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Original Research Article

An Observational Study of Medadhatu Sarata w.s.r. to Lipid Profile

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ABSTRACT

Ayurveda believes in theory of equilibrium of *Dosha*, *Dhatu* and *Mala* in the body. Strength of body depends on the excellent and fine quality status of *Dhatu which* is referred as *Dhatusarata*. In modern, *Meda dhatu* can be correlated as lipids and Adipose tissue. Hence, the present study is to establish the relation between the *Medadhatu sarata* and Lipid profile. For this study 60 individuals as per sign and symptoms *Meda dhatu sarata* selected which having criteria of inclusion and exclusion. Data from Lipid profile test reveals that 96.7%, 96.7 %, 100%, 98.3% and 100% respondents were found to desirable Sr. Cholesterol, LDL-C, HDL-C, Triglyceride and VLDL respectively. Other parameters like BMI, RBS, Sr. Creatinine, Hb%, fatigue index, Aayam and Vistara of body were also found as significant.

This study indicates that in *Medadhatu sarata* lipids which are present in the body gives nourishment to body and maintains health. *Medadhatu sarata* shows normal to high value of HDL (good cholesterol) comparatively low value of LDL (bad cholesterol) and Serum Cholesterol. HDL (high-density lipoproteins) carries cholesterol from other parts of the body back to the liver. Liver then removes the cholesterol from the body. LDL (low-density lipoproteins) leads to a buildup of cholesterol in arteries.

Keywords: *Medadhatu sarata*, lipid profile, HDL, LDL

1. INTRODUCTION

According to Ayurveda, Human physiology can be summarized into three categories *Dosha* (governing energies), *Dhatu* (organs and structures) and *Mala* (waste). [1,2] Qualitative, quantitative and functional assessment of all *dhatus* is called as *Dhatu sarata* or tissue excellence. Physical as well as mental strength can be assessed by examining *sarata* of every *dhatu*. Purest form (*vishuddhatara*) of *Dhatu* is called as *Sara Dhatu*. [3] Strength of vishuddhatara Dhatu (purest form of *dhatu*) is excellent hence *vishuddhatara dhatu* is called as *Uttam sara dhatu*.

Dhatu sarata offers certain kind of specific physical and mental strength to the individuals. On this basis individuals are

classified into eight categories, [4] among all *dhatusarata*, we are going to observe symptoms of *Medadhatu sarata* in individuals. According to *Charak Samhita* Individuals having the excellence of *Meda-dhatu* are Characterized by the abundance of unctuousness in complexion, voice, eyes, hair of head and other parts of the body, nail, teeth, lips, urine and feces. Such individuals are endowed with wealth, power, happiness enjoyment, charity, simplicity and delicate habits. [5] *Medadhatu sarata* put forwarded by *Sushruta Samhita*, gives one more characteristics than Charak *Samhita*. Individuals with *Medosarata* bears unctous urine, sweat and voice, he has stout body. He cannot face physical strain. [6]

Symptoms of Medadhatu sarata

***Snigdhanga*:** Due to the *snigdha* guna of *Medo Dhatu*, the various organs like eyes, hairs, loma, nails, teeth, lips are unctuous in *Medasara* individuals. They can pass urine and faeces without much effort.

Brihatshariram Ayasasahishnutvam: Due to presence of *Sarawan Meda* or adipose tissue in the body, *Medasara* individuals appear to be huge physically. But though they have huge physical appearance they can not tolerate hard work and gets easily fatigued. [7]

***Vittam and Sukha*:** As *Meda Sara* individuals cannot tolerate hard physical work, they earn wealth and livelihood through sedentary work. Also their happiness lies in such type of sedentary work.

***Pradanani*:** *Meda Sara* individuals are generous by nature and they used to donate things to needy peoples. They also do charity and other social activities for the society.

***Arjava*:** *Meda Sara* individuals are humble by behaviour and deals respectfully with their parents, teachers and elders.

***Sukumaropcharata*:** *Meda Sara* individuals in spite of their huge bodily appearance cannot tolerate potentially high doses of drugs (*Ushna-Tikshna Aushadhi*). So, in diseased conditions the physician needs to take care of their treatments and need to plan their treatment in very delicate manner so that no adverse effects occurs in the body.

According to modern science, *Meda dhatu* can be correlated as adipose tissue or lipids present in human body so *Medadhatu sarata* also called as excellence of fats or adipose tissue. The human body lipid includes cholesterol, cholesterol esters, phospholipids, and triglycerides. Lipids are transported to blood as large called as Lipoproteins. Lipoproteins divided into four major classes based on density: 1) chylomicrons, 2) very low density lipoproteins (VLDL), 3) low density lipoproteins (LDL) and 4) high density lipoproteins (HDL). [8]

Chylomicrons are the major carriers of exogenous triglycerides Chylomicrons comprise 90% to 95% triglycerides 2% to 6% phospholipids, 2% to 4% cholesteryl ester, 1% free cholesterol and 1% to 2% apolipoprotein.

Very-low-density lipoprotein (VLDL) carries cholesterol from liver to organs and tissues in the body. It is also associated with atherosclerosis and heart disease.

Low-density lipoprotein (LDL) is considered as the 'bad cholesterol' [9] because it carries cholesterol and phospholipids from the liver to different areas of the body, viz. muscles, other tissues and organs such as heart. It is responsible for deposition of cholesterol on walls of arteries causing atherosclerosis (blockage

and hardening of the arteries). High level of LDL increases the risk of heart disease.

High-density lipoprotein (HDL) is referred as the 'good cholesterol' [10] because it carries cholesterol and phospholipids from tissues and organs back to the liver for degradation and elimination. It prevents the deposition of cholesterol on the walls of arteries, by carrying cholesterol away from arteries to the liver. High level of HDL is a good indicator of a healthy heart, because it reduces the blood cholesterol level.

NCEP (National cholesterol education program) guidelines of United States recommended cholesterol levels less than 200mg/dl & values exceeding 240mg/dl are considered as high risk factors. Raised cholesterol(>220mg/dl) is prevalent in 60% population of 50-59 years age group & 55% population in 60-100 years age group in females in India, whereas in males it is prevalent in 45% individuals of 40-49 years age group. From point of view of HDL, 28.2% males & 12.9% females have HDL below 1mmol/L3. [11]

In NHANES studies prevalence of borderline and high cholesterol (>200 mg/dl) and corresponding borderline and high LDL cholesterol (>130 mg/dl) varies from 50 to 70 % which is much more than in India. [12]

2. AIMS AND OBJECTIVES

AIMS – To study the concept of *Medadhatu sarata* w.s.r. to lipid profile.

OBJECTIVES –

- To evaluate symptoms of *Medadhatu sarata* individuals.
- To check lipid profile level in *Medodhatusara* individuals.
- To establish relation between *Medadhatu sarata* and lipid profile.
- To find level of HDL (high density lipoprotein) than that of Total cholesterol and LDL (low density lipoprotein) in *Medodhatusara* individuals.

3. MATERIALS AND METHODS

MATERIALS:

Selection of individuals- In present study 60 individuals having signs & symptoms of *Medadhatu sarata* were selected from the students & staff of the Government Ayurvedic College, Osmanabad and its periphery irrespective of sex, religion, occupation, socioeconomic status and inclusion and exclusion criteria. 60 individuals were randomly selected by Lottery method. Before starting the study, written consent was taken.

Instruments used in the study

- Weighing machine- to determine the weight of individuals.
- Measuring tape- used to measure the body height.
- Disposable needle and syringe- to collect blood sample for lipid profile.
- Varnier Calliper – to measure Anguli Pramana in the examination of Aayam and Vistar.
- Stool or bench – to step up and down in Harward step test to measure physical fatigue index.
- Metronome - to fix frequency of steps in Harward step test.
- Stop watch – It was use to note time duration of Harward step test.
- Semi Automated biochemical analyzer- It was used for estimation of Lipid Profile Test.

METHODS: Study design is majorly divided into two parts:

1. To select the individual having symptoms of *Medadhatu sarata*.

2. To establish relation between *Medadhatu sarata* and lipid profile.

Inclusive Criteria-

1. Persons were selected on the basis of classical signs and symptoms of *Medadhatu sarata*.
2. Persons of either sex.
3. Persons between ages 18-40 years.
4. Persons having BMI up to 25.
5. Persons irrespective of caste, religion, sex, economical status.

Exclusive Criteria-

1. Persons having symptoms of *Medadhatu sarata* but BMI above 25.
2. Age of patient less than 18 years and more than 40 years.
3. Diabetes mellitus.
4. Hypertension.
5. Heart diseases.
6. Already known for bad lipid profile i.e taking drugs like Atorvastatin, omega 3 fatty acids.

Criteria of Assessment

Subjective criteria– *Medodhatu sarata* was assessed on body weight, BMI, biochemical investigation reports, and classical sign and symptoms of *Medodhatu sarata* which described in questionnaires as following

Physical symptoms:-

Varna 2. Swara 3. Netra 4. Kesha 5. Loma 6. Nakha

Danta 8. Oshtha 9. Mutra 10. Purisha 11. Sweda

Mental symtomps :-

1. Vitta 2. Aishwarya 3. Sukha 4. Upabhoga 5. Pradana

6. Aarjava 7. Sukumara Upacharta 8. Bruhatsharir 9.Aayasa Ahishnu

Sr. no.	*Medadhatu sarata* symptoms in %	Conclusion	Grade
1.	0% to 50%	*Heen Medadhatu sarata*	0
2.	50% to 75%	*Madhyam Medadhatu sarata*	1
3.	75% to 100%	*Uttam Medadhatu sarata*	2

Objective Criteria –

1) Lipid Profile Test -According to National Cholesterol Education Program (NCEP), ATP III (Adult Treatment Panel) guidelines

a) Serum Cholesterol value-

Desirable	< 200
Borderline	200-239
High	>240

b) HDL-C (mg/dl)

<40	Low
>60	High

c) LDL-C (mg/dl)

<100	Optimal
100 – 129	Near Optimal
130 – 159	Borderline high
160 – 189	High
>190	Very high

d) Triglyceride (mg/dl)

<150	Normal
150-199	Borderline High
200-499	High
>500	Very High

e) VLDL - <50 mg/dl (Normal)

2) Body Mass Index - Body mass index (BMI or Quetelet's index)

BMI = Weight in kg. / (Height in meter) ^{2}

<18.5	(Underweight)
18.5-24.9	(Normal)
25-29.9	(Overweight)
30>	(Obese)

3) Random blood sugar - < 140 mg / dl (Normal)

4) Serum Creatinine – 0.5 – 1.5 mg / dl (Normal)

5) Hemoglobin percentage (Hb %) -

Normal range: In males - 13.5 – 18 g / dl

In females - 11.5 – 16 g /dl

6) Physical Fatigue Index -

Fatigue Index	Fitness
Below 55	Poor
55 - 64	Low average
65 - 79	Average
80 - 89	Good
90 and above	Excellent

7) Examination of Aayam and Vistar -

Aayam of the body – 84 Angule (Normal)

Vistar of the body – 84 Angule (Normal)

Investigations: -

a) Lipid profile – 1.HDL 2.LDL 3.VLDL 4.Triglycerides 5.Total Cholesterol

b) BMI- Kg/m^2 c) Blood Sugar (R) d) CBC e) ESR

f) Urine (R) & (M) g) Serum Creatinine

Screening: Guidelines of Adult Treatment Panel (ATP) convened by the National Cholesterol Education Program (NCEP) recommend that all adults have plasma levels of Cholesterol and Triglyceride, LDL-C, and HDL-C measured after a 12 – hour overnight fast were followed. All the reagents used in the lipid profile test were from Corel Clinical System Company. For estimation of Serum Cholesterol, Triglycerides and HDL-C the methods of CHOD/PAP, GPO/PAP and PEG precipitation was used respectively. Semi automated biochemistry analyzer of Tulip gr8 lab company was used.

The LDL-C is estimated using following equation:

LDL-C=total Cholesterol-(Triglycerides/5)-HDL-C

(The VLDL-C is estimated by dividing the plasma Triglyceride by 5,

Reflecting the ratio of Cholesterol to Triglyceride in VLDL particles.)

This formula is reasonably accurate if test results are obtained on fasting plasma and if the Triglyceride level does not exceed approximately 200 mg/dL.

4. OBSERVATIONS AND RESULTS

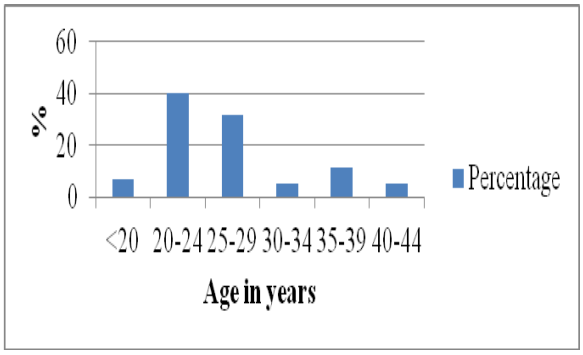

Figure 5.1 Age wise distribution of individuals of *Medadhatu sarata*

Out of 60 individuals maximum individuals (40%) are in the age 20-24 years, followed by 31.7% individuals in the age group 25-29 years. Only 5% individuals are in the age group 30-34 years and 40-44 years.

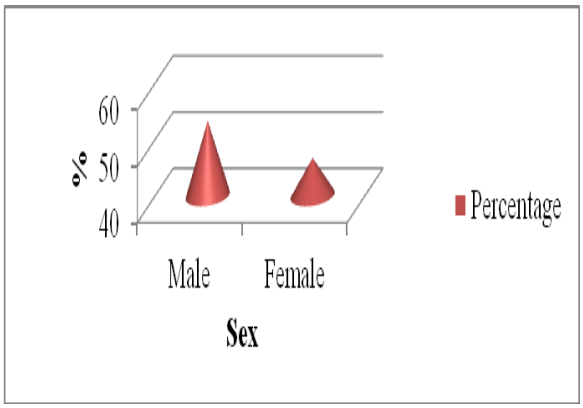

Figure 5.2 Gender wise distributions of individuals of *Medadhatu sarata*

In present study, total 32 (53.3%) were male & 28 (46.75%) were female while more male were recruited out of total 60 individuals.

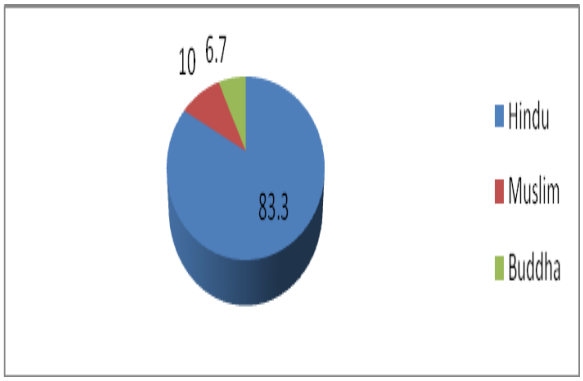

Figure 5.3 Religion wise distribution of individuals of *Medadhatu sarata*

Out of 60 individuals maximum individuals were found in Hindu religion 50 (83.3%), followed by 06 (10%) of Muslim religion and 04 (6.7%) individuals were from Buddha religion.

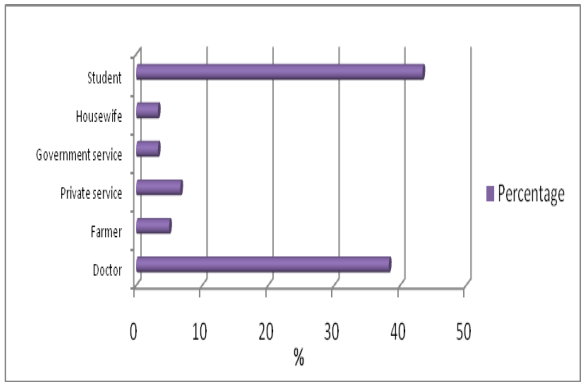

Figure 5.4 Occupation wise distributions of individuals of *Medadhatu sarata*

In present study out of 60 individuals 26 (43.4%) were student, 23 (38.3%) were doctor, 04 (6.7%) were having private service, 03 (5 %) were farmer, 02 (3.3 %) were housewife, 02 (3.3%) were having government service.

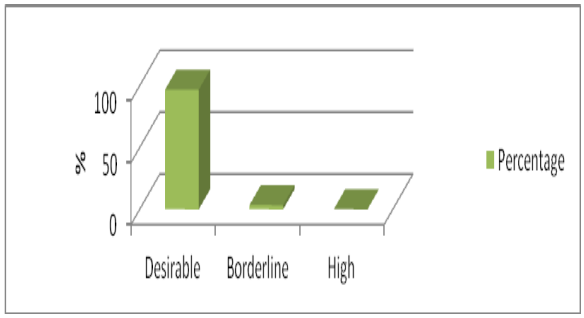

Figure 5.5 Distribution of individuals of *Medadhatu sarata* according to Serum Cholesterol value

96.7% respondents are belonging to desirable Cholesterol value which is statistically highly significantly more (Chi-square=52.3, DF=1,P<0.05) than belonging to other Cholesterol value classification.

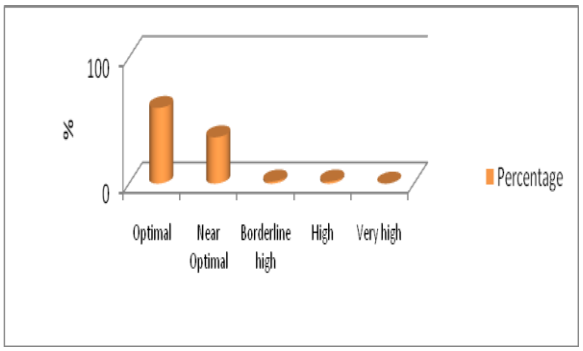

Figure 5.6 Distribution of individuals of *Medadhatu sarata* according to LDL-C

60% respondents are belonging to Optimal LDL-C value which is statistically highly significantly more (Chi-square=58.8, DF=3,P<0.05) than belonging to other LDL-C value classification.

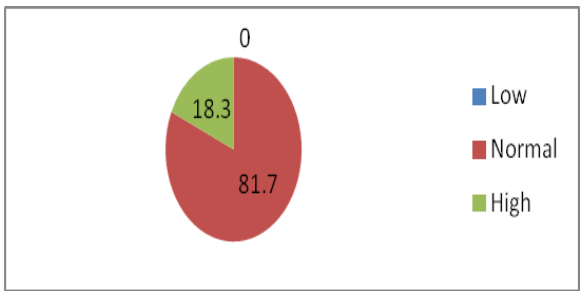

Figure 5.7 Distribution of individuals of *Medadhatu sarata* according to HDL-C

81.7% respondents are belonging to Normal HDL-C value which is statistically highly significantly more (Chi-square=24.1, DF=1,P<0.05) than belonging to other HDL-C value classification.

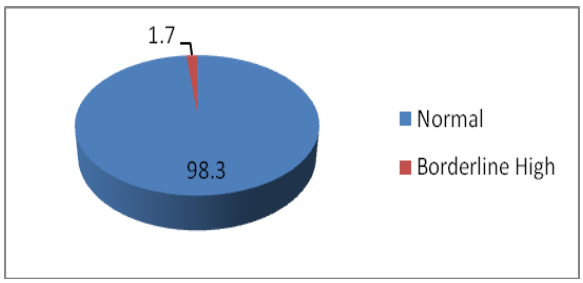

Figure 5.8 Distribution of individuals of *Medadhatu sarata* according to Triglyceride

98.3% respondents are belonging to Triglyceride normal range which is

statistically highly significantly more (Chi-square=56.1, DF=1, P<0.05) than belonging to other Triglyceride classification.

Table 5.1 Distribution of individuals of *Medadhatu sarata* according to VLDL (mg/dl)

VLDL (mg/dl)	Range	No.of respondents	Percentage
Normal	<50	60	100
Borderline High	≥50	00	00
Total		60	100

All respondents (100%) having VLDL is in normal range.

Table 5.2 Distribution of individuals of *Medadhatu sarata* according to Random Blood Sugar (RBS)

RBS	Range	No. of respondents	Percentage
Normal	<140	60	100
Borderline High	≥140	00	00
Total		60	100

All respondents (100%) having RBS is in normal range.

Table 5.3 Distribution of individuals of *Medadhatu sarata* according to Sr. Creatinine

Sr. Creatinine	Range	No. of respondents	Percentage
Normal	0.5-1.5	60	100
Borderline High	>1.5	00	00
Total		60	100

All respondents (100%) having Sr. Creatinine is in normal range .

Table 5.4 Distribution of individuals of *Medadhatu sarata* according to *Aayam*

Aayam	Range	No. of respondents	Percentage
Normal	≤84	00	00
Bruhat Sharir	>84	60	100
Total		60	100

All respondents (100%) having *Aayam* above normal level is classified as *Bruhat Sharir* (Big body).

Table 5.5 Distribution of individuals of *Medadhatu sarata* according to *Vistara*

Vistara	Range	No. of respondents	Percentage
Normal	≤84	00	00
Bruhat Sharir	>84	60	100
Total		60	100

All respondents (100%) having *Vistara* above normal range is classified as *Bruhat Sharir* (Big body).

Table no 5.6 Distribution of individuals of *Medadhatu sarata* according to Body Mass Index (BMI)

Body Mass Index	Range	No. of respondents	Percentage
Underweight	<18.5	00	00
Normal	18.5-24.9	60	100
Overweight	25-29.9	00	00
Obese	≥30	00	00
Total		60	100

All respondents (100%) having Body Mass Index are in normal range.

96.9 % male respondents are belonging to normal range of Hb which is significantly more (Chi-square=28.1,DF=1,P<0.05) than other's Hb %.

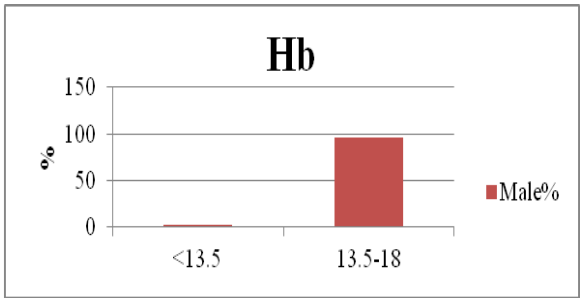

Figure 5.9 Distribution of male individuals of *Medadhatu sarata* according to Hb

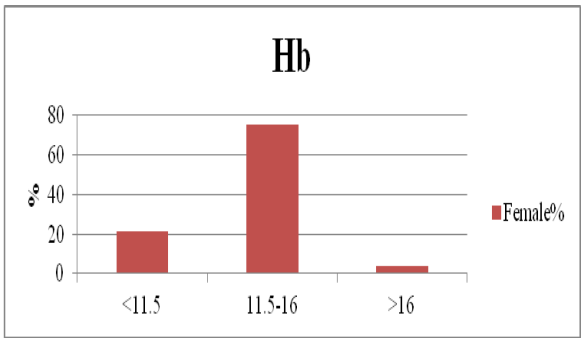

Figure 5.10 Distribution of female individuals of *Medadhatu sarata* according to Hb

75 % female respondents are belonging to normal range of Hb which is significantly more (Chi-square=23.2,DF=2,P<0.05) than other's Hb %.

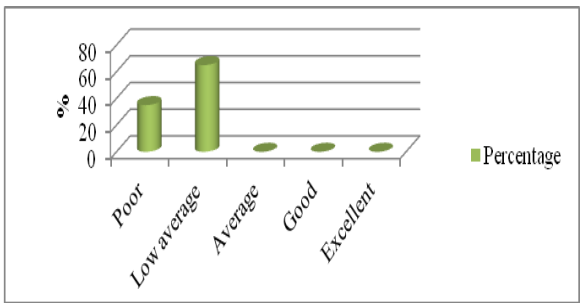

Figure 5.11 Distribution of individuals of *Medadhatu sarata* according to Fatigue Index

65% respondents are belonging to low average is significantly more (Chi-square=5.4, DF=1,P<0.05) than belonging to poor classification.

Table 5.18 Distribution of individuals of *Medadhatu sarata* according to symptoms of *Medadhatusarata*

Symptoms in %	Grade	Category	No of individuals
0% to 50%	0	*Heen Medadhatu sarata*	00
50% to 75%	1	*Madhyam Medadhatu sarata*	00
75% to 100%	2	*Uttam Medadhatu sarata*	60

All 100 % individuals are of *Uttam Medadhatu sarata*.

5. DISCUSSION

Discussion on Observations:

Table 5.1 Age: Observations reveals that out of 60, maximum individuals of *Meda Dhatusarata* are from young age. According to *Sushruta*, in *Madhyavastha Sampurnata* [13] upto 40 years brings development of all *dhatus* as well as whole body, which is well known for strength of the body. So upto that age *Meda dhatusarata* also indicates excellence of the *meda dhatu*.

Table 5.2 Gender : Percentage of male individuals were observed more than females that is 50% it may be due random selection of individuals and percentage of females are more in prevalence of overweight as per WHO recent global estimates. [14] But Lipid profile of female subjects was found to be better than males. [15] At the same time female individuals shows increased values of HDL (High Density Lipoprotein) which is good cholesterol and low values of LDL (Low Density Lipoprotein) which is Bad cholesterol as compared to males. [16]

Table 5.3 Religion : Out of 60 individuals in the study maximum numbers of individuals were found in Hindu religion, they were 50 (83.3%), only 04 (6.7%) individuals were from Buddha religion followed by 06 (10%) individuals were of Muslim religion, it may be due to population distribution in area of study.

Table 5.4 Occupation and socio-economic status: In present study percentage of individuals educated above higher secondary were more, it may be due to individuals from educated class are aware of increasing weight and its relation to its complications hence were more willing for part of study. Most of the individuals from Doctor and students of Ayurved college (81.7%) belonging to upper and upper middle class so according to *Aahar* (nutritious diet), *Nidra* (sound sleep), *Brahmhacharya* (healthy sexual traits) followed by *Dincharya*, *Rutucharya* and *yoga* or exercise like good habits without any addictions helps the individual to became *Medadhatusara*.

Statistical test : Chi Square test is applied for the lipid profile test of individuals of the *Medadhatusarata*. Chi Square test is the most popular discrete data hypothesis testing method. In present study Chi Square test for goodness of fit is used.

Lipid Profile test:

Table 5.5 Serum Cholesterol – Out of 60 individual's average Serum Cholesterol value is 181.4 mg/dl. That means in *Meda dhatusara* individuals, Serum cholesterol value is normal.

Table 5.6 Low Density Cholesterol (LDL–C) – Out of 60 individual's average value of Low Density Cholesterol is 95.73 mg/dl. Thus individuals of *Medadhatu sarata* shows optimal or low level of LDL-C which is bad cholesterol having maximum association with cardiovascular risk.

Table 5.7 High Density Lipoprotein (HDL–C) – Out of 60 individual's average High Density Lipoprotein value is 53.9 mg/dl. It reveals that total 60 individuals of

Meda dhatusarata indicate normal to high level of HDL-C. Thus *Medadhatusara* individuals show significant value of HDL which is known as good cholesterol and protective against atherosclerotic changes.

Table 5.8 Triglyceride (TG) – Out of 60 individual's average Triglyceride value is 101 mg/dl. Thus *Medadhau sarata* shows low value of triglycerides.

Table 5.9 Very Low Density Lipoprotein (VLDL) – Out of 60 individuals average value of Very Low Density Cholesterol is 16.5 mg/dl. Thus *Medadhatusara* individuals have low or normal value of VLDL-C.

Table 5.10, 5.11, 5.15 and 5.16 Other Biochemical Investigations -

In this study, the average value of Random Blood Sugar (RBS) is 92.8 mg/dl. In type-2 DM, insulin resistance and obesity combine to cause mild to moderate Hypertriglyceridemia and low HDL levels. [17] As digestion of lipids maintained mainly by Pancreas and because of proper functioning of Insulin hormone, *Meda Dhatusarata* did not show any increase in blood glucose level so Random Blood Sugar is in normal range.

On other side, the average value of Serum Creatinine is 0.73 mg/dl. Abnormal lipid metabolism is common in renal disease. [18] The nephrotic syndrome and renal failure is associated with raised level of lipid profile. As lipid profile is in normal range, Renal function also becomes normal. Therefore *Meda dhatusara* individuals Sr. Creatinine shows normal range. In this study, 75% female respondents are belonging to normal range of Hb%. Iron deficiency Anemia shows lower value of triglycerides and serum cholesterol. [19] But in *Medadhatusara* individuals Hb% is in normal range.

Table 5.12, 5.13 – *Aayam* and *Vistara* of body

All respondents (100%) having *Aayam* and *Vistara* above normal range is classified as *Bruhat Sharir* (Big body). According to Ayurveda, In healthy individuals *Aayam* and *Vistar* of the body is 84 angule. But *Meda dhatusara* individuals shows Aayam and Vistara above normal range are classified as *Bruhat Sharir*.

Table 5.14 - Body Mass Index (BMI)

Out of 60 individual the average value Body Mass Index (BMI) is 22.78 kg/m^2. All respondents (100%) having Body Mass Index are in normal range. Obesity is associated with higher triglyceride and serum cholesterol and lower HDL levels. Obesity can be measured by body-mass index and BMI of all *Meda dhatusara* individuals shows normal values that mean they are not obese or overweight.

Table 5.17 - Fatigue Index

Out of 60 individual the average value of fatigue index is 53.8. All individuals of Meda dhatusara contributes lower levels of fatigue index. According to *Ayurveda* the symptom of *Aayas Asahishnutva* (not able to do heavy work) belongs to *Medadhatu sarata* which shows lower the values of fatigue index.

Table 5.18 - Symptoms of *Medadhatu sarata*

All the symptoms of *Snigdhata Parikshana* and *Manas Bhava Parikshana* regarding *Meda dhatusarta* belongs to Grade 2 which are represent *Uttam Medadhatu sarata*. According to Ayurveda, Meda dhatu contains all of its essence in *Uttam Medadhatu sarata* which give benefits to individuals.

6. CONCLUSIONS

The following conclusions were drawn from the present study:

- *Dhatusarata* is qualitative, quantitative and functional assessment of *Dhatus*. As *Dhatusarata* represents tissue excellence, *Medadhatu sarata* contributes the excellence of adipose tissue and lipids.
- After assessment of *Medadhatu sarata* among 60 individuals, there is significant relationship obtained between *Uttam Medadhatusara* and lipid profile test.
- In lipid profile test Serum cholesterol, triglycerides, LDL, HDL and VLDL have significant relationship with *Uttam Medadhatusara* individuals.
- *Uttam Medadhatu sarata* shows normal to high value of HDL (good) cholesterol comparatively low value of LDL (bad) cholesterol and Serum Cholesterol.
- There is significant relation between *Uttam Medadhatu sarata* with other parameters such as BMI, Random Blood Sugar, Hb% and Serum creatinine shows normal range.
- There is significant relation between *Aayam* and *Vistara* of Body as well as Physical fatigue index which comes under symptoms of *Medadhatu sarata*.

Thus this study concluded that there is relation between *Medadhatu sarata* and lipid profile. This study indicates that *Meda dhatusarata* shows normal to high value of HDL (good) cholesterol comparatively low value of LDL (bad) cholesterol and Serum Cholesterol. Therefore diet having the fats in proper quantity is required for betterment of the health. This study shows importance of *Medadhatu sarata*, which must be certainly kept in mind while assessment of health of an individual. Further detailed observational study on larger population of patients will be necessary to fully explain and confirm the results obtained in the present study.

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