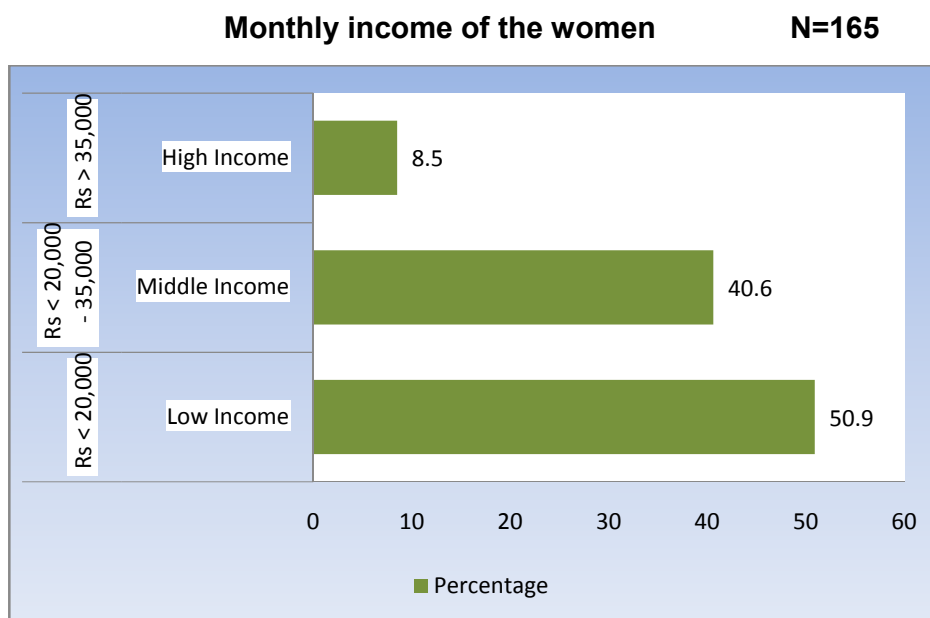


FIGURE 2

The monthly income of the family showed that 50.9 per cent were with low income involved in daily wages such as maid, road side vendors,40.6 per cent were middle income and 8.4 per cent high income. Cardiovascular disease is

increasing rapidly in most low income countries especially in India (Mohan *et al* .,2013)

B. Assessment of Health Risk for cardiovascular disease among selected Women

The assessment of health risk among the selected women comprised anthropometric measurements, biochemical profile, dietary pattern and lifestyle practice are discussed in the following pages.

1. Anthropometric assessment

Anthropometric measurements namely, Body Mass Index and Waist to Hip Ratio are discussed figure 3 and 4.

1.a Body Mass Index

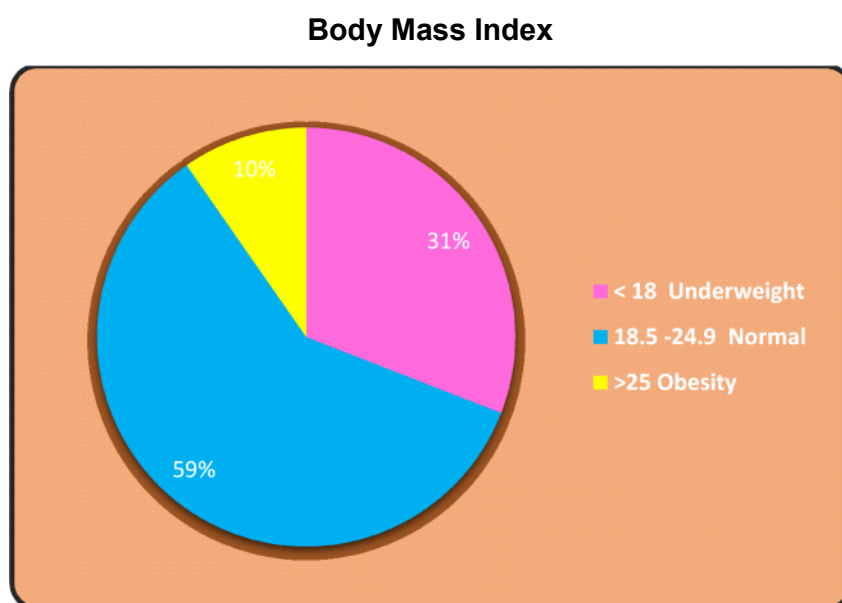


FIGURE 3

The present study reported that 59.4 per cent of the women were at medium risk with found to be obese indicating adiposity and higher chance of lifestyle disorders. whereas 9.7 per cent women were at high risk with Body Mass Index more than 25,cautioning the need for more awareness and behavioural modifications among the young women which may prevent diseases. Rabkin *et al* .,2003 reported that that the prevalence of cardiovascular disease is related to

BMI as low density lipoprotein and triglyceride concentration were higher in the those with higher BMI.

1.b Waist Hip Ratio

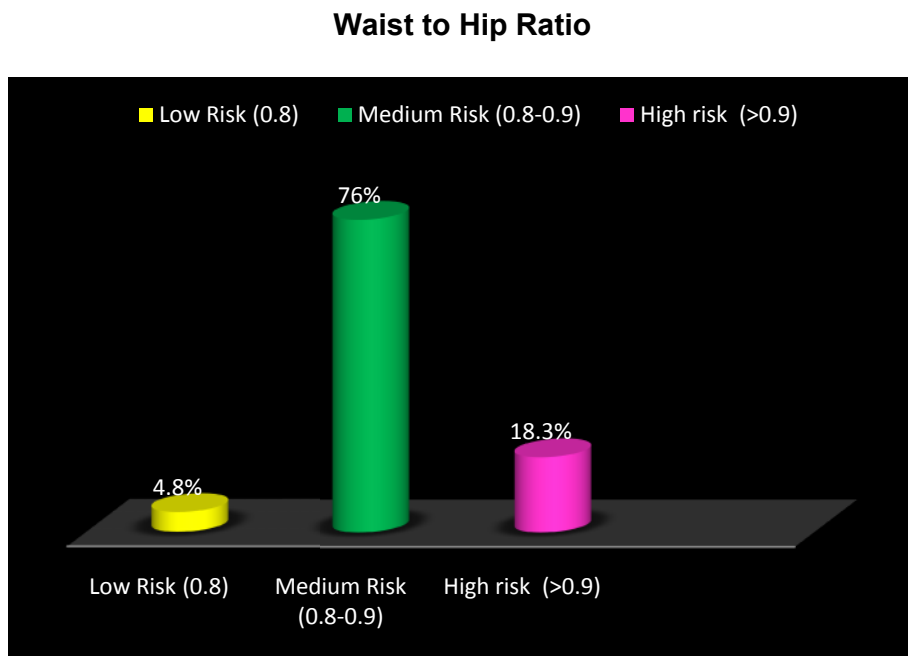


FIGURE 4

Seventy six percent women were at medium risk and the 18.3 per cent had high risk of cardiovascular disease. According to Munawar *et al* .,2012 ,women with waist to hip ratio of more than 0.8 and body mass index more than 32 have an increased risk of the cardiovascular diseases.

2. DIETARY ASSESSMENT

Table VI gives the details of type of diet ,meal pattern and meal timing of the selected women.

TABLE VI
Dietary pattern of the study participants **N =165**

Dietary pattern	Variables	No.	Percentage
TYPE OF DIET	Vegetarian	36	21.8
	Non vegetarian	125	75.7
	Ova vegetarian	4	2.5
MEAL PATTERN/DAY	2	32	19.3
	3	108	65.4
	4-5	25	15.3
MEAL TIMING	Regular	121	73.4
	Irregular	44	26.6

Dietary pattern comprising the type of diet, meal pattern, consumption pattern of fibre rich foods, fat rich foods, intake of fats and oils, consumption of beverages and dine out pattern elicited are discussed in following tables.

2.a Dietary pattern of the women

The type of diet revealed that 75.7 per cent of the women were vegetarians followed by 21.8 per cent vegetarian and 2.5 per cent ova vegetarian. Study reported that non vegetarianism predominates among the population especially young and had chances of higher rate lipid profile triglycerides and lower level of cardiac protective.

Sixty five per cent of women followed three meals per day. However, meal timing was seem to be practiced regularly by 73.4 per cent of women attributing to a positive and healthy meal pattern. Consumption of regular meals per day increase good eating habits and making healthy choices (Neil ,2013).

2.b Consumption pattern of Fibre rich foods

The consumption pattern of fibre rich food is given in Table VII

TABLE VII
Consumption pattern of fibre rich foods

N= 165

FOOD GROUPS	Quantity/ serving (Mean value in g)	FREQUENCY OF CONSUMPTION					
		Daily		Weekly		Monthly	
		No.	%	No.	%	No.	%
CEREALS AND MILLETS							
Bajra	38.4	2	1.2	15	9.0	43	26.0
Jowar	40.5	0	0	17	10.3	56	33.9
Maize	28.3	0	0	21	12.7	19	11.5
Oats	51.1	0	0	19	11.5	29	17.5
Ragi	51.4	0	0	37	22.4	55	33.3
Rice	46.7	165	100	0	0	0	0
Samai	52.7	0	0	54	32.7	37	22.4
Varagu	52.7	0	0	59	35.7	34	20.6
Wheat	52.3	0	0	59	35.7	34	20.6
PULSES							
Bengal gram dhal	40.2	0	0	39	23.6	42	25.4
Black gram whole	34.2	18	10.9	105	63.6	9	5.4
Cow peas	37.8	0	0	47	28.4	65	39.3
Green gram dhal	40.2	0	0	43	26.0	41	24.8
Green gram whole	36.2	0	0	99	60	34	20.6
Red gram dhal	40.2	0	0	129	78.1	25	15.1
Red gram whole	50.1	12	7.2	106	64.2	12	7.2
GREEN LEAFY VEGETABLES							
Agathi	55.1	0	0	21	12.7	30	18.1
Amaranth	37.8	0	0	36	21.8	32	19.3
Cabbage	31.5	0	0	103	62.4	31	18.7
Coriander leaves	8.5	110	66.6	51	30.9	4	2.4
Curry leaves	8.5	134	81.2	27	16.3	4	2.4

FOOD GROUPS	Quantity/ serving (Mean value in g)	FREQUENCY OF CONSUMPTION					
		Daily		Weekly		Monthly	
		No.	%	No.	%	No.	%
Drumstick	66.1	0	0	54	32.7	62	37.5
Mint leaves	8.5	0	0	53	32.1	84	50.9
Paruppu keerai	63.3	25	15.1	87	52.7	12	7.2
Ponnagani	52.4	0	0	51	30.9	49	29.6
Spinach	67.3	0	0	41	24.8	62	37.5
ROOTS AND TUBERS							
Beetroot	40.9	0	0	97	58.7	44	26.6
Carrots	55.2	0	0	108	65.4	40	24.2
Raddish	70.2	0	0	25	15.1	36	21.8
Sweet potato	50.6	0	0	22	13.3	28	16.9
Yam	54.3	0	0	101	61.2	33	20
OTHER VEGETABLES							
Bottle gourd	56.6	0	0	57	34.5	53	32.1
Brinjal	67.1	0	0	119	72.1	29	17.5
Broad beans	52.5	0	0	59	35.7	33	20
Cauliflower	59.1	0	0	72	43.6	49	29.6
Cluster bean	50.2	0	0	44	26.6	31	18.7
Drumstick	60.3	0	0	39	23.6	79	47.8
Ladies finger	51.5	0	0	96	58.1	44	26.6
Mush room	61.7	0	0	41	24.8	82	49.9
Plantain	35.1	0	0	59	35.7	50	30.3
FRUITS							
Amla	48.4	0	0	22	13.3	58	35.1
Apple	70.2	0	0	60	36.3	75	45.4
Dates dry	40.2	0	0	27	16.3	28	16.9
Dates fresh	58.5	11	6.6	42	25.4	48	29.0
Guava	74.5	0	0	76	46.0	41	24.8
Orange	70.2	0	0	113	68.4	29	17.5
Papaya	41.2	0	0	54	32.7	55	33.3

FOOD GROUPS	Quantity/ serving (Mean value in g)	FREQUENCY OF CONSUMPTION					
		Daily		Weekly		Monthly	
		No.	%	No.	%	No.	%
Sapota	39.2	0	0	26	15.7	59	35.7
NUTS AND SEEDS							
Almonds	38.1	3	1.8	25	15.1	48	29.0
Coconut, fresh	62.3	43	26.0	87	52.7	11	6.6
Peanuts	38.4	4	2.4	61	36.9	48	29.0
Soya bean	80	0	0	70	42.4	86	52.1
Walnuts	0	0	0	0	0	3	1.8

* Multiple Response

Among the consumption pattern of cereals and millets, rice was observed to be consumed daily by all the selected women as rice is the staple food of the South Indians. Oats is observed to be consumed in weekly once(12.7 per cent) and 11.5 percent monthly. Among the millets such as samai ,varagu and wheat were consumed by 30 percent women once a week. Millets were found as a part of main course in the households and showed that they have started to use millets is addition to rice. This adds fibre from different sources of cereals and millets. Compared to other cereals and millets whole grains of oats meal can have beneficial effect and lower total and low density lipoprotein cholesterol (Devlin *et al.*, 2010).

In the case of pulses, 7.2 per cent and 10.9 per cent of women consumed Bengal gram whole and black gram daily . Compared to other pulses 78 per cent women consumed red gram dhal weekly once and quantity per serving was also noticed high. Average intake of pulses per day showed significant improvement in total cholesterol and low density lipoprotein cholesterol (Vanessa, 2013).

Consumption pattern of vegetables showed that, 81.2 per cent of women consumed fibre rich green leafy vegetables weekly once but in low quantity. According to Liu *et al* .,2002, daily intake of fibre was associated with a lower risk of cardiovascular disease in women. In the case of roots and tubers,65.4 per cent of the women consumed weekly once and 17 per cent of the women consumed

monthly once . Seventy two percent women used other vegetables like beans, drumstick, bottle gourd and plantain once in a week.

The consumption pattern of fruits among the women revealed that orange (68.4%), guava (46 %), apple (36.3 %) and papaya (32.7 %) were commonly consumed by the women . Among the group, 6.6 per cent of the women used fruits weekly once in the diet. The study reported that daily consumption of fresh coconut was high in the women (26 percent). Manson *et al* ., 2007, stated that low consumption of fibre rich foods like fruits and vegetables increase the risk of cardiovascular disease.

2.c Consumption pattern of fat rich foods

The consumption pattern of meat , dairy products and processed foods is given in table VIII

The table VIII depicts that 7 per cent of the women consumed large amount of fat rich foods, while 1.2 per cent of women had small serving size. The fatty foods contain little nutritive value and contain high calories, fats and salts that will negatively affect the body. Consumption pattern of chicken and poultry was found to be among women 53.9 percent with average serving size. The consumption of meat, pork, beef and canned foods showed that none of the women consumed daily and was consumed once a week.

Fried foods like fried vegetables , fish were consumed in average size by 50.9 per cent and 46 percent respectively. Among the study participants, 58.7 per cent of women consumed milk and dairy products everyday and 300 grams was the serving size per portion.

TABLE VIII

Consumption of fat rich foods

N = 165

FOOD CATEGORY	RISK CRITERION	LOW RISK		MEDIUM RISK		HIGH RISK		HIGH RISK		MEDIUM RISK		HIGH RISK	
	FOOD ITEMES	Small serving Size		Average serving Size		Large serving Size		Daily		Weekly		Monthly	
		No.	%	No.	%	No.	%	No.	%	No	%	No	%
Chicken and Poultry	Chicken	24	14.5	89	53.9	3	1.8	0	0	95	57.5	21	12.7
	Egg	17	10.3	84	50.9	5	3.0	8	4.8	98	59.3	0	0
Red meat	Pork	2	1.2	14	8.4	3	1.8	0	0	4	2.4	15	9.0
	Beef	6	3.6	35	21.2	2	1.2	0	0	15	9.0	28	16.9
Milk and Milk products	Milk	24	14.5	97	58.7	7	4.2	97	58.7	25	15.1	6	3.6
	Skim milk	10	6.0	17	10.3	1	0.6	12	7.2	10	6.0	6	3.6
	Yogurt	11	6.6	19	11.5	3	1.8	17	10.3	11	6.6	5	3.0
	Cheese	30	18.1	17	10.3	0	0	2	1.2	24	14.5	21	12.7
	Butter	23	13.9	39	23.6	3	1.8	4	2.4	37	22.4	24	14.5
Fried Foods	Fried vegetables	46	27.8	84	50.9	6	3.6	50	30.3	81	49.0	5	3.0
	Fried fish and meat	20	1.2	76	46.0	8	4.8	0	0	75	45.4	29	17.5
Processed Foods	Canned foods	30	18.1	51	30.9	5	3.0	0	0	44	26.6	42	25.4
	Packed foods	43	26.0	40	24.2	2	1.2	2	1.2	40	24.2	43	26.0
	Chips	33	20	79	47.8	11	6.6	20	12.1	81	49.0	22	13.3
Bakery Products	Cookies	29	17.5	49	29.6	9	5.4	18	10.9	54	32.7	15	9.0
	Biscuits	45	27.2	63	38.1	7	4.2	41	24.8	69	41.8	5	3.0
	Crackers	23	13.9	52	31.5	3	1.8	13	7.8	50	30.3	15	9.0
	Nuts	20	12.1	32	19.3	2	1.2	16	9.6	17	10.3	21	12.7

The bakery products especially the consumption of biscuits was observed to be consumed by 24.8 per cent women. The consumption of processed foods such as canned foods and packed foods 24.5 percent and 26 percent was consumed monthly once by the women, 47.8 per cent of women consumed chips in average size of 50 gram per serving. High consumption of snacks , fatty foods ,salty foods and sugar found to increase the development of lifestyle disorders (Midlet *et al* .,2010).

2.d Consumption pattern of fats/oils

The consumption pattern of oils is given in the Table IX

TABLE IX
Consumption pattern of fats and oils of the study participants N=165

Risk criteria	LOW RISK		MEDIUM RISK		HIGH RISK		HIGH RISK		MEDIUM RISK		HIGH RISK	
	<3 tsp		3 tsp		>3 tsp		Daily		Weekly		Monthly	
Oils /fats	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Refined oil	14	8.4	40	24	83	50.3	123	74.5	11	6.6	3	1.8
Gingelly oil	4	2.4	15	9.0	13	7.8	12	7.2	16	9.6	4	2.4
Palm oil	5	3.0	26	15.7	25	15.1	50	30.3	4	2.4	2	1.2
Olive oil	3	1.8	5	3.0	8	4.8	10	6.0	2	1.2	4	2.4
Mustard oil	4	2.4	3	1.8	3	1.8	5	3.0	4	2.4	1	0.6
Coconut oil	20	12.1	29	17.5	33	20	46	27.8	29	17.5	8	4.8
Vanaspathi	2	1.2	8	4.8	2	1.2	0	0	8	4.8	4	2.4
Butter	20	12.1	10	6.0	5	3.0	0	0	24	14.5	11	6.6

* Multiple Response

The consumption pattern of fats and oils showed that amount of fats and frequency used per day by the study participants.

Fifty percent of the women consumed more than three teaspoons of oil(refined oil) indicating risk for cardiovascular disease. Gingelly oil ,palm oil and coconut oil were also used by the women. All the study participants and used refined oil every day as a source of visible fat .

According to Boemeke *et al* .,2015, study reported that coconut oil contain high levels of lauric acid that is directly absorbed by enterocytes and may prevent the fat deposition in blood vessels and no specific role for coconut oil in the

causation of cardiovascular disease in population. As the cost of palm oil was economically low , the use of palm oil for cooking was found high . So, preference of eating foods from street vendors on a daily basis will result in obesity this increased risk for lifestyle disorders like cardiovascular disease, as palm oil found to be contain only saturated fatty acid. The study found that 30.3 per cent of the women used palm oil for cooking . Palm oil are high in saturated fat with increasing risk for heart disease (Agho *et al* .,2015).

2.e Consumption of beverages

The consumption pattern of beverages is given in Table X

TABLE X
Consumption pattern of fats and oils N=165

Beverages	No of Serving /day				Frequency							
	< 3 cups		> 3 cups		Daily		Weekly		Fortnight		Rarely	
	No.	%	No.	%	No.	%	No	%	No.	%	No.	%
Coffee	86	52.1	2	1.2	82	49.6	3	1.8	3	1.8	0	0
Tea	117	70.9	1	0.6	109	66.0	4	2.4	2	1.2	3	1.8
Milk	88	53.3	1	0.6	67	40.6	13	7.8	2	1.2	7	4.2
Fresh juice	161	97.5	4	2.4	6	3.6	75	45.4	59	35.7	25	15.1
Carbonated beverages	75	45.4	51	30.9	0	0	27	16.3	54	32.7	45	27.2

*Multiple Response

Fifty per cent women had the habit of consuming coffee less than three cups and it was observed to be consumed daily by 49.6 per cent of the women. Heavy coffee consumption has been showed to increase the risk of heart attack and result in coronary death.

Tea was consumed daily by the study participants (66 per cent) whereas only 1.8 per cent consumed rarely .Tea contain photochemical compounds and potential bioactive which decrease the 10 and 20 percent rate of cardiovascular disease incidence with increasing tea consumption (Arab *et al* 2013).

The consumption pattern of milk among the women showed that 67 percent was consumed by daily. Four percent of the women consumed fresh juice daily and 45.4 percent women weekly once .The study found that most of the women consumed juice from outside only once a week. The consumption of sugar sweetened carbonated beverage was associated with weight gain and risk of type 2 diabetes and it may lead to risk for cardiovascular disease.

2.f Dine out pattern

The dine out pattern and types of food outlets visited by women is given in Table XI

TABLE XI

Dine out and food outlet pattern

N=165

	Variables	No.	Percentage
Dine out	Once in week	64	38.7
	Thrice in week	19	11.5
	Rarely	82	49.6
Types of food outlets	Restaurant	48	29.0
	Hotel	88	53.3
	Fast food	27	16.3
	Street food	25	15.1

*Multiple Response

The table XI discussed the dine out and type of food outlets visited by the study participants. It showed that all women dined out at different frequencies , 38.7 percent with the habit of dining out once a week as part of family outing and social gatherings. Out of the total 165 women ,twenty nine per cent of the women ate from restaurants and 15 per cent of the women had from street food outlet . According to Buscemi et al 2001, the study participants consuming street foods are associated with high risk of Body Mass Index and cardiovascular disease compared to restaurant dine out.

2.g Health disorders of the women

Figure 5 depicts the health disorders of the women.

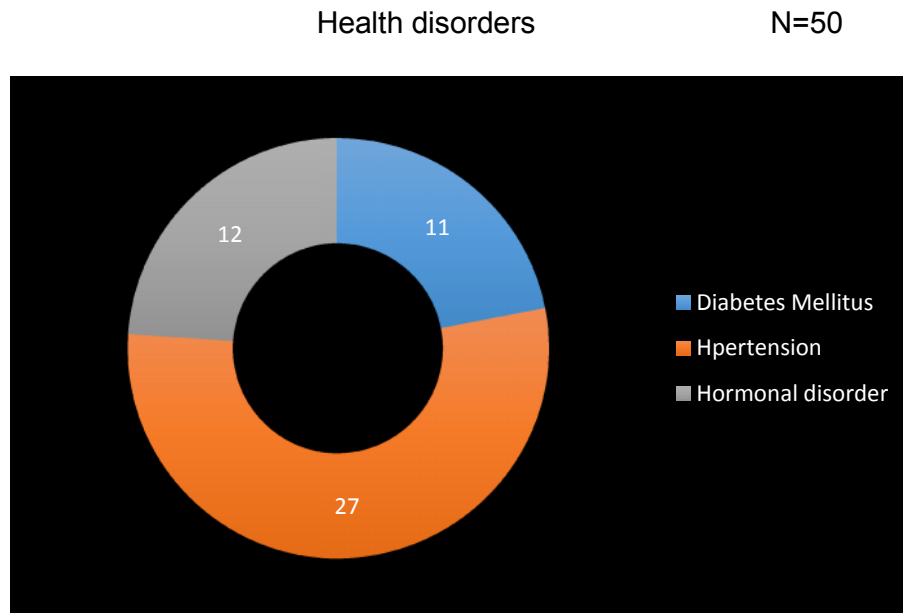


FIGURE 5

Among the 165 women, 50 women had one or the other form of health disorders such as diabetes mellitus, hypertension and hormonal disorders .Hypertension was common health disorders of the study participants. Hypertension was one of the significant health disorders of the women. From the study 16.3 per cent of the women had hypertension. Hypertension is one of the most prevalent and powerful contributors to cardiovascular disease and the leading causes of death in the United States (Malik *et. al* 2012).Seven percent of the women had diabetes mellitus and people with diabetes develop cardiovascular disease at a younger age and more severely than people without diabetes (Howard *et al.*, 2006).

2.h Menstrual cycle of the study participants

Regular menstrual cycle protect against cardiovascular disease. Of the 165 study participants, 92.7 per cent of the women had regular menarche .Among the study participants 7.2 per cent had irregular menstrual cycle because of health disorders. According to Gast 2009, state that premenopausal women appear to be safe from cardiovascular disease compared with men of the same age. However

women 's with risk of cardiovascular disease increase after menopause. The average age of menopause has been reported as 54 in India (Ceylan et al., 2014).

3 LIFE STYLE PATTERN

Lifestyle pattern, comprising physical activity , meditation practices, stress pattern and stress busters of the selected women are discussed in the following pages .

3.a Physical activity pattern of the study participant is given in Table XII

TABLE XII

Physical activity pattern of the women

N= 165

Physical activity	Duration of the work out				Low risk		Medium risk		High risk	
	15-30 min		30-60 min		Daily		Weekly		Monthly	
	No	%	No	%	No	%	No	%	No	%
Exercise	50	30.3	14	8.4	48	29.0	14	8.4	2	1.2
Yoga	24	14.5	2	1.2	14	8.4	8	4.8	4	2.4
Meditation	11	6.6	3	1.8	2	1.2	9	5.4	3	1.8

* Multiple Response

The study reported that among study participants 30.3 per cent women practiced any one form of physical activity such as walking ,yoga and meditation for 15 to 30 minutes every day. Other physical activities like jogging, swimming and gardening to meet the physical activity pattern was done by 75 percent women. In women physical activity gradually reduces the fat deposition and induce weight gain. However 1.2 per cent women had physical activity daily in the form of walking. Among selected women only 1.2 per cent women did meditation daily and 8.4 per cent women did yoga daily. High physical activity reduce coronary heart disease and type II diabetes by up to 50 per cent and regular moderate physical activity and meditation, yogasanas and pranayama may help to control lifestyle disorders (Singh et al., 2006).

3.b Lifestyle habits

The lifestyle behavior of the women is given in Table XIII

TABLE XIII

Lifestyle habits of the study participants N= 165

	Variables	No.	Percentage
LEISURE TIME	Watching TV	118	71.5
	Reading	41	24.8
	Sleeping	59	35.7
	Any other	19	11.5
SLEEP HOURS	< 5hrs	6	3.6
	5-8 hrs	147	89.0
	> 8hrs	12	7.2

* Multiple Response

On analyzing the lifestyle pattern of the study participants, 72 percent women spent their leisure time by watching television. Among the women 35.7 per cent was choose their hobby time for sleeping. Many common forms of sedentary behavior like sitting, sleeping, using computer and watching television were activities that increased risk of cardiovascular disease (Katzmarzyk *et al.*, 2008).

Duration of sleep hours influenced the cardiovascular risk in women. Eighty nine per cent women had normal sleep hours, duration of sleep hours was more than 8 hours in 7.2 per cent of women and 3.6 per cent women had less than 5 hours sleep. Epidemiological study reported that people sleep less may be at greater risk for cardiovascular disease and diabetes, sleeping 8 or more hours was associated with a 42 per cent increase risk (Sanjay *et al.*, 2007).

3.c Stress pattern

The table XIV depicts that stress pattern of the study participants

TABLE XIV**Stress pattern of the women**

N = 165

Type of stress	Always N=81		Rarely N=210		Sometimes N=163		Mostly N=44	
	No.	%	No.	%	No.	%	No.	%
Occupational stress	8	4.8	24	14.5	17	10.3	4	2.4
Environmental stress	7	4.2	18	10.9	24	14.5	4	2.4
Neighbourhood stress	10	6.0	15	9.0	14	8.4	5	3.0
Physical stress	20	12.1	74	44.8	37	22.4	4	2.4
Personal stress	27	16.3	61	36.9	39	23.6	11	6.6
Psychological stress	7	4.2	11	6.6	22	13.3	8	4.8
Biological stress	2	1.2	7	4.2	10	6.0	8	4.8

* Multiple Response

Stress was significant risk factor for cardiovascular disease. Result showed that all women had stress at home ,work place or environment. Personal stress was more prominent with 44.8 per cent among the selected women and 36.9 percent stated physical stress. Depression, social isolation, lack of social support, mental pressure and fatigue or excessive work were as risky to heart health as abnormal levels of blood fats and high blood pressure plays a role in the development and progress of cardiovascular disease (Grundy , 2007).

3.d Stress busters

The stress busters that were used to relieve stress of the women is given in

Table XV

TABLE XV
Stress pattern of the women

N= 165

STRESS BUSTERS	No.	Percentage
ANAEROBIC EXERCISE		
Physical activity	17	10.3
AEROBIC EXERCISE		
Yoga	15	9
Meditation	18	10.9
Deep breath	20	12.1
OTHERS		
Music	107	64.8
Read	28	16.9
Spa	0	0
Sleep	111	67.2
Eat	35	21.2
Talk to friends	94	56.9
Nature	33	20

* Multiple Response

The stress busters of the selected study participants depicts that , 64.8 per cent of women listened to music ,followed by 67 per cent women had sleep as a stress reliever, 21.2 percent coped stress by eating foods such as chips, cakes, samosa and other fast foods and 56.9 per cent women talked to friends to relieve the undergoing stress. All study participants chose stress busting technique, According to Burke et al., 2008 , when people are under stress it will difficult for them to maintain eating habits .

C. Analysis of the health status of the selected study participants

TABLE XVI

Mean nutrient intake of selected women

N=165

Nutrient	Recommended Dietary Allowance (A)	Pre education (B)	Excess/Deficit	't' value	Post education (C)	Excess/Deficit	't' value
Energy (k cal)	1900	1953	+53	37.49**	1902.3	+02	41.56**
Protein (gm)	55	63	+8	7.90**	70	+15	11.63**
Carbohydrate (k cal)	475	532.1	+57	12.63**	539	+64	16.37**
Fat(gm)	20	38	+18	8.65**	22.2	+2	3.52*
Fibre (gm)	30	1.6	-28	76.95**	12.1	-17	63.49**
Vitamin A (mcg)	4,800	3794	-1006	236.20**	3998	-802	285.14**
Iron (mg)	21	18.6	-2.4	4.27**	20	-1	1.46 ^{NS}
Calcium (mg)	600	576	-24	6.84**	615	+15	8.36**
VitaminC (mg)	40	30.2	-10	7.39**	41.3	+1.3	1.052 ^{NS}

* Recommended Dietary Allowance , 2010 * - significant at 5% level

** - Significant at 1% level (p<0.01) NS – Not Significant

The mean nutrient intake of the selected women showed that the energy derived from the menu met the Recommended Dietary Allowance with increase in protein and carbohydrates . There was a gradual reduction in fat intake from 38 gram at pre education to 22 gram at post education. This evidently proved the awareness to the women folks in the use of fats and oils for themselves and for family. There was improvement in fibre intake from 1.6 gram to 12.1 gram and still calls for increased awareness and modification in the consumption of fibre through whole grams , grains , vegetables and fruits . The mean intake for micronutrients such as vitamin, iron , calcium , vitamin C has increased and met the Recommended Dietary Allowances. Hence proved that health status of the women is entirely dependents on the awareness and behavioural modification for quality health and well being.

D. Health education and Health profile at pre and post education of the study Participants.

The health profile after education to the study participants is discussed as food frequency and mean lipid profile of the women in Table XVII and XVIII.

1.a Food frequency for the selected young women

TABLE XVII
Food frequency of the selected women N=165

Food items	Pre Education				Post Education			
	Daily	Weekly once	Monthly once	Not at all	Daily	Weekly once	Monthly Once	Not at all
Cereals & Millets	165	-	-	-	165	-	-	-
Pulses	120	40	-	5	140	25	-	-
Green leafy vegetables	26	80	59	-	40	95	30	-
Other Vegetables	20	75	50	20	59	63	33	10
Roots & Tubers	40	76	43	6	25	50	84	6
Fruits	11	55	79	20	25	90	42	8
Non - vegetarian	60	80	15	10	30	55	60	20
Nuts & oil seeds	16	58	49	42	18	62	43	42

The food frequency consumption of foods for all food groups showed that education to women has increased the knowledge on consumption of millets such as wheat, samai and varagu in addition to rice. Also pulse consumption has increased with more for whole grams. The use of seasonal vegetables also gradually increased among the women. The women had for awareness on health food choices for millets , vegetables and fruits.

1.b Mean lipid profile

The mean lipid profile of the selected women is given in Table XVIII

TABLE XVIII

Mean lipid profile of the selected women

N=17

Lipid fractions	Standard values mg/dl	Before mean values	't' value	After mean values	't' value
Total cholesterol	<200	189.9 ± 40.43	0.707 ^{NS}	179.12 ± 43.84	0.102 ^{NS}
High density lipo proteins	60	49.6 ± 6.13	0.699 ^{NS}	50.33 ± 8.63	2.33*
Low density lipo proteins	60-130	111.4 ± 40.40	0.854 ^{NS}	108.18 ± 40.19	1.504 ^{NS}
Very low density lipo proteins	40-50	30.7 ± 11.72	0.983 ^{NS}	28.47 ± 12.79	1.88 ^{NS}
Triglycerides	<150	151.5 ± 59.42	0.811 ^{NS}	146.77 ± 43.66	1.247 ^{NS}

National Cholesterol Education Programme - 2012 * - Significant at 55 level

NS – Not Significant

The mean value of the lipid profile examination among women showed that the lipid fraction such as Total cholesterol ,low density lipoprotein ,very low density lipoprotein ,triglyceride has decreased although there was not a significant decrease in the statistical analysis with 't' tests. This may be attributed to the reason of the shorter intervention period and this may prove beneficial to the women where behavioral modification in healthy choices and dietary pattern on a long practice and adopting healthier food choices. The lipid fractions respond well to the simple dietary modifications with reduction in fat and increase in fiber.

5. SUMMARY AND CONCLUSION

Cardiovascular diseases occur throughout the world in all races and in all strata of society, without variation between sexes, ages and socio-economic status. They are life threatening and are responsible for ill health and death in many countries

Dietary choices, lifestyle and behavioural pattern are important factors influencing the chronic health conditions including cardiovascular disease, diabetes mellitus, hypertension and cancer. Prevention, as known is always better than cure, hence prevention should always aim at primordial prevention. Diet plan and an active lifestyle pattern play a strong foundation and ensure that the heart beats with the quality life till the very end. Hence the study titled, "Consumption pattern of dietary fat and fibre among women with risk for Cardiovascular Disease" was undertaken with objectives to assess the risk for cardiovascular disease and associate health profile with risk for cardiovascular disease among women between the dietary pattern of the age group of 21 and 40 years.

The methodology comprised a total of 165 study participants with households and working women. The details regarding baseline data of the study participants, anthropometric, lipid profile, dietary pattern including dairy products, consumption of fats and oils, consumption of beverages, intake of food with fibre, total amount of oil used per day, were elicited. Lifestyle practices comprised exercise pattern, yoga, meditation and type of stress were assessed for risk of cardiovascular disease using Health Risk Assessment Index. Based on the scores obtained, women were categorised as normal, low risk, medium and high risk. Education on diet and lifestyle modification were imparted to all high risk women with interactive aids such as chart, power point, pamphlet and demonstration of healthy food choices for healthy heart were used for health education.

The salient findings of the study are

- Among the total of 165 study participants, 50 per cent were in the age group of 21 to 25 years, 14 per cent in the age group of 26 to 30 years, 17 per cent in the age group of 31 to 35 and 19 per cent in the age group of 36 to 40 years.

- Sixty six per cent belonged to nuclear family while 33.5 per cent adopted joint family system. Sixty two per cent of the respondents were married while 38 percent were unmarried.
- Women with low income were 50.9 per cent (<20,000), 40.6 per cent were middle income with income between 20,000 and 35,000 and 8.4 per cent high income above 35,000. The Health risk showed that 59.4 per cent of the women were at medium risk, whereas 9.7 per cent women were at high risk with Body Mass Index more than 30. Eighteen per cent have high risk of cardiovascular disease with respect to Waist to Hip ratio.
- The dietary pattern revealed that 75.7 per cent of the women were non vegetarians followed by 21.8 per cent vegetarian. Sixty five per cent of women followed three meals per day and meal timing was seem to be practiced regularly by 73.4 per cent of women.
- Among the consumption pattern of cereals and millets samai ,varagu, and wheat were consumed by 30 percent women once a week in addition to rice that was used every day.
- Among the study participants, 6.6 per cent of the women consumed fruits once or twice a week. Twenty six percent of the women consumed fresh coconut daily diet.
- Seven per cent of the women consumed large amount of fat foods and 53.9 percent of the women consumed poultry. Fried foods like fried vegetables , fish and meat consumed average size by 50.9 per cent and 46 percent respectively.
- Twenty five per cent of the women consumed bakery products and and 26 percent consumed processed foods such as canned foods, packed foods and chips. Fifty percent of the women consumed more than three teaspoons of oil. .
- Fifty percent women had the habit of consuming coffee less than three cups and sixty six percent of the women consumed tea every day. Four percent of the women consumed fresh juice daily. From the dine out pattern, twenty nine per cent of the women ate from restaurants and 15 per cent of the women had foods eaten at street food outlets.

- Among the 165 women 50 women were found to have health disorders such as Diabetes , Hypertension and Hormonal disorders .Sixteen per cent of the women had hypertension and 7 percent of the women had diabetes mellitus. Ninety eight percent of the women had regular menarche and 7.2 per cent had irregular menstrual cycle.
- Thirty percent women practiced any form of physical activity for 15 to 30 minutes. Among selected women, 1.2 per cent women did meditation daily and 8.4 per cent women did yoga daily.
- Seventy two percent of the women spent their leisure time by watching television. Eighty nine per cent women had normal sleep hours and 3.6 per cent women had less than 5 hours sleep.
- Forty five percent of the women had personal stress and 36.9 percent stated physical stress as the stress pattern. Sixty seven percent of the study participants used sleep as their stress busters.
- The mean nutrient intake of the selected women had gradual reduction in fat intake from 38 grams at pre education to 22 grams at post education. After education, the use of seasonal vegetables also gradually increased among the women. Total cholesterol levels of the study participants were in borderline and it was gradually decreased after health education.

The dietary pattern and lifestyle practices are the major modifiable risk factors in prevention of cardiovascular disease and other lifestyle disorders such as diabetes mellitus, obesity and hypertension. Imparting education among the women to adopt healthy food choices, fibre rich foods, low fat and daily physical activity will have greater influence on the health of the women. The present study among the women clearly pointed that consumption of vegetables increased but use of the fruits in the diet need to be increased at larger levels in order to meet the Recommended Dietary Allowances and hence the fibre requirements. Healthier food choices with more fibre , micronutrients from fruits especially the seasonal fruits will certainly benefit the population from the burden of lifestyle disorders. Simple lifestyle modifications with physical activity will pave way for better promotion in health of the women and thereby heart health.

BIBLIOGRAPHY

- ❖ Agho I, Iori, Imoisi and Ekhaton (2015). "Palm oil ,its nutritional and health impactions(Review),J.Appl.Sci. Environ. manage, 19(1),P 125
- ❖ Alexandria and Virginia (2014). "A series of systematic reviews on the relationship between dietary patterns and health outcomes", united states department of agriculture and U.S department of health and human services, dietary guidelines for Americans, 7th edition, PP 31-35.
- ❖ Alijefree N and Ahmed F 2015. "Associates between dietary pattern and risk of cardiovascular disease among adults in the middle east and north Africa region : A systematic review, food nutr Res, 59 (10), PP 2748 – 2750.
- ❖ Anderson J.B and Pineo E.C (2008). "Cardiovascular benefits of the Mediterranean Diet", nutrition today, 43 (3), PP 316 – 318.
- ❖ Asha K, Kapoor and segal S (2007). "Hypocholestrimic effect of gaur gum in over weight adults", 41(3), Pp 241 – 245.
- ❖ Barmard N (2014). "Cholesterol and Heart Disease", Physicians committee for Responsible Medicine – 2014, Pp 1-3.
- ❖ Bhansali A, Walia R, Ravikiran M, Bhadada S.K and Sachdeva N (2014). "High prevalence of CVD risk factor in Asian Indian : A community survey Chandigarh urban diabetes(CUDS), Indian journal of medical research, 139, Pp 253-258.
- ❖ Bhatnagar P, Williams. J, Raymer .M and Town send .M (2015)."The epidemiology of cardiovascular disease in the UK 2014", Heart published online, March 9, doi:10.1136, Pp 4.
- ❖ Bhopal R, Addo J, Aikins A and Stronks K (2009). "Cardiovascular disease, diabetes and established risk factors among populations of sub-Saharan African descent in Europe : A literature review, Globalization and Health : Bio med central, 5 (7), Pp 4-6.
- ❖ Boemeke L, Marcadenti A and Busnello F.M (2015)." Effect of coconut oil on human health" open journal of endocrine and metabolic disease,5 ,P 84- 87.

- ❖ Boutayeb A (2006). “The double burden of communicable and non communicable and non-communicable disease in developing countries”, *trans R soc Trop med Hyg* , 100, Pp 191-193.
- ❖ Brands M, Appel L and Lichtenstin A (2006). “Diet and life style recommendations revisions 2006 : A scientific statement from the American Heart Association nutrition committee, *circulation*; 2006, 114, Pp 82-85.
- ❖ Burke L.E, Hudson A.G, Warziski M.J, Styn M.A and Sereika S.M (2008). " Effect of a vegetarian diet and treatment preference on biochemical and dietary variable in overweight and obese adults", P 106.
- ❖ Burrowes J.D (2010). “preventing heart disease today and tomorrow in youth”, *Nutrition Today*, 45 (1), P 34.
- ❖ Busch M.A, Mensink G, Gobwald A and Endres M (2015). “modifiable cardiovascular risk factor in adults aged 40-79 years in Germany with and without prior coronary heart diseases or stroke”, *BMC public health*, 15 (701), Pp 1-2.
- ❖ Caterina R.D. Zampolli A, Turco S.D, Modonna R and Massaro M (2006), “Nutritional mechanisms that influence cardiovascular disease”, *American journal of clinical nutrition*, 83 (20), Pp 421 – 424.
- ❖ Chow C.K. and Patel A.A (2012). “Cardiovascular healthcare for women in India. *Heart*, 98 (6), Pp 456-460.
- ❖ Chowdhury S and Purnima C (2015). “prevalence of Hypertension among the Bangladeshi adult population : A meta analysis of studies between 2004 and 2014, *Cardiovasc .J*, 72 (2), Pp 104-105.
- ❖ Cook N.R, Cutler J.A and Appel S.K. (2009). “Long term effects of dietary sodium reduction of cardiovascular disease out comes : observational follow up of the trials of hypertension prevention”, *nutrition abstracts and reviews*, 77 (9), Pp 570-574.
- ❖ Coulter S.A (2013). “Emerging modifiable risk factor for cardiovascular disease in women”, *Texas Heart institute journal*, 40 (3), Pp 293 – 295.

- ❖ Cousin P.J. and Hartving K (2011) : “The New complete guide to Nutritional health”, Duncan Baird publishers, London 2011, Pp 61-63.
- ❖ Daj L and Gillen (2006). “Advice that includes food sources of unsaturated fat supports future risk management of gestational diabetes mellitus”, journal of the American dietetic Association, 104 (12), P 1863.
- ❖ Daniells (2009). “Soluble Dietary fiber from certain foods and coronary Heart Disease : JAMA ,71(20), Pp 29248 – 29250.
- ❖ Daniels S, Karanja M, Brands M and Appel L (2006). “Dietary approach to prevent and treat Hypertension : A scientific statement from the American Heart Association Hypertension. 2006; 47, Pp 296-299.
- ❖ Darren C, Diane E, Charlotte E, Chrisline L, and Nykjaer C (2013). “Dietary fibre intake and risk of cardiovascular disease: systematic review and meta-analysis, BMJ, 13(9), Pp 2-5.
- ❖ Devrim E and Durak I (2007). “Garlic plays important role in the prevention and treatment of cardiovascular disease”, Trans world Research Network, ISBM 81-7895-266-271, Pp 7-10.
- ❖ Edalman R (2005). “Obesity, Type 2 diabetes and cardiovascular disease”, Nutrition Today, 40 (3), Pp 120-122.
- ❖ Esmailzadeh A and Azadbakht L (2008). “Food intake patterns may explain the high prevalence of cardiovascular risk factor among Iranian women, J Nutr, 138, Pp 1469-1471.
- ❖ Forman D and Bulwer B.E (2007). “Cardiovascular Disease accounts for almost 50% of all deaths in industrialized nations”, American journal of medicine, 120 ,9, Pp 598 – 502.
- ❖ Gast C.M (2010). " Menstrual cycle, vasomotor symptoms, hormone therapy and risk of cardiovascular disease ,A high intake of menaquinone reduce the incidence of coronary heart disease in women, Nutritional metabolism and cardiovascular disease 2009;19,504-506.

- ❖ Ghafoorunisa and Krishnaswamy .K (2014). “Diet and heart disease”, National institute of Nutrition. Hyderabad, P 1-2
- ❖ Gopalan C, Sastri R.V and Balasubramanian C.S (2011).” Nutritive value of Indian foods ,National institute of nutritional , Indian council of medical research (ICMR),Hyderabad, P 32 -34
- ❖ Groenewald P, Bradshaw D, Van wngk V.P, Laubscher R, Nojilana B, Nannan N and Metcarf C (2010). “Cause of death statistics for south Africa : Challenges and possibilities for improvement”, Burden of Disease Research unit, Pp 20-23.
- ❖ Gupta R (2010).” Coronary heart disease in India: From epidemiology to action”, Fortis Med. J. 2(7), P 12.
- ❖ Gupta R (2011). “Epidemiology and regional variations in cardiovascular disease and risk factor in India”, J. Prevalive cardiology, 1(1), Pp 7-9.
- ❖ Gupta R (2013). Prevention and control of CVD in women and children in India, Indian journal of medical research, 138 (15), Pp 281 – 283.
- Gupta R, Joshi P, Mohan V, Reddy K.S and Yusuf S (2008). “Global burden of cardiovascular disease”, Epidemiology and causation of coronary heart disease and stroke in India, 95(10), Pp 16-20.
- ❖ Huma S, Rabia T, Amin F and Mahmood K (2012). “Modifiable and Non-modifiable predisposing Risk factors of myocardial infarction – A Review, J. Pham Sci and Res, 4 (1), Pp 1649-1651.
- ❖ Jennifer A, Holligan S and Kri P (2013). “Dietary pattern that decrease cardiovascular disease and increase longevity”, Colin Exp cardiology, doi:104172/2/55 9880 S6-006, P3.
- ❖ Jensen M.K, Banarjee P, and Rimm E.B (2008). “Intake of whole grains, bran and germs”, among women with coronary Heart Disease, American Journal of clinical nutrition, 80 (69), Pp 1492-1494.
- ❖ Jimenez F, Ruano J, Peroz M.P, Segurce F and Miranda J (2008). “The influence of online oil on human health, not a question of fat alone”, Molecular Nutrition and food Research, 51(10), Pp 1199 – 1202.

- ❖ Jones J.M and Coletta .F (2005)". The 2005 Dietary guidelines : Avoiding fortification "Mis – Step" as we "step up" to whole grains", Nutrition Today, 40 (5). P 218.
- ❖ Josefina M, Morey O and Diaz H (2008). "Prevalance of life style related cardiovascular risk factors in Peru : The prevencion study, AMJ public health, 24 (8), P 170.
- ❖ Joshi S.R and Parikh R.M., (2007), India - Diabetes capital of the World: Now heading towards hypertension. J. Assoc. Physicians India, 55, Pp 323-4.
- ❖ Katzmarzyk P, Church T and Bouchard C (2008)." Sitting time and Mortality from all causes, cardiovascular disease, and cancer, official journal of the American college of sports medicine,27(6), P 999.
- ❖ Kothari C.R (2009). Research methodology, second revised edition, New age international publishers (India), P 196.
- ❖ Krishnaswamy K, Bamji M.S and Brahmam G (2013)." Text book of human nutrition", third edition, Oxford and IBH publishing company ,New Delhi, P 120-121.
- ❖ Kumath A, Nandini M, Kedilaya H.P and Souza V (2008). " Relation of anthropometry to CVD risk factor in young obese women", Department of Biochemistry, 6(2), P 138.
- ❖ Liang W, Lee A and Binns C.W (2011). "Dietary intake of minerals and the risk of ischemic stroke in Guangdong province, china 2007 – 2008", Prev. Chron. Dis, 8 (2), Pp 628 – 633.
- ❖ Lichtenstein A, Lawrence J, Brands M, Carnethon M, Daniels S and Harold A (2009)." Diet and life style Recommendations Revision 2006 : A scientific statement from the American heart association nutrition committee ", American Heart Association, January 22, P 83
- ❖ Liu S.B ,Sesso J, Rimm H, Willet E, and Manson J.E (2002). "A prospective study of dietary fibre intake and Risk of cardiovascular disease among women,Journal of the American college of cardiology, 39(1),P 51.

- ❖ Lokomb C.A and Deborah L (2004). "Physical activity minimizes the association of body fatness with abdominal obesity in white, premenopausal women : Result from the third National Health and Nutrition Examination Survey", *Journal of the American dietetic Association*, 104 (12), Pp 1859 – 1861.
- ❖ Lupton J.R. (2005). "The 2005 Dietary guidelines Advisory committee Report", *nutrition today*, 40 (5), P 213.
- ❖ Mag T and Ghosh A (2015). "Prevalence of cardiovascular disease risk factors in a rural community in west Bengal, India", *International Journal of medicine and public health*, 5(4), PP 259-262.
- ❖ Malik F, Ahmad Z, Iqbal R and Mahmood S (2012). "A statistical analysis of hypertension as cardiovascular risk factor", *Middle-East Journal of Scientific Research*, 12(1), P 21.
- ❖ Manson J, Willett W, Rimm E, Howard D and Liu S (2007). " A prospective study of dietary fibre intake and risk of cardiovascular disease among women , *Journal of the American college of cardiology* , 39(1),Pp 55-56.
- ❖ Mantzoros C, Heidemann C, Franco H, Rob M and Christos S (2008). "Dietary pattern and Risk of mortality from cardiovascular disease, cancer, and all causes in a prospective cohort of women, *American Heart Association, circulation*. 2008, 118, Pp 230-234.
- ❖ Mendis S, Puska P and Morring B (2011). "Global Atlas on Cardiovascular disease prevention and control", published by world Health organization (WHO), Pp 9-12.
- ❖ Midhet F, Almohaimeed R and Sharaf E (2010). " Dietary practices, physical activity and health education in qassim region of Saudi Arabia", *International Journal of health science*, 4(1), Pp 3-4.
- ❖ Milanjana D, Devlina D and Vimala (2010) "functional foods of Malir original overview, *Indian journal of natural products*" and resources, 1(2), Pp137-140.
- ❖ Mitra A, Pradhan R and Mukherjee S (2009). "Importance of heart healthy diet", *Journal of human Ecology*, Pp 53-60.

- ❖ Mohamed S and Ibrahim S (2014)." Research methodology", pass publication(Madurai), P 164.
- ❖ Mozaffarian D, Abdolachi M, Lampos .H, Houshiarrood A and willut W.C (2007)," consumption of transacts and estimated effects on coronary heart disease in Iran", European journal of clinical nutrition, 10 (3), Pp 1004 – 1007.
- ❖ Muhamad R.F yusaff H.M (2014). "Association between knowledge, Altitude and practice on CVD among women in Kelantan, international journal of collaborative research on internal medicine and public health, 14 (8), Pp 1508 – 1509.
- ❖ Munawar F, Momina , Munawar S and Ahmed M (2012). "Waist hip ratio and body mass index in women of different age groups, pak J physiol,Vol 8(1) ,P 49.
- ❖ Murray R.G ,Harrels J.S, Bangdiwala S.I.(2013) Journal of Traditional diet 15(4), Pp 365 - 374
- ❖ Murugesan P.T and Ramadas V.S (2008). "Incidence of cardiovascular risk factors among selected adult population consuming different types of fats and oils", Indian journal of nutrition and dietetics, 18 (9), Pp 14.
- ❖ National Health and Medical Research council (NHMRC) (2012), Australian Government, 21 (5),P 458
- ❖ Neil K (2013) MD, Clinical Assistant professor of pediatrics, university of Washington school of medicine, 115,Pp 234-2245.
- ❖ Nicklas .T, & Britten .P (2005). "The 2005 Dietary guidelines advisory committee Report", Nutrition Today, 41 (3), Pp 103-105.
- ❖ Osonoi Y, Mita .T, Saito .M , Jamasawa .A , Nakayama .S, Someya .Y, Ishida .H and Kanazawa .A (2016). " Relationship between dietary pattern and risk factor for cardiovascular disease in patient with type 2 diabetes mellitus: A cross-sectional study, Nutritional Journal,15(11), P 5.
- ❖ Oteffen L, Kroenke C and Yux (2005). "Association of plant food, dairy product and meat intake with incidence of elevated blood pressure in young black and

white adults: the coronary Artery risk development in young adults study”, Am J Nutr. 82, Pp 1169 – 1173.P 1253

- ❖ Padmakumar B (2007). “Disease with lifestyle”, Kerala calling, 26 (7), P 23.
- ❖ Palli (2009). “Changes in whole – grain, vegetables and cereal fiber consumption in relation to weight gain among men, AM clin Nutr. 80 (25), Pp 1237 – 1242.
- ❖ Parameshwari S and Nazni P (2012). “Fatty Acid composition and Hypolipidemic effect of Roasted flaxseed powder”, Int. J. Pharm med and Bio.Sc, 1(2), Pp 151-153.
- ❖ Parkin L (2009). " Cardiovascular disease in women", Awareness. prevention and psychosocial characteristics, Heart Drug, 3(7), P 200-202.
- ❖ Paul S (2007). “A Textbook of Bio-Nutritia curing Diseases Through Diet”, published by Satish Kumar Jain for CBS publisher and Distributors, New Delhi, Pp 389 – 390.
- ❖ Peter .G and Merk .H (2006). “The lifestyle Disease Time Bomb, Oxford University Press, New York, Pp 159-160.
- ❖ Pettee K.K., Kriska, Conroy M.B. Jonhson B.D,Orchard B.D. Pasters B.H. and kuller L.H. (2007).” Effect on cardiovascular Disease risk with lifestyle changes”, American journal of preventive medicine, 32 (6), P 214.
- ❖ Ramaswamy L and Prasath S (2005). “Effect of flax oil supplementation on the lipid profile of the elderly, The Indian journal of Nutrition and dietetics, 42 (12), P 571
- ❖ Recarti S.J. Stehuwer and unger .T (2015). “Excess cardiovascular risk in Diabetic women : A case for intensive Treatment”, Curr Hyper tens Rep, 17 (45), Pp 2-5.
- ❖ Robert B (2004) “Women and cardiovascular disease, A global perspective”, The Heart, 32 (2), Pp 6-7.
- ❖ Robinson B.S and William S.R (2007). "Nutrition throughout lifecycle, fifth edition, P 146.

- ❖ Sabarwal (2005). "The nutritional value of chlorophyll as related to hemoglobin formation" *Proc.Soc.Exp.Boil Med*, 31(7), Pp 788-789.
- ❖ Sabate J, Oda K and Ros E (2010). "Nut consumption and blood lipid levels : A pooled analysis of 25 intervention trials, *Arch. intern. Med* 170(9), Pp 821–824.
- ❖ Saima L, Khuwaja A, Azam and Ali B (2001). "Cardiovascular Disease – Related life style factors among people with type 2 Diabetes in Pakistan : A multi centre study for prevalence, clustering and Associable sociodemographic determinants", *cardiology research and practices*, Article 10 656835, Pp1-3.
- ❖ Sattelmair J, Pertman J, Ding E .L, Kohl H.W, Haskell.W, and Lee. I, (2011)." Dose response between physical activity and risk of coronary heart disease", A meta-analysis. *Circulation*, 124,P 789-91.
- ❖ Senapati S, Bharti M and Baltacharya A (2015). "Modern lifestyle diseases : Chronic Diseases, Awareness and prevention", *International journal of current research and Academic Review*", 3 (7), Pp 216-218.
- ❖ Sharma R and Ram B (2010). "Bioactive foods and Nutraceutical supplementation criteria in cardiovascular protection, *open Nutrcecut .J*, 3 (10), Pp 141-145.
- ❖ Sing R.B, Niaz M.A, Ghosh S, Sing .R and Rastogi S.S (2003). " Effect on mortality and reinfarction of adding fruits and vegetables to a prudent diet in the Indian experiment of infarct survival", *American Journal of Clinical Nutrition*, 12(3),P 235.
- ❖ Sofi F, Abbate R, Gensini G and Casini A (2010). "Accruing evidence about benefits of adherence to the mediterranean diet on health : An updated systematic review and meta-analysis, *AM.J.Clin. Nutri*, 92 (5), Pp 1189-1191.
- ❖ Sontakke A, Tinaikar and Dhat V (2013). "Association between serum ceruoplasmin level and dyslipidemia : study in Tertiary case Teaching hospital", *international journal of medical research and review*, 1 (3), Pp 84-86.
- ❖ Srilakshmi B (2014). "Dietetics", seventh edition, New age international publishers, New Delhi, p 235.

- ❖ Stone .C, Hubsmith .D, Kallins W (2011). "American Journal of Public Health" 93,P p 1431–1434
- ❖ Taifour A, Shishani A, Khasawneh A, Nawaiseh A and Bakeer M (2015). "The Effects of 8-weeks Aerobic Exercise program on Blood lipids and cholesterol profile of smokers Vs. Non Smokers, International Education studies, 8 (5), P 133.
- ❖ Thomas P.E and Lawrence J (2003). "The Relationship between meat intake and cardiovascular disease," Review paper published by the Johns Hopkins centre for livable future, April 17, Pp 1 and 5.
- ❖ Tsai S.P, (2011)." Minimum amount of physical activity for reduced mortality and extended life expectancy, A prospective cohort study, Lancet, Oct 1,378 (9798)
- ❖ US Center for Disease Control, (2010), HealingWithNutrition.com1-800-943-1123.CardiovascularDiseaseFacts,DiseaseNutritionalSupportStrategieshttp://www.healingwithnutrition.com/ .
- ❖ Vanessa (2013). " Effect of dietary pulses on lipid risk factor of cardiovascular disease and oxidative stress", Department of nutritional science ,University of Toronto, P 17.
- ❖ Welty I.K, Leck S, Lew M.S and Zhou J.R (2007), "Effect of soy nuts on blood pressure and lipid levels in hypertensive, prehypertensive and normotensive postmenopausal women", Nutrition Abstracts and Reviews, Vol 77 (9), PP 213.
- ❖ Wild R (2010) "Assessment of cardiovascular risk and prevention of cardiovascular disease in women with the polycystic ovary syndrome: A consensus statement by the androgen excess and polycystic ovary syndrome society", journal of clinical Endocrinology and metabolism, 95(5), Pp 2038 – 2040.
- ❖ Willet W.C(2006). "The Mediterranean diet : science and practice. Public Health Nutr. 9 (2), Pp 105-108.
- ❖ World Health organization (2011). Cardiovascular disease, Geneva 2011, Pp 1-4.

- ❖ World Health organization. Global status Report of MCD 2010. Gereva: World health organization; 2011.
- ❖ Yadav R.K and sarvottam K (2014). “Obesity related inflammation and cardiovascular diseases : efficacy of a yoga – based lifestyle intervention”, Indian J med Res, 139, Pp 826 – 827.
- ❖ Yoshida Y, and Sakamoto J (2012) “Cardiovascular Disease risk factors among rural Kazakha population”, Nagoya journal of medical science, 74 (51), Pp 51-52 and 58.

APPENDIX I

Institutional Human Ethical Clearance Form

INSTITUTIONAL HUMAN ETHICS COMMITTEE



Avinashilingam

Institute for Home Science and Higher Education for Women

University

(Estd. u/s 3 of UGC Act 1956)

Chairman

Dr. S. Ramalingam
Principal, PSG Institute
of Medical Sciences
& Research, Coimbatore

Member Secretary

Dr. P. R. Padma
Professor, Department of
Biochemistry, Biotechnology and
Bioinformatics

Members

Dr. S. Premakumari
Mr. K. Arulmoli (Legal Expert)
Dr. A. Saraswathy
Mrs. V. Mangayarkarasi
Dr. S. Kowsalya
Dr. N.S. Rohini
Dr. Subhashini K. Sripathi
Mrs. S. Radha Devi
Mrs. Judith Justin

11th March 2016

To
Ms. Neethu K.P
Department of Food Service Management and Dietetics
Avinashilingam Institute for Home Science and
Higher Education for Women
Coimbatore – 641 043


Dear Madam,

Ref : Your proposal No. IHEC/15-16/FSMD/06 entitled
"Consumption pattern of dietary fat and fiber among
women with risk for cardio-vascular disease (CVD)"
submitted for approval of the IHEC

The Institutional Human Ethics Committee of our University hereby grants approval to your research proposal No. IHEC/15-16/FSMD/06 entitled "Consumption pattern of dietary fat and fiber among women with risk for cardiovascular disease (CVD)" submitted by you. The Approval number for the same is AUW/IHEC/FSMD-15-16/XMT-05.

We wish you all the best in your research endeavours.

Regards,


11/3/16
Dr.P.R.Padma
Member Secretary



APPENDIX II

QUESTIONNAIRE TO ELICIT DETAILS ON DIETARY PATTERN AND LIFESTYLE PRACTICES AMONG WOMEN (21-40 Years)

A. BACKGROUND INFORMATION OF STUDY PARTICIPANTS

1. Respondent's Name :
2. Age :
3. Address :

- Telephone number :
4. Family :

Joint Family Nuclear Family

5. Total Number of family members :

6. Marital Status:

Married Unmarried
7. Educational Qualification:

Non Working Working
8. Monthly Income (in Rs) :

<20,000 20,000-35,000 >35,000

B. NUTRITIONAL ASSESSMENT

i. Anthropometric Assessment

1. Height(c.m) :
2. Weight(Kg) :
3. BMI (Kg/ m²) :
4. Waist(c.m) :
5. Hip (c.m) :
6. Waist Hip Ratio (WHR) :

ii. Biochemical Assessment

Sl. No	Lipid profile	Normal range (mg/dl)	Your level (mg/dl)
1	Total cholesterol	<200	
2	HDLC	60	
3	LDLC	60-130	
4	VLDLC	40-50	
5	TGL	<150	

Sources : National Cholesterol Educational Programme 2012

C. DIETARY PATTERN

1. The type of dietary pattern?

Vegetarian

Non vegetarian

Ova vegetarian

2. Meal Timing

Regular

Irregular

3. How many meals do you eat daily ?

2

3

4

>5

4. Types of food pattern

Sl no	Foods category	Serving size			FREQUENCY		
		Small	Average	Large	Daily	Weekly	Monthly
1	MEAT Chicken Beef Pork						
2	EGGS Whole egg Egg white						
3	DAIRY Milk Skim milk Yogurt Cheese Butter						
4	FRIED FOODS Fried vegetables Fried chicken Fish and meat Biscuits Cookies						
5	CONVENIENCE FOODS Canned Packed						

6	SNACKS Chips Snack mix Nuts Crackers Candy(milk chocolate,carmel, coconut)					
---	--	--	--	--	--	--

Consumption of oils/fats

Sl.No	Types of oil/fats is used	✓	Quantity per day (ml)	Frequency		
				Daily	Weekly	Monthly
1	Refined oil					
2	Gingely oil					
3	Palm oil					
4	Olive oil					
5	Mustard oil					
6	Coconut oil					
7	Vanaspathi ghee					
8	Butter					
9	Other oils Specify:					

7. How often do you dine out?

Daily

once in week

Thrice in week

Rarely

8. Type of food outlets?

Restaurant

Hotel

Fast food outlet

Street food

Any other

specify :

9. Consumption pattern of Beverage

BEVERAGE	FREQUENCY	AMOUNT PER SERVING
Coffee		
Tea		
Milk		
Fresh juice		
Carbonated beverages		

11. 24.hours recall method

MEALS	DAY 1		DAY 2		DAY 3	
	Food items	Quantity (No,Cups, Katori)	Food items	Quantity (No,Cups Katori)	Food items	Quantity (No,Cups Katori)
BREAK FAST						
MID MORNING						
LUNCH						
EVENING						
SUPPER						
BED TIME						

B. LIFE STYLE PRACTICES

1. Are you diagnosed for any health problem?

Yes

No

if yes specify:

2. Do you have regular menstrual cycle?

Yes

No

if No specif

3. Do you have the habit of exercises?

Sl.no	Exercise	Duration	Frequency
1	Walking		
2	Swimming		
3	Yoga		
4	Gardening		
5	Any other Specify:		

4. How do you spend your hobby time?

Watching TV

Reading

Sleeping

Any other

5. How many hours do you sleep every day?

Less than 5 hrs.

5-6 hrs.

7-8hrs

More than 8hrs

6. Do you have the habits of practicing yoga and meditation?

Yes

No

If yes:

MENTION	FREQUENCY	DURATION IN MINUTES			
		15 min	30 min	45 min	1 hr.
Yoga	Daily				
	Twice a week				
	Thrice a week				
	Once a week				
	Rarely				
Meditation	Daily				
	Twice a week				
	Thrice a week				
	Once a week				
	Rarely				

7. Do you feel stressed?

Yes

No

8. Types of stress

Types of stress pattern	Always	Rarely	sometimes	Mostly
Occupational stress				
Environmental stress				
Neighbourhood stress				
Physical stress				
Personal stress				
Psychological stress				
Biological stress				

9. Stress Busters

Sl.no	Stress Busters	✓
1	Exercise	
2	Meditation	
3	Yoga	
4	Music	
5	Read	
6	Deep breath	
7	Spa	
8	Sleep	
9	Eat	
10	Talk to someone	
11	Nature	

APPENDIX III
MODULE I RECIPE BOOKLET

RECIPE 1
DRUMSTICK SOUP

Category : Soups

Portion size : 2

Cooking time : 20 minutes

INGREDIENTS

Drumstick : 2 No.
Onion, small : 10 g
Pepper powder : 1 teaspoon
Salt : to taste
Cumin seeds : 1 teaspoon
Gingelly oil : 1/2 teaspoon

METHOD

- Scrap the drumstick and wash well.
- Cut into two pieces and boil with 1/4 teaspoon turmeric powder.
- Drain and keep water aside.
- Remove the flesh of drumstick with a spoon and add it to the stock water.
- Add salt, cumin seeds ,pepper and bring to boil for 5-10 minutes.

NUTRITIVE VALUE OF THE DRUMSTICK SOUP PER SERVING

Energy (Kcal)	Protein (gm)	Carbohydrate (gm)	Fat (gm)	Fibre (gm)	Vit.A (mg)	Vit.C (mg)
25	2.1	6	0.27	3.1	90	60.4

RECIPE 2

CABBAGE AND TOMATO SOUP

Category : Starter soups

Portion size : 2

Cooking time : 15 minutes

INGREDIENTS :

Cabbage : 10 g
Tomato : 20 g
Carrot : 15 g
Green pepper : 5 g
Black pepper : 5 g
Coriander : 10 g
Salt : to taste

METHOD :

- Cut the vegetables in to fine peaces
- Boil all the vegetables and stir continuously for 10 minutes
- Add the black pepper, green pepper and salt in to the soup and add chopped coriander leaves for flavor.

NUTRITIVE VALUE OF TOMATO AND CABBEGE SOUP PER SERVING

Energy (Kcal)	Protein (gm)	Carbohyd rate (gm)	Fat (gm)	Fibre (gm)	Vit.A (mg)	Vit.C (mg)
52	1.2	63	1.2	1.9	430	20.1

RECIPE 3

VEGETABLE SOUP BROTH

Category : Soups

Portion size : 2

Cooking time : 20 minutes

INGREDIENTS :

Carrot : 10 g
Onion : 10 g
Garlic : 10 g
Green peas : 15 g
Cabbage : 10 g
Cauliflower : 10 g
Tomato : 10 g
Olive oil : 3 ml
Salt : to taste

METHOD

- Cut onion , carrot ,cauliflower, cabbage and tomatoes into small pieces
- Heat oil ,then add onion, carrot and cabbage and cook for 5 minutes
- Cook garlic and peas for 5 minutes
- Add tomatoes and cauliflower in to soup with medium heat for 15 minutes.

NUTRITIVE VALUE OF VEGETABLE SOUP BROTH PER SERVING

Energy (Kcal)	Protein (gm)	Carbohydrate (gm)	Fat (gm)	Fibre (gm)	Vit. A (mg)	Vit.C (mg)
64	1.7	26.2	3.2	1.1	425	17.4

RECIPE 4
OATS BHEL

Category : Salad

Portion size : 2

Cooking time : 30 minutes

INGREDIENTS :

Oats : 30g
Pomegranate : 20g
Orange : 20g
Apple : 20g
Raw mango : 15g
Coriander leaves : 1 No

METHOD:

- Hot the pan, add oats and mix well
- Remove from flame and keep aside
- Add pomegranate, orange, apple ,raw mango and coriander leaves in a bowl and mix well.
- Add salt to be taste and serve it.

NUTRITIVE VALUE OF OATS BHEL PER SERVING

Energy (Kcal)	Protein (gm)	Carbohydrate (gm)	Fat (gm)	Fibre (gm)	Vit.A (mg)	Vit.C (mg)
26	4.8	5	0.5	1.2	245.2	6.6

RECIPE 5

BEANS AND CAPSICUM SALAD

Category : Salad

Portion size : 3

Cooking time : 15 minutes

INGREDIENTS :

Rajma	: 20 g
Red capsicum	: 30 g
Onion	: 20 g
Coriander leaves	: 20 g
Green chillies	: 10 g
Chili powder	: 5 g
Lemon juice	: 1 teaspoon

METHOD :

- Rajma was boiled for about 10 minutes
- Cut red capsicum into cube shape and chop the coriander, green chili and keep aside in bowl
- Chopped ingredients are put in to bowl and mix with rajma.
- Add one lemon juice for flavour and salt for taste.

NUTRITIVE VALUE OF BEANS AND CAPSICUM SALAD PER SERVING

Energy (Kcal)	Protein (gm)	Carbohydrate (gm)	Fat (gm)	Fibre (gm)	Vit.A (mg)	Vit.C (mg)
102	5.1	28	1.4	2.1	380	24.2

RECIPE 6

SPROUTED GREEN GRAM SALAD

Category : Salad

Portion size : 1

Cooking time : 15 minutes

INGREDIENTS :

Sprouted green gram : 30g (any millets)
Onion : 1no (chopped ,30g)
Tomato : 1no (chopped 1 30g)
Mint leaves : 1(5g)
Salt : to taste

METHOD:

- Mix all the ingredients together in a bowl
- Add salt to be taste

NUTRITIVE VALUE OF SPROUTED GREEN GREAM SALAD PER SERVING

Energy (Kcal)	Protein (gm)	Carbohydrate (gm)	Fat (gm)	Fibre (gm)	Vit.A (mg)	Vit.C (mg)
102.4	8.2	22.4	0.5	1.7	123	18.3

RECIPE 7

BEEET ROOT MILLET RICE

Category : Main dish

Portion size : 2

Cooking time : 30 minutes

INGREDIENTS :

Samai rice : 20g
Beet root : 30g
Onion : 20g
Lemon : 5ml
Cumin seed : 5g
Chili : 5g
Curry leaves : 5g

METHOD:

- Wash and soak the millets for about 10 minutes and boil it in water till it is cook.
- Heat oil in a pan , add cumin seeds and saute till the color of onion change and add grated beet root and salt to be taste
- Mix well and cook for couple of minutes

NUTRITIVE VALUE OF BEEET ROOT MILLET RICE PER SERVING

Energy (Kcal)	Protein (gm)	Carbohydrate (gm)	Fat (gm)	Fibre (gm)	Vit.A (mg)	Vit.C (mg)
110.2	3.4	21	1.3	3.2	790	10.4

RECIPE 8

MIXED MILLETS KOZHUKATAI

Category : Main dish

Portion size : 2

Cooking time : 30 minutes

INGREDIENTS :

Thinai	: 25g
Samai	: 25g
Kuthiraivali	: 25g
Rice flour	: 25g
Ragi flour	: 25g
Bengal gram dhal	: 50g
Vegetables	: 55g (beans carrot, coriander leaves and cabbage)

METHOD:

- Wash and Grind all millets with Bengal gram dhal to form a batter.
- In the batter, add chopped beans, carrots, coriander leaves, cabbage and green chili and mix well
- Add salt into the mixture and keep in idli vessels and cook

NUTRITIVE VALUE OF MULTI MILLET KOZUKATAI PER SERVING

Energy (Kcal)	Protein (gm)	Carbohydrate (gm)	Fat (gm)	Fibre (gm)	Vit.A (mg)	Vit.C (mg)
328.3	21	90.4	3.1	8.3	935	46.2

RECIPE 9

RAGI IDLI

Category : Main dish

Portion size : 4

Cooking time : 45 minutes

INGREDIENTS :

Ragi : 50 g
Coconut water : 1 cup
Basal flour : 20 g
Salt : for taste

METHOD :

- Wash the ragi and soak in water for 30 minutes
- Grind ragi to make paste using 1 cup of tender coconut water and add salt to taste
- Steam till it is cook for atleast10 minutes

NUTRITIVE VALUE OF RAGI IDLI PER SERVING

Energy (Kcal)	Protein (gm)	Carbohydrate (gm)	Fat (gm)	Fibre (gm)	Vit.A (mg)	Vit.C (mg)
106	6.1	69.2	1.2	1.6	20.2	3.6

RECIPE 10

CARROT AND CORIANDER ROTI

Category : Main dish

Portion size : 4

Cooking time : 1 hour

INGREDIENTS :

Carrot	: 30 g
Rice flour	: 30 g
Soya flour	: 30 g
Green chili paste	: 1 teaspoon
Turmeric powder	: a pinch
Oil	: 1/2 teaspoon
Salt	: for taste

METHOD :

- Combine all the ingredients in bowl and knead into soft dough with warm water
- Divide dough into 4 equal portion and roll out each portion in to a circle
- Heat non stick tava and cook roti , till it turn golden brown in colour from both side.

NUTRITIVE VALUE OF CARROT AND CORIANDER PER SERVING

Energy (Kcal)	Protein (gm)	Carbohydrate (gm)	Fat (gm)	Fibre (gm)	Vit.A (mg)	Vit.C (mg)
89	1.9	20.1	0.3	0.9	435	19.1

RECIPE 11

KEERAI DHAL MASIYAL

Category : Accompaniment

Portion size : 1

Cooking time : 20 minute

INGREDIENTS :

Dhal	: 20 g
Keerai	: 30 g
Onion	: 15 g
Garlic	: 5 g
Ginger	: 5 g
Chili	: 5 g
Coriander leaves	: 5 g
Oil	: 1 teaspoon (15 ml)

METHOD :

- Wash and pressure cook the dhal about 10 minutes
- Finely chop the keerai, garlic, ginger, onion, and green into small pieces
- Heat the oil ,add curry leaves, keerai, green chilies, garlic, ginger, onions and sauté for few seconds.
- Add pressure cooked dhal and water for required consistency
- Add salt to taste.

NUTRITIVE VALUE OF KEERAI DHAL MASIYAL PER SERVING

Energy (Kcal)	Protein (gm)	Carbohydrate (gm)	Fat (gm)	Fibre (gm)	Vit.A (mg)	Vit.C (mg)
159	6.3	18	4.3	1.4	2433	25.3

RECIPE 12

MIXED SPROUT SAMBAR

Category : Accompaniment

Portion size : 2

Cooking time : 30 minutes

INGREDIENTS :

Bean sprouts : 30g
Cumin seed : 5g
Onion : 5g
Ginger : 5g
Garlic : 5g
Tomatoes : 20g
Green chili : 5g
Turmeric powder : 1 teaspoon
Cumin powder : 1/2 tspn
Coriander powder : 1/2 tsp
Coriander leaves : 10 g
Oil ; 1/2 tsp
Salt : to taste

METHOD :

- Thoroughly wash bean sprouts and pressure cook the mixed sprouts for 5 to 6 whistles.
- Heat 1/2 teaspoon oil in a pan and crackle 1/2 teaspoon cumin seed, tomato and saute till the tomato soften
- Grind garlic , ginger and chili make into fine paste
- Add turmeric powder , cumin powder , coriander powder and stir well
- Add the mixed sprout along with the stock and mix well
- Add 3 teaspoon chopped coriander leaves and salt to taste

NTRITIVE VALUE OF MIXED SPROUT SAMBAR PER SERVING

Energy (Kcal)	Protein (gm)	Carbohydrate (gm)	Fat (gm)	Fibre (gm)	Vit.A (mg)	Vit.C (mg)
94.3	10.1	104.2	1.1	1.5	463.1	23.1

RECIPE 13

AMARANTH MOONG DHAL KOOTU

Category : Accompaniment

Portion size : 3

Cooking time : 30 minutes

INGREDIENTS :

Amaranth leaves : 40g
Moong dhal : 30g
Turmeric powder : a pinch
Green chili : 5g
Cumin seed : 5g
Mustard seed : 3g
Oil : 1/2 teaspoon
Salt : for taste

METHOD :

- Finely chop the amaranth and green chili
- Add the moong dhal and cook for 10 minutes. Add amaranth leaves and chili in to pan
- Then, seasoned with mustard and cumin seed
- Salt to taste

NUTRITIVE VALUE OF AMARANTH MOONG DHAL KOOTU

Energy (Kcal)	Protein (gm)	Carbohydrate (gm)	Fat (gm)	Fibre (gm)	Vit.A (mg)	Vit.C (mg)
68	6.3	92.1	0.9	1.2	2230	16.1

RECIPE 14

SWEET CORN SUNDAL

Category : Snacks

Portion size : 2

Cooking time : 30 minutes

INGREDIENTS :

Sweet corn : 1 no (100g)
Grated carrots : 1 no (20)
Mustard seeds : 1 teaspoon (5g)
Curry leaves : 1 stem (5g)
Dry chillies : 2 no (5g)
1 teaspoon oil : 5 ml
Salt : to taste

METHOD:

- Boil the sweet corn kernels with few spices
- Pour 1 tsp oil in to kadai
- Saute with curry leaves, dry chillies
- Add boiled sweet corn to it
- Add grated carrots and coriander leaves in to the recipe
- Add salt for taste

NUTRITIVE VALUE OF SWEET CORN PER SERVING

Energy (Kcal)	Protein (gm)	Carbohydrate (gm)	Fat (gm)	Fibre (gm)	Vit.A (mg)	Vit.C (mg)
59	1.2	3.2	0.1	0.9	764	6.3

RECIPE 15

FOXTAIL MILLET KHEER

Category : Dessert

Portion size : 2

Cooking time : 30 minutes

INGREDIENTS :

Foxtail (Thinai) : 20g
Jaggery : 15g
Milk : 20 ml
Nuts : 3 g
Raisin : 3 g
Cardamom : 3 g
Ghee : 6 g

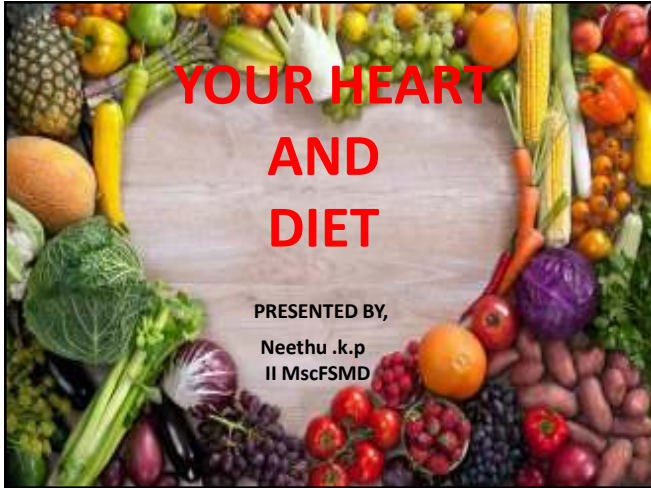
METHOD :

- Heat a teaspoon of ghee and fry the nuts and raisins separately. Remove it and in the same pan, fry thinai until it is slightly hot.
- Pressure cook thinai with two cup of water for 3 minutes
- Dissolve jaggery in 1/2 cup of water and add in to pressure cooker and mix well till required consistency.
- Add salt to be taste

NUTRITIVE VALUE OF THE FOXTAIL MILLET KHEER PER SERVING

Energy (Kcal)	Protein (gm)	Carbohydrate (gm)	Fat (gm)	Fibre (gm)	Vit.A (mg)	Vit.C (mg)
143.3	2.1	30.5	6.2	2.3	38.6	6.5

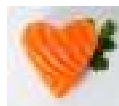
APPENDIX - IV
Power Point for health education



TYPES OF CHOLESTEROL

- VLDL (very Low Density Lipoprotein)
- LDL (Low Density Lipoprotein)
- HDL (High Density Lipoprotein)
- TGL (Triglyceride Level)

RISK FACTORS



Personal characteristics	Behavioral pattern	Back ground information
Sex	Stress	Diabetes mellitus
Age	Sedentary life	Hypertension
Family history	Obesity	hyperlipedemia
	Food Habits ,fat and sugar	
	Drinking soft water	
	Drinking coffee	

DIET

- High fiber
- Low fat
- Low calorie
- Normal proteins, vitamins and minerals

HEART HEALTHY FOODS

- Cereals
- Pulses
- Millets
- Green leafy vegetables and fruits

FOOD TO BE INCLUDED

High fiber foods:

- Millets (Bajra, Jowar,ragi, wheat ,oats)
- Pulses (Bengal gram, green gram whole, black gram, horse gram)



MILLET WILL REDUCE THE CHOLESTEROL LEVEL AND WEIGHT



- Its ability to protect your heart health, yourself from diabetes, improve your digestive system, lower your risk of cancer, Its rich in
- Calcium
- Manganese
- Tryptophan
- Phosphorus
- Fiber
- B vitamins
- Antioxidant

GREEN LEAFY VEGETABLES RICH IN FIBER, VITAMINS AND MINERALS



Drumstick leaves

- Rich in phytonutrients, proteins, vitamins and minerals.
- It contains very low amount of fats and no harmful cholesterol

Coriander leaves

- Coriander leaves contain linoleic acid, oleic acid, palmitic acid, stearic acid and ascorbic acid (vitamin-C) are very effective in reducing the cholesterol level



High fiber – Help to lower the blood cholesterol level



Spinach – high fiber, omega-3 fatty acids, vitamin K, vitamin-B6, beta-carotene

BEANS PAVE WAY FOR HEALTHY HEART

Broad beans



Cluster beans



- **Beans** high source of protein, fiber, antioxidants and phytonutrients. Dietary fiber, vitamin B-12, vitamin-B6 (pyridoxine), thiamin, iron, copper, manganese

Ladies finger

Ladies finger – Soluble fiber pectin. Pectin helps in lowering bad cholesterol.

- Folate
- Pyridoxine
- Thiamine
- Vitamin C, Vitamin A, Vitamin K
- Copper, Calcium, Potassium, Iron, Magnesium, Manganese, Zinc and Phosphorus



Bottle gourd

Bottle gourd has lots of Dietary fiber and vitamin C, B vitamins, minerals like iron, sodium and potassium





Brinjal

- Brinjal has no fat and its high fiber content .
- Rich in minerals potassium, magnesium, calcium and phosphorous.
- vitamin C and vitamin B6.

Drumstick

- Drumstick includes calcium, potassium, iron, m phosphorous and zinc.
- It contains very low amount of fats.



AVOID ROOTS AND TUBERS



- Roots and tubers are rich in Energy. It increase deposition of fat in the body.

FRUITS

Choose high fiber fruits instead of starchy fruits. Go for whole fruits and not fruit juice.

- * Guava
- * Apple
- * Orange
- * Sweet lemon



Pineapple

- Pineapple- Dietary fiber reduce cardiovascular risk and higher HDL serum cholesterol levels .
- Pineapples are one of the fruits highest in the flavonoid, antioxidant and Vitamin C .

Apple

- Apples are also a good source of soluble Fiber and have the cholesterol-lowering abilities
- Good sources of antioxidant



Sweet lemon

Its rich in high fiber and vitamin C

Orange

Its rich in high fiber and vitamin C




Lemon

Lemon juice contains no fat , and Protect against high cholesterol levels. Dietary fiber and vitamin C

Guava

- Guava has a high content of vitamins C and vitamin A.
- It also contains vitamins B2, E and K, fiber, calcium, copper, folate, iron, manganese, phosphorus and potassium.







Dates

- Dates are free from cholesterol and contain very low fat.
- Dates are rich in vitamins and minerals , dietary fiber and rich in vitamin B1, B2, B3 and B5 along with vitamin A and C and iron .
- Dates are rich in potassium and reduced in sodium.

Amla

- Amla- rich in antioxidant , vitamins C and fiber. It reduce LDL and increase HDL.





Strawberry

- Antioxidants in strawberries can help to lower LDL (“bad”) cholesterol as part of a diet low in saturated fat and dietary cholesterol

TIPS TO REDUCE CHOLESTEROL


Daily intake of 3 or 4 **almonds** and walnuts




- It contain :
 - Unsaturated fats
 - Omega 3 fatty acids
 - Fiber
 - Vitamin E

Daily intake or 2 or 3 **garlic**


- Rich in antioxidants



Antioxidants



- **Antioxidants** may help prevent heart disease by increasing levels of high-density lipoprotein (HDL) cholesterol (the "good" cholesterol) and protecting against artery damage.



FOOD TO BE RESTRICTED

Milk and milk products(ghee, cheese,butter,cream ect..)



- **Dairy products** are high in calcium, potassium, and Vitamin D.
- Consuming whole-fat dairy products - high LDL cholesterol levels.
- Whole-fat dairy products are high in saturated fat and cholesterol

Red meat (beef, pork and mutton)



- **Meat** are high in saturated fat and increase the cholesterol level

Organ meat(brain ,heart, kidney, liver)



Fish (prawns and sea foods)



- Fish are high in cholesterol and saturated fatty acid
- If you like fish , Eat 2-3 times a week .

Avoid egg yolk



- **Egg yolk** are good sources of both cholesterol and saturated fatty acid
- High intake of cholesterol increase blood cholesterol
- Egg white rich in protein, vitamin B12 and ,riboflavin, and folate.

Fried foods(chips ,mixture, fried meats and fishes)



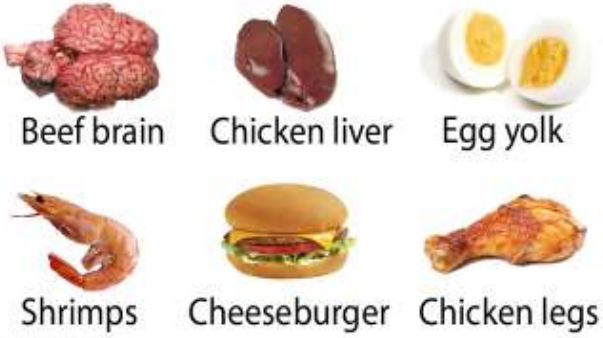
- **Fried foods** : Eating foods that contain saturated fats raises the level of cholesterol in your blood.
- High levels of LDL cholesterol in your blood increase your risk of heart disease and stroke.

Avoid Maida ,biscuits, cookies and cakes etc



- **Refined foods** and empty calories from sugar increase blood sugar and triglycerides levels.
- Refined foods not contain fiber

Foods High in Cholesterol



SATURATED FAT

- Dietary Guidelines recommendations are:
 - Total fat
 - 20 to 35% total calories
 - Saturated fat
 - < 10% total calories
 - Coconut oil (92% saturated)
 - Palm kernel (82% saturated)
 - Palm oils (50% saturated)



SATURATED FATS **Vs** **UNSATURATED FATS**

HEART HEALTHY OIL

- Contains polyunsaturated fatty acid and monounsaturated fatty acid.
- It decrease the blood cholesterol level

PUFA **MUFA**

CHANGE YOUR LIFE STYLE ACTIVITY

“ HELP UR HEART STAY YOUNG”



PHYSICAL ACTIVITY



- Aerobic exercises benefit your heart, and includes :
 - walking
 - jogging,
 - swimming or biking.



- 10-15 minutes per day/ 30 minutes of moderate-intensity aerobic activity at least 5 days per week

- Yoga and meditation – 30 minutes per day help to reduce triglyceride level.



40 minutes of moderate- to vigorous-intensity aerobic activity 3 or 4 times per week



HEALTHY FOOD CHOICES

Sweet corn sundal (1 cup)

- Sweet corn : 1 no (100g)
- Grated carrots : 1 no (20)
- Mustard seeds : 1 teaspoon (5g)
- Curry leaves : 1stem(5g)
- Dry chilies : 2 no(5g)
- 1 teaspoon oil : 5 ml
- Salt to be taste



PREPARATION

- Boil the sweet corn kernels with few spices
- Pour 1 tsp oil in to kadai
- Saute with curry leaves, dry chilies
- Add boiled sweet corn to it
- Add grated carrots and coriander leaves in to the recipe
- Add salt for taste

MIXED MILLETS KOZHUKATAI

Setaria italica (Thinai)

Ingredients

- Thinai : 25g
- Samai : 25g
- Kuthiraivali : 25g
- Rice flour : 25g
- Ragi flour : 25g
- Bengal gram dhal : 50g
- Vegetables : 55g (beans ,carrot, coriander leaves, cabbage and chili)

PREPARATION

- Grind all millets
- Add Bengal gram dhal, beans, carrots and well chopped coriander leaves, cabbage and green chili.
- Add salt and sprinkle water
- Keep in idli vessels and cook.

Sprouted green gram poriyal(1 cup)

- Sprouted green gram : 30g (any millets)
- Onion : 1no(chopped ,30g)
- Tomato : 1no (chopped 1 30g)
- Mint leaves : 1(5g)
- Salt : to be taste

**PREPARATION**

- Mix all the ingredients together in a bowl
- Add salt to be taste



HEALTHY FOOD CHOICES FOR HEART



Total fat : Should be restricted to 20-25% of calories, and should be made up from polyunsaturated, monounsaturated and saturated type of fat.



PUFA



MUFA



Saturated fat

Dietary fiber: A high intake of fiber helps to reduce serum lipids cholesterol level. Fruits, green leafy vegetables, whole grams, and pulses, and unrefined cereals are good sources of fiber.



Oil allowance per day : 2 or 3 tsp (10 - 15 ml)

FOOD TO BE INCLUDED LIBERALLY

- Millets (Bajra, jowar, Ragi, wheat)
- Pulses (Bengal gram, green gram whole, horse gram)
- Greenleafy Vegetables (Keerai, coriander, drumstick, mint)
- Fruits (Guava, apple, orange, amla, pineapple)



FOODS TO BE RESTRICTED

- Rice and other cereals
- Sugar and sweets
- Roots and tubers



FOODS TO BE AVOIDED

- Egg yolk
- Organ meats(liver,brain,ect,)
- Red meats
- Shellfish (prawn, shirmp)
- Cream, cheese, butter, ghee,dalda
- Palm oil, coconut oil
- Milk sweets (gluab jamun, ice creams,ect)
- Fried foods (pooris,vadai)
- Bakery products (cakes , puffs, biscuits, cookies)



HEART FRIENDLY OILS

SFA	MUFA	PUFA
1 :	1 :	1

Saturated Fats

- Palm oil
- Coconut oil

Monounsaturated Fats

- Olive oil
- Groundnut oil
- Mustard Oil



Polyunsaturated Fats

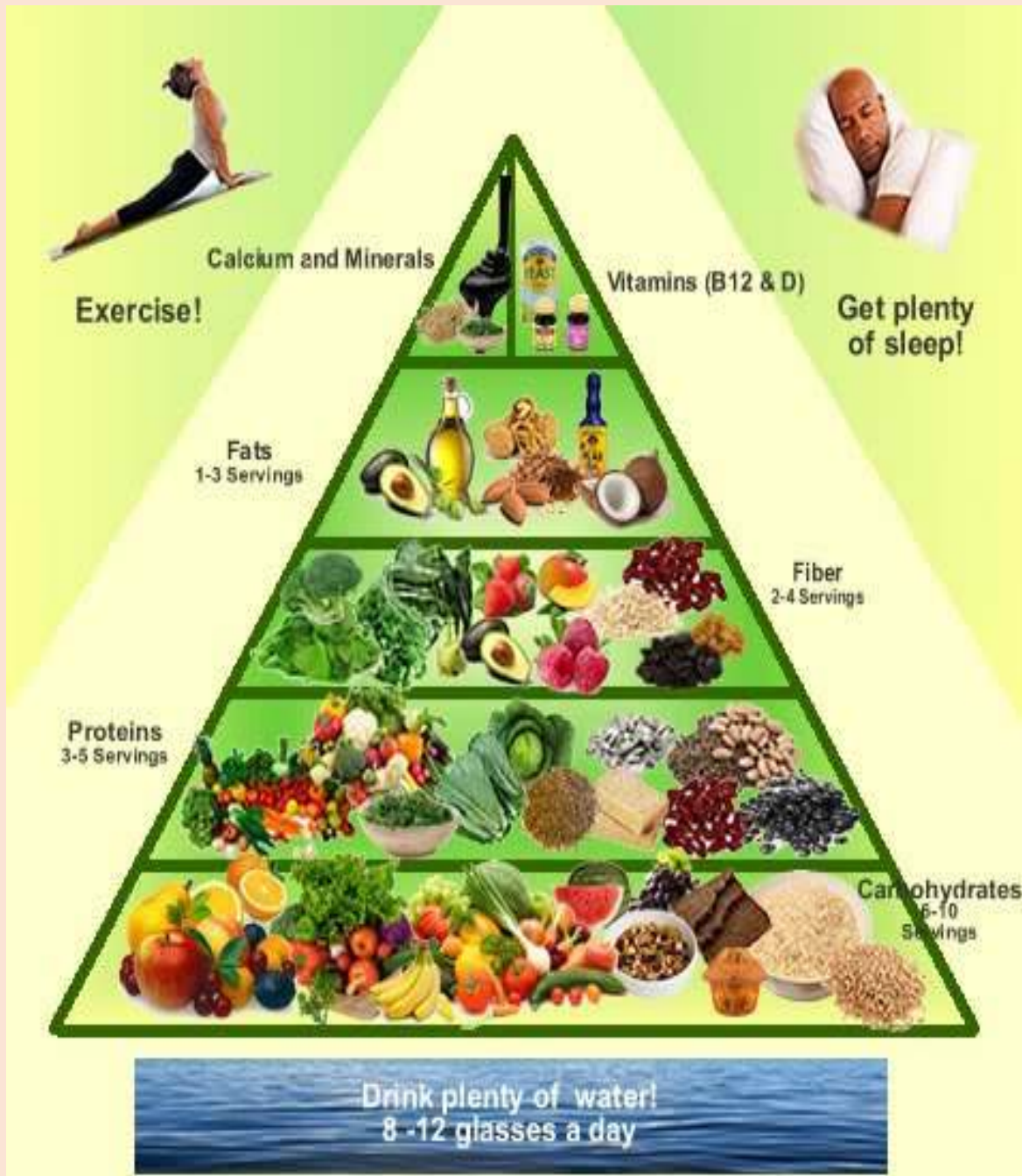
- Soya bean oil,
- Corn oil
- Refined Oil

MODERATE EXERCISE

Helps in reducing weight and lowering serum lipid levels.

- 30 minutes walk every day
- Practice yoga or meditation every day
- Gardening, Swimming - 15-30 minutes daily

Food Guide Pyramid for Healthy Heart



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APPENDIX VII

LIPID FRACTIONS OF THE STUDY PARTICIPANTS

N=17

SUBJECTES	PRE EDUCATION					POST EDUCATION				
	Total cholesterol	High density lipo protein	Low density lipo Protein	Very low density lipo protein	Triglycerides	Total cholesterol	High density lipo protein	Low density lipo protein	Very low density lipo protein	Triglycerides
Subject 1	224.4	45	162	17.4	87.1	210.3	45.2	162.3	16.3	86.5
Subject 2	175.4	44	87.3	44.1	220.9	175.2	54	86.2	40.8	200.3
Subject 3	291.2	54.7	211.6	24.9	124.7	270.3	65.2	201.5	23.5	200
Subject 4	198.9	41.8	122.1	35	175.1	253	50.1	153	52	180.5
Subject 5	222.3	45.3	135.6	41.4	207.1	210	40	110.5	32.4	200
Subject 6	110.8	55.7	35.5	19.6	98.4	100.2	45.2	30	15.3	88.4
Subject 7	166	43.9	84.3	37.8	189.2	143	38.9	75.2	33.3	169.1
Subject 8	184.2	61.2	104	19	95.3	162.2	52.4	96.4	14	98.5
Subject 9	186.2	46.3	104	35.9	179.8	195.5	52.3	113.1	40.8	184.5
Subject 10	150.7	47.2	61.3	42.2	221.2	128.5	45.2	68.2	44.2	150.2
Subject 11	174.1	43.4	102.3	34.9	125.9	144.2	42.3	100.1	30.2	144.3
Subjects 12	194.1	44.6	133.6	25.4	127	183.2	39.6	128.2	23.3	117
Subject 13	185.2	46.5	118.4	20.3	101.6	170.1	49.5	115.3	17.3	97.6
Subject 14	235	58.7	118.8	57.5	287.5	200.2	56.3	114.2	47.3	215.2
Subject 15	188.4	39.7	124.6	24.8	123.7	168.4	40.8	144.3	19.5	124.8
Subject 16	140.4	45.9	65.6	28.8	144.2	132.8	49.3	63.2	22.5	132.2
Subject 17	203.7	56	124.4	13.5	67.6	198.3	53.1	119.3	11.3	110.7