BILWADI PANCHAMOOL GHANA VATI — A COMPREHENSIVE DRUG REVIEW WITH SPECIAL REFERENCE TO ITS POTENTIAL IN *MEDOROGA* (DYSLIPIDEMIA)

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ABSTRACT

Introduction: Dyslipidemia, characterized by abnormal levels of lipids in the blood, is a major modifiable risk factor for cardiovascular diseases. In Ayurveda, this condition closely correlates with *Medoroga* and *Medovriddhi*, arising from vitiation of *Medo Dhatu* and derangement of *Medodhatvagni*. *Bilwadi Panchamool Ghana Vati* is a polyherbal formulation in solid extract (*Ghana*) tablet form derived from the five major tree roots of *Brihat Panchamool*, namely *Bilwa* (Aegle marmelos), *Agnimantha* (Premna integrifolia), *Shyonaka* (Oroxylum indicum), *Patala* (Stereospermum suaveolens), and *Gambhari* (Gmelina arborea).

Methods: A comprehensive literature review was conducted using classical Ayurvedic texts including Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya, Sharangdhara Samhita, Bhavaprakasha Nighantu, and Dhanvantari Nighantu. Modern databases including PubMed, Google Scholar, and ScienceDirect were searched for pharmacological, phytochemical, and clinical evidence on each ingredient drug of Bilwadi Panchamool.

Results: Classical Ayurvedic literature attributes Kapha-Vata Shamaka, Medohara, Deepana, and Pachana properties to the constituent drugs of Brihat Panchamool. Modern pharmacological studies have demonstrated hypolipidemic, antihyperlipidemic, antioxidant, anti-inflammatory, hepatoprotective, and antidiabetic activities in individual drugs of this formulation. Key phytoconstituents such as marmelosin, baicalein, chrysin, beta-sitosterol, luteolin, and oroxylin-A have been identified as potential mediators of lipid-lowering activity. The Ghana Kalpana (solid extract) form offers advantages of enhanced bioavailability, concentrated active principles, longer shelf life, and convenient dosing.

Discussion: The collective pharmacological profile of the five drugs in Bilwadi Panchamool Ghana Vati suggests a multi-target approach to dyslipidemia management through Agni correction, Ama Pachana, Medo Dhatu regulation, and antioxidant-mediated vascular protection. The formulation addresses the Ayurvedic pathogenesis of Medoroga at multiple levels—Nidana Parivarjana, Deepana-Pachana, and Medohara actions—while modern evidence supports lipid-lowering and hepatoprotective mechanisms. Further well-designed randomized clinical trials are warranted to validate the therapeutic efficacy and safety of Bilwadi Panchamool Ghana Vati in the management of hypertriglyceridemia and dyslipidemia.

Keywords: *Bilwadi Panchamool, Brihat Panchamool, Dyslipidemia, Ghana Kalpana, Hypolipidemic, Medoroga, Triglycerides*

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INTRODUCTION

Dyslipidemia is a metabolic disorder characterized by abnormal levels of one or more lipids and/or lipoproteins in the blood, including elevated total cholesterol, low-density lipoprotein cholesterol (LDL-C), triglycerides (TG), and reduced high-density lipoprotein cholesterol (HDL-C). It is one of the most prevalent modifiable risk factors for cardiovascular diseases (CVD), which remain the leading cause of morbidity and mortality globally [1]. In India, the prevalence of dyslipidemia

has been reported to be as high as 79–81% in various population-based studies [2]. Hypertriglyceridemia, in particular, is an independent risk factor for coronary artery disease, pancreatitis, and metabolic syndrome [3].

The conventional pharmacological management of hypertriglyceridemia involves fibrates (such as fenofibrate), statins, omega-3 fatty acids, and nicotinic acid derivatives. Fenofibrate, a peroxisome proliferator-activated receptor alpha (PPAR-α) agonist, is the primary agent for lowering triglyceride levels. However, long-term use of these agents is often associated with adverse effects including myopathy, hepatotoxicity, gastrointestinal disturbances, and increased risk of rhabdomyolysis, especially in combination therapy [4]. These limitations have prompted the search for safe, effective, and affordable alternatives from traditional medicine systems.

In Ayurveda, dyslipidemia can be understood through the concepts of *Medoroga* (diseases of fat tissue), *Medovriddhi* (pathological increase of fat), *Ama Medo Dhatu* (improperly formed fat tissue due to metabolic toxins), and *Dhatvagnimandya* (diminished tissue-level metabolic fire). Acharya Charaka has categorized *Atisthaulya* (obesity) as one of the eight despicable constitutions (*Ashtau Nindita Purusha*) and has described its etiopathogenesis in detail, including disproportionate increase of *Meda Dhatu* leading to diminished lifespan, reduced enthusiasm, sexual dysfunction, weakness, foul body odour, excessive perspiration, and excessive hunger and thirst [5]. The treatment principles involve *Rukshana* (drying therapy), *Lekhaniya* (scraping therapy), *Deepana-Pachana* (enhancing digestive and metabolic fire), and drugs possessing *Katu* (pungent), *Tikta* (bitter), and *Kashaya Rasa* (astringent taste) along with *Laghu* (light) and *Ruksha Guna* (dry quality) [6,7].

Brihat Panchamool (the group of five major tree roots) is an important sub-group of the classical *Dashamoola* formulation, widely used in Ayurvedic therapeutics. It comprises the roots of five trees: *Bilwa* (Aegle marmelos Linn., Rutaceae), *Agnimantha* (Premna integrifolia Linn., Verbenaceae), *Shyonaka* (Oroxylum indicum Vent., Bignoniaceae), *Patala* (Stereospermum suaveolens DC., Bignoniaceae), and *Gambhari* (Gmelina arborea Roxb., Lamiaceae). The group is predominantly *Vata-Kapha Shamaka* and possesses *Shothahara* (anti-inflammatory), *Deepana* (appetizer), and *Pachana* (digestive) properties [8,9]. Acharya Sushruta has mentioned *Brihat Panchamool* under *Viratarvadi Gana* and *Varunadi Gana*, which are specifically indicated in the management of *Medoroga* [10].

Ghana Kalpana (solid extract preparation) is a derivative dosage form of *Kwatha Kalpana* described in Sharangdhara Samhita. It is prepared by re-boiling the decoction (*Kwatha*) until it attains a semisolid to solid consistency, which is then dried and converted into tablet (*Vati*) form. The reference "*Kwathadinam Punaha Pakat Ghanatwam Sa Rasakriya*" from Sharangdhara Samhita describes this process [11]. This dosage form offers several advantages: enhanced concentration of water-soluble active principles, improved bioavailability, longer shelf life, ease of administration, accurate dosing, and improved patient compliance [12].

The present review aims to compile and critically analyse the classical Ayurvedic references, phytochemical profiles, and modern pharmacological evidence for each constituent drug of Bilwadi Panchamool Ghana Vati, with special emphasis on their potential role in the management of *Medoroga* (dyslipidemia), to provide a scientific rationale for its use in clinical practice and to identify directions for future research.

MATERIALS AND METHODS

A comprehensive narrative review was conducted by systematically searching both classical Ayurvedic texts and modern scientific databases. Classical references were collected from Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya, Ashtanga Sangraha, Sharangdhara Samhita, Bhavaprakasha Nighantu, Dhanvantari Nighantu, Kaiyadeva Nighantu, and the Ayurvedic Pharmacopoeia of India (API). Modern pharmacological and phytochemical data were searched using PubMed, Google Scholar, ScienceDirect, and ResearchGate using the search terms: Aegle marmelos, Premna integrifolia, Oroxylum indicum, Stereospermum suaveolens, Gmelina arborea, Brihat Panchamool, Dashamoola, hypolipidemic, antihyperlipidemic, antioxidant, dyslipidemia, triglycerides, and Medoroga. Relevant published articles in English and Hindi up to 2025 were included. The compiled data were analysed, tabulated, and discussed to evaluate the potential of Bilwadi Panchamool Ghana Vati in the management of Medoroga (dyslipidemia).

DRUG REVIEW: CONSTITUENT DRUGS OF BILWADI PANCHAMOOL

Table 1: Ingredients of Bilwadi Panchamool Ghana Vati with Ayurvedic Properties

Sanskrit Name	Botanical Name	Family	Rasa	Guna	Veerya	Vipaka

Bilwa	*Aegle marmelos* Linn.	Rutaceae	Kashaya, Tikta	Laghu, Ruksha	Ushna	Katu
Agnimantha	*Premna integrifolia* Linn.	Verbenaceae	Katu, Tikta, Kashaya, Madhura	Laghu, Ruksha	Ushna	Katu
Shyonaka	*Oroxylum indicum* Vent.	Bignoniaceae	Tikta, Kashaya, Madhura	Laghu, Ruksha	Ushna	Katu
Patala	*Stereospermum suaveolens* DC.	Bignoniaceae	Tikta, Kashaya	Laghu, Ruksha	Ushna	Katu
Gambhari	*Gmelina arborea* Roxb.	Lamiaceae	Tikta, Kashaya, Madhura	Guru, Ruksha	Ushna	Katu

1. *Bilwa* (*Aegle marmelos* Linn.)

Bilwa (*Aegle marmelos*), commonly known as Bael, is a sacred tree of the family Rutaceae. It is a medium-sized deciduous tree found throughout the Indian subcontinent. Acharya Charaka has included *Bilwa* in *Shothahara Mahakashaya* (anti-inflammatory group) and *Arshoghna Mahakashaya* (anti-haemorrhoidal group) [13]. It possesses *Kashaya* (astringent) and *Tikta Rasa* (bitter taste), *Laghu-Ruksha Guna* (light and dry quality), *Ushna Veerya* (hot potency), and *Katu Vipaka* (pungent post-digestive effect), which collectively make it suitable for *Kapha-Vata Shamana* and *Deepana-Pachana* actions [14].

Phytochemically, various parts of Aegle marmelos contain more than 100 identified compounds including coumarins (marmelosin, marmesin, imperatorin), alkaloids (aegeline, aegelenine), flavonoids (rutin), tannins (skimmianine), terpenoids, and essential oils. The presence of beta-sitosterol is of particular significance to lipid metabolism [15]. Kumari (2016) conducted a preliminary clinical study on 40 hyperlipidemic subjects treated with Aegle marmelos leaf powder (5 g daily for 30 days) and reported it to be a safe and effective hypolipidemic agent, showing statistically significant reductions in total cholesterol, triglycerides, and LDL-cholesterol [16]. Kamalakkannan and Prince (2005) demonstrated that aqueous extract of Aegle marmelos fruit significantly reduced blood glucose, total cholesterol, and triglyceride levels in streptozotocin-induced diabetic rats [17]. Phytochemical evaluation by Arif et al. (2018) confirmed that bael leaf extract exhibited significant antihypercholesterolemic and antilipidemic properties in hyperlipidemic rat models [18]. The seed extract has also shown a 45.77% reduction in triglyceride levels and 25.49% reduction in total cholesterol in diabetic rat models [19].

2. *Agnimantha (Premna integrifolia* Linn.)

Agnimantha (Premna integrifolia Linn.), belonging to family Verbenaceae, is an essential constituent of both *Brihat Panchamool* and *Dashamoola*. Acharya Charaka has mentioned it in *Shothahara Mahakashaya*, *Sheet Prashamana Mahakashaya*, and *Anuvasanopaga Mahakashaya*. Bhavaprakasha Nighantu describes it as a drug that alleviates Kapha and Vata, treats *Shotha* (inflammation), and increases *Agni* (digestive fire) [20,21]. Its leaves are particularly noted for anti-obesity and metabolism-boosting properties, and fresh leaf juice has been traditionally used to reduce weight and improve fat metabolism [22].

The pharmacological profile of Premna integrifolia includes documented hypolipidemic, anti-atherosclerotic, anti-inflammatory, analgesic, antimicrobial, antidiabetic, and antioxidant activities [23]. Mali (2015) published a comprehensive review confirming the biodiversity, traditional uses, and phytochemistry of Premna integrifolia, highlighting its rich content of p-methoxycinnamic acid, linalool, linoleic acid, beta-sitosterol, flavone luteolin, iridoid glycosides, premnine, and clerodendrin-A [24]. Azad et al. (2018) demonstrated potent COX-2/5-LOX dual inhibitory activity from the petroleum ether extract of roots, suggesting an anti-inflammatory

mechanism relevant to atherosclerosis and metabolic inflammation [25]. Khanna et al. (1991) reported hypolipidemic activity of Premna integrifolia in experimental models [26].

3. *Shyonaka (Oroxylum indicum* Vent.)

Shyonaka (*Oroxylum indicum*), also known as Sonapatha, belongs to the family Bignoniaceae. It is described in Ayurveda under the broad group of Dashamoola and possesses *Tikta* (bitter), *Kashaya* (astringent), and *Madhura Rasa* with *Laghu-Ruksha Guna* and *Ushna Veerya*. It is reputed for its anti-inflammatory effects and has been widely used in managing *Shotha* (swelling), *Jwara* (fever), and *Vata-Kaphaja* disorders [27,28].

The plant is rich in flavonoids, particularly chrysin, baicalein, and oroxylin-A, along with biochanin-A, ellagic acid, sitosterol, and oroxindin [29]. Hengpratom et al. (2019) demonstrated that Oroxylum indicum extract inhibited adipogenesis and lipase activity in vitro, suggesting anti-obesity potential [30]. Islam et al. (2019) evaluated the hypolipidemic activity of organic extract of Oroxylum indicum in rat models and confirmed significant reductions in serum cholesterol and triglyceride levels [31]. The flavonoid chrysin has been independently studied for its lipid-lowering, antioxidant, and anti-inflammatory properties, supporting the traditional use of Shyonaka in metabolic disorders [32].

4. *Patala (Stereospermum suaveolens* DC.)

Patala (*Stereospermum suaveolens* DC.) is a member of the family Bignoniaceae and is an important constituent of *Brihat Panchamool*. The Ayurvedic Pharmacopoeia of India describes *Patala* root as possessing *Tikta-Kashaya Rasa*, *Laghu-Ruksha Guna*, *Ushna Veerya*, and *Katu Vipaka*. It is indicated in *Shotha*, *Jwara*, *Aruchi* (anorexia), and *Trishna* (excessive thirst) [33].

Phytochemical studies have identified the presence of lapachol, flavonoids (scutellarein-glucoside), sterols, and the alkaloid sonococuline in various parts of Stereospermum suaveolens [34]. The ethyl acetate fraction from ethanol extract of Stereospermum suaveolens has been found to possess potent antihyperglycemic and antioxidant properties [35]. The hepatoprotective activity of methanol stem bark extract has been demonstrated against carbon tetrachloride-induced liver damage in albino rats, showing significant improvement in serum lipid profiles including LDL-cholesterol reduction [36]. The anti-inflammatory activity reported in multiple experimental models supports its role in addressing the inflammatory component of atherosclerosis and metabolic syndrome [37].

5. *Gambhari (Gmelina arborea* Roxb.)

Gambhari (*Gmelina arborea* Roxb.), belonging to the family Lamiaceae (formerly Verbenaceae), is a fast-growing deciduous tree distributed throughout India. Acharya Charaka has classified *Gambhari* under *Shothahara Varga* (anti-inflammatory group), *Dahaprashamana Gana* (thirst-alleviating group), and *Virechanopaga Gana* (purgation-adjunct group). It possesses *Rasayana* (rejuvenative), *Medhya* (intellect-promoting), and *Vrishya* (aphrodisiac) properties [38,39].

The plant contains diverse phytoconstituents including lignans (gmelinol, arboreal), flavonoids (luteolin, apigenin, quercetin), iridoid glycosides, coumarins, steroids (beta-sitosterol), terpenes, and fatty acids [40]. Kumari et al. (2017) described significant antihyperlipidemic effects of ethanol extract of Gmelina arborea leaf in streptozotocin-induced diabetic rats, with marked reductions in total cholesterol, triglycerides, and LDL levels [41]. The cardioprotective activity of ethanolic extract has been demonstrated against doxorubicin-induced cardiac toxicity [42]. Maurya et al. (2013) provided a comprehensive pharmacognostic and pharmacological review confirming antioxidant, anti-diabetic, diuretic, cardioprotective, and immunomodulatory activities [43].

DISCUSSION

The Ayurvedic understanding of dyslipidemia through the concept of *Medoroga* provides a comprehensive framework for management that extends beyond mere lipid reduction. The pathogenesis of *Medoroga* involves *Agnimandya* (diminished digestive fire) at the level of *Jatharagni* and *Medodhatvagni*, leading to the production of *Ama* (metabolic toxins) and disproportionate increase in *Meda Dhatu* with simultaneous malnutrition of subsequent *Dhatus* [5,6]. This correlates well with the modern understanding of impaired hepatic lipid metabolism, insulin resistance, and atherogenic dyslipidemia.

The analysis of the five constituent drugs of Bilwadi Panchamool reveals a remarkable convergence of Ayurvedic properties and modern pharmacological evidence that is directly relevant to the management of dyslipidemia. All five drugs share certain common attributes: predominantly Tikta (bitter) and Kashaya (astringent) Rasa, Laghu-Ruksha (light and dry) Guna, Ushna Veerya (hot potency), and Katu Vipaka (pungent post-digestive effect). According to Ayurvedic pharmacology, Tikta Rasa performs Medoshoshana (desiccation of fat), Kashaya Rasa exhibits Lekhana Karma (scraping action), and Ushna Veerya with Katu Vipaka corrects Agnimandya at tissue level. These

properties collectively address the core pathology of Medoroga—Kapha-Meda Dushti with Agnimandya [7,44].

From a modern pharmacological perspective, the constituent drugs exhibit a multi-target therapeutic profile. The hypolipidemic activity has been independently demonstrated for Aegle marmelos [16-19], Premna integrifolia [23,26], Oroxylum indicum [30,31], and Gmelina arborea [41,42]. Key phytoconstituents such as baicalein, chrysin (from Oroxylum indicum), marmelosin (from Aegle marmelos), beta-sitosterol (present across multiple drugs), luteolin (from Gmelina arborea), and flavonoids collectively contribute to lipid-lowering effects through multiple mechanisms including inhibition of HMG-CoA reductase, enhancement of lipoprotein lipase activity, stimulation of PPAR-alpha receptor pathways, and inhibition of pancreatic lipase [15,29,40].

The *Ghana Kalpana* formulation approach offers significant advantages for this polyherbal combination. By extracting and concentrating water-soluble active principles through the process of repeated decoction and evaporation, the Ghana form maximizes the bioavailability of flavonoids, glycosides, and other polar phytoconstituents while eliminating inert plant matter. The solid extract tablet form further ensures standardized dosing, improved shelf life, and better patient compliance compared to traditional liquid decoctions [11,12].

It is noteworthy that several Ganas mentioned by Acharya Sushruta and Vagbhata for the management of Medoroga include drugs from the Brihat Panchamool group. Sushruta's Varunadi Gana, which contains Agnimantha and Bilwa among its constituents, is specifically indicated for Medoroga management [10,44]. This classical endorsement, combined with the documented pharmacological evidence for each constituent drug, provides a strong scientific rationale for the use of Bilwadi Panchamool Ghana Vati in the management of hypertriglyceridemia and dyslipidemia.

The antioxidant and anti-inflammatory activities documented for all five drugs [14,23,29,35,43] are of additional therapeutic relevance, as oxidative stress and chronic low-grade inflammation are key pathophysiological drivers of atherogenic dyslipidemia, endothelial dysfunction, and cardiovascular disease. The hepatoprotective properties of several constituent drugs [36,42] further support their utility in preserving hepatic lipid metabolism, which is central to lipid homeostasis.

However, certain limitations must be acknowledged. The pharmacological evidence for individual drugs, while encouraging, is predominantly derived from pre-clinical animal studies and in-vitro experiments. Clinical studies are few and limited in sample size. Moreover, the synergistic or additive effects of the five drugs in combination, which is the fundamental premise of Ayurvedic polyherbal formulation science, have not been systematically evaluated. Well-designed, adequately powered randomized controlled trials comparing Bilwadi Panchamool Ghana Vati with standard hypolipidemic agents such as fenofibrate are urgently needed to establish clinical efficacy, determine optimal dosing, and evaluate safety in the management of hypertriglyceridemia.

CONCLUSION

Bilwadi Panchamool Ghana Vati, a polyherbal formulation derived from the five major tree roots of *Brihat Panchamool*, possesses a strong classical rationale and promising modern pharmacological evidence supporting its potential in the management of *Medoroga* (dyslipidemia). The collective *Tikta-Kashaya Rasa* (bitter-astringent taste), *Laghu-Ruksha Guna* (light-dry quality), and *Ushna Veerya* (hot potency) of its constituent drugs address the pathogenesis of *Medoroga* at multiple levels. Individual drugs have demonstrated hypolipidemic, antioxidant, anti-inflammatory, hepatoprotective, and antidiabetic activities in experimental studies. The *Ghana Kalpana* dosage form enhances the therapeutic potential through concentrated active principles and improved bioavailability. However, rigorous clinical trials are warranted to validate the efficacy and safety of this formulation in the management of increased triglyceride levels and dyslipidemia, particularly in comparison with standard pharmacological agents like fenofibrate.

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