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Research Article

AYURVEDIC MANAGEMENT OF HYPERLIPIDEMIA WITH *ARJUNA GHAN VATI*

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ABSTRACT

Hyperlipidemia describes a condition in which a patient has high levels of lipids (LDL & triglycerides), low levels of HDL in their blood. Hyperlipidemia is a significant risk factor for heart disease and stroke and it often coexists in patients who are obese. It is very common, especially in modern developed countries. It is also increasing around the world. The prevalence of hypercholesterolemia is around 79% in Indian population. It is said that every 1% reduction in lipid levels, the risk of heart diseases reduces by 2.5%. People with untreated hyperlipidemia are twice likely to develop coronary artery disease (CAD) as those with cholesterol levels in the normal range. This can lead to clogged arteries, which can trigger heart attack, stroke or other serious problems. In Ayurvedic literature, hyperlipidemia is considered as *Medo Vriddhi*, where *Meda* refers to one of the *Dhatus* and *Vriddhi* means increase. In *Medo Vriddhi* or *Medo roga bahu adaddha medas* circulates in the body. In Ayurveda, hyperlipidemia can be called as *Atisthaulya* or *Medo roga* and *Prameha*. All these occur due to *Guru snigdha ahara sevana* which leads to *Ama uttaptti* and the *Ama* produces the *Agni vikriti*. This Ama goes directly to the *Medo dhatu* and gets combined with *Kapha* at tissue level and cause increase in *Medo dhatu.*

INTRODUCTION

In ancient Ayurvedic texts, there is no specific terminology for hyperlipidaemia, *Medoroga* or *Medovriddhi* or Medo dosha use for the same. Hyperlipidaemia is identical to *Asthayi Medo Dhatu vriddli* on the basis of its pathophysiology. *Medo dhatu vriddhi* is *Ama* in origin and if *Dusta medo dhatu* is stored in body for a longer-periods of time, it can result in wide variety of complications. *Medo roga* is a disease caused by excessive accumulation of *Medo dhatu*. It is caused by vitiated *Kapha dosha* from the beginning and then afterwards *Pitta* and *Vata dosha* have an impact in its pathogenesis, causing side effects of their own. In later stages abnormal *Abhaddha apachita Medas* in other *Strotas* causes different adverse effects like *Javaparodha*, *Ayushohrasa*, *Swedabadha* etc *Avyayama, Adhyashana*, *Divaspana, Ati madhura, Guru, Snigdha ahara sevana*, multiple *Mansika bhavas* and *Bheejodosha* are some of the *Nidanas (Hetu)* that patients do. The appearance of symptoms such as *Swedadhikya, Atikshudha, Atipipasa, Dourgandhya, Dourbalya, Utsahahani* and other indicates the involvement of other doshas such as *Pitta* and *Vata*. *Aptarpana chikitsa* can be used with measures such as *Ullekhana, Raktamokshana, Vyayama, Upavasa, Dhuma, Swedana, Sakshaudra ahara, Abhyaprasha, Rukshanna Sevana* and various forms of *Churnas* and *Pradehas*. Since *Kapha dosha* and *Medo dhatu* are primary vitiated factors in the pathogenesis of hyperlipidaemia, *Vishesha Chikitsa* refer to test that leads to a decrease in the former two. Since the treatment of two diseases, *Sthaulya* and *Prameha*, aim to reduce unnecessary kapha dosha and Medo dhatu, there can be seen as a treatment option for the *Vriddha Asthayi Medo Dhatu*.

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Acharya Charaka and Acharya Sushruta both mentioned *Shilajatu, Guggulu, Gomutra, Triphala, Madhu, Loharaja, Rasanjana, Yava, vrukshana* and *Chedaniya, Dravyas, Vayayama* and *Lekhana basti* in *Vatarakta* and *Sthaulya chikitsa*. Sushruta also recommended walking a distance of 100 *Yojana* and adhering to dietary restrictions.

Acharya Charaka has described *Atisthool paurusha* (*Medo Roga* patient) among the *Ashta Nindit Paurasha* (eight despicable personalities)[1] and also considered it as a *Santarpanajanya Roga* [2]. *Medo Roga* or *Sthaulya* is counted as a disorder of *Slesma dosha* located in *Medo dhatu* [3].

Aetiopathogenesis

Acharya Charaka mentioned in Ayurvedic literature that *Bijadosha* (hereditary component) along with *Aharatmaka, Viharatmaka* and *Mansika* factors in the causation of this disease[4] whereas Acharya Sushruta described *Ati sampurana* (excessive eating), *Sheeta, Guru, Snigdha ahara sevana* (excessive consumption of cold, heavy, sweet, unctuous food), *Avayam* (lack of physical exercise), *Avavaya* (lack of sexual life), *Divaswapana* (sleeping in a day time), *Achintanat* (relaxation from tension) are causes *(Nidanas)* of this disease. It is very clear that both endogenous as well as exogenous factors play a crucial role in the manifestation of disease. In *Medo roga* the predominant *Dushya* is *Medo dhatu* but all the three *Doshas* are vitiated, especially *Kledaka Kapha, Pachaka Pitta, Samana* and *Vyana Vata*. There is a difference in the opinion of both Acharyas as Acharya Charaka has emphasized *Ahara* (diet) as the main etiological factor whereas Acharya Sushruta mentioned *Ama dosha* as the cause. The *Kaphavardaka ahara* vihara leads to formation of undigested *Ama rasa*, which by circulating in the body leading to excessive *Meda* (fat) formation due to *Atisnigha guna*. The accumulation of Meda dhatu is termed as *Atisthoolta* by Acharya Sushruta [5]. This vitiated and accumulated Medo dhatu causes obstruction of *Srotas*, the *Vata* moving mainly into stomach, fires up the *Jatharagni* (digestive fire) and absorbs the food. The obese person digest foods speedily and craves for food inordinately. Overeating produces more *Upadana rasa* which causes overgrowth of *Medo dhatu*, thus leads to *Sthulata* or *Medo roga* [6].

Symptoms of *Medo Roga*

The obese person has decreased endurance and less enthusiasm in physical activity due to inordinate increase of fat and flesh, pendulous buttocks, abdomen and breast. Besides these features, the inabilities of these patients are:[7]

1. *Ayushohrasa* (Diminution of life span)
2. *Javaparodha* (Lack of enthusiasm)
3. *Kriccha Vyavaya* (Difficulty in sexual act)
4. *Daurbalya* (General debility)
5. *Daurgandhya* (Foul smelling of body)
6. *Swedabadha* (Distressful sweating)
7. *Kshuradhatimatra* (Excessive hunger)
8. *Pipasatiyoga* (Excessive thirst)

Classification of *Meda* in Ayurveda

Two types of Meda (fat) are described in Ayurveda[8] -

1. *Baddha Meda* (bounded/unmovable)– The fat which is not mobile and is stored in the form of fat at various places (fat depots/omentum/muscles) in the body.
2. *Abaddha Meda* (unbounded/movable)– The fat which is mobile and circulates in the body along with blood in the form of lipids (CH, TG, LDL, HDL, VLDL).

Karma* (Functions) of *Medo dhatu

Snehana (oiliness/luster of skin, hair, eyes etc.,), *Sweda* (sweat), *Dridhatva* (strength), *Asthipusti* (strengthening of bones) and *Netra- Gatra Snigdhata* (oiliness of eyes and body) are the main functions of *Medo dhatu.*

Sthana* (Location) and *Swarupa* (Morphology) of *Medo Dhatu: There are two types of Meda dhatu- One is *Poshaka* (nourishing) and second one is *Poshya* (which get nourished). Among these two *Poshaka Meda dhatu* is mobile in nature, which is circulated in the whole body along with *Rasa – Rakta dhatu*, to give nutrition to *Poshaya Medo dhatu*. Through different imaging technologies it can be visualized that lipids along with cholesterol are being circulated with the blood. *Poshya Medo dhatu* is having immobile nature, which is stored in *Medodharakala*. The site of *Medo dhara kala* is *Udara* (abdomen) and *Anuasthi* (bones). *Udara, Sphika* (buttocks), *Stana* (breast tissue) are also depots of *Poshya Meda* [9].

Medo dhatu is also considered as *Sneha* dominant *Drava dhatu* which is having *Guru, Snigdha* properties and dominance of *Prithvi, Aap* and *Tejo Mahabhuta*.

Arjuna: The drug is mentioned in detail in *Bhavaprakash Nighantu Vatadi varga*. *Arjuna* is known for its lipid lowering and cardio- protective activities. It is one of the most widely used drugs in Ayurveda as cardiotonic, anti-inflammatory and anti-hypertensive drug.

The famous Indian Physician Vagbhata was the first to recommend the use of Terminalia arjuna stem bark for treating heart ailments, further solidifying its importance in traditional medicine[10].

Phytochemistry: The bark contains the flavones, arjunolone, terpenes and their glycosides, arjungenin, friedelin, arjunin, arjunectine, arjun Glycoside I, II, III, Arjunoside II, Arjunolic acid, oleanolic acid, arjunic acid in addition ellagic acid, gallocatechol,

pyrocatechol, tannins (19%), Beta- sitosterol, arjunolic acid, diglycoside (arjunolitin) and large amounts of calcium salts has also been isolated from bark [11].

Classical Names of *Arjuna*

Kakubh, Nadisarj, Indradu, Veervriksha, Veerasch, Partha, Dhananjay, Savyasachi, Shamber[12].

Phamacological Properties (Ayurveda)[13]

Rasa: Kashaya
Guna: Laghu, Ruksha
Virya: Sheeta
Vipaka: Katu
Doshaghanta: Kapha Pitta Shamaka

Taxonomic Classification

Kingdom: Plantae
Division: Mangnoliopsida
Class: Magnoliopsida
Ordem: Myrtales
Family: Combretaceae
Genus: Terminalia
Species: Arjuna
Botanical Name: Terminalia Arjuna Wright and Arn (Roxby)

Modern Introduction

Hyperlipidemia is a medical condition characterised by an elevation of any or all lipid profile and/or lipoproteins in the blood. It is also called hypercholesterolemia/hyperlipoproteinemia. Elevated low density lipoprotein cholesterol (LDL) is thought to be the best indicator of atherosclerosis risk[14]. Dyslipidemia can also lead to elevated cholesterol (TC) or triglyceride (TG) or low levels of high-density lipoprotein cholesterol (HDL). Lipids are fats in blood stream, commonly divided into cholesterol and triglycerides (TG) are best viewed as energy that either used immediately or stored in fat cells. Triglyceride (TG) is manufactured in the liver from the food or being observed from the intestine [15]. The rate limiting enzyme is 3- hydroxy-3- methylglutaryl (HMG)- co A reductase and provides feedback regulation by controlling the cholesterol concentration in cells.

Virchow in 19th century who identified cholesterol crystals in atherosclerotic lesion and stated that endethelial cell injury initiated atherogenesis[16]. The consequences of hyperlipidemias is to cause atherosclerosis, leading to risk of coronary heart disease and strokes. Thus, the risk of heart disease depends on factors such as levels of cholesterol, blood vessels and blood circulation.

Hyperlipidemia are divided into primary and secondary subtypes. Primary hyperlipidemia is usually due to genetic causes (such as mutation in a receptor protein), while secondary hyperlipidemia arises due to other underlying causes such as diabetes. Lipids and lipoprotein abnormalities are common in general population and are regarded as modifiable risk factors for cardiovascular disease due to influence on atherosclerosis[17]. In addition, some forms may predispose to acute pancreatitis.

Signs and Symptoms

Hyperlipidemia, on its own, is typically asymptomatic. However, it can predispose one to more serious medical problems via lipid buildup, such as atherosclerosis, heart attack, stroke[18]. Some indicators of hyperlipidemia are xanthomas, which are yellow bumps on the arms, legs or trunk, or xanthelasmas, which are yellowish deposits of fat on the eye lids[19].

Causes[20]

The major causes of hyperlipidemia are either genetic or lifestyle causes. Individuals with a genetic predisposition for hyperlipidemia or family history are more at risk for this disease. However, unhealthy habits can lead to secondary hyperlipidemia. A diet rich in trans fats or saturated fats, contained in red meats and diary, can lead to secondary hyperlipidemia. Not getting enough exercise can also be a risk factor. Stress and alcohol can lead to elevated levels of cholesterol. Smoking damages blood vessels, contributing to atherosclerosis and lowers HDL levels. An increase in age also increases the risk of hyperlipidemia.

Classification[21]

Hyperlipidemias may basically be classified as either familial (also called primary) when caused by specific genetic abnormalities or acquired (also called secondary) when resulting from another underlying disorder that leads to alterations in plasma lipid and lipoprotein metabolism. Also, hyperlipidemia may be idiopathic.

Hyperlipidemias are also classified according to which types of lipids are elevated, that is hypercholesterolemia, hypertriglyceridemia or both in combined hyperlipidemia. Elevated levels of lipoprotein(a) may be also classified as a form of hyperlipidemia.

Screening Age[22]

The CDC recommends cholesterol screenings once between age 9 and 11, once again between 17 and 21 and every 4 to 6 years in adulthood. USPSTF recommends men older than 35 and women older than 45 to be screened. NCE-ATP III recommends all adults older than 20 to be screened as it may lead to potential modification that can reduce risk of other diseases. However, screening should be done for those with known CHD or risk equivalent conditions (e.g. Acute Coronary Syndrome, history of heart attacks, stable or unstable angina, Transient ischemic attacks, Peripheral

arterial disease of atherosclerotic origins, coronary or other arterial revascularization).

AIMS AND OBJECTIVES

1. To assess the efficacy of Arjuna drug through clinical parameters.
2. To assess the efficacy of the drug through biochemical parameters.
3. To assess the side-effect profile of this drug.

MATERIAL AND METHODS

All the patients are selected from the OPD of NTPHC Suchetgarh, Jammu. The *Arjuna Ghan Vati* of Punarvasu Pharmacy Pune is selected for this study. The main content of *Arjuna Ghan Vati* is *Arjuna* (Terminalia arjuna). Before initiating the study, blood pressure, pulse rate, temperature, weight of all these patients measured at the time of examination.

Inclusion criteria

All patient who are having hyperlipidemia and who are above 30 years of age and below 80 years of age are considered for this study.

Exclusion Criteria

Patients having chronic diseases like heart failure, myocardial infarction, stroke, chronic kidney diseases, epilepsy, pregnant and lactating females and patients >80 years of age, and all those patients who are suffering from autoimmune diseases are excluded from this study.

Duration of Trial: 90 days, beginning in May 2023 up to July 2023.

Dosage: One tablet two times a day before meals with lukewarm water.

Follow up: One follow up after 30 days interval drug trial. One follow-up after 15 days after completion of trial.

Criteria of Assessment

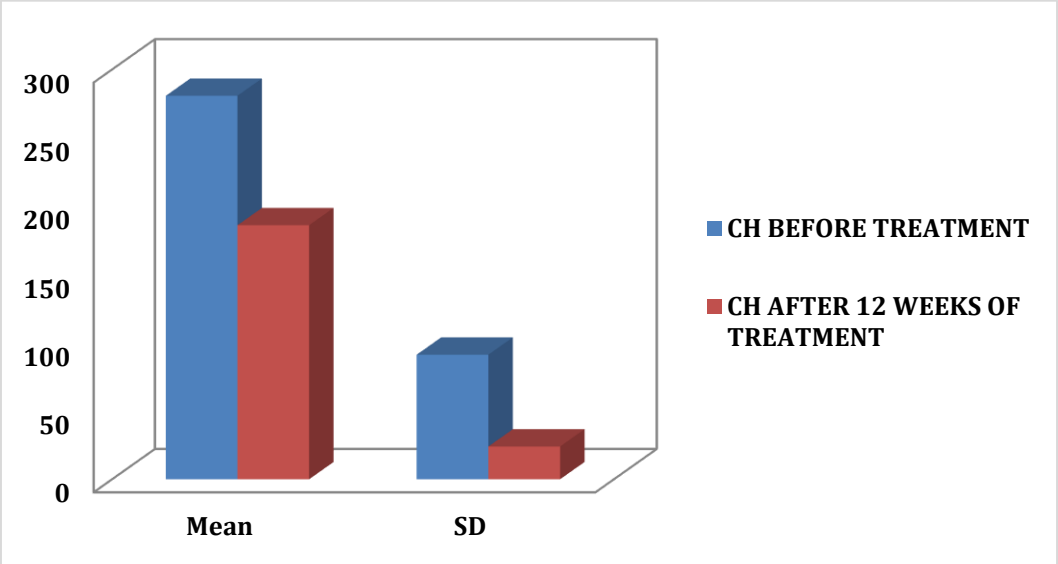
Subjective Criteria

S.No.	Parameters	Before treatment	After treatment
1.	*Chala Sphik*	1	1
2.	*Chala Udara*	1	1
3.	*Chala sthana*	1	1
4.	*Anutsana*	3	1
5.	*Krichrya vyaraaya*	2	2
6.	*Dourbalya*	3	1
7.	*Dourgandha*	3	1
8.	*Swedhabaada*	3	2

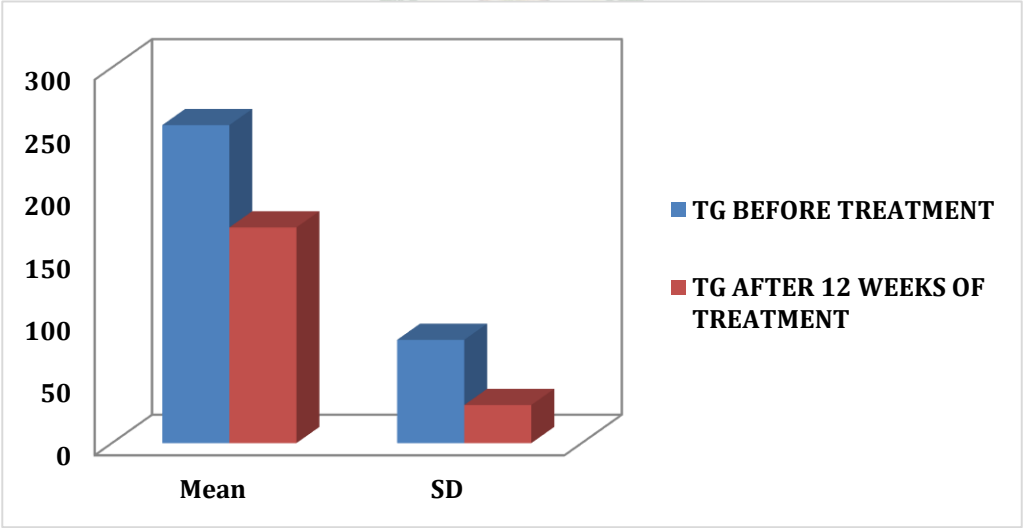
Objective Criteria

S.no.	Feature	Grade 0	Grade 1	Grade 2	Grade 3
1.	Cholesterol	< 200	200-299	300-499	500-699
2.	Triglycerides	< 150	151-300	351-450	451-600
3.	HDL	>40	35 - 39	30 -34	25 - 29
4.	LDL	< 100	101-120	121-140	141-160
5.	VLDL	< 30	31 - 39	40 - 49	<50- 59

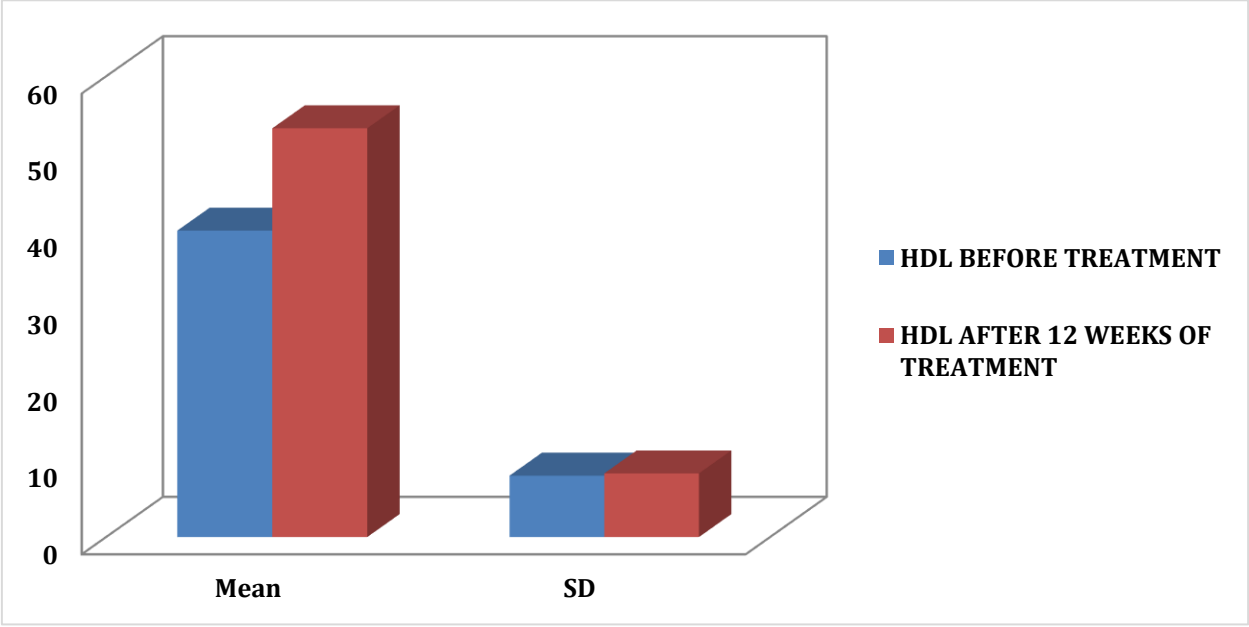
	N	Mean	Diff	%	SD	Wilcoxon Signed-rank test value	p-Value	Remarks
CH before treatment	30	280.73	-	-	91.177	465	<.001	Significant
CH after 12 weeks of treatment	30	185.97	94.76	33.75485	23.968			



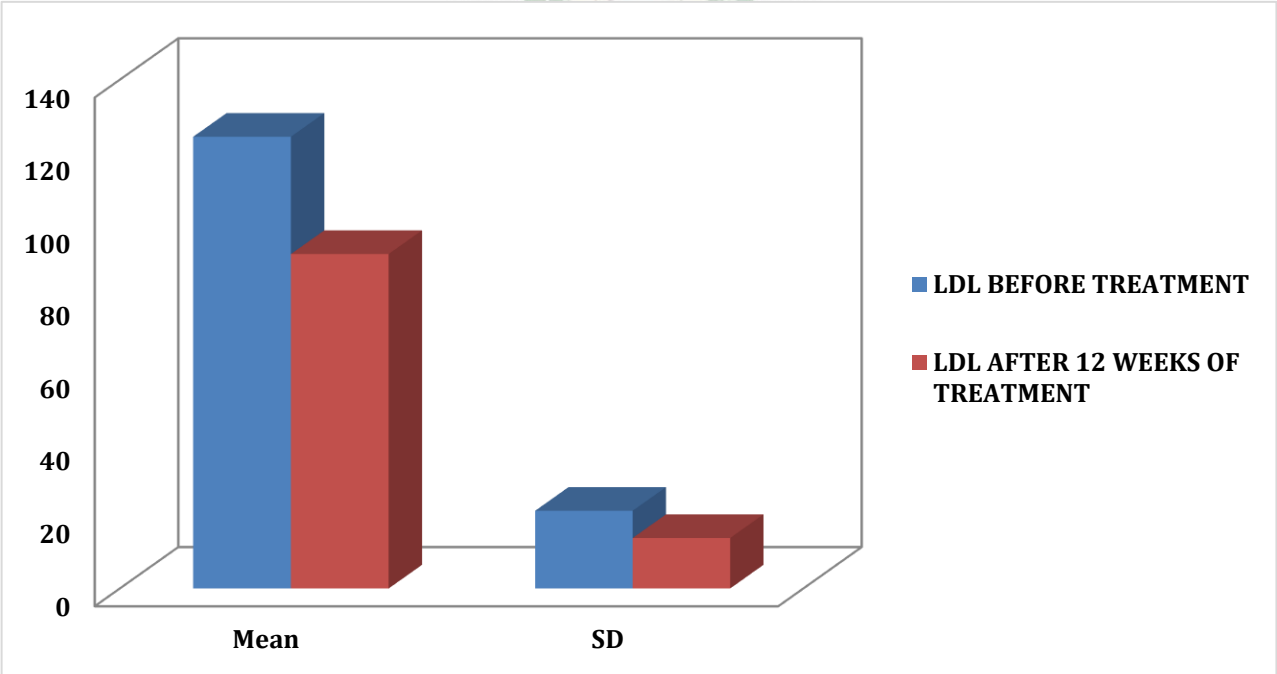
	N	Mean	Diff	%	SD	Wilcoxon Signed-rank test value	p-value	Remarks
TG before treatment	30	254	-	-	82.473	465	<.001	Significant
TG after 12 weeks of treatment	30	172.27	81.73	32.17717	30.406			



	N	Mean	Diff	%	SD	Wilcoxon Signed-rank test value	p-value	Remarks
HDL before treatment	30	39.9	-	-	7.989	0	<.001	Significant
HDL after 12 weeks of treatment	30	53.23	-13.33	-33.4085	8.282			



	N	Mean	Diff	%	SD	Wilcoxon Signed-rank test value	p-value	Remarks
LDL before treatment	30	124.3	-	-	21.372	459	<.001	Significant
LDL after 12 weeks of treatment	30	92.03	32.27	25.96138	13.878			



	N	Mean	Diff	%	SD	Wilcoxon Signed-rank test value	p-value	Remarks
VLDL before treatment	30	43.83	-	-	8.305	435	<.001	Significant
VLDL after 12 weeks of treatment	30	30.53	13.3	30.34451	3.683			

Adverse Effects

No adverse effects is a reported in any of the patients during the trial period. The drug had shown very good improvement in the component of lipid profile test. But it is seen in one female patient that after the intake of *Arjuna ghan vati* she feels heaviness of abdomen. Apart from this no undesirable effect is seen in any of the patients during the trial period.

DISCUSSION

Ayurvedic Mode of Action of *Arjuna*

In Ayurveda, drugs having *Kshaya, Tikta, Katu Rasa, Ushna* and *Tikshana* properties are commonly used for *Meda vilyana* or to decrease excess lipids. *Arjuna* is having *Laghu, Ruksha Guna, Kashaya Rasa, Katu vipaka, Sheeta veeya* and *Prabhav Hriday*. Through *Kashaya, Laghu* and *Ruksha guna* it is *Kapha shamaka* and by *Sheeta veerya* it pacifies *Pitta*. *Arjuna* has the property of *Kaphahara* and *Lekhaniya* because Acharya Charaka placed *Arjun* in *Kashayaskandha*, *Udardaprashamana Mahakashaya*. Acharya Sushruta in *Nyagrodhadi, Salsararadi Gana.* It also has *Raktastamahara, Sandhaniya* and *Vranaropana* to *Kashaya Rasa*.

Mode of Action of *Arjuna* in Western Medicine

Arjuna lowers total cholesterol, LDL cholesterol, triglycerides while increasing HDL cholesterol. It is also having anti-oxidant properties, which can further benefit cardiovascular health by combating oxidative stress. The hypolipidemic action is thought to occur through enhanced hepatic clearance of cholesterol, downregulation of lipogenic enzymes and inhibition of HMG-COA reductase.

CONCLUSION

Hyperlipidemia is one of the world's great public health problems as it is one of the most common modifiable risk factors for myocardial Infarction and coronary heart disease. Lack of physical exercise, indulgence in unwholesome food habits, intake of fat rich diet, excess intake of alcohol, stress, etc., causes vitiation of *Jatharagni* which ultimately leads to *Medo Roga. Medo Roga* is considered as *Kaphaja Nanatmaja Vikara* as mentioned by Acharya Charaka and *Kapha prakriti* persons are more prone to have this disorder. Ayurvedic medicines for *Medo* etc., *Kaphaja Rogas* have excellent efficacy and very low or negligible side effects. *Kashaya, Katu* and *Tikta Rasa, Laghu* and *Rooksha guna* and *Ushna Veerya dravyas* are ideal for their scrapping action and thereby reduces the lipids deposition inside the walls of arteries, thereby improving endothelial dysfunction and also overall improves the cardiovascular health. *Arjuna* lower total cholesterol, LDL cholesterol, triglycerides while increasing HDL cholesterol. It is having anti-oxidant properties which can further benefit cardiovascular health by combating oxidative stress.

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