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Review Article

A REVIEW ON *HINGWADI CHURNA*: AN AYURVEDIC COMPOUND FORMULATION FOR ISCHEMIC HEART DISEASE

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ABSTRACT

Hingwadi churna, described in Charaka Samhita Siddhisthana, is indicated for disorders of *Hridaya* (heart). The formulation contains *Hingu, Amlavetas, Shunthi, Sauvarchala lavana* and *Dadima* as ingredients. According to Acharya Sushruta, in the presence of etiological factors, the *Dosha* get vitiated, undergo *Sthanasamshraya* in the *Hridaya*, and afflicts the *Rasadhatu* to produce pain in the cardiac region referred to as *Hridbadha* or *Hridroga*. In the contemporary medical science, these painful cardiac conditions can be correlated with ischemic heart disease. However, limited scientific literature is available regarding the role of this formulation in ischemic heart disease. The present review aims to analyse the pharmacological properties of the compound formulation and its ingredients from both Ayurvedic and contemporary scientific perspectives. Classical Ayurvedic texts and various *Nighantu* were reviewed along with modern scientific literature describing chemical constituents and pharmacological activities retrieved from databases such as PubMed, Google Scholar, ScienceDirect, and WHO publications. The reviewed data suggest that the ingredients of the formulation possess *Deepana*, *Pachana*, *Hridya*, *Kapha-Vata shamana*, *Anulomana* and *Srotoshodhana* properties according to Ayurvedic principles. From a contemporary biomedical viewpoint, many of the ingredients exhibit antioxidant, antihyperlipidemic, anti-inflammatory, and anti-atherosclerotic activities. These pharmacological properties suggest that *Hingwadi churna* has significant potential in maintaining cardiovascular health and may play a supportive role in the management of *Hridroga*, particularly in conditions related to ischemic heart disease.

INTRODUCTION

Hingwadi churna is a formulation mentioned in Charaka Samhita- Siddhisthana -Chapter 9 (*Trimarmeeyamsiddhim*), in the context of the management of diseases affecting the *Hridaya.* The formulation contains *Hingu, Amlavetas, Shunthi, Sauvarchala lavana* and *Dadima* as its ingredients.[1] The contents possess *Deepana*, *Pachana*, *Kapha-Vata shamaka*, *Hridya, Anulomana* and *Srodhoshodhaka* properties, suggesting the therapeutic potential of the formulation in the management of *Hridroga*. In Ayurveda, *Hridroga* (heart disease) is classified into five subtypes: *Vataja, Pittaja, Kaphaja, Tridoshaja* and *Krimija hridroga*.

Acharya Sushruta describes the *Samanya samprapti* (general pathogenesis) of *Hridroga*, in which the *Tridosha* become vitiated due to etiological factors leading to *Rasadhatu dushti* and undergo *Sthanasamshraya* (stage of localization) in the heart, resulting in various types of pain, collectively termed as *Hridbadha*.[2] *Rasadushti* can result in *Rasavahasrotodushti*. The deranged and denatured *Rasadhatu* upon localization in the *Hridaya*, may contribute to anatomical and functional changes in the heart.

Endothelial dysfunction, an early event in the development of atherosclerosis, may be interpreted as due to *Vata prakopa*. Aggravation of *Vata* may lead to

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vasoconstriction instead of normal vasodilatation, thereby contributing to endothelial injury and impaired vascular function. The subsequent adhesion of monocytes, increased vascular permeability to monocytes, macrophages, and lipoproteins, followed by their accumulation within the vessel wall, may be correlated with *Kapha dushti* and *Meda* accumulation, leading to *Srotorodha* and progressive vascular changes.

Atherosclerosis is a chronic inflammatory process characterised by gradual plaque accumulation, luminal narrowing and impaired blood flow, and the clinical manifestations vary depending on the vascular territory involved.[3] Coronary artery disease results from atherosclerotic changes in coronary vessels and may remain asymptomatic for prolonged periods before clinical manifestation as coronary heart disease (CHD) or ischemic heart disease (IHD). Contemporary management includes lifestyle modification, pharmacotherapy, and revascularisation procedures such as Percutaneous Coronary Intervention (PCI) and Coronary Artery Bypass Grafting (CABG). Although these approaches improve symptom control, long-term pharmacological therapy- particularly nitrates- is frequently limited by adverse effects, tolerance, and suboptimal impact on disease progression and quality of life.[4]

Despite significant advancements in coronary angioplasty techniques, recurrent angina has been reported in a proportion of patients following the procedure.[5] These limitations highlight the need for safer and more holistic treatment approaches that not only alleviate anginal symptoms but also enhance overall cardiac efficiency, improve quality of life, while minimizing adverse effects. Ayurveda, with its emphasis on *Amapachana*, *Srotoshodhana, dosha-samyata* and *Rasayana*, offers potential therapeutic alternatives that may support myocardial function, reduce ischemic burden, and complement or provide comparative benefit to existing therapies. However, limited scientific literature exists evaluating this formulation in cardiovascular disorders. Therefore, the present review aims to critically analyse the potential role of *Hingwadi churna* in the management of *Hridroga*, with special reference to ischemic heart disease.

MATERIALS AND METHODS

The information regarding the formulation and its ingredients was collected from classical Ayurvedic texts, including Charaka Samhita, Sushruta Samhita, Ashtanga Hridaya, Bhavaprakasha Nighantu, Dhanwantari Nighantu, Raja Nighantu, and Shodhala Nighantu along with data retrieved from electronic databases such as PubMed, Google Scholar, Science Direct, and WHO publications. The literature search was conducted using key words including *Hridroga*, atherosclerosis, coronary artery disease and *Hridya dravya*. *Hingwadi churna* and the Sanskrit and scientific names of its individual ingredients were also used as search keywords. The collected information was critically analysed and compiled to explain the pharmacological properties, classical therapeutic indications, and the probable role of *Hingwadi churna* in the management of *Hridroga* with special reference to ischemic heart disease.

Pharmacological Profile of *Hingwadi Churna*

Hingwadi churna, mentioned in Charaka Samhita Siddhisthana 9th chapter verse 19, was selected for review to evaluate its potential in the management of *Hridroga*. A similar formulation of *Hingwadi churna*, with slight variations in the order of ingredients as described in Ashtanga Hridaya, is also indicated for *Hridroga*, *Apatantraka*, and *Shwasa*, which supports its relevance in the management of cardiovascular conditions.[6]

Table 1: Details of each ingredient of *Hingwadi churna*- including botanical name, plant part used, and quantity

S.No	Drug	Scientific Name	Part used	Quantity
1	*Hingu*	*Ferula assa-foetida* L.	Gum resin	1 part
2	*Amlavetasa*	*Hippophae salicifolia* D.Don	Fruit	1 part
3	*Shunthi*	*Zingiber officinale* Roscoe.	Rhizome	1 part
4	*Sauvarchala*	Unaqua Sodium chloride	-	1 part
5	*Dadima*	*Punica granatum* L.	Seed	1 part

Table 2: *Rasapanchaka* of *Hingwadi churna*

Drug	*Rasa*	*Guna*	*Veerya*	*Vipaka*	*Karma*
Hingu[7,8,9]	*Katu*	*Tikshna*	*Ushna*	*Katu*	*Pachana, Ruchya, Vatabalasahrit, Pittavardhanam, Hridyam*
Amlavetasa[10,11,12]	*Atyamla*	*Laghu, Ruksha*	*Ushna*	*Amla*	*Bhedanam, Deepanam, Pittalam, Lomaharshanam, Vinmutradoshaghnam*

Shunthi[13,14]	*Katu*	*Snigdha, Laghu*	*Ushna*	*Madhura*	*Kaphavatanut, Vibandhanut, Swarya, Grahi*
Sauvarchala[15]	*Lavana*	*Laghu, Sukshma, Saugandhya, Snigdha, Vishada*	*Ushna*	*Katu*	*Rochanam, Bhedi, Deepanam, Pachanam, Vatanut, Atipittalam, Udgarashudhidam, Hridyam*
Dadima[16,17]	*Madhura-Amla-kashaya*	*Laghu, Ushna*	*Sheeta*	*Madhura-Amla*	*Vatapittakaphavinashi, Grahi, Deepanakaram, Shramahara, Ruchidayi*

Chemical constituents and pharmacological action of ingredients of *Hingwadi churna*

Hingu

Chemical Constituents

Ferula assa-foetida L. generally contains about 68% carbohydrates, 16% moisture, 4% protein, 1% fat, 7% minerals, and 4% fiber. It is composed of three principal fractions: resin (40–64%), gum (25%), and essential oil (10–17%). The resin fraction includes ferulic acid and its esters, coumarins, sesquiterpene coumarins, and various terpenoids. The gum portion consists mainly of glucose, galactose, arabinose, rhamnose, glucuronic acid, polysaccharides, and glycoproteins. The volatile oil fraction contains sulphur-based compounds, monoterpenes, and other volatile terpenoids.[18]

The sulphur compounds present in *Ferula assa-foetida* L. resin exhibit diverse biological activities, making them of potential medicinal importance. Among the major sulphur constituents identified are 2-butyl 1-propenyl disulphide, 1 (methylthio) propyl 1-propenyl disulphide, and 2-butyl 3-(methylthio)-2-propenyl disulphide.[19]

Pharmacological actions

Recent pharmacological and biological investigations have demonstrated that asafoetida exhibits a wide range of activities, including antioxidant, antimicrobial, antiviral, antifungal, anticancer, antidiabetic, antispasmodic, and hypotensive effects. Additionally, it has been reported to possess relaxant, neuroprotective, and molluscicidal properties.[20]

Ferulic acid contributes to a wide range of biological activities, including molluscicidal, anticoagulant, antioxidant (as sodium ferulate), cancer chemopreventive, anti-atherosclerotic, vasodilatory, and hypoglycemic effects. Umbelliferone exhibits molluscicidal, antioxidant, antihyperglycemic, antihyperlipidemic, and antioedematous properties. Recent phytochemical and pharmacological investigations have identified umbelliprenin as a major bioactive constituent of asafoetida, noted for its potent lipoxygenase inhibitory activity.[21]

The study in streptozotocin-induced diabetic Wistar rats, demonstrated that administration of ethanolic Ferula asafoetida oleo-gum resin extract significantly lowered serum total cholesterol, triglycerides, and low-density lipoprotein (LDL) level.[22]

In a study, oral pretreatment with ferulic acid at doses of 10, 20, and 40mg/kg body weight for 28 consecutive days, followed by isoproterenol administration for two days, significantly reduced alterations in serum cardiac enzyme levels in rats. Histopathological analysis further confirmed the preservation and restoration of normal myocardial architecture in ferulic acid- treated animals. The cardioprotective efficacy of ferulic acid was found to be comparable to that of the standard drug, metoprolol. Overall, ferulic acid exhibited a pronounced protective effect against isoproterenol-induced cardiac toxicity by normalizing serum cardiac biomarkers, mitigating oxidative stress, and enhancing the endogenous antioxidant defence system.[23]

A study by Esmaeili et al. (2018) investigated the effects of asafoetida essential oil (AEO) on myocardial ischemia- reperfusion injury in isolated rat hearts. The results showed that high concentrations of AEO (0.5µL/g heart) significantly worsened cardiac function, increasing markers of myocardial injury such as LDH and CK, while reducing coronary flow and contractile performance. In contrast, lower concentrations (0.125–0.25µL/g heart) had no cardiotoxic effects. Overall, the findings suggest that although asafoetida possesses antioxidant properties, its essential oil at higher doses may aggravate ischemic-reperfusion injury rather than protect the heart.[24]

Amlavetas

Controversy: *Amlavetas* has long been a subject of taxonomic controversy. P.V. Sharma, in his 2000 publication *Sachitra Ayurveda*, addressed its botanical identity and proposed that *Hippophae salicifolia* D.Don should be considered as its probable source.[25]

Chemical Constituents:

Pharmacological investigations have shown *Hippophae salicifolia* D.Don to be an exceptionally rich source of vitamins- 5 to 100 times higher than common fruits and vegetables- particularly vitamins A, B_1, B_{12}, C, E, and K. The fruits contain abundant polyphenols (flavonoids such as isorhamnetin, quercetin, myricetin, kaempferol and their glycosides) and carotenoids including β-carotene, lycopene, and

cryptoxanthin. Among sea buckthorn species, *Hippophae salicifolia* D.Don exhibits the highest vitamin C and phenolic content. Its seed oil is rich in vitamin E (1290–1919 ppm), vitamin K (1.1–2.3 mg/g), triacylglycerols, and β-carotene.[26]

Pharmacological actions

Owing to this exceptional nutrient profile, *Hippophae salicifolia* D.Don is regarded as a "super-fruit" and has been traditionally used to treat asthma, skin ailments, gastric ulcers, lung disorders, cough, diarrhea, and menstrual problems. The plant exhibits diverse pharmacological properties- antioxidant, antibacterial, antifungal, anti-inflammatory, anti-cancer, immunomodulatory, radio-protective, adaptogenic, anti-atherosclerotic, and anti-sterility activities. Its seed oil is also used in pharmaceutical formulations for wound healing, tissue regeneration, reducing inflammation, enhancing blood circulation, and preventing platelet aggregation, while its vitamin K content supports normal blood coagulation.[27]

In experimental studies, the aqueous extract of *Hippophae salicifolia* D.Don has demonstrated significant adaptogenic and cytoprotective potential under multiple stress conditions. Rathor et al. (2015) investigated its pharmacological effects in rats exposed to combined cold, hypoxia, and restraint (C-H-R) stress, simulating high-altitude environmental challenges. Pretreatment with HS markedly reduced oxidative stress by lowering reactive oxygen species, lipid peroxidation, and protein oxidation, while preserving endogenous antioxidant defenses such as superoxide dismutase, catalase, and glutathione. The extract also stabilized stress induced alterations in heat shock proteins (HSP70 and HSP60) and enhanced the expression of cytoprotective mediators including heme oxygenase-1 (HO-1), vascular endothelial growth factor (VEGF), and nitric oxide (NO), suggesting activation of endogenous adaptive and repair mechanisms. Overall, *Hippophae salicifolia* D.Don exhibited pronounced antioxidant, anti-stress, and tissue protective effects, supporting its traditional use as a potent natural adaptogen, particularly beneficial in conditions involving oxidative or environmental stress.[28]

Administration of *Hippophae salicifolia* D.Don in Wistar albino rats has been shown to lower serum total cholesterol and LDL-C, while elevating HDL-C levels.[29] Omega fatty acids, particularly omega-7 and omega-3, present in *Hippophae salicifolia* D.Don show potential cardiovascular benefits by helping reduce inflammation and lower cholesterol levels.[30]

Shunti

Chemical Constituents

Zingiber officinale Roscoe. (ginger) contains a wide range of biologically active compounds, primarily belonging to phenolic and terpene groups. The major phenolic constituents include gingerols, shogaols, and paradols. Fresh ginger predominantly contains gingerols, particularly 6-gingerol, 8-gingerol, and 10-gingerol, which are considered its principal polyphenolic compounds. During processes such as heating or extended storage, gingerols undergo dehydration to form shogaols, which may subsequently be converted into paradols through hydrogenation. Ginger also comprises other phenolic components such as quercetin, zingerone, gingerenone-A, and 6-dehydrogingerdione. In addition to phenolics, ginger is rich in terpene compounds including β-bisabolene, α-curcumene, zingiberene, α-farnesene, and β-sesquiphellandrene, which constitute the major components of its essential oils.[31]

Pharmacological actions

Zingiber officinale Roscoe. has been reported to possess diverse pharmacological activities, including antioxidant, anti-inflammatory, antimicrobial, and anticancer effects. Emerging scientific evidence suggests that ginger may play an important role in the prevention and management of several pathological conditions, such as neurodegenerative disorders, cardiovascular diseases, obesity, diabetes mellitus, chemotherapy-associated nausea and vomiting, and respiratory disorders. Research findings indicate that dried ginger demonstrates superior antioxidant potential, primarily due to its higher concentration of phenolic compounds when compared with fresh, stir-fried, or carbonized forms of ginger.[32]

Both in vitro and in vivo investigations have demonstrated that *Zingiber officinale* Roscoe. and its bioactive compounds, such as 6- shogaol, 6-gingerol, and oleoresin possess strong antioxidant properties. Experimental animal studies have shown that ginger extract helps reduce body weight in rats fed a high-fat diet and improves serum lipid profile by increasing high-density lipoprotein (HDL) cholesterol, which is known to exert cardioprotective effects. The extract was also found to enhance hepatic levels of apolipoprotein A-1 and lecithin-cholesterol acyltransferase, thereby promoting HDL synthesis, while simultaneously reducing total cholesterol and low-density lipoprotein (LDL) levels. Furthermore, combined administration of ginger extract along with aerobic exercise demonstrated an additional rise in HDL cholesterol levels. Ginger extract has also been reported to lower plasma triglycerides, total cholesterol, and very low-density lipoprotein (VLDL) cholesterol, possibly through upregulation of hepatic expression of peroxisome proliferator-activated receptors (PPARα and PPARγ), which play a crucial role in the prevention of atherosclerosis.[33]

Zingiber officinale Roscoe. has demonstrated significant cardioprotective potential. Studies have shown that its active constituent, 6-shogaol, inhibits

the proliferation of vascular smooth muscle cells by inducing cell cycle arrest at the G0/G1 phase and stimulating antioxidant defense mechanisms involving Nrf2 and HO-1 pathways. Ginger has also been reported to exert antihypertensive effects by decreasing the activity of angiotensin-converting enzyme (ACE) and arginase while enhancing the production of nitric oxide (NO), which facilitates vasodilation. Additionally, it exhibits antiplatelet activity and supports vascular relaxation through modulation of adenosine levels. Furthermore, extract of *Zingiber officinale* Roscoe. contribute to vascular protection by influencing nitric oxide synthase and cyclooxygenase pathways.[34]

Sauvarchala

Chemical composition

Sodium Chloride: 97.8% w/w, Total Sulphide: 0.918% w/w, Iron: 0.030% w/w, Insoluble matter: 0.07 %w/w.[35]

Pharmacological actions

Modern pharmaco-analytical and clinical explorations are limited but indicative: compositional analyses confirm its mineral and sulphur-rich nature and potential effects on taste/digestion. A small clinical study paired *Haritaki* with warm water containing *Sauvarchala lavana* (as "*Anupana*") for patients with constipation (*purishaja anaha*). The group receiving the *Sauvarchala anupana* had better symptomatic relief than the control group with plain water as *Anupana*, suggesting a potentiating / adjuvant effect in that context.[36]

Dadima

Chemical Constituents

Punica granatum L. (pomegranate) is a rich source of diverse phytoconstituents distributed in various parts of the plant. The seeds and seed oil contain abundant punicic acid, a conjugated linolenic acid that forms 60–80% of the total fatty acids, along with other unsaturated fatty acids such as oleic, linoleic, and α-linolenic acids. Saturated fatty acids like palmitic and stearic acids, together with sterols, tocopherols, and minor volatile compounds, are also present. The seeds possess phenolic compounds including ellagitannins (punicalagin, punicalin), ellagic acid, and gallic acid, along with flavonoids such as quercetin and catechin in smaller quantities. In addition, amino acids, proteins, organic acids, sugars, vitamins, and minerals contribute to their nutritional and pharmacological value.[37]

Pharmacological actions

Pharmacologically, Punica granatum exhibits a broad spectrum of activities. It demonstrates potent antioxidant and anti-inflammatory actions through free radical scavenging and suppression of proinflammatory mediators. The fruit and seed extracts show anticancer and chemopreventive effects by inducing apoptosis, inhibiting cell proliferation, and modulating key signalling pathways. Pomegranate has marked cardioprotective and anti-atherogenic potential, attributed to inhibition of LDL oxidation, improvement of lipid profile, and enhancement of endothelial function. Other reported activities include hypolipidemic, antidiabetic, antimicrobial, hepatoprotective, neuroprotective, anti-ulcer, and wound-healing effects. These pharmacological actions are mainly linked to the synergistic activity of polyphenols, tannins, flavonoids, and the unique fatty acid composition of the seed oil.[38]

Punica granatum (pomegranate) is described as a potent cardioprotective fruit due to its rich composition of polyphenolic antioxidants, mainly punicalagin, ellagic acid, and anthocyanins. These constituents exert strong anti-atherogenic and antioxidant effects by preventing the oxidation of low-density and high-density lipoproteins (LDL and HDL), thereby slowing the progression of atherosclerosis. Pomegranate polyphenols enhance the activity of paraoxonase-1 (PON1), an enzyme that removes oxidized lipids from lipoproteins and arterial plaques, contributing to vascular protection. Clinical and experimental studies demonstrate that regular consumption of pomegranate juice reduces carotid intima-media thickness, lowers systolic blood pressure, improves myocardial perfusion, and decreases LDL oxidation. The fruit's bioactive compounds also modulate lipid metabolism and endothelial function, promoting overall cardiovascular health. Thus, pomegranate serves as a natural antioxidant and anti-atherosclerotic agent with significant potential in maintaining and improving cardiovascular function.[39]

Punicic acid (PA), the major fatty acid in pomegranate seed oil (a conjugated isomer of α-linolenic acid), has gained attention as a promising nutraceutical with cardiovascular benefits. It exerts antioxidant and anti-inflammatory effects, improves lipid profiles (e.g. lowering LDL, triglycerides, raising HDL), and shows potential in modulating obesity and insulin resistance. Mechanistically, PA is metabolized in vivo (for instance, partly converted to conjugated linoleic acid isomers) and may act via PPARγ activation, suppression of inflammatory cytokines, and regulation of lipid-metabolism genes. In preclinical models, supplementation with PA/seed oil leads to improved endothelial function, reduced atherosclerotic lesion progression, diminished oxidative stress, and favorable changes in cardiovascular risk factors.[40]

Several compounds derived from pomegranate demonstrate diverse vasculoprotective properties. Different parts of the pomegranate have been shown to reduce oxidative stress, lipid peroxidation, and foam

cell formation, enhance endothelial function (by increasing nitric oxide levels and reducing glucose), inhibit platelet aggregation, and lower blood pressure, collectively improving vascular health. Additionally, pomegranate and its constituents offer protection against chemical- or drug-induced toxicity.[41]

DISCUSSION

The probable mode of action of *Hingwadi churna* can be explained through the *Rasapanchaka*, which includes its *Rasa*, *Guna*, *Veerya*, *Vipaka*, and *Prabhava*. The formulation contains ingredients with *Katu*, *Amla* and *Madhura rasa*. *Amla rasa* is known for its *Hridya* property and actions such as *Pachana*, *Rochana*, and *Mudavata anulomana*.[42] *Katu rasa* exhibits *Sneha-meda-kledopashoshana* and *Srotovishodhana* properties. The *Lavana rasa* helps in alleviating *Stambha, Sanghata* and *Vibandha* and functions as *Agnikrut*, thereby enhancing digestion.[43] The *Laghu, Ruksha, Tikshna*, and *Sukshma guna* present in its components contributes to the reduction of *Kapha* and *Medas*, while promoting proper circulation and clearance of obstructions in channels. Its *Ushna veerya* acts as a *Kapha-vatahara* and plays a significant role in removing *Avarana* (obstruction), thereby allowing *Vyana vayu* to perform its normal physiological function of *Rasasamvahana*. The formulation's *Deepana* property stimulates *Jatharagni*, enhancing digestion and metabolism, thereby reducing *Rasa dushti*, a central pathological factor in *Hridroga*.

The classical pharmacodynamic properties of the formulation may further be supported by pharmacological activities reported in contemporary scientific literature. Pharmacological studies suggest that several ingredients of *Hingwadi churna* possess significant antioxidant activity. *Amlavetas* (*Hippophae salicifolia* D.Don) is a rich source of Vitamin C. In animal studies vitamin C has been reported to improve contractility and mechanical efficiency of the heart. Vitamin C may enhance mechanical efficiency, especially in the heart, by improving contractility while lowering the energy needed for a given workload. Research indicates that vitamin C may augment the heart's contractile response to specific stimuli without raising oxygen consumption, a benefit particularly noted in patients with heart failure. Sufficient vitamin C intake also supports overall bodily efficiency, contributing to better performance and reduced fatigue, as reported in various studies.[44] Several studies have reported that vitamin C supplementation can lead to improvements in LVEF.[45] Clinical and experimental studies demonstrate that regular consumption of *Dadima* (*Punica granatum* L.) reduces carotid intima-media thickness, lowers systolic blood pressure, improves myocardial perfusion, and decreases LDL oxidation.[46] Collectively, these pharmacological actions of the *Hingwadi churna* components may contribute positively to cardiac function.

Hingwadi churna contains constituents that are cardiovascular supportive. *Hingu* (*Ferula assa-foetida* L.) demonstrates anti-atherosclerotic and vasodilatory effects, attributed to compounds such as umbelliprenin and ferulic acid, which help limit lipid peroxidation, decrease LDL oxidation, and enhance endothelial relaxation via the nitric-oxide–cGMP mechanism, thereby supporting coronary circulation. Along with *Shunti* (*Zingiber officinale* Roscoe.), it may help in reducing thrombosis risk and slow plaque formation. *Amlavetas* (*Hippophae salicifolia* D.Don), rich in vitamin C and particularly vitamin K, offers additional antioxidant and anti-atherosclerotic benefits, while vitamin K plays a key role in preventing vascular calcification, maintaining arterial elasticity, and promoting smoother coronary flow.[47] Taken together, these actions may contribute to better coronary perfusion and thereby reducing chest pain on exertion.

Furthermore, ferulic acid in *Hingu* (*Ferula assa-foetida* L.) aids in managing hypercholesterolemia; gingerol and zingerone in *Shunti* (*Zingiber officinale* Roscoe.) reduce total cholesterol, LDL, and triglycerides; omega-7 and omega-3 fatty acids in *Amlavetas* (*Hippophae salicifolia* D.Don) provide cardiovascular benefits by lowering cholesterol and inflammation; and punicic acid in *Dadima* (*Punica granatum* L.) exhibits antioxidant and anti-inflammatory effects while improving lipid profiles and modulating obesity and insulin resistance. Overall, these pharmacological actions of the formulation may help in correcting dyslipidemia, slowing the progression of atherosclerosis, and improving coronary perfusion, thereby supporting its potential therapeutic role in *Hridroga*.

CONCLUSION

The Ayurvedic pathogenesis of *Hridroga* emphasizes *Agnidushti, Rasadushti,* and *Srotorodha,* leading to impaired *Rasa-samvahana,* whereas modern medicine attributes the condition primarily to atherosclerosis, endothelial dysfunction, and oxidative stress. The ingredients of *Hingwadi churna* possess *Deepana-Pachana, Kapha-Vata Shamana, Hridya,* and *Srotoshodhana* properties, suggesting its potential role in correcting the underlying pathological processes. Additionally, the reported antioxidant, antihyperlipidemic, anti-inflammatory, vasodilatory, and cardioprotective activities of its constituent ingredients provide pharmacological support for its application in *Hridroga*, particularly in relation to ischemic heart disease. Therefore, *Hingwadi churna* may be considered as a promising Ayurvedic formulation for managing *Hridroga*, with a strong theoretical basis for reducing atherosclerotic progression and improving coronary circulation.

However, further well-designed clinical and experimental studies are required to scientifically validate its efficacy, safety, and precise mode of action.

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