

# A Study of HDL-C & LDL-C in Myocardial Infraction: Atherosclerosis.

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**ABSTRACT:** Food of dietary Status may directly affect on lipid fractions especially HDL-c and LDL-c i.e lipid profile is one of the main determinants in the causation of the coronary heart diseases especially Myocardial Infraction due to Atherosclerosis . Lipid profiles plays an important role in coronary heart diseases & atherosclerosis.. A significant increased levels show of triglyceride, total cholesterol,LDL,VLDL but a significant decreased level of HDL-c in the >40years age groups.i.e.HDL-c & fish consumption mixed diet individuals is important negative risk factors for atherosclerosis. This finding should be considered a public health problem & encouraged to prevent coronary heart diseases.

**KEYWORDS:** High density lipoprotein(HDL-c), Low density lipoprotein(LDL-c), Atherosclerosis, Coronary heart disease, Hypercholesterolemia, Hypertriglyceridemia,

## I. INTRODUCTION

Myocardial Infraction of atherosclerosis is initiated by a series of proinflammatory events that occur in the arterial wall causing endothelial smooth muscle disruption, macrophage activation and infiltration, oxidized lipid accumulation, and plaque formation.<sup>[1-4]</sup> Atherosclerosis of the coronary arteries commonly causes angina pectoris & myocardial infarction, atherosclerosis of arteries supplying the central nervous system frequently provokes transient cerebral ischemia & strokes. In the peripheral circulation atherosclerosis can cause intermittent claudication, gangrene can jeopardize limb viability. Involvement of splanchnic circulation can cause mesenteric ischemia. it can affect the kidney directly causing renal artery stenosis & kidney is a frequent site of atheroembolic disease[5-7] Cardiovascular atherosclerosis disease is the leading cause of death worldwide [8] because atherosclerosis progresses unnoticed over decades preclinical makes contribute to early detection & prevention strategies [9] Lifestyle & dietary habits are thought to powerfully affect cardiovascular risks<sup>[10]</sup>

Atherosclerosis is the leading cause of death industrialized nations. The atherosclerotic lesion contains a high amount of sphingolipids, a large group of structurally diverse lipids that regulate distinct biological functions beyond their role as structural membrane components<sup>[11]</sup> One of the main causes of atherosclerosis is hypercholesterolemia, which is a hallmark of the so called “western-style” The marked dependence of cholesterol levels upon lifestyle is illustrated by the rightward shift in the distribution of plasma cholesterol levels for the entire population<sup>[12]</sup> Indeed there is a linear relationship between the risk factor cholesterol & protection from atherosclerosis<sup>[13]</sup> Hypertriglyceridemia is also a major risk factor for atherosclerosis This has led to intense efforts to lower cholesterol triglycerides by a combination of dietary & pharmacological interventions. In addition to diet ,lipid profiles are regulated by multiple genes<sup>[14]</sup> Hypertriglyceridemia is a complex pathological entity strongly connected to low HDL level but controversially related to the risk of coronary heart disease<sup>[15]</sup>

Dietary habits directly affect the lipid level in an Indian individual as lipid profile is main determinant in causation of atherosclerosis as atherosclerosis of coronary arteries produces coronary ischemic disease that leads to typical cardiovascular changes ,a relation between dietary habit & lipid profile levels changes can be found out.<sup>[16]</sup> Our studies indicated that both LDL cholesterol lowering & HDL cholesterol raising can result in significant cardiovascular benefit of atheromatous lesions , LDL-c & HDL-c have opposite roles in both cholesterol regulation & both reduced deposition LDL-c reduction & increased removal raised HDL-c can improve coronary heart disease CHD<sup>[17]</sup>

## II. MATERIALS & METHODS

The study group 772 Indian adults both male & female i.e. two groups age less than 40 years & age more than 40 years old from Govt. Medical college & Hospital, Miraj India. These selected cases were divided into groups depending upon taken dietary history of Indian adults, such as vegetarian diet, non-vegetarian diet & mixed diet etc. Also questionnaire was used i.e. food frequency lists, food record & calculation of total calories from fat protein & carbohydrates etc. was done according to method of Gopalan et al, McCance & Widdowsan 1993. Collection of whole blood specimen of the subjects was collected by venipuncture technique using a 5ml disposable syringe with a needle. The whole blood allowed to clot & then centrifuged at 3500 r.p.m. for 5 min at 25°C. The resulting supernatant-serum was collected sample screw capped bottle & stored frozen until needed.

The enzymatic end point method of Richmond was used to estimate total cholesterol & triacylglycerides was determined by method of study group of Atherosclerosis society (1987), HDL-c was estimated according to the method of the National cholesterol Education Programme (NCEP 2001), LDL-c concentration was calculated directly from values obtained from total cholesterol (TC), HDL-c & Triglyceride (TG) using Friedewald et al (1972)

Proximate analysis of food composition of the individuals was determined by the method of the association of official analytical chemist (AOAC, 1980).

The data obtained were analyzed using the analysis of variance (ANOVA) and values expressed in mean ± Standard error of mean (SEM) except otherwise stated.

## III. OBSERVATION

A total 772 Indian adults patients were studied, 306 cases were associated abnormalities serum lipid profile levels are shown. In the vegetarian groups 7.1% cases were associated abnormalities in serum lipid profile level such as total cholesterol, Triacylglyceride, LDL-c is higher level & lower level of HDL-c. In Non-vegetarian diet group, this percentage is 61.1% noted But Mixed diet group shows 98.63% associated with normal serum lipid profile level were taking non-vegetarian diet less than twice per week but more than twice per week mixed diet including fish consumption as shown in **table no.1** As frequency of taking non-vegetarian diet more than per week increases, chances of getting of lipid profile levels also increase. In the observation **table no.2 & 3** shows the serum lipid profile values in CHD patients & controls in both age groups i.e. <40 years & >40 years respectively. The values of TG, Total cholesterol, LDL-c, VLDL & Chylomicron were significantly increased, HDL-c are decreased in both age groups of CHD patients. Among the control groups, a significant rise levels of TG, total Cholesterol, LDL-c & VLDL was observed in older groups when compared to younger groups. But, the concentration of HDL-cholesterol significantly decreased ( $p < 0.01$ ) in older control group compared to the younger group.

Our study shows that the significantly higher levels of TG, Total Cholesterol, LDL-c, VLDL & Chylomicron but lower levels of HDL-c in CHD patients. Thus, the HDL-c component of serum cholesterol is widely recognized to be an important negative risk factor for CHD. Our studies indicated that both LDL-c lowering & HDL-c-increasing can result in significant cardiovascular benefit of atheromatous lesions, LDL-c & HDL-c have opposite roles in both cholesterol regulation & both reduced deposition LDL-c reduction & increased removal raised HDL-c can improve coronary heart disease.

**Table ( 1): Correlation in between dietary group & Lipid profile levels in CHD**

| Subset  | Vegetarian diet | Mixed diet  | Total      |
|---|-----------------|-------------|------------|
| Normal Lipid profile level i.e. TC, TG, LDL & HDL-c   | 320 (68%)       | 148 (31.1%) | 466        |
| Abnormal Lipid profile level i.e. TC, TG, LDL & HDL-c | 22 (7.1%)       | 184 (61.5%) | 306        |
| <b>Total</b>  | <b>342</b>      | <b>330</b>  | <b>772</b> |

**Table (2): The serum lipid profile values in CHD & Controls in age group of patients < 40 yrs.**

|  |                     |                      |
|--|---------------------|----------------------|
| <b>Total Cholesterol TC</b>                                | <b>Control n=50</b> | <b>Patients n=90</b> |
|  | 194.96 (±37.79)     | 234.43 (±63.82)      |
| <i>p&lt;0.0001 i.e. p value is highly significance</i>     |                     |                      |
| <b>Serum Triglyceride TG</b>                               | <b>Control n=50</b> | <b>Patients n=90</b> |
|  | 101.25 (±43.72)     | 185.05(±78.08)       |
| <i>p&lt;0.001 i.e. p value is highly significance</i>      |                     |                      |
| <b>Low Density Lipoprotein LDL</b>                         | <b>Control n=50</b> | <b>Patients n=90</b> |
|  | 131.40(±24.62)      | 168.90 (±55.31)      |
| <i>p&lt;0.01 i.e. p value is significance</i>              |                     |                      |
| <b>Very Low Density Lipoprotein VLDL</b>                   | <b>Control n=50</b> | <b>Patients n=90</b> |
|  | 20.25(±8.34)        | 37.01(±15.63)        |
| <i>p&lt;0.01 i.e. p value is highly significance</i>       |                     |                      |
| <b>High Density Lipoprotein HDL</b>                        | <b>Control n=50</b> | <b>Patients n=90</b> |
|  | 42.86(±6.66)        | 26.23(±5.7)          |
| <i>p&lt;0.0001 i.e. p value is significantly decreased</i> |                     |                      |

**Table (3): The serum lipid profile values in CHD& Controls in age group of patients > 40 yrs.**

|   |                     |                       |
|---|---------------------|-----------------------|
| <b>Total Cholesterol TC</b>                           | <b>Control n=50</b> | <b>Patients n=124</b> |
|   | 217.19(±28.19)      | 231.06(±51.52)        |
| <i>p&lt;0.001 i.e. p value is highly significance</i> |                     |                       |
| <b>Serum Triglyceride TG</b>                          | <b>Control n=50</b> | <b>Patients n=124</b> |
|   | 148.96(±54.96)      | 192.72(±104.50)       |
| <i>p&lt;0.001 i.e. p value is highly significance</i> |                     |                       |
| <b>Low Density Lipoprotein LDL</b>                    | <b>Control n=50</b> | <b>Patients n=124</b> |
|   | 145.24(±26.72)      | 159.66(±50.57)        |
| <i>p&lt;0.001 i.e. p value is significance</i>        |                     |                       |

|  |                     |                       |
|--|---------------------|-----------------------|
| <b>Very Low Density Lipoprotein VLDL</b>               | <b>Control n=50</b> | <b>Patients n=124</b> |
|  | 29.79(±11.05)       | 38.50(±20.91)         |
| p<0.001 i.e. p value is highly significance            |                     |                       |
| <b>High Density Lipoprotein HDL</b>                    | <b>Control n=50</b> | <b>Patients n=124</b> |
|  | 43.68(±8.24)        | 28.54(±5.39)          |
| p<0.001 i.e. p value is highly significantly decreased |                     |                       |

X<sup>2</sup>= 11.690 p<0.01 using correction factor formula, value p is significant.

**Table (4): A Guide to a Balanced diet for Healthy heart,**

|                        | <b>Vegetarian<br/>(Gm/person/day)</b> | <b>Non-vegetarian(mixed)<br/>(Gm/person/day)</b> |
|------------------------|---------------------------------------|--|
| <b>Food group</b>      |                                       |  |
| Cereals/millet         | 350-400                               | 350-400  |
| Pulses                 | 40-50                                 | 30-40  |
| Milk                   | 200-250                               | 150-200  |
| Green leafy vegetables | 50-100                                | 50-100   |
| Roots & Tubers         | 70-100                                | 70-100   |
| Fats & Oils            | 20-40                                 | 20-30  |
| Fruits                 | 50-100                                | 50-100   |
| Sugar                  | 20-30                                 | 20-30  |
| Meat                   | --                                    | 40-60  |
| Fish                   | --                                    | 100-200  |
| <b>Nutrients</b>       |                                       |  |
| Calories (kcal)        | 1800-2000                             | 1800-2000  |
| Carbohydrates (gm)     | 300-340                               | 300-340  |
| Proteins (gm)          | 50-60                                 | 50-60  |
| Fats (gm)              | 40-60                                 | 40-60  |

(Gopalan et al – Expert Group of Indian Council of Medical Research,1989)

#### IV. DISCUSSION

Coronary heart disease occur over many years usually decades & is a accelerated in subjects with abnormalities levels of lipid-lipoprotein fractions. Dyslipidemia is one of the primary causes for coronary artery disease (CAD). Elevated total cholesterol (TC), triglycerides (TG), low-density lipoprotein-cholesterol (LDL-C) and lowered density lipoprotein cholesterol HDL-C are conventional risk factor in myocardial infarction high-patients<sup>[18]</sup> Diet is one of the determinant factor of atherosclerosis

Along the dietary risk factors, hypertension, diabetes mellitus, smoking, alcohol consumption & physical activity plays determinant role in risk of CHD. Hence. causes of coronary artery disease. Those cases of coronary artery ,heart disease manifesting with abnormal lipid levels can be explained on the basis of a differential distribution of the aforementioned risk factors<sup>[19]</sup> Proper diet is the key to good health & vigor. Diet & nutrition are synonymous with health. Our provides necessary nutrients, which give energy, promote growth, sustain metabolic functions & repair processes that are essential for health. Inadequate & improper diet is not only responsible for under nutrition but also contributes to several chronic degenerative diseases such as cardiovascular disease, atherosclerosis, cerebrovascular disease & diabetes.<sup>[20]</sup> Extensive biological research all over world over several decades has shown that coronary heart disease is difficult expensive to treat. Hence, shifting the focus to prevention. Previous research shows that various risk factors are responsible for the development of coronary heart disease& atherosclerosis like hypertension, diabetes mellitus, smoking, familial hyperlipidemia, sedentary life style & excessive fatty diet etc & some of them are modifiable. The continuous modernization & technological advancement of the developing world has brought rapid lifestyle changes which result to the consumption of fast food, caloric dense diets &

sedentary life style which are known to have a major impact in the development of atherosclerosis & cardiovascular diseases CVD. Main Pathogenesis in the development of coronary heart disease is of atherosclerosis in coronary arteries. Intensive investigations of recent years shed light particularly on the relationship of dietary pattern & atherosclerosis. Dietary factors directly affect the lipid profile in an individual. Lipid profile & its fraction which is main determinant in causation of coronary ischemic disease & atherosclerosis<sup>[21]</sup>

In present study shows, total 772 Indian adults, 306 cases associated abnormalities serum lipid profile levels. In the vegetarian groups 7.1% cases were associated abnormalities in serum lipid level such as cholesterol, triacylglyceride, LDL is higher level & lower level of HDL cholesterol. In Non-vegetarian diet group, this percentage is 61.1% noted But Mixed diet group shows 98.63% associated with normal serum lipid level were taking non-vegetarian diet less than twice per week but more than twice per week mixed diet including fish consumption As frequency of taking non-vegetarian diet more than per week increases, chances of getting of lipid profile levels also increase

( table no. 1, 2 & 3 )

Vegetarian & Mixed diet may have beneficial effect for cardiovascular diseases CVD & atherosclerosis, while Non-vegetarian diet might adversely affect for atherosclerosis. This finding was statically highly significant<sup>[22]</sup> Mixed diet included a strikingly higher of n-3 PUFAs rich in marine sources such as seal & whale etc. that resulted in lower blood cholesterol, lower TG & LDL-c and increased HDL-c & bleeding time which is lower rate of coronary heart disease CHD & atherosclerosis. Omega-3 fatty acid are PUFA found in fish oils & soybeans, consumption of fish two or more time a week for prevention of CHD & atherosclerosis. Efficacy of fish contains Omega -3 fatty acid supplements i.e. eicosapentaenoic acid & docosahexanoic acid which is reduce the risk of recurrent CV events & in secondary prevention of cardiovascular disease & atherosclerosis

Thus “Prevention is better than cure” is particularly appropriate for coronary heart disease, since cost of treatment & cost in term of life & mental stress due to coronary heart disease CHD for exceed the cost of prevention through simple changes like dietary modification. Can we then conquer atherosclerosis & CHD through modification in diet? Hence, we evaluating the levels of lipids profile in CHD with reference to dietary status.

#### V. CONCLUSION

Dietary factors is directly affect the lipid profile fraction which is main determinant in causation of coronary heart disease & atherosclerosis. A significant increased levels show of triglyceride, total cholesterol, LDL, VLDL but a significant decreased level of HDL-c in the >40 years age groups. i.e. HDL-c & fish consumption mixed diet individuals is important negative risk factors for CHD. This finding should be considered a public health problem & encouraged to prevent coronary heart diseases.

#### Ethical statement

This research study was reviewed and approved by the Institutional Review Board (IRB) National Research & Ethical committee of Shivaji University, Kolhapur, India. Informed consent was obtained from all participants before the study. All participants were given a follow-up appointment for results discussion, counseling & treatment initiation if indicated.

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