International Journal of Science and Research (IJSR)
ISSN: 2319-7064
Impact Factor 2025: 7.089

Clinical Efficacy of Vachaharidradi Ghana Vati in the Management of Dyslipidemia: A Randomized Controlled Clinical Trial

Dr. Sreeranjani[1], Dr. Suvendu Rout[2], Dr. Vipin S.G[3], Dr. Vijayarajaa P[4]

[1]PG scholar, P.G Department of Kayachikitsa, Sri Jayendra Saraswathi Ayurveda College, Chennai, India
[2]Guide, Professor & HOD, P.G Department of Kayachikitsa, Sri Jayendra Saraswathi Ayurveda College, Chennai, India
[3]Co-Guide, Associate Professor, P.G Department of Kayachikitsa, Sri Jayendra Saraswathi Ayurveda College, Chennai, India
[4]Co-Guide, Assistant Professor, P.G Department of Kayachikitsa, Sri Jayendra Saraswathi Ayurveda College, Chennai, India

Abstract: ***Background: Dyslipidemia is a metabolic disorder characterized by abnormal levels of serum lipids such as elevated total cholesterol, triglycerides, low-density lipoprotein (LDL) and reduced high-density lipoprotein (HDL), which significantly increase the risk of cardiovascular diseases. Sedentary lifestyle, unhealthy dietary habits, obesity and stress have contributed to the increasing prevalence of dyslipidemia. In Ayurveda, dyslipidemia can be correlated with Medorogam, which occurs due to Agnimandyam, Kapha-Meda Vriddhi and Srotorodha. Vachaharidradi Ghana Vati, owing to its Deepana, Pachana, Lekhana, Medohara and Srotoshodhana properties, was selected for the present study. Objectives: The present study was undertaken to evaluate the clinical efficacy of Vachaharidradi Ghana Vati in the management of dyslipidemia. It was also carried out to compare the effectiveness of Vachaharidradi Ghana Vati and Lekhaniya Mahakashaya Ghana Vati in the management of dyslipidemia. Materials And Methods: A total of 30 subjects fulfilling the diagnostic criteria were randomly divided into two groups of 15 each. Group VHGV received Vachaharidradi Ghana Vati and Group LMGV received Lekhaniya Mahakashaya Ghana Vati for 30 days, followed by follow-up assessment. Assessment was done based on subjective parameters such as Lakshanas of Medorogam and objective parameters including lipid profile and anthropometric measurements. The collected data were statistically analysed. Results: Both groups showed improvement in subjective and objective parameters. Group VHGV showed statistically highly significant improvement ($p<0.01$) in Serum Total Cholesterol, Serum Triglycerides, Serum LDL, Serum HDL, Body Mass Index, Waist-Hip Ratio and Waist-Height Ratio. Significant improvement was also observed in Medorogam Lakshanas. Intergroup comparison showed better improvement in lipid profile parameters in Group VHGV. Interpretation and Conclusion: Both interventions were effective in the management of dyslipidemia. However, Vachaharidradi Ghana Vati demonstrated better improvement in lipid profile, anthropometric parameters and Medorogam Lakshanas. Its efficacy may be attributed to its Deepana, Pachana, Medohara, Lekhana and Srotoshodhana actions, along with phytoconstituents exhibiting hypolipidemic, antioxidant, anti-inflammatory and metabolic regulatory activities.***

Keywords: Dyslipidemia, Medorogam, Vachaharidradi Ghana Vati, Lekhaniya Mahakashaya Ghana Vati

1. Introduction

Dyslipidemia is a disorder of lipoprotein metabolism characterized by elevated levels of total cholesterol, low-density lipoprotein (LDL) and triglycerides, along with reduced levels of high-density lipoprotein (HDL)[1]. It is a significant contributor to the development of atherosclerotic cardiovascular disease (ASCVD), one of the major causes of morbidity and mortality worldwide. Dyslipidemia is widely prevalent, with 24.1% of adults having hypercholesterolemia, 28.8% having hypertriglyceridemia, 38.4% having low HDL and 18.9% having high LDL levels[2]. The first-line of management in dyslipidemia includes statins (HMG-CoA reductase inhibitors), owing to their established efficacy in reducing LDL levels and cardiovascular events. Other pharmacological options include ezetimibe, PCSK9 inhibitors, fibrates, niacin and omega-3 fatty acids, depending on the lipid abnormality and cardiovascular risk. Along with pharmacological therapy, lifestyle modification including a diet low in saturated and trans fats, regular physical activity, weight reduction and smoking cessation plays an important role in management[3]. Dyslipidemia can be correlated with *Medorogam* in Ayurveda. *Ati-Madhura*, *Guru*, *Snigdha*, *Medya* and *Shleshma-kara Ahara*, along with *Avyayama*, *Diwaswapna*, *Avyavaya*, *Achintana* and *Beejaswabhava*, are the *Nidanas* of *Medoroga* [4]. Excessive *Santarpana* leads to *Kapha Vriddhi* and *Dushti* of *Rasa* and *Medo Dhatu*. Since *Kapha Dosha* and *Medo Dhatu* share an *Ashrayashrayi Bhava*, the same causative factors may result in vitiation of both. The aggravated *Kapha* combines with *Medas*, resulting in *Medovriddhi* and *Medodushti*, which manifest as *Medorogam*. The treatment principles include *Apatarpana*, *Amapachanam*, *Agnideepanam*, *Lekhana* and *Kapha-Medohara Chikitsa*. Therefore, considering the increasing burden of dyslipidemia and the limitations associated with long-term conventional pharmacological management, scientifically evaluating time-tested Ayurvedic interventions may provide an additional therapeutic approach.

Vachaharidradi Ghana Vati was selected as the trial drug owing to its *Deepana*, *Pachana*, *Lekhana, Medohara* and *Srotoshodhana* properties. A clinical study conducted by Dr. Deepak BSR et al. demonstrated significant improvement in lipid profile and anthropometric parameters with *Lekhaniya Mahakashaya Ghana Vati* in patients with dyslipidemia with $P < 0.5$ [5]. Hence, *Lekhaniya Mahakashaya Ghana Vati* was selected as the control drug for the present study. However, clinical evidence evaluating *Vachaharidradi Ghana Vati* specifically in dyslipidemia is limited. Hence, the present study was undertaken to evaluate the effect of *Vachaharidradi Ghana Vati* in the management of dyslipidemia and to compare its effectiveness with *Lekhaniya Mahakashaya Ghana Vati.*

2. Aim and Objectives

Aim
To evaluate the clinical efficacy of *Vachaharidradi Ghana Vati* in the management of dyslipidemia.

Objectives
- To evaluate the effect of *Vachaharidradi Ghana Vati* in the management of dyslipidemia.
- To compare the effectiveness of *Vachaharidradi Ghana Vati* and *Lekhaniya Mahakashaya Ghana Vati* in the management of dyslipidemia.

3. Materials and Methods

3.1 Study Design

Double-arm, open-label randomized clinical study. 30 subjects were divided into two groups of 15 each. Subjects were allocated to the groups using a simple randomization method.

3.2 Study Setting

OPD and IPD of the Postgraduate Department of Kayachikitsa, Sri Jayendra Saraswathi Ayurveda College and Hospital, Nazarathpet, Chennai.

3.3 Source of Drug

Both *Vachaharidradi Ghana Vati* and *Lekhaniya Mahakashaya Ghana Vati* were procured from a GMP-certified source, Arogya Amrutham Vaidya Sala, Valsaravakkam, Chennai.

3.4 Ethical Clearance and Trial Registration

Ethical clearance was obtained from the Institutional Ethics Committee of Sri Jayendra Saraswathi Ayurveda College and Hospital on 26/06/2024, IEC No. SJSACH/IEC/2024/025. The study was registered with the Clinical Trial Registry of India on 10/09/2024, CTRI/2024/09/073699.

3.5 Diagnostic Criteria

If anyone or many parameters among the lipid profile of an individual is found to be in the limit given below, then the subject will be included in the study:

Table 3.1: Diagnostic Criteria

Total Cholesterol	200-239 mg/dl
LDL	129-159 mg/dl
Triglycerides	150-199 mg/dl
HDL	<40 mg/dl

3.6 Inclusion Criteria:

- Subjects aged 18–64 years.
- Subjects fulfilling the diagnostic criteria or previously diagnosed with dyslipidemia within the specified range.
- QRISK3 value <10%.

3.7 Exclusion Criteria:

- K/C/O primary dyslipidemia, coronary artery disease, cerebrovascular disease, cerebrovascular accident, peripheral artery disease, carcinomas, renal disorders (chronic kidney disease, nephrotic syndrome), hepatic disorders (liver cirrhosis, Steatotic liver disease), hypothyroidism, hypertension and diabetes mellitus.
- Dyslipidemia due to consumption of drugs such as glucocorticoids and diuretics.
- Pregnant and lactating women.

3.8 Investigations: Lipid profile

3.9 Assessment Criteria:

3.9.1. Subjective Parameters:
Lakshanas of *Medorogam*:
- *Kshudhadhikya* (excessive hunger)
- *Pipasadhikya* (excessive thirst)
- *Kshudraswasa* (breathlessness on exertion)
- *Swedadhikya* (excessive sweating)
- *Atinidra* (excessive sleep)
- *Dourbalyam* (weakness)
- *Gouravam* (heaviness of body)
- *Krichravyavayata* (difficulty in intercourse)
- *Dourgandham* (excessive body odour)

3.9.2. Objective Parameters

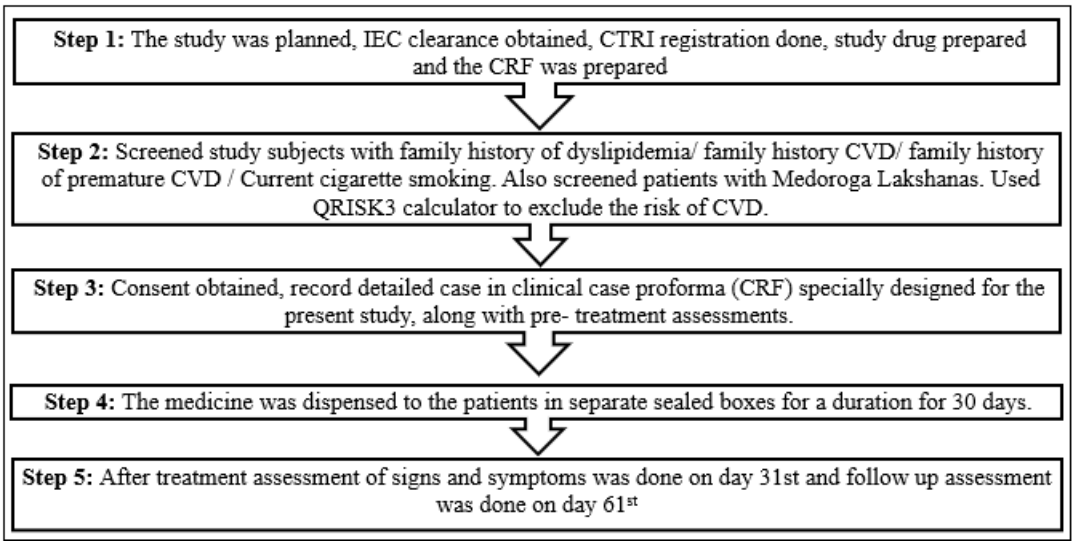
1) **Lipid Profile:**
- Serum. Total Cholesterol
- Serum. Triglycerides
- Serum. HDL
- Serum. LDL

2) **Anthropometric Assessment:**
- B.M.I
- Waist Height Ratio
- Waist Hip Ratio

3.10 Study Duration

- **TREATMENT PERIOD**: 30 days
- **POSOLOGY:** 2 tablets each 500mg of *Vachaharidradhi Ghana Vati* and *Lekhaniya Mahakashaya Ghana Vati* is given to respective groups.
  - **ANUPANAM**: Ushnodaka.
  - **TIME OF ADMINISTRATION**: morning and night after food.
- Baseline assessment: 1st assessment – DAY 0
- Post treatment assessment: 2nd assessment- DAY 31
- Follow up: 1st follow up -DAY 61

3.11 Patient Inflow Chart



Flowchart No.3.1: Plan of the study

3.12 Statistical Analysis

Data were entered and compiled using Microsoft Excel and analysed using SPSS version 26.0. Descriptive statistics included frequency, percentage, mean and standard deviation. Normality of numerical data was assessed using the Shapiro-Wilk test. Since the data did not follow a normal distribution and some variables were graded data, non-parametric tests were used. Intragroup comparison across BT, AT and FU was performed using the Friedman test, followed by Wilcoxon signed-rank test for pairwise comparison. Intergroup comparison was performed using the Mann-Whitney U test. Chi-square test was used for comparison of categorical variables where applicable. A p-value <0.05 was considered statistically significant and p<0.01 was considered highly significant.

4. Results

4.1 Demographic Characteristics

30 subjects were included in the study, with 15 subjects in each group. Females constituted 60% of the study population and males 40%. The largest proportion belonged to the middle-age groups, with the highest representation in the 41–50-year age group. The thesis therefore observed a predominance of middle-aged subjects and females in the study population. The study also recorded dietary, occupational and lifestyle characteristics. The thesis noted that sedentary lifestyle and dietary factors were relevant to the development of dyslipidemia and could be correlated with the *Nidana* described for *Medorogam*.

4.2 Effect on Lipid Profile

- **Serum Total Cholesterol (STC):** Both groups showed statistically highly significant reduction in serum total cholesterol levels (p<0.01). However, Group VHGV demonstrated more sustained improvement, while Group LMGV showed moderate reduction with slight variation during follow-up.
- **Serum Triglycerides (STG):** Both groups showed statistically highly significant improvement in serum triglyceride levels (p<0.01). Group VHGV achieved greater and sustained reduction, whereas Group LMGV showed minimal improvement with values nearing baseline at follow-up.
- **Serum Low Density Lipoprotein (S LDL):** Both groups showed statistically highly significant reduction in serum LDL levels (p<0.01). However, Group VHGV demonstrated greater reduction with sustained improvement, whereas Group LMGV showed minimal reduction with values nearing baseline at follow-up.
- **Serum High Density Lipoprotein (S HDL):** Group VHGV showed statistically highly significant improvement in serum HDL levels (p<0.01), whereas Group LMGV showed non-significant changes (p>0.05). Group VHGV demonstrated better improvement in protective HDL levels compared to Group LMGV.

Table 4.1: Effect on Lipid Profile

Lipid Profile	Group	BT	AT	FU	Intragroup p-value
STC	VHGV	211.87	174.2	172.97	<0.001
	LMGV	210.13	203.13	207.2	<0.001
STG	VHGV	179.37	141.22	140.92	<0.001
	LMGV	174	167.93	173.33	<0.001
S LDL	VHGV	131.14	98.71	101.22	<0.001
	LMGV	133.87	127.33	130.91	<0.001
S HDL	VHGV	44.15	48.19	48.13	<0.001
	LMGV	41.47	41.93	41.47	0.121

4.3 Effect on Anthropometric Parameters

- **Body Mass Index (BMI):** Both groups showed statistically highly significant reduction in BMI (p<0.01). Group VHGV demonstrated sustained reduction throughout follow-up, whereas Group LMGV showed reduction after treatment with rebound increase during follow-up.
- **Waist–Height Ratio (WHtR):** Both groups showed significant improvement in Waist–Height Ratio (p<0.01 in Group VHGV; p<0.05 in Group LMGV). Group VHGV demonstrated greater and sustained reduction, while Group LMGV showed mild improvement with stabilization at follow-up.
- **Waist–Hip Ratio (WHR):** Group VHGV showed statistically highly significant improvement in Waist–Hip

Ratio ($p<0.01$), whereas Group LMGV showed non-significant changes ($p>0.05$). Group VHGV demonstrated better reduction in central obesity parameters.

Table 4.2: Effect on Anthropometric Parameters

	Group	BT	AT	FU	Intragroup p-value
BMI	VHGV	30.34	29.14	29.08	<0.001
	LMGV	28.89	26.86	28.67	0.005
WHtR	VHGV	0.5987	0.5787	0.576	<0.001
	LMGV	0.5853	0.5807	0.5807	0.011
WHR	VHGV	0.8907	0.874	0.8747	<0.001
	LMGV	0.8933	0.8893	0.89	0.05

4.4 Effect on Subjective Parameters

Several subjective parameters showed significant or highly significant improvement in Group VHGV. These included *Pipasadhikya, Kshudraswasa, Swedadhikya, Atinidra, Dourbalyam* and *Gouravam. Kshudhadhikya* did not demonstrate statistically significant change. *Gouravam* showed particularly marked improvement in Group VHGV, ($p<0.01$).

Table 4.3: Effect on Subjective Parameters

	Group	BT	AT	FU	Intragroup p-value
Kshudhadhikya	VHGV	0.67	0.27	0.2	0.086
	LMGV	0.6	0.4	0.2	0.082
Pipasadhikya	VHGV	1.67	0.67	0.27	0.001
	LMGV	1.36	0.86	0.64	0.004
Kshudraswasa	VHGV	1.57	0.86	0.14	0.002
	LMGV	0.86	0.36	0.29	0.015
Swedadhikya	VHGV	1.13	0.53	0.27	0.009
	LMGV	1.13	0.53	0.27	0.01
Atinidra	VHGV	1.47	0.73	0.27	0.001
	LMGV	0.47	0.27	0.2	0.156
Dourbalyam	VHGV	1.67	0.8	0.33	0.001
	LMGV	0.73	0.47	0.33	0.037
Gouravam	VHGV	3	1.07	0.07	<0.001
	LMGV	2	1.2	0.87	<0.001
Krichravyavayam	VHGV	0	0	0	1
	LMGV	0	0	0	1
Dourgandham	VHGV	0.67	0.4	0.2	0.022
	LMGV	0	0	0	1

Table 4.4: Comparative Outcome

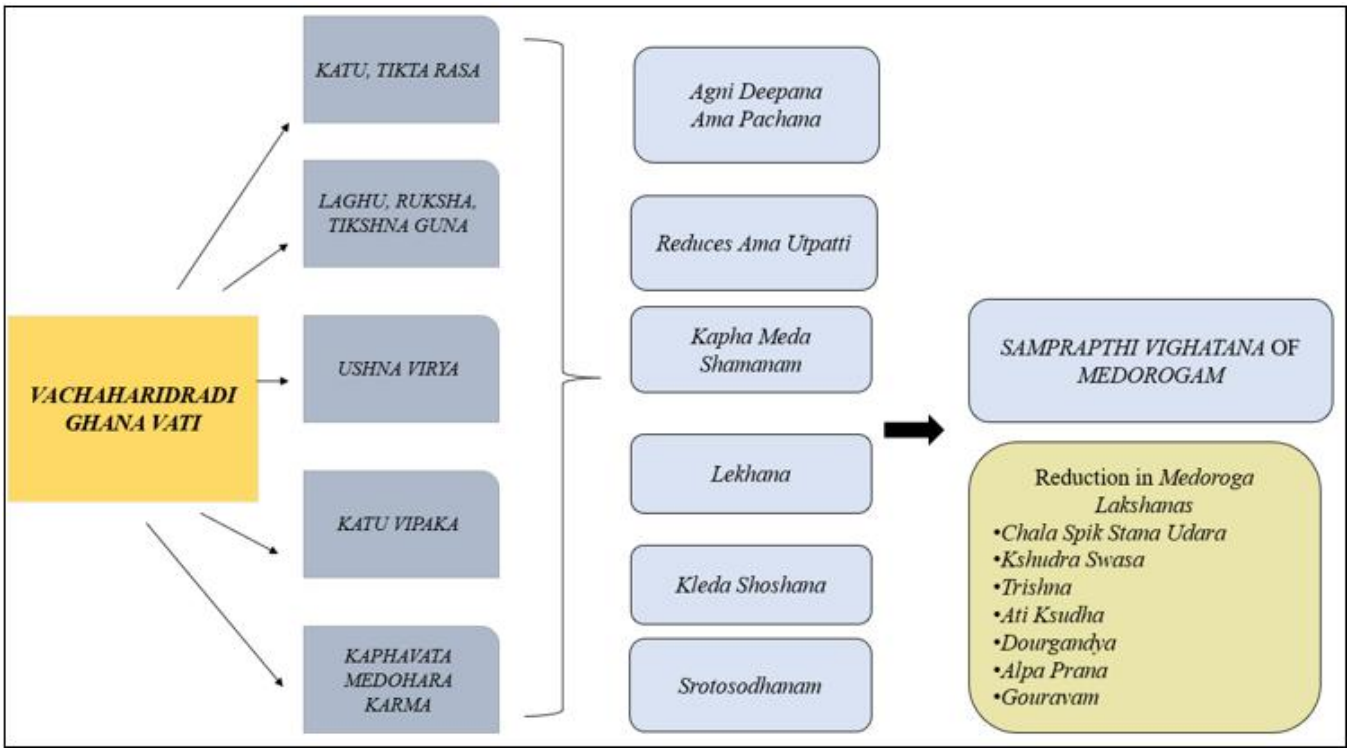
Parameters	Time Point	Group VHGV	Group LMGV
STC	AT	17.78%	3.33%
	FU	18.36%	1.39%
STG	AT	21.27%	3.49%
	FU	21.44%	0.38%
S LDL	AT	24.73%	4.88%
	FU	22.82%	2.21%
S HDL	AT	9.16%	1.12%
	FU	9.02%	0.01%
BMI	AT	3.97%	7.03%
	FU	4.14%	0.76%
WtHR	AT	3.34%	0.78%
	FU	3.79%	0.78%
WHR	AT	1.87%	0.45%
	FU	1.80%	0.37%
Kshudhadikhya	AT	59.70%	33.33%
	FU	70.15%	66.67%
Pipasadikhya	AT	59.88%	36.76%
	FU	83.83%	52.94%
Kshudraswasa	AT	45.22%	58.14%
	FU	91.08%	66.28%
Swedadhikya	AT	53.09%	53.09%
	FU	76.10%	76.10%
Atinidra	AT	50.34%	42.55%
	FU	81.63%	57.45%
Dourbalyam	AT	52.10%	35.62%
	FU	80.24%	54.79%
Gouravam	AT	64.33%	40.00%
	FU	97.67%	56.50%
Dourgandam	AT	40.30%	0%
	FU	70.15%	0%

5. Discussion

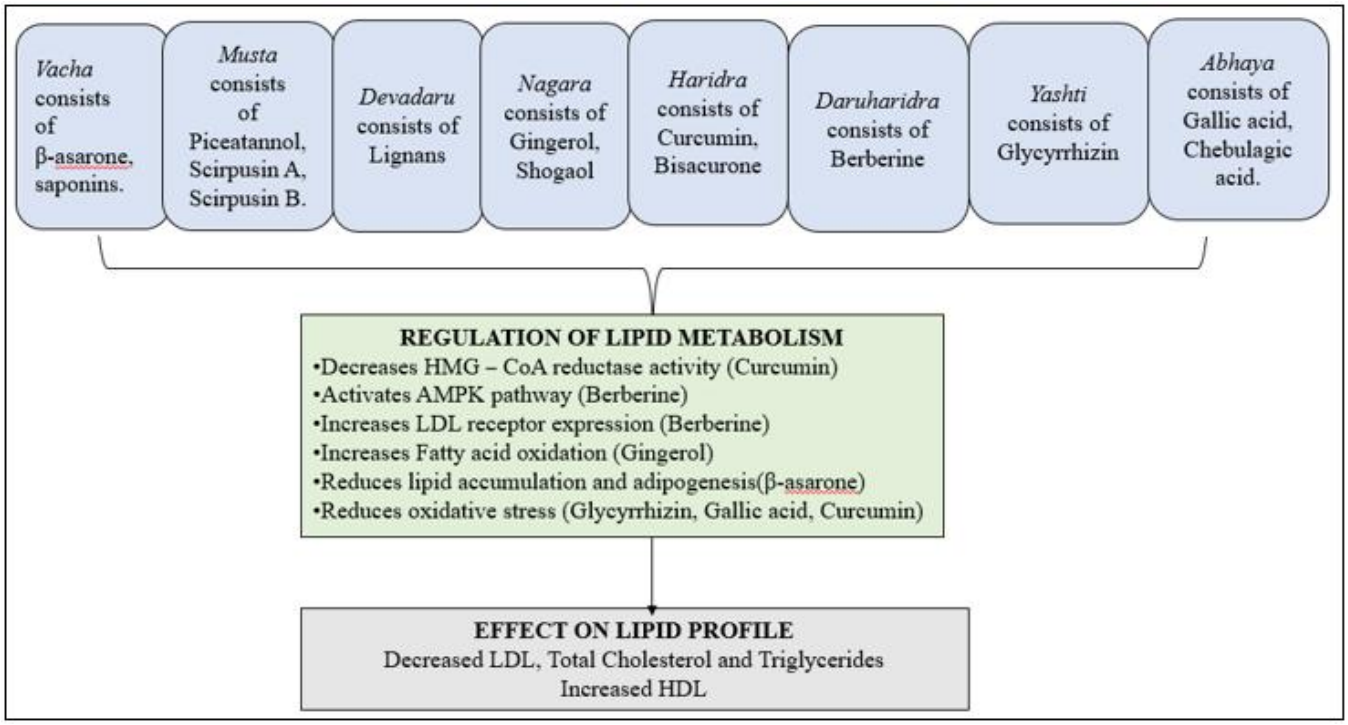
- Both Group VHGV and Group LMGV showed significant improvement in lipid profile, anthropometric measurements, and clinical symptoms; however, their pattern of response differed.
- Group VHGV: Showed rapid and highly significant improvement ($p<0.01$) in major lipid parameters such as STC, STG, S LDL, S HDL, anthropometric parameters such as BMI, Waist–Height Ratio, Waist–Hip Ratio, and clinical parameter Gouravam from baseline to follow-up, indicating strong immediate efficacy. Several symptoms including *Pipasadhikya, Kshudra Swasa, Swedadhikya, Atinidra, Dourbalyam*, and *Dourgandham* also showed significant improvement ($p<0.05$). Most post-treatment to follow-up comparisons were non-significant, indicating stabilization and sustained maintenance of therapeutic effect.
- Group LMGV: Demonstrated highly significant improvement ($p<0.01$) in STC, STG, S LDL, BMI, and *Gouravam*, while moderate improvement ($p<0.05$) was observed in S HDL, Waist–Height Ratio, *Pipasadhikya, Kshudra Shwasa*, and *Swedadhikya*. However, several parameters including Waist–Hip Ratio, *Atinidra, Dourbalyam, Kshudhadhikya*, *Krichravyavayam*, and *Dourgandham* showed non-significant changes, indicating comparatively limited improvement.
- Overall, Group VHGV demonstrated faster, broader, and more sustained improvement, whereas Group LMGV showed gradual improvement with comparatively lesser sustainability during follow-up.

5.1 Probable Mode of Action

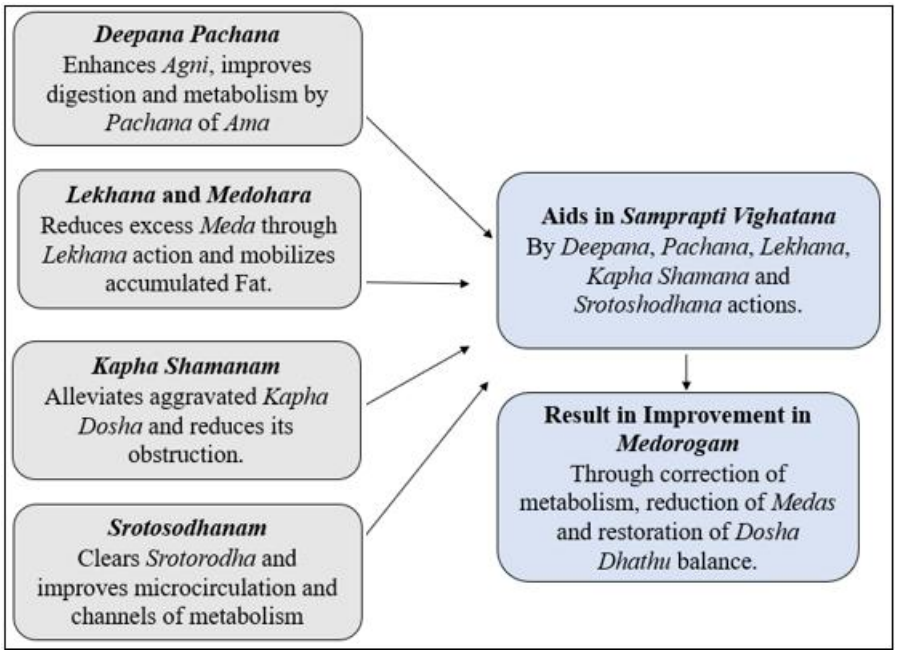
Vachaharidradi Ghana Vati possesses *Kaphamedohara* and *Lekhana* properties. The formulation predominantly possesses *Katu* and *Tikta Rasa*, *Laghu* and *Ruksha Guna*, *Ushna Virya* and *Katu Vipaka*, which contribute to its *Deepana*, *Pachana*, *Lekhana*, *Medohara* and *Srotoshodhana* actions.



The chemical constituents in *Vachaharidradi Gana Vati* influence multiple pathways involved in lipid metabolism. Compounds such as curcumin in *Haridra* [6], berberine in *Daruharidra* [7], gingerol in *Shunti* , β-asarone in *Vacha* [8], flavonoids in *Musta* and *Haritaki*, and glycyrrhizin in *Yashtimadhu* may contribute to inhibition of HMG-CoA reductase, activation of AMP-activated protein kinase (AMPK), enhancement of fatty acid oxidation and reduction of intestinal lipid absorption [9].



5.2 Overall Probable Mode of Action



5.3 Adverse Drug Events

No specific major adverse events or treatment-related complications are reported in the thesis results. Both formulations were administered for 30 days and subjects were followed until Day 61.

5.4 Limitations in the Study

The relatively short study and follow-up period, single-centre design and limited sample size (n=30) restrict the assessment of long-term efficacy and generalizability of the findings. Uncontrolled dietary habits and lifestyle factors may also have acted as confounding factors, influencing the lipid profile and anthropometric outcomes.

5.5 Future Study Recommendations

Further multicentric studies with larger sample sizes and longer follow-up are recommended, incorporating advanced lipid and inflammatory markers such as apolipoproteins and lipoprotein(a). Experimental and clinical studies on the phytochemical constituents and molecular mechanisms of the formulation, along with better control of confounding factors such as dietary habits, physical activity and occupational patterns, may provide a more comprehensive evaluation of its therapeutic efficacy.

5.6 Conclusion

Both *Vachaharidradi Ghana Vati* and *Lekhaniya Mahakashaya Ghana Vati* showed improvement in the management of dyslipidemia. However, *Vachaharidradi Ghana Vati* demonstrated greater and more sustained improvement in lipid profile, anthropometric parameters and major *Medorogam Lakshanas*. Thus, *Vachaharidradi Ghana Vati* may be considered more effective than *Lekhaniya Mahakashaya Ghana Vati* in the management of dyslipidemia.

Declarations

- **Informed Consent-** Written informed consent was obtained from participants before enrolment into the study, as documented in the thesis methodology.
- **Funding:** This research was supported by the Central Council for Research in Ayurvedic Sciences (CCRAS), Ministry of AYUSH, Government of India, under the PG STAR 3.0 scheme. The funding body had no role in study design, data collection, analysis, interpretation, or manuscript preparation.
- **Acknowledgements:** The authors gratefully acknowledge all study participants for their time and cooperation; the PG Department of Kayachikitsa, Sri Jayendra Saraswathi Ayurveda College and Hospital; and Arogya Amrutham Vaidya Sala for the preparation of the medicine.
- **Conflict of Interest:** The author declares no conflict of interest.
- **Data Availability:** The study data are available from the corresponding author on reasonable request, subject to institutional and ethical requirements.

References

[1] Pirillo A, Casula M, Olmastroni E, Norata GD, Catapano AL. Global epidemiology of dyslipidaemias. Nat Rev Cardiol. 2021 Oct;18(10):689-700. doi: 10.1038/s41569-021-00541-4. Epub 2021 Apr 8. PMID: 33833450.

[2] Ballena-Caicedo J, Zuzunaga-Montoya FE, Loayza-Castro JA, Vásquez-Romero LEM, Tapia-Limonchi R, De Carrillo CIG, Vera-Ponce VJ. Global prevalence of dyslipidemia in the general adult population: a systematic review and meta-analysis. J Health Popul Nutr. 2025 Aug 26;44(1):308. doi: 10.1186/s41043-025-01054-3. PMID: 40859400; PMCID: PMC12379389

[3] Mach F, Baigent C, Catapano AL, Koskinas KC, Casula M, Badimon L, Chapman MJ, De Backer GG, Delgado V, Ference BA, Graham IM, Halliday A, Landmesser U, Mihaylova B, Pedersen TR, Riccardi G, Richter DJ,

Sabatine MS, Taskinen MR, Tokgozoglu L, Wiklund O; ESC Scientific Document Group. 2019 ESC/EAS Guidelines for the management of dyslipidaemias: lipid modification to reduce cardiovascular risk. Eur Heart J. 2020 Jan 1;41(1):111-188. doi: 10.1093/eurheartj/ehz455. Erratum in: Eur Heart J. 2020 Nov 21;41(44):4255. doi: 10.1093/eurheartj/ehz826. PMID: 31504418.

[4] K.R.Srikanta Murthy. Madhava Nidanam,Sloka No(34/1-2). 2013th ed. Chaukambha Orientalia; pg.121.

[5] Bsr, Deepak & Lakshmiprasad, Jadhav & KJ, Girish & Prakash, Narayana. (2015). Randomized Controlled, Open Labeled Study Of A Herbal Preparation, Lekhaneeya Mahakashaya Ghanavati In Dyslipidemia Patients. Journal of Ayurveda and Holistic Medicine. 3. 1-23.

[6] Li X, Guo J, Liang N, Jiang X, Song Y, Ou S, Hu Y, Jiao R, Bai W. 6-Gingerol Regulates Hepatic Cholesterol Metabolism by Up-regulation of LDLR and Cholesterol Efflux-Related Genes in HepG2 Cells. Front Pharmacol. 2018 Feb 27; 9: 159. doi: 10.3389/fphar.2018.00159. PMID: 29535632; PMCID: PMC5835308

[7] Maharlouei N, Tabrizi R, Lankarani KB, Rezaianzadeh A, Akbari M, Kolahdooz F, Rahimi M, Keneshlou F, Asemi Z. The effects of ginger intake on weight loss and metabolic profiles among overweight and obese subjects: A systematic review and meta-analysis of randomized controlled trials. Crit Rev Food Sci Nutr. 2019;59(11):1753-1766. doi: 10.1080/10408398.2018.1427044. Epub 2018 Feb 2. PMID: 29393665.

[8] Shinde UA, Phadke AS, Nair AM, Mungantiwar AA, Dikshit VJ, Saraf MN. Studies on the anti-inflammatory and analgesic activity of Cedrus deodara (Roxb.) Loud. wood oil. J Ethnopharmacol. 1999 Apr;65(1):21-7. doi: 10.1016/s0378-8741(98)00150-0. PMID: 10350366

[9] Fuhrman B, Volkova N, Kaplan M, Presser D, Attias J, Hayek T, Aviram M. Antiatherosclerotic effects of licorice extract supplementation on hypercholesterolemic patients: increased resistance of LDL to atherogenic modifications, reduced plasma lipid levels, and decreased systolic blood pressure. Nutrition. 2002 Mar;18(3):268-73. doi: 10.1016/s0899-9007(01)00753-5. PMID: 11882402.