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Research Article

A COMPARATIVE STUDY OF CHANGES IN LIPID PROFILE IN DIFFERENT AGE GROUPS W.S.R. PRAKRITI

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ABSTRACT

The progressive increase in the incidence of hyperlipidaemia and cardiovascular disease in developing countries has led to the rapid development of studies of this condition, particularly its etiopathology. Therefore, the main objective of present research work is to study how lipid profile values vary with Age and *Prakriti* (constitution) and to suggest life style modifications to combat these variations. Sixty volunteers were taken for clinical trial and were divided into 2 groups and study was conducted in Ayurvedic & Unani Tibbia College and Hospital in 2007-08. It was found that the levels of Cholesterol, Triglycerides, LDL-C and VLDL increased with age and were higher in *Kaphapittaja Prakriti.* So, life style changes and regular exercise must be done with increasing age and in *Kaphapittaja prakriti.*

KEY WORDS: *Prakriti,* Constitution, Lipid Profile, Hyperlipidaemia.

INTRODUCTION

With urbanization and relative affluence, dyslipidaemia and cardiovascular diseases have emerged as an epidemic. Developing hyperlipidaemia and associated risks also depend on personal habits of eating, smoking, physical activity & genetic background. Clinical signs of this condition are an increase in the fasting serum cholesterol level (hypercholesterolaemia) or the fasting serum triglyceride level (hypertriglyceridaemia) or both.

Absolute risk for CHD morbidity and mortality increases steeply with age (Castelli et al. 1992)[1]. The risk accelerates in men after they reach the age of 45 & in women after age 55. People, who are 65 years old or older, 2/3 of women, i.e., nearly 60% are admitted into hospital for acute MI. They have high in hospital and post discharge death rates than younger patients (Forman & Aronow 1996) and are more likely to suffer sudden death (Tresch & Aronow 1996)[1]. Indeed 85% of CHD deaths are in this age group.

The work was carried out at Ayurvedic & Unani Tibbia College and Hospital, Karol Bagh, Delhi.

CLINICAL FEATURES

Acharya Sushruta has clearly mentioned that if a person over indulges in articles of food that conduce to the production of *Shleshma* or leads a sedentary life and is averse to physical exercise, overeats and resorts to day sleeping, the predominantly sweet tasting rasa circulates throughout the body, very much like *Ama*. From this sweet tasting *Amarasa* is formed *Sneha* (oil) and *Medas* (fat)[2]. Also, with age the *Dhatvagni* becomes *Manda* (sluggish) and in consequence *Ama* (undigested) is produced at the level of *Dhatvagnipaka*. According to *Ayurveda*, *Dosha Prakriti* characterizes a person apart from other and is also responsible for a particular disease affliction[3]. As per *Ashiraya Ashrayi Bhava, Vasa* and *Meda* are places of *Kapha*. These too have definite relationship with other two *Doshas* when it comes to abnormality.

So, the main objective of present research work is to study how lipid profile values vary with Age and *Prakriti* and to suggest life style modifications to combat these variations.

AIMS AND OBJECTIVES

1. To study if there is any relation of *Prakriti* with changes in Lipid Profile.
2. To find out possibilities of comparing *Vasa*/*Meda Vyapad* with changing values of lipid profile on modern parameters.
3. To summarize the effect of age & sex over lipid profile readings.

MATERIALS AND METHODS

Inclusion Criteria

- Volunteers who are physiologically normal.
- Volunteers who lie in age group 21-60 years irrespective of either sex.

Exclusion Criteria

- Persons of age less than 21 years and above 60 years.
- Persons with any cardiac disease, life threatening disease like MI, CHF, COPD, CVA, Cirrhosis of liver and malignant diseases.

- Person with major psychiatric illness.
- Person taking drugs like corticosteroids, tricyclic anti depressant, cycloheptadine which leads to weight gain.

Observational study

All the volunteers were observed on the basis of demographic profile; physical measurements like pulse rate, respiratory rate, temperature, height, weight, body mass index, waist and hip circumference; determination of prakriti and agni.

CRITERIA FOR ASSESSMENT

60 volunteers of various *Dosha Prakriti* were observed by making 2 groups as under:

Group 1 = X_1 = 30 individuals of age group 21-40 years.

Group 2 = X_2 = 30 individuals of age group 41-60 years.

Adopting the following objective criteria and laboratory investigations the following were assessed the results.

(1). Skin fold thickness of Triceps region (in mm)

16-20 mm - Linear

21-25 mm - Muscular

26-30 mm - Obese

(2). Assessment of Body Mass Index (B.M.I.)

25-29.9 kg/m^2 - Linear

30-34.9 kg/m^2 - Muscular

35-39.9 kg/m^2 - Obese

(3). Assessment of Waist Hip Ratio

In Male	In Female	
0.95 or below	0.8 or below	Linear
0.96 - 1	0.81 - 0.85	Muscular
1 and above	0.85 and above	Obese

LABORATORY PROCEDURES

The laboratory investigations were done at the Pathology Lab of A & U Tibbia College, Delhi. The samples were drawn in fasting state for Routine Hematological, Lipid Profile, Fasting and Post Prandial Blood sugar (sample collected after 2 hour of fasting sample).

OBSERVATIONS

In the present study out of 60 volunteers, 50% belonged to 21-40 years of Age group while 50% were in 41-60 years of Age group.

According to distribution based on Sex, 55% volunteers were Males and 45% were Females.

The data showed that majority of volunteers 75% were Hindus while 25% volunteers were of Muslim religion.

According to distribution based on Socio economic status, majority of volunteers 55% belonged to MIG group, 26.66% belonged to HIG group, followed by 18.33% of LIG group.

The data showed Family history of dyslipidaemia in 28.33% volunteers while 71.66% had no relevant Family history.

According to distribution based on Diet pattern, 56.66% volunteers consumed vegetarian diet while 43.33% consumed mixed diet.

The data showed 45% volunteers had *Madhyama kostha*, 31.66% had *Kroora kostha*, followed by 23.33% of *Mridu kostha*.

When assessing the status of Agni it was observed that 35% volunteers had *Vishamagni*, 31.66% had *Teekshnagni*, 28.33% had *Mandagni* and 5% had *Samagni*.

The data showed that only 28.33% volunteers had *Samayak nidra* while maximum 41.66% had Atinidra, 21.66% had *Alpanidra* and 8.33% had *Anidra*.

When assessing the *Sharirika Prakriti* of volunteers it was observed that majority of volunteers i.e. 41.66% were of *Kapha Pitta Prakriti*, followed by 30% of *Vata Pitta Prakriti* and 28.33% of *Vata Kapha Prakriti*.

According to distribution based on Dhatu sara, maximum no. of volunteers i.e. 41.66% were *Medasara*, followed by 26.66% of *Mamsasara*, 20% were *Twaksara*, 6.66% were *Raktasara* and 5% were *Asthisara*.

According to distribution based on *Samhanana*, 55% volunteers were of *Sthula samhanana*, followed by 30% of *Madhya samhanana* and 15% of *Krisha samhanana*

The data showed that 55% volunteers had *Madhyama satva*, 26.66% had *Avara satva* and 18.33% had *Pravara satva.*

When assessing the *Vyayama shakti* of volunteers, it was observed that 38.33% volunteers had *Madhyama vyayama shakti*, while 35% were *Avyayami*, 21.66% had Avara while 5% had *Pravara vyayama shakti.*

When assessing the *Abhyavaharana shakti* of volunteers; it was observed that 41.66% volunteers had *Madhyama abhyavaharana shakti,* 35% had *Pravara* while 23.33% had *Avara abhyavaharana shakti.*

When assessing the *Jarana shakti* of volunteers, it was observed that 48.33% volunteers had *Madhyama jarana shakti* followed by 31.66% of *Pravara* and 20% of *Avara jarana shakti*.

The data showed 58.33% volunteers belonged to (151-165 cm) Height group, followed by

31.66% of (135-150 cm) Height group while 10% belonged to (166-180 cm) Height group.

According to distribution based on Weight of volunteers, 38.33% belonged to (61-70 kg.) weight group, followed by 35% of (71-80 kg) weight group, 18.33% of (50-60 kg) weight group and 8.33% of (81-100 kg) weight group.

When assessing the BMI of volunteers, it was observed that maximum volunteers (37) 61.66% are BMI group (25-29.9), followed by 30% were (30-34.9) group, while 6.66% observed >35 BMI group.

When assessing the SFT of volunteers, it was observed that maximum volunteers (27) 45% are SFT group (16-20mm), followed by 35% are SFT(21-25mm) group, while 13.33% observed (26-30 mm) group and only 6.66% (31-35mm) group.

When assessing the waist circumference of volunteers, it was observed that maximum volunteers 46.66% are waist circum. (male 36-38 inches and female 33-35 inches) group, followed by 28.33% are waist circum. (male 33-35 inches and female 30-32 inches) group and 21.66% are waist circum. (male 39-41 inches and female 36-38 inches) group.

According to distribution based on Hip circumference of volunteers, it was observed that maximum volunteers 48.33% are Hip circumference (36-38 inches) group followed by 33.33% are (33-35 inches) group while 11.66% observed Hip circum. (39-41 inches) group.

While assessing Total Body weight in relation to Age group the mean body weight in Group I was found to be 66.86 kg and in Group II it was found to be 71.9kg.

Table 1: Total Body Weight in relation to Age Group

Age group	Sample size	Mean Body Weight (kg)	S.D.	S.E.	t value	p value
21-40	30	66.86	6.74	1.74	2.89	<0.01
41-60	30	71.9				

The mean cholesterol in relation to Age group was 165.7 mg/dl in Group I and 184.63 mg/dl in Group II.

Table 2: Mean Cholesterol in relation to Age Group

Age group	Sample size	Mean Cholesterol (mg/dl)	S.D.	S.E.	t value	p value
21-40	30	165.7	17.6	4.54	4.16	<0.001
41-60	30	184.63				

The mean Triglycerides in relation to Age group were 116.06 mg/dl in Group I and 135.83 mg/dl in Group II.

Table3: Mean Triglycerides in relation to Age Group

Age group	Sample size	Mean Triglyceride (mg/dl)	S.D.	S.E.	t value	p value
21-40	30	116.06	18.65	4.81	4.10	<0.001
41-60	30	135.83				

The mean HDL, LDL and VLDL in relation to Age group were 49.36 mg/dl, 93.53 mg/dl and 22.96 mg/dl in Group I and 45.4 mg/dl, 112 mg/dl and 26.93 mg/dl in Group II respectively.

Table 4: Mean HDL in relation to Age Group

Age group	Sample size	Mean HDL (mg/dl)	S.D.	S.E.	t value	p value
21-40	30	49.36	5.18	1.33	2.96	<0.01
41-60	30	45.4				

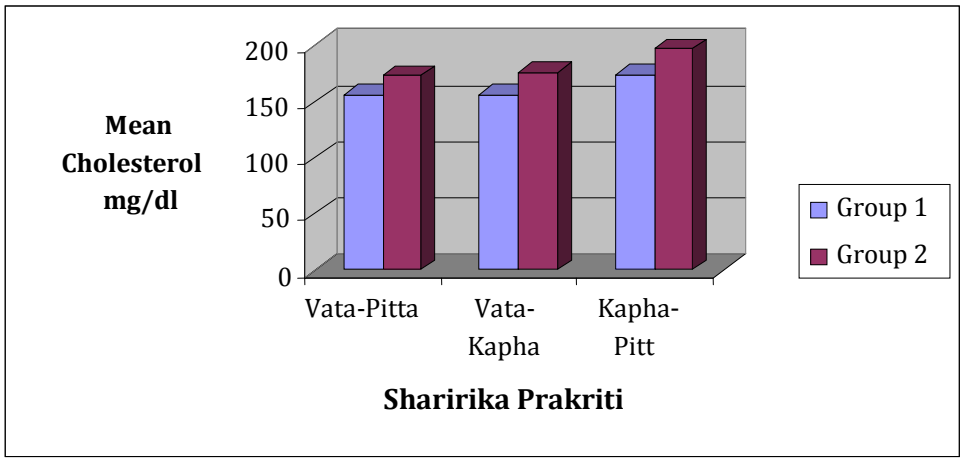
Table 5: Mean LDL in relation to Age Group

Age group	Sample size	Mean LDL (mg/dl)	S.D.	S.E.	t value	p value
21-40	30	93.53	17.37	4.48	4.12	<0.001
41-60	30	112				

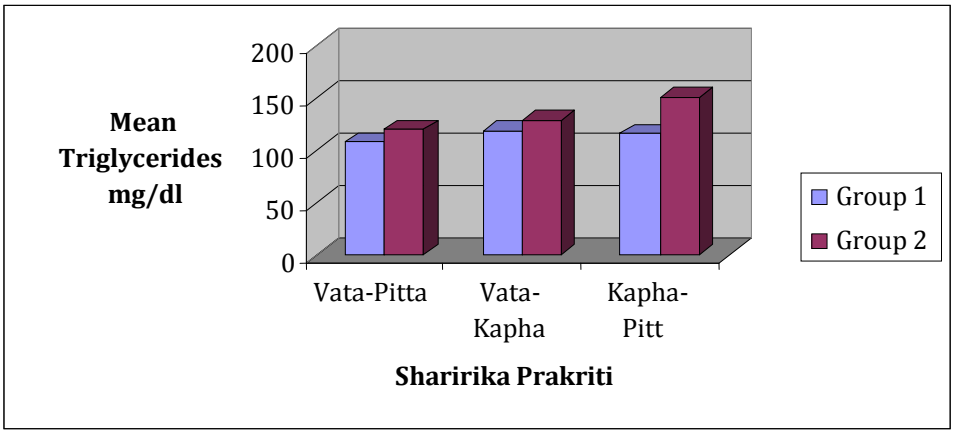
Table 6: Mean VLDL in relation to Age Group

Age group	Sample size	Mean VLDL (mg/dl)	S.D.	S.E.	t value	p value
21-40	30	22.96	3.76	0.97	4.0	<0.001
41-60	30	26.93				

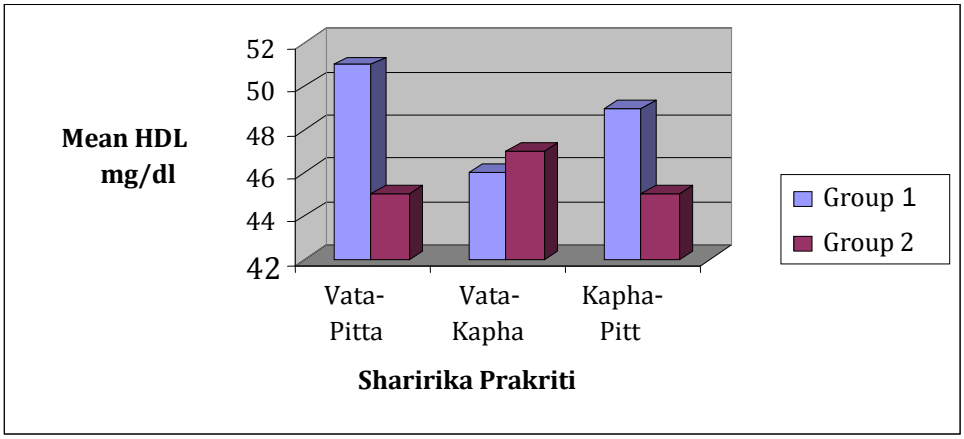
The mean cholesterol in Group I and Group II volunteers of *Vata Pitta Prakriti* came out to be 157 mg/dl and 174 mg/dl respectively. In *Vata Kapha Prakriti* it came out to be 157 mg/dl and 177 mg/dl resp. and in *Kapha Pitta Prakriti* came out to be 175 mg/dl and 198 mg/dl resp.



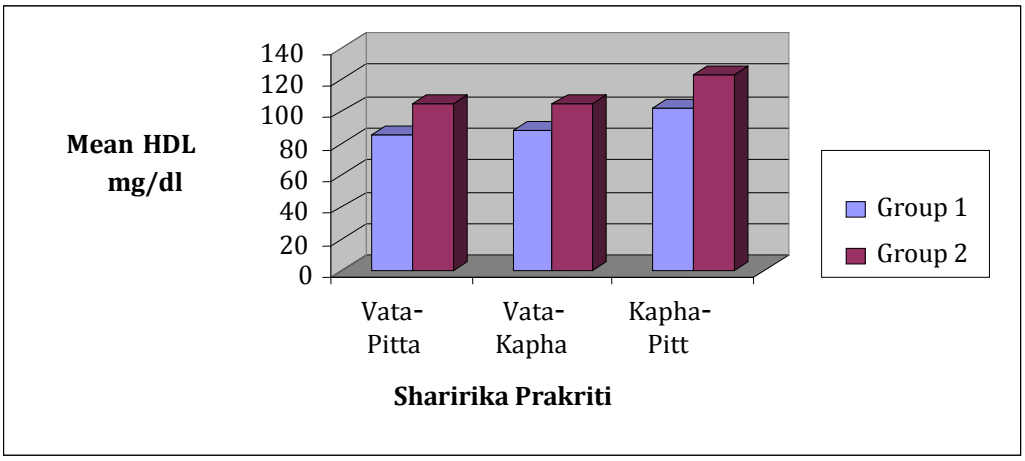
The mean Triglyceride in Group I and Group II volunteers of *Vata Pitta Prakriti* came out to be 108 mg/dl and 120 mg/dl resp., in *Vata Kapha Prakriti* it came out to be 119 mg/dl and 129 mg/dl resp. and in *Kapha Pitta Prakriti* came out to be 116 mg/dl and 152 mg/dl resp.



The mean HDL in Group I and Group II volunteers of *Vata Pitta Prakriti* came out to be 51 mg/dl and 45 mg/dl resp., in *Vata Kapha Prakriti* came out to be 46 mg/dl and 47 mg/dl resp., and in *Kapha Pitta Prakriti* came out to be 49 mg/dl and 45 mg/dl resp.

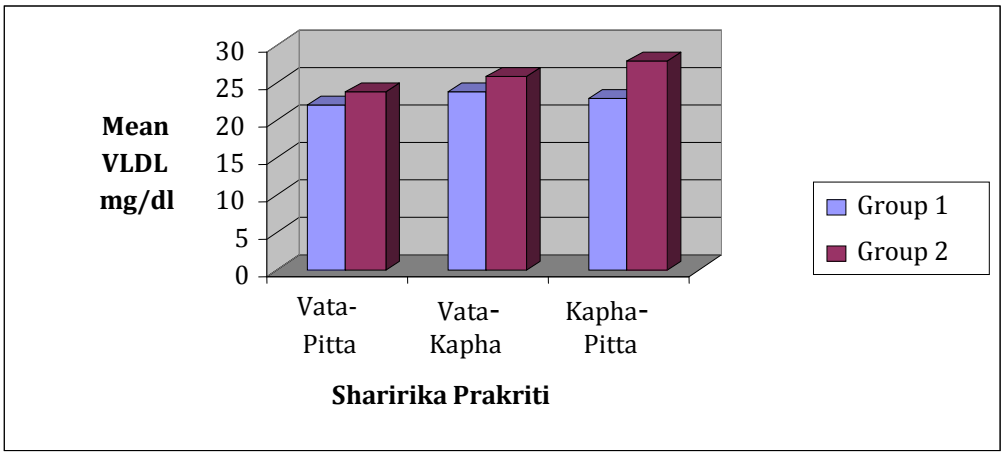


The mean LDL in Group I and Group II volunteers of *Vata Pitta Prakriti* came out to be 85 mg/dl and 105 mg/dl resp., in *Vata Kapha Prakriti* came out to be 88 mg/dl and 105 mg/dl resp., and in *Kapha Pitta Prakriti* came out to be 102 mg/dl and 123 mg/dl resp.



The mean VLDL in Group I and Group II volunteers of *Vata Pitta Prakriti* came out to be 22 mg/dl and 24 mg/dl resp., in *Vata Kapha Prakriti* came out to be 24 mg/dl and 26 mg/dl resp., in *Kapha Pitta Prakriti* came out to be 23 mg/dl and 28 mg/dl resp.

Group II volunteers of *Vata Pitta Prakriti* came out to be 22 mg/dl and 24 mg/dl resp., in *Vata Kapha Prakriti* came out to be 24 mg/dl and 26 mg/dl resp., in *Kapha Pitta Prakriti* came out to be 23 mg/dl and 28 mg/dl resp.



RESULTS AND DISCUSSION

The mean cholesterol level, mean TG level, mean LDL level and mean VLDL level were found to be highly significantly in Group II (41-60 years). Mean HDL was slightly lower in Group II as compared to Group I. Various studies also support the data that as age advances lipid profile levels rise. As women and men get older, their cholesterol levels rise. Before the age of menopause, women have lower total cholesterol level than men of the same age[4]. After the age of menopause, women LDL levels tend to rise. Also, much of the decline in BMR with increasing age, probably related to loss of muscle mass and replacement of muscle with adipose tissue that has a lower rate of metabolism[4]. Likewise, slightly lower BMRs in women, compared with men, are due partly to their lower percentage of muscle mass and higher percentage of adipose tissue[5]. Total cholesterol rises in both men and women through middle age; in women, the rise is more gradual (Miller and Nanjee 1992)[6]. At about age 65 years in men and age 75 years in women, total cholesterol and LDL-C begin to fall (Ferrara et al. 1997)[7]. The progressive decline in cholesterol in the elderly may enrich CHD rates in mid-range cholesterol values (Denke and Winker 1995)[8]. HDL-C values are generally higher in women than in men; they are relatively constant across age groups (Matthews et al. 1989; Johnson et al. 1993)[10], perhaps some decline in women after menopause (Matthews et al. 1989)[9]. Fasting TG rises gradually in both men and women, although at a slower rate in women; in middle age, it may decrease in men and continue to rise in women (The Lipid Research Clinics Program Epidemiology Committee 1979).

A study conducted at Department of Medicine, Massachusetts on the "Role of intestinal sterol transporters Abcg 5, Abcg 8 and NPc 1/1 in cholesterol absorption in mice: gender and age effects" found that there are gender differences in intestinal cholesterol absorption efficiency in animals and humans and the efficiency of cholesterol absorption increase with age[11]. They reported that high doses of oestrogen and ageing greatly increase hepatic outputs of biliary lipids and cholesterol content of bile as well as biliary bile salt pool size and hydrophobicity index in mice, consistent with the

results from human studies. These alterations in biliary lipid outputs explain how gender and age exert a major influence on the efficiency of intestinal cholesterol absorption. Ayurveda also opines that *Dhatvagni* becomes *Manda* with age[12]. The requirements of Poshaka Dhatus are greatest in the *Kaphakala* i.e., the first third of one's age, which corresponds to the period of growth. The middle third of one's age is characterized by *Pittakala* which is marked by an equilibrium, that is the subject neither gains nor looses. The last third period known as *Vatakala* is marked by progressive decline and its outlook is predominantly catabolic. Hence, a rise in both stored and circulating forms of lipids or Sneha *Dravyas* are seen in *Pittakala* when compared to *Kaphakala* which declines again in vatakala[13].

In group II, the physical activity was less as compared to Group I. They led a more sedentary life style. So, the predominantly sweet tasting *Annarasa* behaved very much like *Ama* and from this, produced *Medas* which accumulates[14]. The production of *Medas* is carried out at the expense of other *Dhatus*.

In addition, the mean weight of volunteers in Group II was more than mean weight in Group I. Being overweight also tends to increase our cholesterol. It is well known that losing weight can help lower our LDL and total cholesterol levels as well as raise our HDL and lower our Triglycerides.

The mean Cholesterol, mean TG, mean LDL & VLDL levels were high in *Kapha Pitta Prakriti* persons. Mean HDL levels were highest in *Vata Pitta Prakriti* particularly in Group I. The possible explanations for higher lipid profile values in *Kapha Pitta Prakriti* could be due to similarity between Kapha and Meda dhatu. According to *Ashraya Ashrayi Bhava*, *Vasa* and *Meda* are places of Kapha. These too have definite relationship with other two *Doshas* when it comes to abnormality. *Kapha* is unctuous, smooth, soft, sweet, firm, dense, slow, stable, heavy, cold, viscous and clear[15]. All the properties are similar to *Meda Dhatu. Pitta* has qualities like *Ushna, Drava, Visram, Amlam* and Katukam[15]. When *Pitta Prakriti* person intakes food ingredients which are pungent, heavy (*Ajirna*), *Vidahi* (which cause burning sensation), sour, alkaline etc., the aggravated Pitta suppresses and extinguishes *Agni* (digestive enzymes). As a consequence of the *Manda Dhatwagni*, the *Annarasa* after its formation and absorption is not properly dealt with and results in the circulation of unmetabolized substances[16]. These latter accumulate in the body as *Medas* or fat.

Thus, *Kapha Pitta Prakriti* persons are more likely to have higher lipid profile values. They should follow dietary modifications from the beginning and should follow do's & don'ts to keep the heart healthy as described by specialists in the field. The mean Cholesterol, Triglycerides, LDL and VLDL levels were almost similar is *Vata Pitta* and *Vata Kapha Prakriti*. This could be due to the properties of *Vata* being opposite to *Medadhatu*. *Vata* is unctuous, light, mobile, swift, rough and non slime, leading to non deposition of medodhatu[15].

CONCLUSION

Following conclusions can be drawn from current research project.

- With urbanization, dyslipidaemia and cardiovascular diseases have emerged as an epidemic.
- Developing hyperlipidaemia and associated risks also depends on personal habits of eating, smoking, physical activity and genetic background.
- More incidences can be avoided by following do's and don'ts to keep the heart healthy, as described by specialists in the field.
- Life style changes such as eating a diet, low in saturated fat and regular exercising can help maintain the lipid levels in body. Acharya Charaka has mentioned various prescriptions in *Sutrasthan* 21 for reducing over corpulence. *Kaphapittaja prakriti* persons and with advancing age one should follow these dietary modifications
- The levels of Cholesterol, Triglycerides, LDL-C and VLDL were seen rising with age. All the above levels were higher in Group II as compared to Group I. HDL-C level was slightly lower in Group II when compared to Group I.
- The level of cholesterol, Triglycerides, LDL-C and VLDL were higher in *Kaphapittaja Prakriti* persons when compared to other *Prakritis*. HDL-C level was high in *Vatapittaja Prakriti* and that too in Group I.
- The weight of volunteers was more in Group II as compared to Group I. Less number of volunteers were physically active in Group II.
- HDL-C values were slightly higher in women than in men. They were relatively constant across age groups.
- Hence, Group II and Kaphapittaja Prakriti were more prone to develop hyperlipidaemia and associated risks. Therefore, life style modifications to lower LDL-C levels must be done with increasing age and in Kaphapittaja Prakriti.

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