



## International Journal of Nutrition and Agriculture Research

Journal home page: [www.ijnar.com](http://www.ijnar.com)



### EFFECT OF HYPOCALORIC DIETARY INTERPOSITION AMONG OLD AGE SUBJECTS SUFFERING FROM HYPERLIPIDEMIA

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#### ABSTRACT

Cardiovascular disease refers to any disease that affect the cardiovascular system, principally cardiac disease, vascular disease of the brain, kidney and peripheral arterial disease (Valentin, 2010). The present study was conducted on selected Old aged subjects by purposive random sampling to find the role of Dietary Interposition in their daily life. The demographic details, medical history were collected by the researcher by a validated questionnaire. The dietary intake was taken using 24hr recall method. The dietary intake is responsible for the development of metabolic disorders so the effect of Hypo caloric diet of 1300-1500kcal was given to the subjects. The diet was just adjusted to their daily eating pattern. The results showed the decrease in overall Lipid levels in the subjects and also weight reduction of 3-4kgs was also achieved in three months. The dietary counseling and behaviour modifications were also advised to the subjects.

#### KEYWORDS

Dietary Interposition, Malnourishment, Diabetes Mellitus and Hyperlipidemia.

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#### INTRODUCTION

A Cardiovascular disease is basically a heart disease which involves the heart, the blood vessels, arteries, veins or capillaries (Wright, 1993). Cardiovascular diseases (CVDs) are a group of disorders of the heart and blood vessels and they include Coronary heart disease which is the disease of the blood vessels that supply blood to the heart, Cerebrovascular disease which is the disease of the blood vessels that supply blood to the brain, Peripheral arterial disease which is the disease of blood vessels that supply blood to the arms and legs, Rheumatic heart disease deteriorates the muscles of the heart as it often causes rheumatic

fever that is caused by streptococcal bacteria, Congenital heart disease that causes malformations of heart structure existing at birth, deep vein thrombosis and pulmonary embolism that is blood clots in the leg veins which can dislodge and move to the heart and lungs.

Heart attacks and strokes are acute events and are mainly caused by a blockage that prevents blood from flowing to the heart or brain. The most common reason for this is a build-up of fat deposits on the inner walls of the blood vessels that supply blood to the heart or brain. Strokes can be caused by bleeding from a blood vessel in the brain or from blood clots (WHO, 2013).

The deaths all over world are due to the heart diseases since 1970's and the mortality rates have only gone high (Institute of the medicine of national, 2010). Cardiovascular deaths and disease have increased at a fast rate in low and middle income countries (Finegold, 2012).

Evidence suggested that risk factors for heart diseases are Age, Gender, High Blood Pressure, Hyperlipidemia, Diabetes Mellitus, Tobacco smoking, processed meat consumption, excessive alcohol consumption, sugar consumption, family history, Obesity, lack of physical activity, Psychological factors and Air pollution (Onpuu, 2004). There are various types of cardiovascular diseases such as Coronary artery disease, Cardiomyopathy, Hypertensive heart disease, Heart failure, Pulmonary heart disease, Cardiac dysrhythmias, Inflammatory heart disease, Endocarditis, Cardiomegaly, Myocarditis, Valvular heart disease, Cerebrovascular disease, Peripheral arterial disease, Congenital heart disease, Rheumatic heart disease.

Age is the most important risk factor in developing cardiovascular or heart diseases, and the risk triples with each decade of life (Finegold, 2012). Aging is also associated with changes in the mechanical and structural properties of the vascular wall which further leads to the loss of arterial elasticity and reduced arterial compliance and may also lead to coronary artery disease. (Rajkumar, 2006). Men are at greater risk of heart disease than pre-menopausal woman. Among middle-aged people, coronary heart disease is

2 to 5 times more common in men than women (Puska, 1999).

The risk of cardiovascular disease and death can be decreased by a diet high in fruits and vegetables. Evidence suggests that the cardiovascular outcomes can be improved by Mediterranean diets (Reamy, 2009) There is also evidence that a Mediterranean diet may be more effective than a low-fat or no fat diet which lowers the lipid levels in one's body. The DASH diet which is high in nuts, fish, fruits and vegetables, and low in sweets, red meat and fat has been shown to reduce blood pressure, lower total and low density lipoprotein cholesterol and improve metabolic syndrome, but the long term benefits apart from the clinical trial have been questioned (Logan, 2007). A high fiber diet lowers the risks. Total fat intake is not the only risk factor (Willete, 2012) A diet high in trans fatty acids appears to increase rates of cardiovascular disease. Dietary guidelines recommend a reduction in saturated fat worldwide (Hibbeln, 2013). However, there are some questions around the effect of saturated fat on cardiovascular disease in the medical literature. Abnormal blood lipid levels that is high in total cholesterol, high levels of triglycerides, high levels of low-density lipoprotein or low levels of high-density lipoproteins are both responsible for the deaths. Changing to a healthy diet, exercise and medication can modify blood lipid profile. Tobacco use whether smoking or chewing it increases risks of cardiovascular disease. Smoking is also a major culprit behind the development of heart disease. Passive smoking is also a risk factor for cardiovascular disease. Inhibiting tobacco use can reduce the risk of cardiovascular disease significantly, no matter how long one have smoked (World heart federation, 2011).

Physical inactivity increases the risk of heart disease and stroke by 50%. Obesity is a major risk for cardiovascular disease and predisposes to diabetes. Diabetes is a risk factor for cardiovascular disease (World heart federation, 2011).

#### **Physiological Factors**

Vascular aging is largely associated with senescence of the vascular endothelium (El Assar, 2012) present a wide overview of the mechanisms that participate

on endothelial dysfunction that accompanies vascular aging, analyzing the synergisms.

#### **Environment related factors**

Another study shows the effect of air pollution in causing cardiovascular diseases. Atherosclerotic lesions can lead to ischemia of the heart, brain, or extremities. Air pollution may induce atherosclerosis in the peripheral arteries, coronary arteries and aorta.

#### **Risk factors**

There are many risk factors associated with coronary heart disease and stroke. Some risk factors such as family history, ethnicity and age that cannot be changed. Other risk factors that can be treated or changed include tobacco exposure, high blood pressure (hypertension), high cholesterol, obesity, physical inactivity, diabetes, unhealthy diets, and harmful use of alcohol. Particular significance in developing countries is the fact that while they are grappling with increasing rates of cardiovascular disease, they still face the scourges of poor nutrition and infectious disease. Hypertension is the single biggest risk factor for stroke. It also plays a significant role in heart attacks. It can be prevented and successfully treated but only if one have it diagnosed and stick to your recommended management plan. (World heart federation, 2010).

#### **Complications**

In recent years, there is the dominance of chronic diseases as major contributors to total global mortality has emerged and has been previously described in detail elsewhere (Adeyi, 2007). By 2005, the total number of deaths caused by cardiovascular disease mainly coronary heart disease, stroke, and rheumatic heart disease (WHO, 2005).

### **MATERIALS AND METHODS**

The method and material used for investigation are discussed under the following headings:

#### **Locale of study**

The study was conducted on Old age people of age group 50-60 yrs belonging to the area of Dharuhera, Haryana.

#### **Selection of the subjects**

Forty subjects between 50-60 years of age were selected with purposive random sampling. The

objective and experimental protocol of the study was explained to the subject, and their prior consent was taken.

#### **Experimental Plan**

The general information, history of cardiovascular disease, medical problems and clinical signs, dietary intake, physical activity pattern were taken by the developed questionnaire. The information about the food likes and dislikes and dietary pattern of subjects was also obtained. The subjects were divided equally into two experimental groups. The study was constituted of phases and the classification of subjects elaborated as under:

#### **Experimental Group (E1): Hypocaloric Diet**

##### **Field studies**

The Biochemical parameters were recorded before the study and in this group Hypocaloric diet was recommended that was low in calories and daily fat intake was restricted. Twenty subjects were taken as control group.

#### **Experimental Group (E2): Exercise and Hypocaloric Diet**

The second Experimental group was guided exercise with hypocaloric diet and twenty subjects were included in this experimental group. The consent of the subjects was taken prior that whether they can perform light exercises. A walk for thirty minutes was recommended daily.

#### **Control Group**

This group did not follow any of the restrictions. Twenty subjects were included as control group.

#### **Statistical Analysis**

SPSS software 21.0 was used to calculate Mean, Standard deviation, Paired T-Test, Anova and Dunkan's Post hoc test.

### **RESULTS AND DISCUSSION**

The results of the study entitled "A study conducted on cardiovascular patients in the age group of (50-60) years" are discussed below:

The demographic details are explained in the Table No.1.

#### **Cholesterol Levels**

As shown in Table No.2. There was significant decrease in the Cholesterol levels from  $256.8 \pm 26.07$

to  $193.8 \pm 10.3$  in Experimental group E1. In the experimental group 2 the cholesterol came down from  $249.3 \pm 19.16$  to  $198.8 \pm 22$ . The Control group remained with no significant difference as their levels were still above normal levels. The Anova was applied among the groups and significant difference was seen in the groups after the study. The difference in the E (experimental) versus C (Control) group was also significant.

#### **High Density Lipoproteins (HDL-C)**

The results show a significant decrease ( $p \geq 0.05$ ) in the levels as the whole lipid profile changed. The subjects reduced fat intake so their overall lipids were also reduced from  $51.1 \pm 5.27$  to  $46 \pm 6.32$ , Although HDL is considered as good cholesterol. There was more significant reduction in HDL levels from  $52.4 \pm 5.27$  to  $43.3 \pm 2.31$  in the E2 group.

#### **Low Density Cholesterol (LDL-C)**

As shown in Table No.2. There was significant decrease in the LDL Cholesterol levels from  $159 \pm 19.6$  to  $118 \pm 12.28$  and  $139.3 \pm 25.8$  to  $122.6 \pm 6.55$  in E1 and E2 group significantly. This shows that if low calorie diet is combined with exercise, its more effective in reducing the LDL levels.

#### **Very Low Density Cholesterol (VLDL-C)**

The VLDL levels were also reduced significantly in E1 and E2 group from  $46.74 \pm 4.71$  to  $29.8 \pm 2.61$  and  $57.6 \pm 4.80$  to  $32.7 \pm 7.44$  respectively.

#### **Serum Triglycerides**

The serum triglycerides were also reduced to half of the levels as were before study period.

#### **Management and Prevention of CVD's**

##### **Diet**

Diet is very important to control all the metabolic disorders. The nutritional assessment of the subjects was done. The method of dietary survey was adopted to calculate the dietary intake of the subjects. The different nutrient intake of the subjects was recorded and calculated by Nutriguide Computer Programme. The clinical signs were also noted according to ICMR score card so as to depict malnourishment among the subjects. After the weight reducing interventions the daily food intake of the subjects in terms of Cereals, Pulses, Sugar and Fats was reduced to significant levels. The subjects were asked to follow a 1300-1500

kcal Diet plan as advised by the investigator. (Sharma, 2015).

Very few studies have been done on the correlation among nutrition, dementia and depression while we know very well about the nutritional deficiencies and physical ailments. Depression pathology is linked with the biochemical and emotional changes in the body but the reality is that Depression is very well associated with daily food intake. There are noticeable dietary patterns that shows as depression precedes. The symptoms include poor appetite, skipping meals and eating voraciously anything as in most cases its sweets. Nutritional neuroscience is emerging day by day so that the mental behavior could be controlled by the food we eat (Beardsley, 2016).

The dietary intake of the Asians and Americans was studied and it says that the old people are mostly deficient in many nutrients. The nutrients are vitamins, minerals and omega -3 fatty acids. It was very well found with the patients with mental illnesses such as depression, dementia and OCD (Obsessive Compulsive Disorder). Studies have indicated that daily nutritional supplements improved the condition of patients with mental illnesses by decreasing symptoms (APA, 2000). The dietary supplements of Omega-3 fatty acids and amino acids reduce the symptoms of depression and dementia. The amino acids are known to be the converter to neurotransmitters which are helpful for secreting happy hormones in the body thereby reducing symptoms of depression especially (Shaheen, 2008). The diets such as Mediterranean diet is characterized by high intake of fruits, legumes, vegetables, cereals and monounsaturated fats such as olive oil, low intake of saturated fats, moderate intake of dairy products and also moderate intake of alcohol. This type of diet is found to be useful in lowering the risk of mental disorders and even Alzheimers disease (Feart, 2009). People with problems in eating and low mood should be provided with special feeding practices such as parenteral feeding. Older people should be assisted with meals on wheels so as to improve their dietary intake. There is clearly a need for improved communication and dissemination of nutrition information by dietitians, who could play a more

active role through the Alzheimer’s Association and other nongovernmental support organizations. The protein and energy intake has to be increased in old age. Moreover the dining culture could be changed to improve the dietary intake as for example the food can be served as cafeteria type style as not following traditional methods of meal delivery. A twenty day trial showed positive results i.e the dietary intake was increased from 29% to 56% (Desai, 2007) the studies showed the health effects of reducing total fat intake of the subjects. The fiber was increased. The fatty acids has to be replaced in the diet of the subjects from time to time as the MUFA (Mono unsaturated fatty acids), Medium chain triglycerides and PUFA (Poly unsaturated fatty acids). The oils are categorized in PUFA are sunflower, safflower, soyabean, rice bran etc. Coconut oil is also very beneficial for GI tract and also for heart. So these oils were recommended for the heart patients.

**Sample Diet Plan**

Early Morning: Flax seeds - 10gms with water  
 Breakfast: Brown bread sandwich - 2 slices with Double toned milk or Poha with Lassi or chhach or Upma with Chach or Stuffed bran roti with curd  
 Mid- Morning: Sprouts - 1 bowl or Fruit or Roasted chana or Coconut water

Lunch: Take any three out of things given - Dal/ Vegetable + Rice/ Chapati -2 + Salad/ Curd  
 Evening tea - 1 cup green Tea/ Black coffee - 1 cup/ Fruits/ Puffed Rice/ Rice flakes roasted  
 Dinner - Same as lunch

A 2013 Meta-analysis concludes that the fats replaced results in the decrease in development of Heart disease whether they are Omega 6 fatty acids. Alternate of saturated fats with carbohydrates does not change or may increase risk. Benefits from stand-in with pufa has the good effect on heart (Elisaf, 2012).

Alcohol intake in moderation is recommended to lower down the risk of CVD. One drink a day can lower your risk by raising your high-density lipoprotein (HDL), or "good," cholesterol level. One drink is a glass of wine, beer, or a small amount of hard liquor.

**Exercise**

As the subjects were older in age so they were recommended a light 20- 45minutes walk per day. They were not forced to do it. It was recommended and they were happily doing it at least four times a week (The National Heart, Lung, and Blood Institute, 2011).

**Table No.1: Demographic details of the old age subjects**

S.No	Population Characteristics	Response	Percentage n=40
1	Marital Status	Single	0
		Married	100
2	Occupation	Working	30
		Non-Working	70
3	Smoke or Chewing tobacco	Yes	30
		No	70
4	Alcohol Intake	Yes	40
		No	60
5	Following a Diet	Yes	10
		No	90
6	Activity Level	Mild	20
		Moderate	70
		Active	10
7	Type of family	Nuclear	20
		Joint	80
8	Size of family	Small	20
		Medium	20
		Large	60
9	Literacy level	Intermediate	30
		Graduate	60
		Post graduate	10
10	Economic status	Low	20
		Medium	60
		High	20

**Table No.2: Mean Lipid levels before and after the dietary interventions**

S.No	Blood Parameters	Hypocaloric diet (E1) (n=20)	Exercise and Hypocaloric diet (E2) (n=20)	Control Group (C) (n=20)	F
1	Total CHOB (mg/dl) A	256.8±26.07	249.3±19.16	235.3±19.3	NS 12.79**
	t value	193.8±10.3	198.8±22	204.1±22	
	E vs C (B)	5.16**	4.23**	NS	
	E vs C (A)	NS	NS	NS	
		1.031**	2.133**		
2	HDL-CB (mg/dl) A	51.1±5.27	52.4±5.27	51.4±14.1	NS 28.5**
	t value	46±6.32	43.3±2.31	34±3.88	
	E vs C (B)	7.17**	9.339**	NS	
	E vs C (A)	NS	NS	NS	
		4.058**	5.212**		
3	LDL-CB (mg/dl) A	159±19.6	139.3±25.8	143.1± 16.3	NS NS
	t value	118±12.28	122.6±6.55	134.2±17.9	
	E vs C (B)	5.58**	NS	NS	
	E vs C (A)	NS	NS	NS	
		2.981**	NS		
4	VLDL-CB (mg/dl) A	46.74±4.71	57.6±4.80	40.8±9.92	9.120** 7.854**
	t value	29.8±2.61	32.7±7.44	35.9±1.26	
	E vs C (B)	9.29**	4.71**	NS	
	E vs C (A)	NS	NS	NS	
		5.023**	6.129**		
5	Total B Tri.(mg/dl) A	233.7±56.4	328.8 ±156.1	204.6 ±7.3	23.1** NS
	t value	149±23.3	163.7±11.6	179.5±36.8	
	E vs C (B)	NS	6.85**	NS	
	E vs C (A)	NS	NS	NS	
		NS	2.002**		

CHO - Cholesterol, B - Intake before intervention \*\* Significance at 1% level

A - Intake after intervention \*Significance at 5% level

(B)/ (A) - Difference between control and each experimental group on basis of Dunckan Post hoc test.

### CONCLUSION

According to this study, the subjects were negligent towards junk, fast or bakery food groups. The causes were modernization, better economic status and change in their environment. This was major cause of malnourishment among the subjects. The wrong food habits contributed to the apple shaped body of the subjects which was a major cause for non-communicable diseases such as Hypertension, Diabetes Mellitus and Hyperlipidemia. The nutrition education and dietary counseling was provided to the subjects and positive reduction in weight and lipid levels and management of the diseases was also achieved.

### ACKNOWLEDGEMENT

The authors wish to express their sincere gratitude to Department of Dietetics and Applied Nutrition, Amity Medical School, Amity University, Gurgaon, India for providing necessary facilities to carry out this research work.

### CONFLICT OF INTEREST

We declare that we have no conflict of interest.

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**Please cite this article in press as:** Sharma Luxita and Ekta Tanwar. Effect of hypocaloric dietary interposition among old age subjects suffering from Hyperlipidemia, *International Journal of Nutrition and Agriculture Research*, 4(1), 2017, 1-8.