Conceptual study on Anthelmintic action of Kshara Agada: A review

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Abstract

In Agadtantra there are number of yoga are describe due to highly potential and fast acting ingredients. One such unique yoga (Formulation) describe by Acharya Charaka in Charaka Samhita is ksharagada yoga. Ksharagada is a yoga where Palash Kshar is prepared and several vishaghna drugs were added into it. It is indicated for the treatment of conditions manifested by poison such as inflammation, bloating, skin ailments, haemorrhoids, fistula-in-ano, liver diseases, anaemia, digestive ailments, respiratory ailments, psychological disturbances and also in worm manifestation (krumiroga). Ingredients of Ksharagada possess antibacterial, antioxidant, antimicrobial hepatoprotective and Antihelminthic action. The review is an attempt to provide collective knowledge on therapeutic, pharmacological and medicinal properties of Ksharagadawith respect to its anthelmintic activity based on classical literature and available research.

Keywords: Kshara, Krumi, Anthelmintic action.

Introduction

Man, the superior most of all the species is always remaining in search of One Prime Goal: The perfect health. From Vedic era to this age, all the researches have been directed by the eminent scholars to achieve the same. Ayurveda literatures are vast treasures of various drug formulations. Agada yogas are those formulations which counteract the deleterious actions of visha or poison over the senses and organs. Although helminths (worms) infestation is not fatal, they sometimes leave greater impact on the growth and slow cognitive development of the children. Affect other system and may prove fatal. The major drawback in the fight against such parasite is insensibility to prevent them by immunization.

Ksharagada is one of the formulation described by Acharya Charaka. It is indicated for the treatment of conditions manifested by poison such as Shotha (inflammation), Gulma (bloating), Twakdosa (skin ailments), Pandu (anaemia), haemorrhoids, fistula-in-ano, liver diseases, anaemia, digestive ailments, respiratory ailments, psychological disturbances and also in krumi roga. The ingredients are having antioxidant, antibacterial and hepatoprotective action. Ksharagada is available in gutika (pills) and churna (powder) form. The ingredients of kshara Agada according to Charaka Samhita and CharakaSamhita along with the Rasa Panchaka.

Material & Method:

Classical literature from Charaka Samhita was studied, and Research work related to ingredients of Ksharagada were compiled from various international journals. Interpretation and correlation of research and classical information was done to draw definite results.
Method of preparation

Preparation of Kshar:

The all part of dried Palash (Butea monosperma) was burnt totally with limestone. The ash part of plant was collected and mixed with water in 1:6 ratios. The mixture was filtered through filter paper for 21 times in a big vessel. Then filtrate was kept on fire at moderate temperature with continuous stirring. After complete evaporation of water whitish dry powder obtained, this is called Kshar.  

Properties of Kshara: Kshara is not very penetrating, nor very soft, it is mild, spreading in nature, white in color, elevated when smeared, easy to remove and does not produce much secretions.

Preparation of Ksharagada:

Palasha (Butea monosperma) kshara is prepared and the powdered drugs are sprinkled and stirred while being cooked till the paste sticks to spoon. Pills are made from this paste and dried in shade.

Property of Haridra (Curcuma longa) – Curcuma longa has katu, tikta rasa; ruksha laghu guna; usna veerya; katu vipaka; kusthagna (relieving skin disease) and vishagna (anti poisonous) karma. It contains phytoconstituents like curcumin, curcuminoids etc.

Anthelmintic activity: The hydro-alcoholic extracts of Curcuma longa, Zingiber officinale and combination of Curcuma longa and Zingiber officinale rhizome extracts (1:1) were evaluated for their anthelmintic activity using Pheretima posthuma model (Indian earthworm). Extracts obtained from both rhizomes not only paralyzed but also killed the earthworms. Among the two drug extracts, Curcuma longa showed maximum vermifuge activity at the concentration of 50mg/ml. Combination of hydro-alcoholic rhizome extracts of Curcuma longa and Zingiber officinale also showed a significant anthelmintic activity. On the basis of the observations, it was concluded that both Curcuma longa and Zingiber officinale rhizomes extracts bearing a potential anthelmintic property.

Table 1: Rasa panchaka of the ingredients of Ksharagada

<table>
<thead>
<tr>
<th>Dravya</th>
<th>Rasa</th>
<th>Guna</th>
<th>Veerya</th>
<th>Vipaka</th>
<th>Karma</th>
<th>Doshagnata</th>
</tr>
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<tbody>
<tr>
<td>Haridra</td>
<td>Katu</td>
<td>Laghu Usna</td>
<td>Usna</td>
<td>Katu</td>
<td>Kusthaghna</td>
<td>Visaghna</td>
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<tr>
<td>Tikta</td>
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<tr>
<td>Surasmanjari</td>
<td>Tikta</td>
<td>Laghu Usna</td>
<td>Usna</td>
<td>Katu</td>
<td>Kusthaghna Rucikara Krimighna</td>
<td>Kapha Vata Samaka</td>
</tr>
<tr>
<td>Daru haridra</td>
<td>Tikta</td>
<td>Laghu usha</td>
<td>Katu</td>
<td>Visahara Kusthaghna</td>
<td>Pitta Kapha Samaka</td>
<td></td>
</tr>
<tr>
<td>jatamansi</td>
<td>Tikta</td>
<td>Kasaya Madhura</td>
<td>Snigdha Laghu</td>
<td>Sheeta</td>
<td>Katu</td>
<td>Vishagna</td>
</tr>
<tr>
<td>Hingu</td>
<td>Tikta</td>
<td>Tiksna Laghu</td>
<td>Usna</td>
<td>Katu</td>
<td>Krimighna</td>
<td>Vata Kapha Samaka</td>
</tr>
<tr>
<td>Shweta Sariva</td>
<td>Tikta</td>
<td>Madhura Snigdha</td>
<td>Sheeta Madhura</td>
<td>Kusthaghna Visaghna Rucikara</td>
<td>Tridos Samak</td>
<td></td>
</tr>
</tbody>
</table>
Krushna Sariva
Madhura
Snigdha, Guru Sukrula Ruchikar
Sheeta
Madhura
Vrana,Vishamjwara,Kushta,
Tridosh shamak

Madhuka
Kasaya Madhura
Guru Snigdha
Sheeta
Madhura
Balya, Sukrula
Vatapitta hara

Kushta
Tikta katu madhura
Laghru Ruksha
Usna
Katu
Kusthahara, hikka,
karahara
Vata Kapha hara

Shunti
Katu
Ruksha Tiksna
Usna
Madhura
Deepaniya, Kusthahara,
shoolaghna
Vata Kapha hara

Pippali
Pippali Katu,
Laghru Snigdha
Usna
Madhura
Deepana, kusthahara,
rasayana, shoolaghna
Vata Kapha hara

Maricha
Katu
Laghru Tiksna
Usna
Katu
Krimihara, kasahara
Kapha vata

Palasha
Palasha Katu tikta kashaya
Laghru, Snigdha
Usna
Katu
Krimighna Deepaniya
Arshahara
Vata kaphahara

Laksha
Laksha Katu tikta
Laghru Snigdha
Usna
Katu
Kusthahara
Kapha Vata hara

Gairik
adhura kashaya
Snigdha. Shlakshan
Sheeta
Madhura
Varnya, jwarahar
Pittashamak

Saindhav
Lavana, Madhura
Snigdha, Tikshna, Sukshma
Sheeta
Madhura
Vrushya,Deepaniya
Tridosshara

Harenu
Katu tikta
laghu
Sheeta
Katu
DeepanMedhya, Pachani,
Vishaghna
Vatahara,,
Kaphahara,

Property of Surasmanjiri\(^9\) (*Ocimum sanctum*)

Surasmanjiri has tikta, katu rasa; ruksha, laghu guna; usna veerya; kusthaghna, rucikara (appetizer), Krimighna (anti-helminthic) karma. *Ocimum sanctum* contains ursolic acid, polyphenols, anthocyanin and eugenol.

**Anthelmintic Activity**\(^10\).

The formulated compound ursolic acid was also formulated at different concentration of 15, 20 and 25mg/ml as test. The time taken for the worm to lose its movement was considered for paralysis time and the time taken to drop its motility even in the occurrence of outside stimulus (when dipped in warm water at 55°C) and faded body color was measured for mortality time. Albendazole the standard drug at three different concentrations of 15, 20 and 25mg/ml with ethanol was made. Death time and paralysis time of each earthworm in the group was recorded hence Antihelminthic activity was evaluated due to compound ursolic acid present in it.

Property of Daruharidra\(^11\) (*Berberis aristata*)

Daruharidra has tikta rasa; ruksha, laghu guna; usna veerya; katu vipaka; Visahara and kusthughna karma. *Berberis aristata* has alkaloid berberin. It is used as tonic, demulcent, diaphoretic and diuretic, in the treatment of skin disease, jaundice, and diarrhea.
Property of Jatamansi\(^{12}\)(Nardostachys jatamansi)

Jatamansi has tikta, kasaya, madhura rasa; sita veerya; katu vipaka; vishaghna and tvachya (skin promoting effect) karma. Nardostachys jatamansi has sesquiterpene and coumarins as active principles.

Anthelmintic Activity\(^{13}\):

The hydroalcoholic extract of leaves of Valeriana jatamansi have shown anthelmintic activity at the doses 100, 200, 400 mg/ml. The result shows that hydroalcoholic extract possesses wormicidal activity and found to be effective as an anthelmintic may be due to presence of phenols as revealed in the phytochemical screening. The extract showed anthelmintic activity in dose-dependent manner giving shortest time of paralysis and death with 400 mg/ml concentration, for both the worms. Evaluation of anthelmintic activity was compared with reference standard Albendazole. This activity may be due to presence of polyphenolic compounds.

Property of Hingu\(^{14}\)(Ferula asafoetida)

Hingu has tikta, katu rasa; tiktna, laghu guna; usna veerya; katu vipaka; pacana (digesting action), rucikara, Krimighna karma. Ferula asafoetida contains sesquiterpene, coumarin.

Anti-helminthic activity\(^{15}\):

Sesquiterpinoid are another group of constituents which are found to have anti-helminthic properties and are found in this plant. The essential oils, flavonoids and terpenoids are found in this plant in which tannins are polyphenolic compounds contained in the extracts of F. foetida produced similar effects can be possible also they can bind to free protein in the gastrointestinal tract of host animal or glycoprotein on the cuticle of the parasite and result death of worm showing Antihelminthic activity.

Property of Sariva\(^{16}\)(Hemidesmus indicus)

Sariva has tikta rasa; guru, snigdha guna; sita veerya; madhura vipaka; rucikara, kusthaghna, visaghna karma. Hemidesmus indicus contain rutin as active principle.

Antihelminthic activity\(^{17}\): of steam distillates against earthworm model. The average paralysis and death time in case of Hemidesmus distillate alone was found to be 31 and 43minutesrespectivelywhile ittookmoretime to cause paralysis (85 min) and death (133 min) in case of Hemidesmus-Cow urinecombination. In this case also Hemidesmus distillate alone was found to be more effective than combination trial.

Property of Yashtimadhu\(^{18}\)(Glycyrrhiza glabra)

Madhuka has tikta, madhura rasa; guru, snigdha guna; sita veerya; madhura vipaka; balya (improving strength) and sukrala (increasing sperm count) karma. Glycyrrhiza glabra contains glycyrrhizin.

Antihelminthic activity\(^{19}\).

The crude Ethanol extract of Glycyrrhiza glabra did produce anthelmintic activity against Indian earthworm Pheretima posthuma. The plant possesses significant anthelmintic activity at 100 mg/ml concentration measured by time taken for paralyse / death of the earth worms. The current investigation leads to conclusion that the roots of G.glabra have potent anthelmintic activity.

Property of Kustha\(^{20}\)(Saussurea lappa)

Kustha has tikta, katu madhura rasa; laghu, ruksa guna; usna veerya; katu vipaka; kusthahara, hikkahara (relieving hiccups), kasahara (relieving cough) karma. Saussurea lappa contains sesquiterpene lactones as major phyto-constituent. It exhibits anti-in.
Antihelminthic activity:

Dehydrocostus lactone and Costunolide exhibited strong larvicidal activity against A. albopictus with LC50 values of 2.34 and 3.26 μg/mL, respectively, while the essential oil possessed LC50 value of 12.41 μg/mL. The result indicated that the essential oil of S. lappa and the two isolated constituents possessed potential for use in control of A. albopictus larvae and could be useful in search of newer, safer and more effective natural compounds as larvicides.

Property of Shunti (Zingiber officinale):

Shunti has katu rasa; ruksha, tikshna guna, usna veerya; madhura vipaka; deepaniya (appetizer), kusthahara and shoolaghna (relieving pain) karma. Zingiber officinale contains zingerol.

Antihelminthic activity:

The effect would be due to presence of alkaloids which may suppress the transfer of sucrose from the stomach to the small intestine together with its antioxidant effect which is capable of reducing the nitrate generation which could interfere in local homeostasis which is essential for the development of helminths. The possible mechanism of action of tannins may be interfere with energy generation by uncoupling oxidative phosphorylation, or may interfere with glycoprotein of cell surface, or can bind to free proteins in the gastrointestinal tract of host animal or glycoprotein on the cuticle of the parasite and cause death.

Property of Maricha (Piper nigrum)

Maricha has katu rasa; tikshna guna; usna veerya; katu vipaka; krimihara, kasahara karma. Piper nigrum contains piperin as main phytoconstituents. It has ability to control worm infestations, cough and inflammations.

Antihelminthic activity:

The aqueous and ethanolic extract of Piper nigrum, Linn were evaluated for Anthelmintic activity. The dried powder of Black pepper (dried fruit) containing chemical constituent piperine were extracted and the activity was studied. Both aqueous and ethanolic extract collected were screened for preliminary phytochemical studies and also tested for Anthelmintic activity against Indian adult earthworm Pheritima posthuma (Annelida) and recorded the time taken for induction of paralysis and death. Some of these phytoconstituents may be responsible to show a potent Anthelmintic activity. It is also confirmed that these drugs triggers natural immune system to fight against various parasites and helminthes. This study reveals that Piper nigrum Linn shows potent Anthelmintic activity.
Antihelminthic activity:

Seeds of Butea monosperma administered as crude powder (CP) at doses of 1, 2 and 3 g/kg to sheep naturally infected with mixed species of gastrointestinal nematodes exhibited a dose and time-dependent anthelmintic effect. The maximum reduction of 78.4% in eggs per gram of feces (EPG) was recorded on dy 10 after treatment with 3 g/kg. Levamisole (7.5 mg/kg), a standard anthelmintic agent, exhibited 99.1% reduction in EPG.

Property of Laksha (Laccifer lacca)

Laksha has katu tika rasa, laghu snigdha guna: ushna veerya; katu vipaka; kushtahara and kapha vata hara karma. The major constituent of sticklac is the resin (70-80%); other constituents present are: sugars, proteins, and soluble salts - 2-4; coloring matter - 1-2; wax – 4 – 6; sand, woody matter, insect bodies and other extraneous matter – 8-12; a volatile oil is present in traces. The second fraction possibly comprises interests of equivalent amounts of aleuritic acid, an isomer of aleuritic acid and laccolic lactone.

Properties of Gairik:

Gairik has madhura kashaya rasa, snigdha vishada guna; sheetavirya; madhura vipaki; pittashamak, baliya, vrana-ropan, netrya, kaphahara, karma. Gairik is sweet in taste, smooth in quality, cold in potency is good for eyes. It has also astringent in taste Gairika is useful in haemorroids diseases hiccup and vomiting. It act as antidote to poison and clears the disease caused by impure blood. (R.R.S.3/47)

Properties of Lavana (Rock salt):

Rasa : Madhura   Vi rya : Sheeta   Guna : Snigdha, Tikshna, Sukshma, Vipaka, Madhura   Doshaghnata : Tridoshahara . It has got Deepana and Vrishya properties in small doses, it is highly carminative and digestive. Saindhav plays the role of carrier and help to reach the Basti Dravya at microcellular level.

Properties of Harenu (Vitex Agnus-Castus):

Harenu has Katu, Tikta Rasa, Guna Laghu Virya Shita, Vipaka, Katu Karma Deepan, Kaphahara, Medhya, Pachani, Vatahara, Vishaghna, Pittakara, Garbhapatini, Mukha vaimalyakara. Therapeutic Use: PMS galactagogue, potentials as an insect repellant Chemical Constituent: alkaloids, flavonoids, diterpenoids, viterin, casterin, & steroidal harmone, precursors, have been isolated, from chemical analysis.

Observation & Result:

Ksharagada possess seventeen ingredients out of which maximum ingredients having research work on common action in anthelmintic activity, antibacterial anti-inflammatory anti-bacterial, antimicrobial, antifungal and antitoxic in action.

Discussion

There are many modalities to tackle krimi rogas, as per Charaka Ksharagada is one of them. Kshar has all the properties, such as Lekhana - debridement, Shodhana - cleaning, Vilayana- resolution and Shoshana- absorption of discharge and necrotic material. Kshar application over a particular disease is quite difficult and uneven. A definite shape of this particular drug is needed. Ksharagada has this quality along with homogeneous distribution of Kshar. Ksharagada has also quality of sustain release of drug because of its binding agent and poly herbal formulation. Ksharagada possess seventeen ingredients out of which Most of these drugs are having katu, tika rasa; ushna veerya; katu vipaka; Kushtaghna, vishaghna, deepaniya and krimihara karmas. These drugs are very potent and reported to have actions such as anti-oxidant, anti-inflammatory, hepato-protective, anti-mutagenic, anti-bacterial, and anti-helminthic. Individually, some of these drugs have diuretic, diaphoretic actions...
which are useful in elimination of poison mostly ingredients having research work on common action in anthelmintic activity.

Conclusion

Most of the ingredients of Ksharagada are having vishagha, krimihara, deepaniya karmas. The use of Ksharagada in cases such as poisoning, worm infestations skin disorders, liver disorders, ano-rectal disorders, allergic problems is also justified theoretically. Individual ingredients of ksharagadapossess promising anthelmintic activity and combination of ingredients having similar properties which enhance the desire action of drug and shows synergetic effect. The present paper enumerates various pharmacognostic and pharmacological aspects of the ksharagada this review also summaries the therapeutic potential of this Agada. Therefore Ksharagada can be considered as superior anthelmintic agent, however Research work needed on pharmacological & clinical ground to established the classical claim.

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