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STUDY THE SECONDARY PREVENTION OF *AMRITADYA GUGGULU* AND *BHRAMAREE PRANAYAMA* IN HYPERLIPIDEMIA

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ABSTRACT
The hallmark of hyperlipidaemia is high blood lipid concentration in blood disproportionately. In Ayurveda, *Medo Roga (Medo Vruddhi)* is the term for hyperlipidemia. The objectives of the study were to determine the secondary preventive aspect of *Amritadya Guggulu* (AG) and practice of *Bhramaree Pranayama* in Hyperlipidemic patients. Study design was Randomized, Comparative clinical study with 8 week treatment period and 3 months follow up period. Eighty eight patents with Total Cholesterol (TC) >240mg/dl, both genders, aged between 30 to 79 years, were randomly selected from outdoor patient department of *Swastavritta* clinic, National Ayurveda Teaching Hospital, Borella. Selected patients randomly divided into group A(n=44) and B(n=44). Group A patients treated with AG powder and practice of *Bhramaree Pranayama* while group B patients treated with AG powder only. Ethical Clearence Approval was granted by Institute of Indigenous Medicine, University of Colombo. Both groups had a statistically significant reduction in TC ($p<0.01$), LDL ($p<0.05$) and Risk Ratio ($P<0.05$). Only VLDL was significantly reduced in group A ($P<0.05$). Comparing both groups there were significantly different between two groups with Triglycerides level ($p<0.05$) and VLDL ($p<0.01$). Statistically significant reduction in Body Mass Index (BMI) ($p<0.01$), weight ($p<0.01$) systolic blood pressure ($p<0.01$), diastolic blood pressure ($p<0.05$) within Group A and B before and after the treatment. There was significant difference in fasting blood sugar (FBS) among group A and B ($p<0.05$) after the treatment. The present study was concluded as *Amrithadya Guggulu* and *Bhramaree Pranayama* was more effective than using *Amrithadya Guggulu* alone.

KEYWORDS: *Amrithadya Guggulu*, *Bhramaree Pranayama*, Hyperlipidemia, Lipid profile, *Medo roga*.

INTRODUCTION
Hyperlipidemia is characterized by an abnormally high concentration of lipids and lipoproteins in the blood, including cholesterol, triglycerides, low-density lipoprotein (LDL), and very low-density lipoprotein (VLDL). It is often classified based on which type of lipid is elevated. For example, hypercholesterolemia is a type of hyperlipidemia marked by elevated cholesterol levels, while elevated lipoproteins can also be classified as a form of hyperlipidemia.[1] Hyperlipidemias may-be classified as either familial (also called primary) 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. Familial hypercholesterolemia is an inherited condition that causes high levels of LDL (low-density lipoprotein) cholesterol levels beginning at birth, has a 1 in 2 (50 %) chance to pass on that altered gene to each of his or her children and heart attacks at an early age. The altered gene (gene mutation) that causes familial hypercholesterolemia is located on chromosome number 19. It contains the information for a protein called LDL receptor that is responsible for clearing up LDL from the bloodstream. Individuals who inherit the gene mutation from both parents are called homozygotes to have a much more severe form of hypercholesterolemia than heterozygotes.[2]

In the United States, Coronary heart disease is the most common type of heart disease, killing 360,900 people in 2019. About 18.2 million adults age 20 and older have Coronary Artery Disease (CAD)(6.7%). About 2 in 10 deaths from CAD happen in adults less than 65 years old. High blood pressure, high blood cholesterol, and smoking are key risk factors for heart disease. According to Indoor Morbidity and Mortality Return (IMMR) data

for 2019, 50.7% of the total deaths that occurred in the government hospitals in Sri Lanka were due to major Noncommunicable Diseases (NCDs) such as cardiovascular diseases, cancer, chronic respiratory diseases, and diabetes mellitus.[3] In addition to that considering all of the districts in Sri Lanka, the highest prevalence of high blood cholesterol in Colombo is 9%[4]. It can increase the risk of atherosclerosis. That can lead to Angina, heart attack and stroke. Hyperlipidemia which is a major cardiovascular risk factor is common among Sri Lankan adults. It is significantly associated with increasing age, gender, physical activity level, BMI, and diabetes.[5][6] According to a review study conducted from 2000 to 2020 Dyslipidemias in Sri Lanka 77.4% of the adults had some form of dyslipidemia, Sri Lankan dyslipidemia is uniquely different from that evidence from studies conducted in Western populations. It is much in line with dyslipidemia seen in other South Asian countries, Hyperlipidemia can increase the risk of atherosclerosis.[7] So, managing hyperlipidemia by using a well effective Ayurveda treatment is very essential.

According to Ayurveda, "Medo Roga" (MedoVruddhi) is the term for hyperlipidemia. This condition is primarily described by Madhava Acharya in his text "Madhava Nidana".[8] Additionally, Charaka Acharya discusses a similar condition called "Atisthaulya" in his text 'Charaka Samhita' Both Acharyas describe the signs and symptoms of hyperlipidemia in a similar manner.[9] Acharya Charaka also introduces the concepts of Bandha and Abaddhameda in relation to sthaulya: Baddhameda refers to solid or obvious fat of the body, while Abaddhameda refers to free or mobile fat[10].In the ancient time Ayurvedic physicians were treating to the hyperlipidemia patients, used some selected herbal drug formulas according to basic concepts in Ayurveda text and their experience. *Amritadya Guggulu* with bee honey was suitable drug for Hyperlipidemia and which is indicated in many Ayurveda texts such as *Govinda Dasji Bhisagratna*, (1956)*BhaisajyaRathnavali* Volume 2, *MedoRoga*, Chapter 39[11], *Sri Jagadishvara Prasad Tripathy*, (1983) *Chakradatta,Athisthulya Chikithsa*, Chapter, 33[12], *Bulusu Sitaram*(2010) *Bhavaprakasa* of *Bhavamisra* (Original text along with commentary and translation), *Madhyamakhanda*, Chapter 39.[13]

Table 1: Ingredients of *Amrtadya Guggulu.*

Sanscrit name	Scientific name	Part used	Proportion
Amrita	*Tinosphora cordifolia*	Stem	1 Part
Ela	*Elittaria cardamomum*	Seed	2 Part
Vidanga	*Embelia Ribes*	Seed	3 Part
Vatsaka	*Holarrhena antidysentrica wall*	Stem	4 Part
Kalinga	*Holarrhena antidysentrica seed*	Seed	5 Part
Pathya	*Terminalia chebula*	Fruit	6 Part
Amalaki	*Phyllanthus emblica*	Fruit	7 Part
Guggulu	*Commiphora mukul*	Oleogum resine (from stem)	8 Part

According to the table 2.1 Ingredients of *Amrtadya Guggulu* were *Amrita (Tinosphora cordifolia), Ela(Elittaria cardamomum), Vdanga (Embelia ribes), Vatsaka (Holarrhena antidysentrica wall), Kalinga (Holarrhena antidysentrica seed), Pathya(Terminalia chebula) Amalaki (Phyllanthus emblica) and Guggulu(Commiphora mukul).*

Moreover, they have mentioned that Powder form of *Amritadya Guggulu* administrating with bee honey that is a *Anupana* (vehicle).

Table 2: Properties of ingredients of *Amritadya Guggulu* according to Ayurveda.[14]

Name of the ingredient	*Rasa*	*Guna*	*Virya*	*Vipaka*	*Dosha Ghana*	*Karma*
Tinosphora Cordifolia	*Tiktha, Kasaya Madhura*	*Guru, Snigda*	*Ushna*	*Mdhura*	*Pitta, vata, kapha shamaka*	*Rakthashodaka, Deeepana, Pachana*
Elittaria cardamomum	*Katu. Tikta*	*Ruksha, Laghu*	*Seeta*	*Katu*	*Pitta, vata, kapha shamaka*	*Hardya, Muthrajanaka, Deepana, Pachana*
Embelia Ribes	*Katu, Tikta,*	*Lagu, Thishna*	*Ushna*	*Katu*	*Vata, Kapha shamaka*	*Deepana Pachana*
Holarrhena antidysentrica wall	*Tiktha, Kasaya Katu*	*Ruksha, Laghu*	*Sheetha*	*Katu*	*Kapha, Piththa-shamaka*	*Lekhana, Deepana, Rakthshodaka, Dhathushoshana*
Holarrhena antidysentrica	*Tiktha, Kasaya Katu*	*Ruksha, Laghu*	*Sheetha*	*Katu*	*Kapha, Piththa-*	*Deepana, Sangrahi,*

seed					*shamaka*	*Vathanulomaa*
Terminalia chebula	*Madura, Amla, Katu, Tikta, Kasaya*	*Ruksha, Laghu*	*Ushna*	*Madhura*	*Vatha-shamaka*	*Deepana, Pachanama, Mruduvirechana*
Phyllanthus emblica	*Madura, Amla, Katu, Tikta Kasaya*	*Ruksha, Guru*	*Sheetha*	*Madhura*	*Vata, Kapha shamaka Specially pitta-shamana*	*Dahaprashamana, Medya, Hardya, Yakruythuththejaka*
Commiphora Mukul	*Tiktha, Kasaya, Madura, katu*	*Purana-Laghu, Theekshna, Ushna, Sara, Sukshma, Navina Pichchila. Snigda*	*Ushna*	*Katu*	*Pitta, , vata, kapha shamaka*	*Lekhana, Vedanasthapana, Deepana, Anulomana*

Physiological stress" is a common cause of increased lipid levels in the blood and can lead to various heart disorders. Scientific researchers have proven that chronic and mental stress are significant risk factors for hyperlipidemia.[69][70] "*Yoga* treatments" play an important role in reducing stress. Among them, "*Pranayama yoga*" is especially helpful and is considered an effective and easy meditation technique for managing hyperlipidemia.[15] EEG studies conducted during Pranayama practice have shown increased alpha waves, indicating enhanced mental tranquility during the session. Previous scientific research has also mentioned that *Bhramari Pranayama* produces a relaxed state, are parasympathetic activity.[16] The objective of the study were to determine the secondary preventive aspect of *Amritadya Guggulu* (AG) and practice of *Bhramaree Pranayama* in Hyperlipidemic patients.

MATERIALS AND METHODS

Present study was Randomized, Comparative clinical study. Duration of the clinical research was eight weeks and two months follow up period. Eighty eight patients were selected randomly from outdoor patient department of *Swastavritta* clinic from, National Ayurveda Teaching Hospital(NATH), Borella. Ethical Clearence was granted by Ethics Review Committee of Institute of Indigenous Medicine, University of Colombo under ERC No 21/127. Patients were registered for the study, after collecting their consent his/her willingness to the volunteer participation for the research. Patients were examining their general health condition with relevant blood tests. Selected patients will be randomly divided in to two groups which are Group A(n=44) and B(n=44).

Group A: Patients were treated with "*Amritadya Guggulu* powder" and practiced "Bhramari Pranayama", which consisted of ten rounds in the morning and evening for a duration of two months.
Group B: Patients were prescribed with "*Amritadya Guggulu* powder 7.5g mixed with one and half teaspoon of bee honey,

Inclusion criteria:-Patients who exhibit high levels of total cholesterol, LDL, VLDL, triglycerides, and lower HDL (serum total cholesterol >240 mg/dl, HDL < 40 mg/dl, serum triglycerides >150 mg/dl, LDL >160 mg/dl, and VLDL >30 mg/dl)[17][18] and in between the ages of 30 and 75 years were included in the study.

Exclusion criteria: Patients with known heart diseases (eg :- Angina, Congenital heart diseases), with severe hypertension (>160/100Hgmm), age below 29 and over 79 years, and pregnant and lactating mothers, patients with chronic disease conditions -excluded.

Each selected patients were screened with lipid profile test, liver function tests, fasting blood sugar, serum creatinine, and GFR tests before starting the treatment and after completing the 8-week period. Data on socio-demographic characteristics such as age, gender, religion, ethnicity, and others were gathered through a questionnaire. Patients visited the clinic once more after the follow-up period for a final. check-up.

Patients were prescribed with *Amritadya Guggulu* powder 7.5g mixed with one and half teaspoon of bee honey, Morning (Around 8.00 a.m.) and evening(Around 8.00 p.m.) after meal according to the prescription in *Bhaisajya Rathnavali*.[6]

After the treatment period, each patient was assessed through lipid profile, liver function tests (SGPT, SGOT), serum creatinine, eGFR and fasting blood sugar tests. The signs and symptoms of *Medoroga*(Hyperlipidemia) as *Thrusha* (Thirst), *Kshuth* (Hunger), *Swapna* (Daytime Sleepiness), *Ati Sweda* (Hyperhidrosis) *Daurgandya* (Offensive Body Odor). *Daurbalya* (lack of Body Strength) and *Kshudra Shwasa* (Difficulty in breathing) and Maithuna (Impaired or decreased Sexual Performance) and complications of *Medoroga* (Hyperlipidemia) were assessed before and after treatment. Additionally physical examinations (wight, waist circumference, MUAC -mid-upper arm circumference and vital signs blood pressure, pulse, and respiratory rate) were measured at each weekly clinic visit. Efficacy of the treatment is determined on subjective and objective parameters.

RESULTS AND DISCUSSION

Table 3: Distribution of the Sociodemographic characteristics of the respondents.

Characteristics	Group A (n=44)		Group B (n=44)		Total(N=88)	
	n	%	n	%	N	%
Age(Years)						
30-39	6	13.6	5	11.4	11	12
40-49	17	38.6	9	20.5	26	30
50-59	12	27.3	16	36.4	28	32
60-69	6	13.6	9	20.5	15	17
70-79	3	6.8	5	11.4	08	9
Gender						
Male	8	18.2	9	20.5	17	19
Female	36	81.8	35	79.5	71	81
Civil Status						
Unmarried	1	2.3	0	0	01	1
Married	43	97.7	44	100	87	99
Monthly income(Sri Lankan Rupees)						
Below 10000	11	25.0	21	47.7	32	36
10000-20000	2	4.5	1	2.3	03	03
20000-30000	4	9.1	6	13.6	10	11
30000-40000	2	4.5	1	2.3	03	03
40000-50000	0	0	5	11.4	05	07
Above 50000	25	56.8	10	22.7	35	40
Occupation						
Government	26	59.1	5	11.4	31	35
Private	2	4.5	12	27.3	14	16
Self occupation	3	6.8	3	6.8	06	07
Not engaged in occupation	13	29.5	24	54.5	37	42
Religion						
Buddhist	41	93.2	40	90.9	81	92
Catholic	0	0	2	4.5	02	02
Hindu	3	6.8	2	4.5	05	05
Ethnicity						
Sinhala	42	95.5	41	93.2	83	94
Tamil	2	4.5	3	6.8	05	06
Level of education						
Primary	2	4.5	5	11.4	07	7
Up to O/L	9	20.5	18	40.9	27	32
Up to A/L	13	29.5	15	34.1	28	31
Degree	20	45.5	6	13.6	26	30
Living environment						
Urban	34	77.3	33	75.0	67	76
Suburban	4	9.1	7	15.9	11	13
Rural	6	13.6	4	9.1	10	11
Family History of Hyperlipidemia						
Yes	11	25	15	33.3	26	29
No	33	75	29	64.4	62	71

In the present study as shown in Table 4.2 age group (50-59) were high in proportion, i.e.32%. In group A most of them were 40-49 i.e.38.6% age group while group B 50-59 age group i.e.36.4%. Married (99%) female (81%) were also high in total study group. Similar results were observed in group A(Female 81.8% and Married 91.8%) and group B (Female 79.5% and Married 100%). Most of them were unemployed i.e. 42% but most of them were government workers among the employed respondents i.e. 35% and monthly family income was Sri Lankan rupees above 50000.00 (40%). In group A most of them were government workers i.e. 59.1% among the employed respondents and monthly family income was Sri Lankan rupees above 50000.00 (56.8%). In contrast, Group B has more individuals in private employment (27.3%) and a larger number not engaged in any occupation (54.5%) Group B has a higher percentage (47.7%) earning below 10,000 Sri Lankan Rupees.

The majority of participants were Buddhist (92% total), with Group A, B 93.2% and 90.9%.respectively. Sinhala ethnicity was predominant (94% total), with Group A having 95.5% and Group B having 93.2% Sinhala participants. Most of the respondents were education level up to O/L(32%) but Group A had a higher percentage (45.5%) with a degree compared to Group B up to O/L(40.9%). A majority lived in urban areas (76% total), with Group A having 77.3% and Group B 75%. A notable 29% of the total sample reports a family history of hyperlipidemia. Group B has a higher percentage (33.3%) compared to Group A (25%).

Table 4: Distribution of lipid profile in the study group.

Lipid profile	Group A(n=44)		Group B(n=44)		Total (N=88)	
	n	%	n	%	N	%
Total cholesterol (TC) (mg/dl)						
239-240(Borderline high)	5	11.4	5	11.4	10	12
241-400(High)	39	88.6	39	88.6	78	88
Triglycerides (TG) (mg/dl)						
0-150(Desirable)	29	65.9	16	36.4	45	51
150-199(Borderline high)	8	18.2	14	31.8	22	25
200-500(High)	7	15.9	14	31.8	21	24
HDL(mg/dl)						
0-40(Undesirable)	5	11.4	5	11.4	10	11
41-60(Near optimal)	30	68.2	32	72.7	62	71
61-100(Optimal)	9	20.5	7	15.9	16	18
LDL(mg/dl)						
130-159(Borderline high)	4	9.1	5	11.4	09	11
160-190(High)	22	50.0	31	70.5	53	60
191-250(Very high)	18	40.1	8	18.1	26	29
VLDL(mg/dl)						
0-30(Desirable)	30	68.2	16	36.4	46	52
31-100(High)	14	31.8	28	63.6	42	48
Risk ratio(Total cholesterol/HDL)						
0-3.2(Optimal)	2	4.5	0	0	02	02
3.3-4.5(Borderline high)	9	20.5	12	27.3	21	24
4.51-10(High)	33	75.0	32	72.7	65	74

The lipid profile showed in Table 4.10 that TC was high (241-400 mg/dl) in 88% of cases High levels dominated in both groups A and B(in each 88.6%). According to the Triglycerides 51% of respondent were Desirable range (0-150 mg/dl) and Group A and Group B respondents in the Desirable range 65.9% and 36.4% respectively. HDL was near-optimal (41-60) at 71%. while group A and B 68.2% and 72.7% respectively. LDL was high in 60% as well as group A and group B 50.0% and 70.5% respectively. VLDL was desirable in 52% while group A 68.2% desirable and group B High (31-100 mg/dl)The Risk Ratio was high in 74% similar in 75% group A and group B 72.7%.

Table 5: Effect of the treatment on lipid profile before and after among the group A and B by using Paired sample T test.

	Mean		Mean Def.	Std. D.	SEM	95% C.I.D		t	P value
	BT	AT				Lower	Upper		
Group A Pre Total Chol - Post Total Cho.	266.81	233.37	33.44	48.468	7.30	18.70	48.17	4.57	**.001**
Group B Pre Total Cho- Post Total Cho.	265.15	244.87	20.28	44.828	6.75	6.65	33.91	3.00	**.004**
Group A Pre Tri. - Post Tri.	146.36	136.46	9.90	52.046	7.84	-5.92	25.71	1.26	.214
Group B Pre Tri. - Post Tri.	171.69	175.07	-3.38	56.800	8.56	-20.64	13.88	-.39	.695
Group A Pre HDL - Post HDL	53.92	54.05	-.13	8.3296	1.25	-2.65	2.405	-.10	.920
Group B Pre HDL - Post HDL	52.95	52.69	.26	9.1588	1.38	-2.53	3.039	.18	.855
Group A Pre LDL - Post LDL	186.11	153.66	32.45	40.727	6	20.06	44.829	5.28	**.001**

Group B Pre LDL - Post LDL	178.32	157.14	21.18	46.352	6.98	7.09	35.278	3.03	**.004**
Group A Pre VLDL - Post VLDL	28.73	25.82	2.81	8.646	1.30	.27	5.535	2.23	**.031**
Group B Pre VLDL - Post VLDL	34.77	34.57	.20	11.917	1.79	-3.42	3.820	.11	.913
Group A Pre Risk Ratio - Post Risk Ratio	5.17	4.49	.68	1.203	.18	.31569	1.047	3.75	**.001**
Group B Pre Risk Ratio - Post Risk Ratio	5.20	4.85	.35	1.094	.16	.02078	.6860	2.14	**.038**

In group A and B, Paired sample T test revealed that there was a statistically significant reduction in total cholesterol (mean difference = 33.44, p = 0.001), indicating that the treatment had a positive effect in group A while in group B there was a statistically significant reduction in total cholesterol (mean difference = 20.28, p = 0.004), indicating a positive effect of the treatment. There was higher mean difference in group A than group B. In group A respondents followed with Bhramaree pranayama while group B respondents not followed. Results suggested that Bhramaree pranayama had positive effect on total cholesterol. There was a significant reduction in LDL levels (mean difference = 32.45, p = 0.001), suggesting the treatment helped lower harmful cholesterol in group A. As well as a significant reduction in LDL levels was observed (mean difference = 21.19, p = 0.004), suggesting that the treatment had a positive impact on LDL cholesterol group B also. There was higher mean difference in group A than group B. This result was suggested that Bhramaree pranayama had notable effect on total cholesterol. According to the VLDL (Very Low-Density Lipoprotein) a significant change was observed in VLDL levels (mean difference = 2.91, p = 0.031), indicating the treatment had a positive impact only in group A. However in group B significant change was not found in VLDL levels (mean difference = 0.20, p = 0.913. There was a significant change in the risk ratio (mean difference = 0.68, p = 0.001), suggesting an improvement in cardiovascular risk in group A . Also in group B significant change was observed in the risk ratio (mean difference = 0.35, p = 0.038), which indicates an improvement in cardiovascular risk. There was higher mean difference in group A than group B.

Table 6: Comparison of Lipid profile of respondents among group A & B after the treatment by using independent sample T test.

		Levene's Test for Equality of Variances		t-test for Equality of Means					
		F	Sig.	t	p value	Mean Diff.	SEM	95% C.I.D	
								Lower	Upper
Post TC	Equal variances assumed	.694	.407	-1.186	.239	-11.500	9.699	-30.782	7.782
	Equal variances not assumed			-1.186	.239	-11.500	9.699	-30.788	7.788
Post Try	Equal variances assumed	2.301	.133	-2.394	**.019**	-38.604	16.127	-70.665	-6.543
	Equal variances not assumed			-2.394	**.019**	-38.604	16.127	-70.675	-6.533
Post HDL	Equal variances assumed	.003	.954	.542	.589	1.3522	2.493	-3.605	6.310
	Equal variances not assumed			.542	.589	1.3522	2.493	-3.605	6.310
Post LDL	Equal variances assumed	.985	.324	-.376	.708	-3.4795	9.254	-21.876	14.917
	Equal variances not assumed			-.376	.708	-3.4795	9.254	-21.882	14.923
Post VLDL	Equal variances assumed	7.281	.008	-3.092	**.003**	-8.7522	2.830	-14.379	-3.124
	Equal variances not assumed			-3.092	**.003**	-8.7522	2.830	-14.397	-3.107
Post Risk Ratio	Equal variances assumed	.123	.727	-1.336	.185	-.36182	.2708	-.9002	.17657
	Equal variances not assumed			-1.336	.185	-.36182	.2708	-.9002	.17658

Comparing group A and B results of Independent sample T test showed, there was a statistically significant difference between the two groups in triglyceride levels (mean difference = -38.60, p = 0.019). This suggested that the treatment had a significant effect on triglyceride levels among group A and B. Also statistically significant change was found in VLDL levels (mean difference = -8.75, p = 0.003), indicating that the treatment had a positive effect on this lipid parameter among group A and B. Bhramaree pranayama was affected that significant difference of VLDL level.According to the results total cholesterol was not observed statistically significant between the two groups (mean difference = -11.50, p = 0.239), indicating no impact of the treatment on total cholesterol among group A and B. There were no significant change in HDL levels was found (mean difference = 1.35, p = 0.589), meaning that the treatment did not significantly affected

HDL group A and BAs well as significant difference in LDL levels was not observed between two groups A and B (mean difference = -3.48, p = 0.708), suggesting that the treatment did not affect LDL cholesterol. There were significant change not observed in the risk ratio (mean difference = -0.36, p = 0.185), indicating that the treatment had no significant effect on cardiovascular risk.

Table 7: Effect of treatment on BMI, Weight and FBS within group A,B before and after by using Paired sample T test.

	Mean		Mean deff.	SD	SEM	95% C I. D.		t	P value
	BT	AT				Lower	Upper		
Group A Pre BMI - Post BMI	24.969	24.425	.544	.771	.116	.309	.778	4.675	**.001**
Group B Pre BMI - Post BMI	26.900	26.039	.861	1.730	.260	.335	1.388	3.303	**.002**
Group A Pre weight - Post weight	61.708	60.333	1.375	1.6748	.2524	.865	1.883	5.444	**.001**
Group B Pre weight - Post weight	64.415	62.523	1.892	3.7769	.5694	.743	3.040	3.323	**.002**
Group A Pre FBS - Post FBS	102.97	96.88	6.090	40.655	6.128	-6.269	18.451	.994	.326
Group B Pre FBS - Post FBS	109.25	113.16	-3.918	15.198	2.291	-8.539	.702	-1.710	.094

The Paired Samples T-Test results indicate a statistically significant reduction in Body Mass Index (BMI) for Group A before and after the treatment. With a mean difference of 0.544 and a p-value of 0.001, this suggests that the change in BMI is statistically significant at a confidence level of 95%. The t-value of 4.675 supported this conclusion, as the p-value is below 0.05.In group B The Paired Samples T-Test results indicate a statistically significant reduction in Body Mass Index (BMI) for Group B before and after the treatment. The mean difference in BMI is 0.861, with a standard deviation of 1.730. With a p-value of 0.002 and a t-value of 3.303, the results show that the reduction in BMI after treatment is statistically significant at a 95% confidence level. Both groups were observed a significant reduction in BMI, The statistical significance ($p < 0.05$) for both groups supports the effectiveness of the treatment in reducing BMI. The Paired Samples T-Test results indicate a highly significant reduction in weight for Group A before and after the treatment. The mean weight difference is 1.375, with a standard deviation of 1.6748. With a t-value of 5.444 and a p-value of 0.001, this change is statistically significant at a 95% confidence level. In group B the Paired Samples T-Test results show a statistically significant reduction in weight before and after the treatment. The mean weight difference is 1.892, with a standard deviation of 3.7769. With a t-value of 3.323 and a p-value of 0.002, this change is significant at a 95% confidence level. Reduction in weight is treatment effectively reduced weight within Group B. The Paired Samples T-Test results showed no statistically significant change in fasting blood sugar (FBS) within Group A before and after the treatment. The mean difference in FBS is 6.09091, with a standard deviation of 40.655. The t-value is 0.994, and the p-value is 0.326, which is greater than 0.05, indicating that the observed difference is not statistically significant. In group B the Paired Samples T-Test results indicate that there was no statistically significant change in fasting blood sugar (FBS) within Group B before and after the treatment. The mean difference in FBS is -3.918, with a standard deviation of 15.198. The t-value is -1.710, and the p-value is 0.094, which is greater than 0.05, showing that the change is not statistically significant.

Table 8: Comparison of Weight, BMI, FBS among group A & B after the treatment by using Independent sample T test.

Independent Samples T Test									
		Levene's Test for Equality of Variances		t-test for Equality of Means					
		F	Sig.	t	p value	Mean Diff.	SEM	95% C.I.D	
								Lower	Upper
Post BMI	Equal variances assumed	2.777	.099	-1.830	.071	-1.613	.881	-3.366	.139
	Equal variances not assumed			-1.830	.071	-1.613	.881	-3.369	.142
Post weight	Equal variances assumed	.153	.696	-.990	.325	-2.190	2.212	-6.588	2.207
	Equal variances not assumed			-.990	.325	-2.190	2.212	-6.588	2.207
FBS	Equal variances assumed	4.230	.043	-2.561	**.012**	-16.281	6.358	-28.922	-3.641
	Equal variances not assumed			-2.561	**.013**	-16.281	6.358	-29.020	-3.542

Results of the Independent Samples T-Test suggested that there is no statistically significant difference in BMI between Group A and Group B after the treatment. With a p-value of 0.071 (>0.05). This indicates that the difference in BMI between the groups is not statistically significant, suggesting that both groups showed similar outcomes in terms of BMI reduction after the treatment. The Independent Samples T-Test results indicated that there is no statistically significant difference in post-treatment weight between Group A and Group B. The p-value is 0.325 (greater than 0.05) This suggests that the weight outcomes after treatment were similar for both groups, with no statistically significant difference between them. The Independent Samples T-Test results indicate a statistically significant difference in fasting blood sugar (FBS) reduction between Group A and Group B after treatment. With a p-value of 0.012 (assuming equal variances) and 0.013 (not assuming equal variances), both were below the 0.05 threshold, indicating a significant difference. This indicate that one group experienced a significantly different change in FBS levels compared to the other following treatment.

Table 9: Effect of treatment on Liver function and Kidney function test parameters within group A before and after by using Paired sample T test.

	Meam		Mean def.	Std. d.	SEM	95% C.I.D.		t	p value
	BT	AT				Lower	Upper		
GroupA Pre SGPT - Post SGPT	27.863	24.931	2.931	18.148	2.735	-2.585	8.449	1.072	.290
GroupB Pre SGPT - Post SGPT	31.334	31.227	.106	18.544	2.795	-5.531	5.744	.038	.970
GroupA Pre SGOT - Post SGOT	24.718	27.181	-2.463	18.694	2.818	-8.147	3.220	-.874	.387
GroupB Pre SGOT - Post SGPT	32.911	28.584	4.327	21.279	3.208	-2.142	10.796	1.349	.184
GroupA Pre Se. Cre. - Post Se. Cre,	.783	.780	.002	.091	.0137	-.025	.0298	.148	.883
GroupB Pre Se.Cre. - Post Se. Cre.	.799	.842	-.042	.108	.016	-.075	-.009	-2.58	**.013**
GroupA Pre GFR - Post GFR	85.859	85.653	.205	5.288	.79725	-1.401	1.813	.258	.797
GroupB Pre GFR - Post GFR	102.641	82.370	20.271	124.792	18.813	-17.668	58.212	1.078	.287

In group A the Paired Samples T-Test results show that there were no statistically significant changes in liver and kidney function parameters within Group A before and after treatment: SGPT with mean difference = 2.931, and a p-value of 0.290, indicated no significant change. SGOT with mean difference = -2.463, and p-value of 0.387, also indicating no significant change. For kidney function, Serum Creatinine with mean difference = 0.002, and a p-value of 0.883, showing no significant change. eGFR with mean difference = 0.205, and p-value of 0.797, also showing no significant change. These results suggest that the treatment did not significantly impact liver or kidney function within Group A, as all p-values exceed the 0.05 significant level. Within Group B the Paired Samples T-Test results for liver and kidney function parameters show the following: SGPT with mean difference = 0.106, and p-value of 0.970, indicating no significant change. SGOT with mean difference = 4.327, and p-value of 0.184, indicating no significant change. For kidney function, Serum Creatinine: Mean difference = -0.042, with a p-value of 0.013, indicating a statistically significant change. eGFR with mean difference = 20.271, and p-value of 0.287, indicating no significant change. The results suggested that there were no significant changes in liver function (SGPT and SGOT) or eGFR, but there was a significant change in serum creatinine levels within Group B before and after the treatment, with a p-value of 0.013.

Table 10: Comparison of Liver function and Kidney function test parameters among group A & B after the treatment by using Independent sample T test.

Independent Samples Test									
		Levene's Test for Equality of Variances		t-test for Equality of Means					
		F	Sig.	t	P value	Mean Diff.	SEM	95% CID	
								Lower	Upper
Post SGPT	Equal variances assumed	2.349	.129	-1.457	.149	-6.295	4.321	-14.886	2.295
	Equal variances not assumed			-1.457	.149	-6.295	4.321	-14.898	2.307
Post SGOT	Equal variances assumed	.198	.658	-.381	.704	-1.402	3.683	-8.723	5.919
	Equal variances not assumed			-.381	.704	-1.402	3.683	-8.728	5.924
Post serum creatinine	Equal variances assumed	.011	.918	-1.579	.118	-.0611	.038	-.138	.015
	Equal variances not assumed			-1.579	.118	-.0611	.038	-.138	.015
Post GFR	Equal variances assumed	.063	.802	1.514	.134	3.282	2.168	-1.027	7.593
	Equal variances not assumed			1.514	.134	3.282	2.168	-1.031	7.597
Post systolic blood pressure	Equal variances assumed	.061	.806	.732	.466	2.182	2.979	-3.741	8.105
	Equal variances not assumed			.732	.466	2.182	2.979	-3.741	8.105
Post diastolic blood pressure	Equal variances assumed	1.878	.174	-.057	.955	-.114	1.994	-4.077	3.850
	Equal variances not assumed			-.057	.955	-.114	1.994	-4.078	3.851

The Independent Samples T-Test results comparing Group A and Group B for liver and kidney function parameters showed as SGPT (Liver function): The p-value is 0.149, indicating no significant difference between the two groups post-treatment. SGOT (Liver function): The p-value is 0.704, indicating no significant difference between the two groups post-treatment. The Independent Samples T-Test results showed no significant differences in systolic and diastolic blood pressure between Group A and Group B after treatment: Post Systolic Blood Pressure p-value was 0.466, which was greater than 0.05, indicating no significant difference between the two groups. Post Diastolic Blood Pressure the p-value was 0.955, which was also greater than 0.05, indicating no significant difference between the two groups. These results suggested that there were no significant differences in systolic and diastolic blood pressure between Group A and Group B after treatment. For kidney function, Serum Creatinine: The p-value is 0.118, indicating no significant difference between the two groups post-treatment. e GFR: The p-value is 0.134, indicating no significant difference between the two groups post-treatment. These results suggest that there were no significant differences in liver (SGPT, SGOT) or kidney function (serum creatinine, eGFR) between Group A and Group B after the treatment, as all p-values are above the 0.05 significance level.

Table 11: Effect of the symptoms before and after on the treatment of group A,B by using Wilcoxon signed rank test.

Symptoms	Group A				Group B			
	Z value	Mean Rank		P value	Z value	Mean Rank		P value
		Negative	Positive			Negative	Positive	
Thirst	-4.45	15.26	11.50	.001	-5.23	17.58	15.00	.001
Hunger	-4.83	16.30	7.00	.001	-4.80	15.00	00.00	.001
Sleepiness	-5.29	18.00	0.00	.001	-4.94	18.24	27.50	.001
Hyperhidrosis	-4.74	15.67	10.50	.001	-4.09	12.20	7.50	.001
Body Odor	-4.47	13.00	0.00	.001	-4.96	14.50	00.00	.001
Sexual performance	-3.37	16.00	11.05	.001	-.677	8.88	7.00	.499
Body strength	-4.78	17.50	35.00	.001	-4.75	18.38	20.50	.001
Difficult in breathing	-5.38	19.00	00.00	.001	-5.23	18.00	00.00	.001

Table 4.21 revealed that in group A all the symptoms showed p-values of less than 0.05, indicating strong statistical evidence of improvement. Thirst, Hunger, Hyperhidrosis, Body Odor, Body Strength, Sexual

Performance and Breathing Difficulty all have p-values <0.001, showing highly significant improvements. The highest Z-value, for Breathing Difficulty (-5.38), suggested this symptom had the most significant change. The lowest Z-value, for Sexual Performance (-3.37), suggests it showed improvement, but to a lesser degree than the other symptoms in group A. In group B were observed Thirst, Hunger, Sleepiness, Hyperhidrosis, Body Odor, Body Strength, and Difficulty in Breathing all showed statistically significant improvements after treatment, with p-values <0.001. The Z-values for these symptoms are relatively high (ranging from -4.09 to -5.23), indicating substantial changes in symptom severity from pre-treatment to post-treatment. However there were not Significant Improvement in Sexual Performance(p>0.05) in group B. Sexual performance has a p-value of 0.499, indicating no statistically significant change. The Z-value for sexual performance is -0.677, much lower than for the other symptoms. This result suggests that the treatment did not have a measurable effect on sexual performance in this group. But in group A Sexual Performance has a p-value of 0.001, which is statistically significant.

Table 12: The comparison of symptoms of Hyperlipidemia (Medoroga) among the group A & B after the treatment by using Mann-Whitney U test.

Symptoms	Z value	Mean Rank		p value
		Group A	Group B	
Thirst	-.295	43.78	45.22	.768
Hunger	-.391	43.49	45.51	.696
Sleepiness	-.118	44.80	44.20	.906
Hyperhidrosis	-1.95	39.44	49.56	**.050**
Body Odor	-.781	46.43	42.57	.435
Sexual performance	-2.55	51.10	37.90	**.011**
Body strength	-.763	46.44	42.56	.446
Difficulty in breathing	-5.64	43.20	45.80	.615

For most symptoms (thirst, hunger, sleepiness, body odor, body strength, and difficulty in breathing), no statistically significant differences were observed between Group A and Group B in post-treatment. The p-values for each of these symptoms are above the 0.05. Sexual performance showed a statistically significant difference between the groups (Z = -2.55, p = 0.011. This suggested that the treatment had a notable impact on sexual performance in post-treatment difference between the two groups. Hyperhidrosis also demonstrated a significant effect of treatment (Z = -1.95, p = 0.050), indicating that the intervention had significantly impact on this condition as well among group A and B.

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Table 13: Comparison of Lipid profile among group A & B after the follow-up by using Independent sample T test.

Independent Samples T Test									
		Levene's Test for Equality of Variances		t-test for Equality of Means					
		F	Sig.	t	p value	Mean def.	SEM	95% C.I.D	
								Lower	Upper
Follow-up TC	Equal variances assumed	.056	.814	1.656	.105	19.500	11.776	-4.205	43.205
	Equal variances not assumed			1.656	.105	19.500	11.776	-4.209	43.209
Follow-up Try	Equal variances assumed	.230	.634	-.047	.963	-.958	20.473	-42.169	40.253
	Equal variances not assumed			-.047	.963	-.958	20.473	-42.246	40.329
Follow-up HDL	Equal variances assumed	.000	.999	1.619	.112	5.375	3.320	-1.309	12.059
	Equal variances not assumed			1.619	.112	5.375	3.320	-1.309	12.059
Follow-up LDL	Equal variances assumed	.231	.633	1.451	.154	16.666	11.486	-6.453	39.787
	Equal variances not assumed			1.451	.154	16.666	11.486	-6.458	39.792
Follow-up VLDL	Equal variances assumed	.593	.445	-.756	.453	-2.416	3.195	-8.849	4.016
	Equal variances not assumed			-.756	.453	-2.416	3.195	-8.857	4.024
Follow-up Risk Ratio	Equal variances assumed	.010	.920	-.088	.930	-.0254	.289	-.608	.557
	Equal variances not assumed			-.088	.930	-.0254	.289	-.608	.557

The Independent Samples T-Test results showed that there were no statistically significant differences between Group A and Group B in the follow-up for the lipid profile parameters after treatment. There were no statistically significant differences with Total Cholesterol: p-value = 0.105, Triglycerides with p-value = 0.963, HDL with p-value = 0.112, LDL with p-value =

0.154, VLDL with p-value = 0.453 and Risk Ratio: p-value = 0.930.

Past study revealed that treated with Amritadya Guggulu for one group and Amritadya Guggulu with Yavamalaki Choorna for one group 30 days. Total cholesterol, LDL,VLDL and Triglycerides were statistically significant at p<0.001 and HDL was statistically significant change in HDLin Group which treated only Amritadya Guggulu (P=0.043).Same study observed that comparing two groups with giving Amritadya Guggulu for one group and Amritadya Guggulu with Yavamalaki Choorna for one group there was only significant difference between two groups only VLDL (P=0.01) but in our study significant effect on triglyceride levels among group A and B.Further above study mentioned that treated with Amrithadya guggulu within Group A and Group B were significantly associated with BMI(p<0.001.)[9] Past study revealed that treated with Amrithadya guggulu within Group A and Group B were significantly associated with weight (p<0.001.).[20] Previous study mentioned that Amritadya Guggulu possesses Rasa- Katu, Tikta, Kashaya, Guna- Laghu, Ruksha and Virya- Ushna, Vipaka- Katu, Dosha Karma- Kapha Vatashamaka is effective in the management of medogoga. By virtue of its Rasapanchaka, contents of drug are very well indicated in Kapha predominant pathologies.[21] Past study mentioned that chronic stress causes prolonged cortisol elevation, which causes central obesity and insulin resistance. It decreases peripheral glucose absorption while increasing gluconeogenesis. Stress may also reduce the amount of glucose absorbed and insulin secreted by releasing endorphins and growth hormones. Pranayama has been demonstrated to lower sympathetic hormone and cortisol levels.[22] Past study concluded that Bhramari Pranayama has significantly reduced the Blood Pressure in the hypertensive as well as in the normotensive participants immediately after its practice.[23]

CONCLUSION

Corresponding to the results of present study following outcomes were highlighted. Combined treatment of *Amrithadya Guggulu* and *Bhramaree Pranayama* in group A and single treatment of *Amrithadya Guggulu* in group B were statistically significant reduction in total cholesterol(p<0.01), LDL (p<0.05)and Risk Ratio(P<0.05). Only VLDL was significantly reduced in group A which was treated with combine therapy (*Amrithadya Guggulu* and *Bhramaree Pranayama*)(P<0.05). Comparing both groups there were significantly difference in two groups with Triglycerides level (p<0.05) and VLDL (p<0.01). Statistically significant reduction in Body Mass Index (BMI) (p<0.01) and Weight(p<0.01) for Group A and B. There were significantly difference in fasting blood sugar (FBS) among group A and B (p<0.05). Results indicated significant changes in both systolic (p<0.01)and diastolic (p<0.05) blood pressure within Group A and B before and after the treatment. *Amrithadya Guggulu* and *Bhramaree Pranayama* treatment highly significant with symptoms *Thrusha* (Thirst), *Kshuth* (Hunger), Swapna (Daytime Sleepiness), *Ati Sweda* (Hyperhidrosis) *Daurgandya* (Offensive Body Odor). *Alpa Maithuna* (Impaired or decreased Sexual Performance), *Daurbalya* (lack of Body Strength), *Kshudra Shwasa* (Difficulty in breathing) – Shortness of breath (p<0.001). In group B *Thrusha* (Thirst), *Kshuth* (Hunger), Swapna (Daytime Sleepiness), *Ati Sweda* (Hyperhidrosis) *Daurgandya* (Offensive Body Odor). *Daurbalya* (lack of Body Strength) and *Kshudra Shwasa* (Difficulty in breathing)(p<0.001) except *Alpa Maithuna* (Impaired or decreased Sexual Performance) (p<0.05). At the end of the followed up period in group A statistically significant changes in Total Cholesterol (p<0.05), HDL(p<0.05) and highly significant changes in LDL(p<0.001) and risk ratio(p<0.001). In group B statistically highly significant changes in Total Cholesterol (p<0.001), LDL(p<0.001) and risk ratio(p<0.001). Present study was concluded as combined treatment of *Amrithadya Guggulu* and *Bhramaree Pranayama* more effective on subjective and objective parameters than single treatment of *Amrithadya Guggulu.*

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