



The Comparative antimicrobial activity of Karkatshrungi

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ABSTRACT:

Today Ayurveda is recognized worldwide as a system of medicine that provides sound mind in sound body. This traditional system of medicine of India has an enviable position in the field of providing remedies for the ailments. As it provides satisfactory answers to all the problems, today's world facing towards it.

The gall of Karkatshringi (*Pistacia integerrima* Steud Ex. Brand) is a well known drug used in paediatric diseases. Sushrutacharya has mentioned karkatshringi is one of the drugs in Rakshoghna Dravyas, used in treatment of Grahabadha. Symptoms of Grahabadha are similar to the symptoms of various infectious diseases. The galls powder of Karkatshringi was evaluated preliminarily physico-chemically. The water extracts were prepared and performed antibacterial activity by disc diffusion method and assayed for MIC using microdilution technique. It showed that the

galls powder of *Pistacia* was sensitive against staphylococci and E-coli and resistant to pseudomonas.

Keywords: *Pistacia integerrima*, comparative Antimicrobial activity, Physico-Chemical analysis.

Introduction:

In Ayurveda, medicinal plants have occupied a distinctive place as the main source of treatment. The increasing importance of herbs has led to their increased use as home remedies, over the counter drugs and raw materials for the pharmaceutical industries thus represent a substantial proportion of global drug market. The increasing demand of herbal drugs and extinction of species, result in shortage of their supply. Due to unavailability of drugs and their increasing costs, today's manufacturers are tending to use substandard as well as adulterated drugs. Hence, it's the need of hour to find better substitutes for the same.

Karkatshringi is one of the important plants in *Ayurveda*. *Acharya Charaka* has included it in *Hikkanigrahan*ⁱ and *Kasahara ganas*ⁱⁱ and described in *Vataj kasa*ⁱⁱⁱ, *Kaphajanya Chardi*^{iv}. It is one of the ingredients in *Chyavanprash*^v, which is used as *Rasayana* since ancient time.

Acharya Sushrut included it in *Kakolyadi gana*^{vi} and *Rakshoghna dravyas*.

All later *Nighantus* like *Kaiyadev*, *Shivadatta* have followed *Sushruta* and identified *Karkatshringi* as *Putranjeevavat* tree. This is confirmed as *Pistacia integerima*.

Vd. Bapalal Vaidya (Author of *Nighantu Aadarsh*) has stated that galls on *Haritaki* are often sold under the name of *Karkatshringi*^{vii}. Also galls on *Rhus succedenia* plant was substituted for *Karkatshringi*^{viii}.

We need critical study to find out efficacy of substitute market sample. We need to compare its efficacy with genuine original *Karkatshringi*. Its use as substitute is justified only when its efficacy is comparable.

• **Relevance of the Study: -**

As per *Charaka Samhita*^{ix}, '*Bhutabhishanga*' is also responsible factor to cause diseases. One of the three major divisions of diseases i.e. '*Agantuja Vyadhis*' are caused also due to *krimi*^x. Similarly, *Acharya Sushruta*^{xi}(Su.Ni.5/32) has illustrated the means of spread of '*Aaupsargika Rogas*' (Infectious disease). That means, in the etiology of many diseases, microbial relation plays a role that was realized by the modern medicine only a century ago. But the specific idea of the nature of disease producing germs did not

develop till modern Microbiology came into existence.

Microbiology is one such branch, which has improved by leaps and bounds in the past few decades thus allowing for pinpoint diagnosis and treatment of many infective disorders. Now, it has become possible to investigate the action of drugs on isolated micro- organisms. The important thing is that antibiotics from microbial sources have become ineffective & the infectious organism develops resistance against them. Thus, the idea of less intrusive alternative is alluring so due to problem like adverse effect, limited life span & the mixture of traditional antibiotics effect are currently underway to look for natural origin. So, the present study was designed with antimicrobial in vivo pattern.

[A] Materials and Methods for Physico Chemical Standardization of *Karkatshringi*

❖ **Materials :-**

Different samples of *Karkatshringi* are found in market at different places. Originally *Karkatshringi* is found in Gadhwal and Himalaya region. But different plant materials are collected and sold under the name of *karkatshringi*.

We need to standardise these plant materials and compare their efficacy as *krumighna*. We decided to compare samples from Maharashtra

Maharashtra state is divided in to different regions like, Kokan, Marathwada, Vidarbha and Paschim Maharashtra

The samples were collected from markets of Dehradun (Himalaya region) and Major cities of Maharashtra regions like

Mumbai- Kokan region, Nagpur- Vidarbha region, Aurangabad- Marathwada region, Kolhapur- Paschim Maharashtra region.

10 different Main shops of ayurvedic raw materials were selected from these cities then, from that main shops, only one shop is selected Randomly by lucky draw method.

Processing of sample-

These samples were packed and sealed in polythene bags with name marking on each bag. These samples were identified botanically and authenticated by Research Head from Government pharmacy.

These six samples were coded as below:

P1 - Self collected *Karkatshringi* sample from Dehradun market.

P2 - Self collected *Karkatshringi* sample from Mumbai market.

P3 - Self collected *Karkatshringi* sample from Nagpur market.

P4 - Self collected *Karkatshringi* sample from Aurangabad market.

P5 - Self collected *Karkatshringi* sample from Kolhapur market.

All the samples collected from Maharashtra state (Mumbai, Nagpur, Aurangabad, Kolhapur), were found as round, flat, irregular in shape, while that of collected from Dehradun was found to be curved, horn shape, hallow, cylindrical in shape.

Maharashtra & Dehradun samples were totally different, seemed to be belonging to different botanical sources.

These samples were identified & authenticated by from reputed government institute.

BOTANICAL IDENTIFICATION : All the samples of *Karkatshringi* collected from different regions were identified and authenticated in reputed government recognized analytical laboratory with various techniques.

The sample which was round, flat and irregular in shape identified as insect galls on *Populus alba*, Linn. leaves caused by 'Erisoma taskhiri' and the other sample which was horn shaped, cylindrical hallow in nature was identified as galls on *Pistacia integerrima*, Stewart ex. Brandis caused by 'Aphid' insect. All these samples were chosen to evaluate the possibility of similarities in physico-chemical and phytochemical values or properties that of *Pistacia ingegerrima*.

These 5 samples were powdered and pass through 72 no. mesh. Then they were kept in small polythene bags and coded as mentioned above.

Pharmacognosy deals with natural drugs obtained from organisms such as plants, microbes and animals.

Method:

The methods for standardization include-

1. Organoleptic standardization.
2. Physico-chemical standardization.
3. Phyto-chemical standardization.
4. Microscopic standardization.

Showing Organoleptic Characters of Karkatshringi

Tests	<i>Karkatshringi</i> Samples				
	P1	P2	P3	P4	P5
Colour	Light Brown	Light Brown	Light Brown	Light yellow	Light yellow
Texture	Rough	Rough	Rough	Rough	Rough
Taste	Astringent	Astringent	Astringent	Astringent	Astringent
Smell	Specific aromatic	Specific aromatic	Specific aromatic	Odourless	Odourless

Sample P1 (Collected from Dehradun), Sample P2 (Collected from Mumbai) and Sample P3 (Collected from Nagpur) have light brown color while other two Samples P4 (Collected from Aurangabad) and P5 (Collected from Kolhapur) have light yellow color.

All five samples of Karkatshringi were rough in texture and have astringent taste.

The powder of galls of Sample P1, P2 and P3 have aromatic odour while remaining two (P4 and P5) have no odour.

❖ PHYSIOCHEMICAL STUDY:

- Table showing results of physicochemical analysis of five samples of *Karkatshringi*-

Tests	<i>Karkatshringi</i> Samples				
	P1	P2	P3	P4	P5
Moisture Contents	4.5%	7.8%	4.8%	4.6%	5.4%
Foreign Matter	< 1%	1.4%	< 1%	< 1%	1%
Total Ash	3.39 %	5.50 %	4.62 %	4.23 %	4.13 %
Water Soluble Ash	3.25%	3.17%	3.24%	1.97%	1.95%
Acid Insoluble Ash	0.5 %	1.0 %	0.8 %	0.4 %	0.6 %
Alcohol Soluble Extractive	40.86 %	28.46 %	42.88 %	45.24 %	40.10 %

Water	48.95 %	27.36 %	47.01 %	45.51 %	36.83 %
Soluble Extractive					
pH	4.47	4.43	4.56	4.28	4.23
Swelling Index	2.5 ml	2.5 ml	2.25 ml	1.25 ml	1.50 ml
Foam Index	<100	<100	<100	100-200	100-250

❖ PHYTOCHEMICAL STUDY

- Table showing results of phytochemical analysis of five samples of *Karkatshringi*-

Tests	<i>Karkatshringi</i> Samples				
	P1	P2	P3	P4	P5
Alkaloids	Absent	Absent	Absent	Absent	Absent
Tannins	Presents	Presents	Presents	Presents	Presents
Glycosides	Presents	Presents	Presents	Presents	Presents
Proteins	Absent	Absent	Absent	Absent	Absent
Amino Acids	Absent	Absent	Absent	Absent	Absent
Saponins	Presents	Presents	Presents	Presents	Presents

In phytochemical study Tannins, Glycosides & Saponins are to be found in all five samples.

And Alkaloids, Proteins & Amino acids are not found for the same.

- Table showing results of TLC analysis of five samples of *Karkatshringi*-

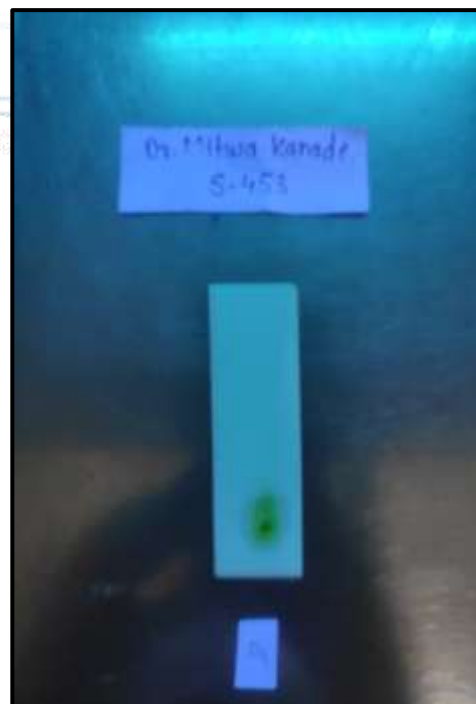
Sr No.	Sample	Extract	Solvent System/ Mobile	Spray/ Treatment	Rf Values
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phase

01	P1	Ethanol	Toluene: Acetate (50:50)	Ethyl	Exposed to Iodine vapours	0.16
02	P2	Do	Do	Do	Do	0.15
03	P3	Do	Do	Do	Do	0.17
04	P4	Do	Do	Do	Do	0.18
05	P5	Do	Do	Do	Do	0.18

In this study all samples having almost same constituents at Rf value ranges from 0.15 to 0.18.

Photographs of TLC





❖ **ANTIMICROBIAL STUDY:-**

Table - showing sensitivity study of water extracts of *Karkatshringi* (5 samples) in *Staphylococcus aureus*.

Sr. no.	Drug conc. (mg/ ml)	Zone of inhibition in mm				
		P1	P2	P3	P4	P5
1	25	<6	<6	<6	<6	<6
2	10	<6	<6	<6	<6	<6
3	5	<6	<6	<6	<6	<6
4	2.5	<6	<6	<6	<6	<6
5	1	<6	<6	<6	<6	<6
6	0.5	<6	<6	<6	<6	<6

Table no.12 - showing sensitivity study of ethanol extracts of *Karkatshringi* (5 samples) in *Staphylococcus aureus*.

Sr. no.	Drug conc. (mg/ ml)	Zone of inhibition in mm				
		P1	P2	P3	P4	P5
1	25	18	15	16	14	17
2	10	13	12	12	10	10
3	5	9	10	9	8	7
4	2.5	7	<6	<6	<6	<6
5	1	<6	<6	<6	<6	<6
6	0.5	<6	<6	<6	<6	<6

Table no.13 - showing sensitivity study of water extracts of *Karkatshringi* (5 samples) in *E.Coli*.

Sr. no.	Drug conc. (mg/ ml)	Zone of inhibition in mm				
		P1	P2	P3	P4	P5
1	25	<6	<6	<6	<6	<6
2	10	<6	<6	<6	<6	<6
3	5	<6	<6	<6	<6	<6
4	2.5	<6	<6	<6	<6	<6
5	1	<6	<6	<6	<6	<6
6	0.5	<6	<6	<6	<6	<6

Table - showing sensitivity study of ethanol extracts of *Karkatshringi* (5 samples) in *E.Coli*.

Sr. no.	Drug conc. (mg/ ml)	Zone of inhibition in mm				
		P1	P2	P3	P4	P5
1	25	19	19	17	18	16
2	10	12	14	13	13	10
3	5	10	10	10	11	7
4	2.5	9	7	7	9	<6
5	1	8	<6	<6	7	<6
6	0.5	<6	<6	<6	<6	<6

Table - Showing sensitivity study of control (Amoxicillin) in *Staphylococcus aureus* & *Escherichia coli*.

Sr. no.	Name of organism	Zone of inhibition	
		0.5 mg/ml	0.05 mg/ml
1	<i>Staphylococcus aureus</i>	19	8
2	<i>Escherichia coli</i>	22	18

DISCUSSION

Brief review of *Karkatshringi* (*Pistacia integremma*)

	Characteristics	
Dravyatah	Dravya swarup	Vruksha
	Botanical name	<i>Pistacia integerrima</i>

	Family	Anacardiaceae
	Habitat	Valleys in Himalayan region
	Colour	Brown
Gunatah	<i>Rasa</i>	<i>Tikta, Kashaya</i>
	<i>Veerya</i>	<i>Ushna</i>
	<i>Vipak</i>	<i>Katu</i>
	<i>Guna</i>	<i>Guru</i>
	Chemical composition	α -pinene (25%), camphene (27%), dilimonene (4-5%), 1:8 cineol (10%), α -terpineol (20%), aromadendrene (4-5%)
	Upayuktanga	Shrungakar kosh
Karmatah	<i>Kaas</i>	+
	<i>Shwas</i>	+
	<i>Rajyakshma</i>	+
	<i>Chardi</i>	+
	<i>Trishna</i>	+
	<i>Aruchi</i>	+
	<i>Atisar</i>	+
	<i>Raktapitta</i>	+
	<i>Kshaya</i>	+
	<i>Jwara</i>	+
	<i>Urdwavata</i>	+
	<i>Hikka</i>	+
	<i>Krumi</i>	+
	<i>Urakshat</i>	+
	<i>Vrusha</i>	+

- **Physico-chemical standardization study:**

Table no.15 showing results of physicochemical analysis of five samples of *Karkatshringi*-

Tests	<i>Karkatshringi</i> Samples					
	API	P1	P2	P3	P4	P5
Moisture Contents	-	4.5%	7.8%	4.8%	4.6%	5.4%
Foreign Matter	<2%	<1%	1.4%	<1%	<1%	1%
Total Ash	<7%	3.39 %	5.50 %	4.62 %	4.23 %	4.13 %
Water Soluble Ash	-	3.25%	3.17%	3.24%	1.97%	1.95%
Acid Insoluble Ash	<0.2%	0.5 %	1.0 %	0.8 %	0.4 %	0.6 %
Alcohol Soluble Extractive	>30%	40.86 %	28.46 %	42.88 %	45.24 %	40.10 %
Water Soluble Extractive	>30%	48.95 %	27.36 %	47.01 %	45.51 %	36.83 %
pH	-	4.47	4.43	4.56	4.28	4.23
Swelling Index	-	2.5 ml	2.5 ml	2.25 ml	1.25 ml	1.50 ml
Foam Index	-	<100	<100	<100	100-200	100-250

CONCLUSION

- The samples collected from different places of Maharashtra were found as round, flat, irregular in shape, while that of collected from Deharadun were found to be curved, horn shape, hallow, cylindrical in shape.
- The Deharadun market sample resembles all characters as

mentioned in Ayurvedic classics so it can be said that it is a guanine.

- Botanically it can be said that the Deharadun sample confirmed as galls of *Pistacia integerrima* and other samples collected from different regions of Maharashtra, as galls of *Populus alba*.
- Galls on *Pistacia integerrima* stew ex. brandis caused by 'Daesia Aedifactor' insect, and galls on

Populus alba linn. caused by *Erisoma* Taskhiri insect.

- In physico-chemical analysis there is not much more difference found in all samples of *Karkatshringi*.
- In phytochemical study Tannins, Glycosides & Saponins were found to be present in all *Karkatshringi* samples.
- Ethanolic extract of Deharadun sample was found to have significant antibacterial activity against *S.aureus* and *E.coli* as compared to all other samples.

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