

Review on Darvyadi Ghrita an Ayurvedic Formulation for Diarrhoea

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Abstract

Darvyadi Ghrita is a polyherbal formulation and is mainly indicated for the diarrhoea. It is mentioned in Charak Samhita by Acharya Charak. Preparation of oleaginous dosage form is described as *Sneha Kalpana* performed by subjecting *Ghrita* or oil to a particular pattern of heat treated with *Kalka* (Paste) of *Kutaja*, *Daruharidra*, *Pippali*, *Shunthi*, *Katuka*, *Draksha* and *Kwath* (Decoction) of same ingredients. *Murchana* is a pre procedure to *Sneha Kalpana* in which *Ghrita* is treated with few drugs. The main ingredients of *Darvyadi Ghrita* is *Kutaja* (*Holarrhena Antidysentrica* Wall.), *Daruharidra* (*Berberis Aristata* DC.), *Pippali* (*Piper Longum* Linn.), *Shunthi* (*Zingiber Officinale* Rosc.), *Katuka* (*Picrorhiza kurroa* Royle ex.Benth), *Draksha* (*Vitis Vinifera* Linn.) and *Go-Ghrita*. In Ayurvedic therapeutics the Pharmacokinetics and Pharmacodynamics of the drug entirely depends upon *Rasa*, *Virya*, *Vipaka*, *Prabhava* and balance of *Tridosha* in the body. The ingredients of *Darvyadi Ghrita* with their *Rasapanchaka*, are very much competent to exhibit anti-bacterial and anti-diarrheal property from Ayurvedic perspective.

Keywords: *Atisara*, Anti-bacterial, Anti-diarrheal, *Darvyadi Ghrita*, Ayurveda.

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INTRODUCTION

Atisara (Diarrhoea) comprises of two words *Ati* and *Saranam*. *Ati* means excess and *Saranam* is *Gati* or flow. Consequently, *Atisara* (Diarrhoea) is a condition where watery stools are passed in excess, several times a day, through *Guda* (anus) [1]. The most salient factor in the pathogenesis of *Atisara* (Diarrhoea) is *Mandagni* (weak state of digestion) which is the root cause of *Ama Dosha* (a state of incomplete digestion). It is a crucial factor for the incarnation of most of the diseases including *Atisara* (Diarrhoea). *Ama Dosha* (a state of incomplete digestion) results due to *Agni Dushti* (Vitiation of digestive fire) caused by *Mithyaaharavihara*, ultimately resulting as *Atisara* (Diarrhoea). Thus faulty diet habits play a significant role in the manifestation of *Atisara* (Diarrhoea) [2]. As per modern science diarrhoea is defined as the passage of three or more loose or liquid stools per day (or more

frequent passage than is normal for the individual). Often, Diarrhoea is the body's natural defense mechanism against a harmful pathogen, an indigested toxin or a food that disagrees with the digestive system. Diarrhoea can also occur as a result of an irritated or inflamed intestinal wall, which allows excess fluid to leak into the stool, may be the side effect of prescribed medication or an indicator of various illnesses [3]. It is often accompanied by abdominal bloating, cramps, nausea and vomiting etc [4]. There are various formulations in classical text for the management of diarrhoea. *Darvyadi Ghrita* is one among them which is comprised of six ingredients i.e. *Kutaja* (*Holarrhena Antidysentrica* wall.), *Daruharidra* (*Berberis aristata* DC.), *Pippali* (*Piper Longum* Linn.), *Shunthi* (*Zingiber Officinale* Rosc.), *Katuka* (*Picrorhiza kurroa* Royle ex.Benth), *Draksha* (*Vitis Vinifera* Linn.) and *Go-Ghrita*. These ingredients are essentially

comprehensible for their anti-bacterial and anti-diarrhoeal activity to cure diarrhoea [5].

Types of *Atisara*

Acharya Charak and Vagabhatta classified diarrhoea on the basis of *Sharir Dosh* and *Mansik Nidan* (Etiology) into six types viz; *Vatika*, *Paitika*, *Kaphaja*, *Sannipataja*, *Shokaja* and *Bhayaja*. Acharya Sushruta and Bhavaprakasha mentioned *Amaja Atisara* instead of *Bhayaja Atisara*. While Madhav Nidan and

Sharangdhara followed same version of *Sushruta* along with one more type i.e. *Raktaja* and *Bhayaja* respectively. With respect to aforesaid types Harita Samhita mentioned only one type i.e. *Jwara Atisara*. In addition to previously depicted six types, Acharya Charaka has illustrated enormous types of *Atisara* (Diarrhoea) in *Siddhithana* i.e. 36.

DRUG REVIEW

Table 1: Drug review of *Darvyadi Ghrita*

Ingredients	Part used	Rasa (Taste)	Guna (Quality)	Virya (Potency)	Vipaka (Post digestive state)	Karma (Pharmacological actions)
<i>Kutaja</i> (<i>Holarrhena antidysenterica</i> Linn.) [6]	Seed	<i>Tikta</i> (bitter), <i>Kashaya</i> (astringent)	<i>Laghu</i> , (lightness) <i>Ruksha</i> , (dryness)	<i>Sheeta</i> (cold)	<i>Katu</i> (pungent)	<i>Deepana</i> , <i>Sangrahi</i> <i>Kaphapittashamaka</i>
<i>Daruharidra</i> (<i>Berberis aristata</i> DC.) [7]	Bark	<i>Madhura</i> (Sweet) <i>Amla</i> (sour)	<i>Laghu</i> , (lightness) <i>Ruksha</i> , (dryness)	<i>Sheeta</i> (cold)	<i>Katu</i> (pungent)	<i>Ruchya</i> , <i>Vishtambhi</i> <i>Pitta Shamak</i>
<i>Pippali</i> (<i>Piper longum</i> Linn.) [8]	Fruit	<i>Katu</i> (pungent)	<i>Laghu</i> , (lightness) <i>Tikshna</i> (sharpness) <i>Snigdha</i> (unctuous)	<i>Anushna</i> <i>Sheeta</i>	<i>Madhura</i> (sweet)	<i>Deepana</i> , <i>Krimighna</i> <i>Jantughna</i> , <i>Kapha-vata Shamaka</i>
<i>Shunthi</i> (<i>Zingiber officinale</i> Rosc.) [9]	Rhizome	<i>Katu</i> (pungent)	<i>Laghu</i> (lightness) <i>Snigdha</i> (unctuous)	<i>Ushna</i> (hot)	<i>Madhura</i> (sweet)	<i>Deepana</i> , <i>Pachana</i> , <i>Grahi</i> , <i>Kapha-vata shamaka</i> ,
<i>Katuka</i> (<i>Picrorrhiza kurroa</i> Royle ex Benth.) [10]	Rhizome	<i>Tikta</i> (bitter)	<i>Laghu</i> (lightness) <i>Ruksha</i> , (dryness)	<i>Sheeta</i> (cold)	<i>Katu</i> (pungent)	<i>Deepana</i> , <i>Bhedana</i> <i>Krimighna</i> , <i>Kaphapitta Shamaka</i>
<i>Draksha</i> (<i>Vitis vinifera</i> Linn.) [11]	Fruit	<i>Madhura</i> (sweet)	<i>Guru</i> , (heaviness) <i>Snigdha</i> , (unctuous) <i>Mridu</i> (softness)	<i>Sheeta</i> (cold)	<i>Madhura</i> (sweet)	<i>Vrishya</i> , <i>Medhya</i> , <i>Sandhankaraka</i> , <i>Vatapittahara</i>
<i>Go-Ghrita</i> [12]	Animal Product	<i>Madhura</i> (sweet)	<i>Guru</i> , (heaviness) <i>Snigdha</i> , (unctuous) <i>Mridu</i> (softness)	<i>Sheeta</i> (cold)	<i>Madhura</i> (sweet)	<i>Tridhoshashamaka</i>

Holarrhena antidysenterica Wall.

Holarrhena antidysenterica Linn. (Family Apocynaceae) is one such plant, popularly known as “*Indrajav*,” “*Coneru*” in English, and “*Vatsaka*” in *Sanskrit* is a shrub, distributed throughout India upto an altitude of 4,000 ft. In Indian traditional medicine, the plant has been considered a popular remedy for the treatment of dysentery, diarrhoea, and intestinal worms [13]. *H. antidysenterica* Linn is a deciduous shrub or a small tree, which attains a height up to 13 m and a girth of 1.1 m with a clear bole of 3–7 m. Its leaves span 15–30 cm × 4–12 cm; its base is obtuse, often rounded or acute; its nerves are in 10–14 pairs, opposite, sessile, elliptic, or ovate; it is oblong in shape, membranous, strong, and arched; its petioles are up to 1.5 cm; and its cymes are 3–6 cm in diameter [14]. Its seeds are 1-2cm

long, linear or oblong concave with a long coma, light brown, marked with linear lines, and are bitter in taste [15].

Chemical Composition of *Holarrhena antidysenterica* Wall

Most of the known chemical constituents in *H. antidysenterica* have been found in the stem, bark, leaves and a few in the seeds as well. The major constituents are steroidal alkaloids, flavonoids, triterpenoids, phenolic acids, tannin, resin, coumarins, saponins, and ergosterol [16-18].

Pharmacological Action of *Holarrhena antidysenterica* Wall

Anti-bacterial activity

An *in vitro* antibacterial study of methanolic extract of bark, seed, and callus of *Holarrhena antidysenterica* was conducted against *Staphylococcus aureus*, *Salmonella typhimurium*, and *Escherichia coli*. The study revealed that bark extract has the highest antibacterial activity against *Staphylococcus* with an inhibition zone of 10.05 mm, whereas in the case of *Salmonella* and *E.coli*, it is only 6.65mm and 2.7mm respectively. The seed extract of *Holarrhena antidysenterica* showed an inhibition zone against *Staphylococcus* (7.05mm), *Salmonella* (5.50mm) and *E.coli* (3.95mm). The callus extract showed a 4 mm inhibition zone against *Staphylococcus* and its least activity against *E.coli* with an inhibition zone of 3.1mm. The study revealed that three types of extracts of *Holarrhena antidysenterica* possess significant antibacterial activity [19].

Anti-diarrhoeal activity

An *in vivo* study of ethanolic seed extracts of *H. antidysenterica* using a castor oil-induced diarrheal model in rats has shown a significant increase in the dry weight of feces and a reduction in defecation drops. Aqueous and alcoholic bark extracts are also known to act against enteroinvasive *E. coli* (EIEC), *Shigella flexneri*, *Shigella boydii* and *Salmonella enteritidis* [20]. Aqueous and methanolic leaf extracts of *H. antidysenterica* were found to inhibit the growth of diarrhoeal pathogens *Salmonella typhimurium*, *Vibrio cholera*, *Vibrio alginolyticus*, *E. coli*, *Salmonella typhi* [21].

Berberis aristata DC.

Berberis aristata DC. (Berberidaceae) is one of the herbs mentioned in all ancient scriptures of Ayurveda, Charaka and Sushruta have mentioned its different properties along with various used for the treatment of numerous illnesses [22]. It is one of the most important species due to its wide medicinal properties and its occurrence has been reported from sub-tropical areas (1800 m ASL) of the mountain State of Uttarakhand and Himanchal Pradesh [23]. It is used in various crude drug formulations and in different Ayurvedic and homeopathic medicines since ancient times. It is an erect spiny shrub, ranging between 2 and 3 meters in height wood, hard and yellow, bark yellow to brown from the outside and deep yellow from the inside, Leaves are in tufts of 5 to 8, phyllotaxy verticillate, simple spiny. Flowers are stalked, yellow, complete, hermaphrodite, cyclic, actinomorphic and perigynous, with the average diameter of a fully opened flower being 12.5 mm [24, 25].

Chemical composition of *Berberis aristata* DC.

The plants contain berberine, oxy berberine, berbamine, promoline, kara chine, palmatine, oxyacanthine, and taxilamine. *Berberis aristata* contains

protoberberine, and bis isoquinoline type of alkaloid [26]. The root of plant *Berberis aristata* contains alkaloids which are berbamine, berberine, oxycanthine, epiberberin, palmatin, dehydrocaroline, jatrorrhizine, karachine dyhydrokarachine, taximaline, oxyberberine, aromoline and columbamine [27, 28] four alkaloids, pakistanine, 1-0 methyl pakistanine, pseudopalmatine chloride and pseudoberberine chloride is also isolated from *Berberis aristata* [29, 30]. Various alkaloids, terpenoids, flavonoids, sterols, anthocyanins, lignans, vitamins, proteins, lipids, and carotenoids have been isolated and characterised from different *Berberis* species plants [31, 32].

Pharmacological action of *Berberis aristata* DC.

Anti-bacterial activity

Three extracts of *Berberis aristata* (aqueous, alcoholic, and powdered root in distilled water) shows wide antibacterial activity against Gram-positive bacteria. The extract was also tested for anti-bacterial activity against Gram-negative bacteria. The antibacterial activity was limited against *E. coli*, *S. Typhimurium*, *S. dysenteriae* type 1, and *V. cholera*, the best activity was found against *V.cholerae*. The gram-negative bacteria reported here as susceptible to the extracts of *B. aristata* are important human pathogens responsible for causing diarrhoea and dysentery [33].

Anti-diarrhoeal activity

The roots and bark of *B. aristata* inhibit the secretory response of heat-labile enterotoxins of *Vibrio cholerae* and *E. Coli* in rabbit ligated intestinal loop model and infant mouse assay and possible clinical effectiveness in treating acute diarrhoeal disease [34]. The effectiveness of the alcoholic extract of the stem of *B. aristata* against castor oil-induced diarrhoea was analysed in rats indicating the anti-enteropooling activity (prevention of induced intestinal fluid accumulation) of the extract [35].

Picrorhiza Kurroa Royle ex Benth

One of the plants mentioned in Ayurveda having important medicinal properties is *katuka*. Hindi derivative of *katuka* is generally known as *Kutki*. The name of picrorhiza is derived from the bitter root, where picros means bitter, while rhiza means root. The specific name *kutki* is derived from karu [36]. *Picrorhiza* species is generally collected at the base of the zemu glacier in Sikkim at 4300 meter and is identified as *Picrorhiza kurroa* [37].

Chemical composition of *Picrorhiza kurroa* Royle ex Benth

The therapeutically potent constituents of the drug essentially comprises of three vital bitter glycosides, namely: picroside 1, picroside 2, and kutkoside. among them chemically both picroside and kutkoside are C-9 monoterpenes. Iridoid glycosides having an epoxy moiety present in the cyclopentane ring. Besides, it also contains organic acids resin, sugar

and tannins along with cucurbitacin glycosides highly oxygenated triterpenes), apocynin andosin, D-mannitol, Kutkiol, Kutkisterol, Apocyanin, Phenol glucosides, Andosin and Picein Iridoid glycosides, Kutkin, Picoside I,II,III,IV,V, Kutkoside, Picrorhizin [38-42].

Pharmacological action of *Picrorhiza kurroa* Royle ex Benth

Anti-bacterial activity

An *in-vitro* study antimicrobial study was conducted on bacterial strains i.e *Bacillus subtilis* and *Staphylococcus aureus* gram-positive bacteria and *Pseudomonas aeruginosa* and *E.coli* gram-negative bacteria and *Aspergillus niger*, *Candida albicans* and *Malasseiza* fungal strains. It was observed that the ethanolic extract of this plant showed efficient action against all the used strains of microbes [43].

Anti-inflammatory activity

An *in-vivo* study was carried out to evaluate the Anti-inflammatory activities of *Picrorhiza kurroa* rhizome extract against carrageenan for inducing paw edema and cotton pellet implantation induced granuloma formation in rats, suggested that this plant is a potent source of anti-inflammatory drugs. Rhizome extract of *Picrorhiza kurroa* in a dose-dependent manner effectively worked on the inhibition of carrageenan-induced paw edema and cotton pellet-induced granuloma formation. It was observed that there was the reduction in levels of inflammatory cytokines (TNF- α , IL-1 β , IL-6) which is accompanied by an increase in anti-inflammatory cytokine (IL-10) levels in the serum and peritoneal macrophages [44].

Piper longum Linn.

Species of the genus *Piper* are among the important medicinal plants used in various systems of medicine [45, 46]. *Piper longum* L. (Piperaceae), commonly known as long pepper, is widely distributed in the tropical and subtropical regions of the world. It is having slender, aromatic, perennial climber, with woody roots and cordate leaves. The fruits are small, ovoid berries, shiny blackish green, embedded in fleshy spikes [47].

Chemical composition of *Piper longum* Linn

Piperine is the major and active constituent of long pepper (*Piper longum*). The piperine content is 3-5% (on a dry weight basis) in *P. longum*. The fruit of *P. longum* contains a large number of alkaloids and related compounds, the most abundant of which is piperine, together with methyl piperine, iperonaline, piperettine, asarinine, pellitorine, piperundecalidine, piperlongumine, piperlonguminine, refractomide A, pregumidiene, brachystamide, brachystamide-A, brachystine, pipericide, piperderidine, longamide and tetrahydropiperine, tetrahydro piperlongumine, dehydropiperonaline, piperidine, piperine, tetrahydropiperlongumine and trimethoxy cinnamoyl-

piperidine and piperlongumine have been found in the root of *P. longum* [48-58].

Pharmacological action of *Piper Longum* Linn

Anti-bacterial activity

Various extracts of *P. longum* were prepared and evaluated against bacterial pathogens, such as *S. albus*, *S typhi*, *P. aeruginosa*, *E.coli*, and *B. megaterium* and one fungus, *A. niger*. Compared to streptomycin all the extracts exhibited a good antibacterial activity [59]. The isolated constituents and n-hexane extract were found to show varying degrees of antibacterial activity against all the tested bacteria. However, the aqueous extract did not show antibacterial activity against the tested bacteria [60].

Anti-inflammatory activity

The fruit extract of *P. longum* was reported to possess anti-inflammatory activity in carrageenan rat paw edema. *P. longum* extract and piperine possess inhibitory activities on prostaglandin and leukotrienes COX-1 inhibitory effect and thus exhibit anti-inflammatory activity [61, 62]. Another study reported that the piper extracts and piperine have inhibitory activities on prostaglandin and leukotrienes COX-1 inhibitory effect and thus exhibit anti-inflammatory [63].

Anti-amoebic activity

The anti-amoebic effects of crude methanol extract of activity *Piper longum* fruit, *Piper sarmentosum* root and *Quercus infectoria* nut gall against *Entamoeba histolytica* infecting the caecum of mice were studied. The severity of caecal wall ulceration was reduced in mice that received the plant extract and metronidazole as compared to the control animals [64]. The activities of n-hexane, dichloromethane, and methanol extract from five anti-diarrheic Thai medicinal plants, *Acacia catechu* (Fabaceae) resin, *Amaranthus spinosus* (Amaranthaceae) whole plant, *Brucea javanica* (Simaroubaceae) seed, *P. longum* (Piperaceae) fruit and *Quercus infectoria* (Fabaceae) nut gall were tested against the *in vitro* growth of fresh isolates of the intestinal protozoan parasite *Blastocystis hominis*. All extracts showed inhibitory activity with reference to metronidazole [65]. Both the root and fruit of *P. longum* possess anti-amoebic activity approximately to the same extent [66]. The ethanolic extract, hexane fraction, and n-butanol soluble fraction exerted *in vitro* amoebicidal action at 1000 micrograms/ml and the chloroform fraction showed the same at 500 micrograms/ml. The ethanolic extract and piperine, a pure compound, from this plant material, cured 90% and 40% of rats with caecal amoebiasis respectively [67].

Zingiber officinale Rosc.

Ginger (*Zingiber officinale*) belonging to the family Zingiberaceae is a perennial herb. It is widely distributed in tropical Asia. Ginger is an aromatic

rhizome (underground root-like stems) that is warty and branched. It has upright stems and narrow medium green leaves arranged in two on each stem. The stem is surrounded by the sheathing bases of two rank leaves. The flower is either white or yellowish-green and is rarely seen. It grows well in humid climates where it can absorb more sunlight [68].

Chemical composition of *Zingiber officinale* Rosc.

The ginger rhizome contains an essential oil and resin known collectively as oleo-resin. The composition of the essential oil varies according to the geographical origin, but the chief constituents, sesquiterpene hydrocarbons, which are responsible for the characteristics of aroma, are fairly constant [69]. 10-Gingerdione-Anti-inflammatory; 6-Gingerdione-Anti-inflammatory; Gingerenone-A-Anticoccidioid 10 ppm; Fungicide 10 ppm; Gingerenone-B-Fungicide; Gingerenone-C- Fungicide; Gingerol-Analgesic; Zingiberone- Antimutagenic; Antiulcer [70].

Pharmacological action of *Zingiber officinale* Rosc.

Anti-diarrhoeal activity

A study was conducted on *Zingiber officinale* to evaluate its antimicrobial profile and effect on virulent features of diarrhoeal pathogens, viz. colonization of epithelial cells and production of enterotoxins. It inhibited the production of cholera toxin, it had no effect on the action of this toxin. It also had no effect on the production and action of *E. coli* heat-labile and heat-stable toxins. However, the bacterial colonization of Hep2 cells was reduced. The results indicate that in the absence of antimicrobial action, *Z. officinale* exhibits its anti-diarrhoeal activity by affecting bacterial and host cell metabolism. This study reports a novel mechanism of action by *Z. officinale* in infectious diarrhoea [71].

Anti-bacterial activity

An *in vitro* study was performed to evaluate the antibacterial activities of three medicinal plants namely *Punica granatum*, *Ricinus communis*, and *Zingiber officinale* against five important bacterial strains viz., *E. coli*, *Bacillus subtilis*, *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Proteus vulgaris*. The study displayed that the extract of these herbs has a great significant effect against different microorganisms tested and has an inhibitory effect [72].

Anti-inflammatory activity

An *in vivo* experimental study was conducted for the evaluation of anti-inflammatory effects on male Swiss mice and male Wister rats respectively. The study illustrated that ginger essential oil (GEO) has significant anti-inflammatory activities [73].

***Vitis vinifera* Linn.**

A large, perennial tendril climber, tendrils leaf opposed, often bifid. Leaves simple, rotund-cordate or orbicular-cordate, dentate, 3-7 lobed, 10-12 cm across,

glabrous above, tomentose beneath. Flowers in long peduncled, leaf-opposed cymes, greenish or white. Fruits (berry) globose, ovoid, or oblong, varying in size, pale green or purple. Seeds 2-4, oblong- obovoid, brown, with a discoidal tubercle on the back. It is cultivated in Jammu-Kashmir, Himachal Pradesh, Uttar Pradesh, Rajasthan, Punjab, Haryana, Delhi, Maharashtra, Karnataka, Andhra Pradesh, and Tamil Nadu [74].

Chemical composition of *Vitis vinifera* Linn.

Grape seed extract contained the following: procyanidin, gallic acid, epicatechin, catechin, and quercetin [75]. Grape skin contained flavonols and anthocyanins [76]. While in the grape pomace extract of *V. vinifera* L. var. Chilean was found quercetin, vanillic acid, kaempferol, syringic acid and gallic acid [77]. Grape juice from *V. vinifera* L. var. Sangiovese detected by liquid chromatography-high-resolution mass spectrometry (LC-HRMS) contained caffeic acid, coumaric acid, ferulic acid, caftaric acid, coutaric acid, fertaric acid, (-) epicatechin, (+) catechin, resveratrol, procyanidin and flavonols such as quercetin, rutin, kaempferol, quercetin-3-o-glucoside and quercetin-3-o-glucuronide [78].

Pharmacological action of *Vitis vinifera* Linn.

Anti-inflammatory activity

The hydroalcoholic leaf extract of *Vitis vinifera* at high doses showed vigorous anti-inflammatory activity which is demonstrated by the reduction in edema at a dose of 400mg/kg (50.02%) at 4 hours via carrageenan-induced hind paw edema test. Various Components present in *Vitis Vinifera* such as quercetin, kaempferol, resveratrol, and quinic acid account for its anti-inflammatory activity [79]. Leaf extract of *V. vinifera* var. Feteasca Neagra with high concentrations had anti-inflammatory activity by reducing inflammatory cytokines (IL-8, IL-6, IL-1, I β) In lipopolysaccharide-induced cells [80]. According to Balea *et al.*, (2020), Grape pomace from *V. vinifera* L. var. Feteasca Neagra and Pinot Noir also presented anti-inflammatory activity. Compounds that played an important role as anti-inflammatory agents were microcells and quercitrin [81].

Anti-bacterial activity

Grape (*V. vinifera* L.) seed extract exhibited antibacterial activity [82]. The higher extract concentration showed higher inhibition zone diameter against *Streptococcus mutans* [83]. The anti-bacterial activity of *V. vinifera* var. *Feteasca Neagra* leaf extract was indicated by inhibition zone diameter on *Porphyromonas gingivalis*, which was 13 ± 1.41 mm, *Enterococcus faecalis* and *Staphylococcus aureus* was 12 ± 1.41 mm, *Streptococcus mutans* and *Escherichia coli* was 11.5 ± 0.71 mm. Meanwhile, the tendril extract of *V. vinifera* var. Feteasca Neagra, antibacterial activity was seen by inhibition zone diameter in bacteria and fungal strains *Porphyromonas gingivalis*,

Enterococcus faecalis and *Streptococcus mutans* were 10.00 ± 0.00 mm, *S. aureus* was 14.5 ± 0.71 mm and *E.coli* was 10 ± 1.41 mm. The antibacterial activity on the leaves and tendrils of *V. vinifera* is possible due to the high concentration of flavonoids and stilbenes in these sites [84].

Go-Ghrita

Ghrita is an oily liquid form or semi-solid form at room temperature, granular in texture, color white to light yellow, odor and taste pleasant. According to Acharya Charaka, it has unctuous property [1]. *Ghrita* can be used both externally (*Lepa*, *Tarpana*, etc.) and internally (medicinally). There are four types of *Sneha* described in Ayurveda, out of them *Ghrita* is the best. It has a most important property i.e. "Sanskaranuvartana". *Ghrita* is mainly prepared with milk (obtained by churning curd) and is appetizing and *Satmya* for every person from their childhood. It is also indicated in both *Shodhana* and *Shamana Chikitsa* [85].

Chemical composition of Go Ghrita

Ghrita provides energy to the body as it is more convenient than the carbohydrates and proteins, one gram of *Ghrita* possess 9.3 calories. The chemical composition of *Ghrita* is ; Tri-glycerides – 97.098%, Di – glycerides – 0.25 – 1.4% , Monoglycerides – 0.16 – 0.038%, Ketoacid glycerides – 0.015- 0.018%, Glycerylestes – 0.011- 0.05%, Free fatty acids – 0.1-0.44%, Phospholipids- 0.2- 1.0%, Sterols – 0.22-0.41%, Butric acid- 4.5-6.0%, Caporic acid- 1.0-1.36%, Caprylic acid- 0.9-1%, Capric acid-1.5-1.8%, Lauric acid- 6-7%, Myristic acid-21-23%, Palmitic acid-19-19.5%, Stearic acid-11-11.5%, Arachidic acid-0.5-0.8%, Oleic acid-27-27.5% [86].

Ayurvedic Pharmacological Properties of Go-Ghrita:

Ghrita is *Madhura* (sweet) in *Rasa* (taste), *Guru* (heavy), *Snigdha* (smooth) and *Mridu* (soft) in *Guna*, *Sheeta* (cold) in *Virya* (potency) and *Madhura* (sweet) in *Vipaka* and thus pacifies *Vata*, *Pitta* and *Kapha Doshas* and is accounts for *Deepana*, *Pachana* (carminative) properties [87], *Nirvapana*, *Ojo-Vardhana*, *Mridukara*, *Rasayana*, *Swaraprasadana*, *Chakshushya*, *Vayasthapana*, *Varnaprasadana*, *Ayushya*, *Smriti*, *Buddhi*, *Kanti*, *Bala* and *Medo Vridhikara*, *Soukumarya*, *Brihmana*, *Rochana* and *Lavanya vriddhi* etc [88-93].

DISCUSSION

Diarrhoea is a prevailing problem of the contemporary era, due to irregular and unhealthy habits relating to *Ahara* and *Vihara*. *Atisara* (diarrhoea) finds a place as a salient disease in an individual's life as everyone suffers from it at least once in lifetime. It is usually caused by *staphylococcus aureus*, *streptococcus aureus*, *Vibrio cholera*, *salmonella typhimurium* and *Escherichia coli*. Different Acharyas have illustrated numerous types of *Atisara* i.e. *Vatika*, *Paitika*, *Kaphaja*, *Sannipataja*, *Shokaja*, *Amaja* and *Bhayaja*. Acharya

Charaka explained *Darvyadi Ghrita*, a polyherbal formulation that combats with *Atisara*. The main components of the formulation are *Kutaja* (*Holarrhena Antidysentrica* Wall.), *Daruharidra* (*Berberis Aristata* DC.), *Pippali* (*Piper Longum* Linn.), *Shunthi* (*Zingiber Officinale* Rosc.), *Katuka* (*Picrorhiza kurroa* Royle ex.Benth), *Draksha* (*Vitis vinifera* Linn.) and *Go-Ghrita*. The common *Rasa* of the components are *Katu*, *Tikta* and *Kashaya* which have probable mode of action of *Agni Deepana*, *Pachana* and pacifies *Tridoshas* as well as provide *Bala* to the body. In addition to the *Rasas*, the drugs also possess *Stambhana* property that inhibit the *Atisara*. As per Acharya Charaka, *Katu Vipaka* accounts for the *Mala Baddhta* property i.e. it binds the 'Mala' in the body.

As to a thorough assessment of other sources, *Kutaja* (*Holarrhena Antidysentrica* wall.) has shown inhibition of the growth of diarrhoeal pathogens like *S. Typhimurium*, *V. Cholera*, *E.Coli* and *S. typhi*. It also shows significant decrease in the levels of inflammatory cytokines. The root and bark of *Daruharidra* (*Berberis aristata* DC.) have shown clinical efficacy in curing acute diarrhoeal disease. *Pippali* (*Piper Longum* Linn.) and *Shunthi* (*Zingiber Officinale* Rosc.) not only prove to acquire anti-bacterial activity but also anti-diarrhoeal activity. Along with this, *Draksha* (*Vitis vinifera* Linn.) showed a higher inhibition zone against microorganisms that originate diarrhoea.

CONCLUSION

In the present era, synthetic drugs are accompanied by their side effects, while herbal drugs are far away from the said notion. *Darvyadi Ghrita* is one of the Ayurvedic formulations indicated for diarrhoea. On analysing the ingredients, it demonstrates that all the drugs present in *Darvyadi Ghrita* possess anti-bacterial, anti-diarrhoeal properties. Their anti-bacterial property is significantly effective in controlling various pathogens causing diarrhoea and therefore helps speed up the treatment of *Atisara*. Thus, proving its anti-diarrhoeal effect, *Darvyadi Ghrita* can be practiced popularly for the alleviation of *Atisara*.

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