



## Research Article

## PHARMACOGNOSTIC, PHYTOCHEMICAL AND ANTIMICROBIAL STUDY OF VIDANGADI CHURNA - AN EXPERIMENTAL STUDY

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### ABSTRACT

Herbal medicines are gaining more and more attention all over the world as they have been in use since ancient times and have no side effects if taken under proper supervision. But they have their own limitations as data about standardization and quality control are not widely available. Therefore, it is the need of the hour to revalidate this herbal compound under the lens of advance tools or procedures. **Method:** *Vidangadi Churna* was prepared according to the classical reference. Physiochemical and Phytochemical study was performed by proper WHO guidelines and Antimicrobial activity of *Vidangadi Churna* was tested by Agar well diffusion method. **Result and Discussion:** In this study *Vidangadi Churna* showed the presence of phytochemical constituents having antimicrobial properties. This preparation was treated with different reagents and examined under UV light. Different reagents showed different colours of the preparation at different wavelengths. Various physiological active compounds like phenolic compounds, Tannins, Amino acids, alkaloids etc. were found in *Vidangadi Churna*. Antimicrobial study revealed the activity of this drug on different microorganisms. **Conclusion:** *Vidangadi Churna* is poly-herbal Ayurveda formulation described in *Yogratnakar* in *Kustha Roga Chikitsa Adhyay*. By this study it is concluded that *Vidangadi churna* fulfilled all the standard criteria with effective parameters and it could be used as anti-microbial agent against infections caused by *Klebsiella aerogenes*, *Escherichia coli*, *Pseudomonas aeruginosa* and *Staphylococcus aureus*.

### INTRODUCTION

According to World Health Organization<sup>[1]</sup> (WHO) majority of the world's population uses traditional medicine for their primary health care needs. The rational use of drug means that half of the treatment is done. In Ayurveda it is clearly stated that therapeutic effects of a drug depends on certain pharmacodynamic properties of that particular substance, because a drug is able to break/reverse the pathogenesis of underlying disease by the properties of *Rasa*, *Guna*, *Veerya*, *Vipak* and *Prabhava*<sup>[2]</sup>.

Nowadays, standardization of drugs especially traditional drugs is the need of the hour. Due to global acceptance of these drugs, it is necessary to validate classical drugs under the lens of pharmaceutical parameters to visualize its potency and efficacy. Some herbal and herbal compounds with their pharmaceutical parameters are mentioned in Ayurveda Pharmacopeia of India except this drug<sup>[3]</sup>.

*Vidangadi Churna*<sup>[4]</sup> is a combination of five constituents- *Vidanga*<sup>[5]</sup> (*Embelia ribes* Linn.), *Triphala*<sup>6</sup> (*Embilica officinalis*, *Terminalia bellerica* Roxb, *Terminalia chebula*) and *Pippali*<sup>[7]</sup> (*Piper longum* Linn.) Fruits of *Vidanga*, *Triphala* (*Amalaki*, *Vibhitaki* and *Haritaki*) and *Pippali* are commonly used for therapeutic purpose. Separately, above three drugs are used as *Deepaniya*, *Krimighna*, *Vishghna*, *Rasayana* and *Rechaniya*. In Ayurvedic classical texts *Vidangadi Churna* is used in *Kushtharoga*, *Krimiroga*, *Drushtavrana* and *Bhagandara*<sup>[8]</sup>.

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The aim of the study was to analyze, physio-chemical characters of *Vidangadi Churna* and the antimicrobial potency of the preparation against the specific infective pathogens like *Klebsiella aerogenes*, *Escherichia coli*, *Pseudomonas aeruginosa* and *Staphylococcus aureus*.

#### MATERIAL AND METHOD<sup>[9]</sup>

Study was completed in below mentioned three subheadings

- 1) Authentications
- 2) Drug Standardization
- 3) Antimicrobial study

First, the raw materials used for the preparation of this *Vidangadi Churna* were collected from the Pharmacy, NIA Jaipur. All the raw materials were physically and microscopically authenticated and screened in Rasa Shastra and Bhaishjya Kalpana department and final drug was prepared in GMP certified Pharmacy.

Second, the physio-chemical, phyto-chemical and quality control analysis was carried out on *Vidangadi Churna* as per Ayurveda Pharmacopeia of India.

Third, antimicrobial activity of *Vidangadi Churna* was tested by the Agar well diffusion method<sup>[10]</sup>. Results were analyzed by observing the zone of inhibition on microbial stains like *Klebsiella aerogenes*, *Escherichia coli*, *Pseudomonas aeruginosa* and *Staphylococcus aureus*. In this study distilled water used for extraction of the drug and antimicrobial activity was tested in 5, 10 and 15 % concentration solution. The pathogenic strains of different species of bacteria were procured from 'Institute of Microbial Technology' (IMTECH), Chandigarh and the stock cultures maintenance and antibacterial study were

#### Pharmacognosy and Phytochemical Analysis

**Table 1: Macroscopic study**

S.No	Macroscopic study	<i>Vidangadi Churna</i>
1	Colour	Yellow brown
2	Odour	Characteristic
3	Taste	Bitter

**Table 2: Physiochemical Analysis**

Physiochemical parameters	<i>Vidangadi Churna</i>
Moisture Content (%)	7.10
pH	8.2
Water Soluble Extractive (%)	22.87
Alcohol Soluble Extractive (%)	1.76
Total Ash (%)	14.96
Acid Insoluble Ash (%)	4.67
Water-soluble Ash (%)	22.87

\*pH –Potential of hydrogen

done at 'Analytical Division of Bilwal Medchem and Research Laboratory Pvt. Ltd'.

#### Groups design

**Negative Control-** DMSO (Dimethyl sulfoxide) Solution

**Positive control -** 5% Vancomycin

#### Test groups

- 5% solution w/v of *Vidangadi Churna* in DMSO
- 10% solution w/v of *Vidangadi Churna* in DMSO
- 15% solution w/v of *Vidangadi Churna* in DMSO

In this procedure, Petri plates were loaded with 20ml Muller Hinton agar medium, then seeded with *Klebsiella aerogenes*, *Escherichia coli*, *Pseudomonas aeruginosa* and *Staphylococcus aureus* microbes culture. Approximately 10 mm wells were drilled using well cutters and various density samples such as 5%, 10% and 15% solutions were added. The plates were incubated for 24 hours at 37°C. The antimicrobial action was assayed by measuring the diameter of resistance zone built around the well.

#### OBSERVATION AND RESULT

Pharmacognosy and phytochemical analysis were presented in tabular form (Table 1, 2, 3) and thin layer chromatography with  $R_f$  (retardation factor) value was calculated (figure 1).

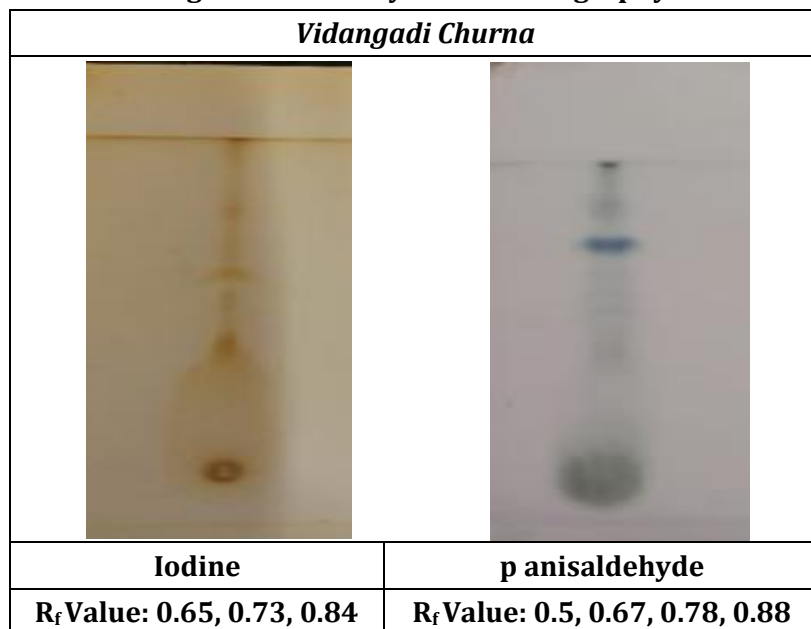
Result of antimicrobial study was analyzed by observing the zone of inhibition on microbial strains. In this study distilled water was used for the extraction of the drug and the antimicrobial activity was tested in three different concentrations of 5%, 10% and 15%. Anti-microbial study suggests that *Vidangadi Churna* can be used as anti-microbial agent against infections caused by *Klebsiella aerogenes*, *Escherichia coli* and *Staphylococcus aureus*. (figure 2).

**Table 3: Phytochemical screening**

<b>Vidangadi Churna</b>		
<b>Name of Test</b>	<b>Aqueous Extract</b>	<b>Ethanol Extract</b>
<b>Carbohydrate</b>		
Molish test	+ve	+ve
Benedict test	+ve	+ve
Fehling test	-ve	+ve
<b>Alkaloids</b>		
Dragendorff test	+ve	+ve
Wagner's test	-ve	-ve
Hager's test	+ve	-ve
<b>Amino acids</b>		
Ninhydrine	+ve	+ve
<b>Protein</b>		
Biuret test	-ve	-ve
Xenthoprotic test	-ve	-ve
Millon test	-ve	-ve
<b>Saponin</b>		
Foam test	-ve	-ve
<b>Glycosides</b>		
Borntrager's test	-ve	+ve
<b>Phenolic compound</b>		
Phenolic test	+ve	+ve
<b>Steroids</b>		
Salkowaski	-ve	+ve
<b>Tannins</b>		
Fecl <sub>3</sub>	+ve	+ve
Lead acetate	+ve	+ve
Potassium Dichromate	+ve	+ve

\*+ve - Positive, -ve - Negative

**Figure 1: Thin Layer Chromatography**



\*R<sub>f</sub>- retardation factor

**Antimicrobial Study**

**Table 4: Zone of Inhibition in mm**

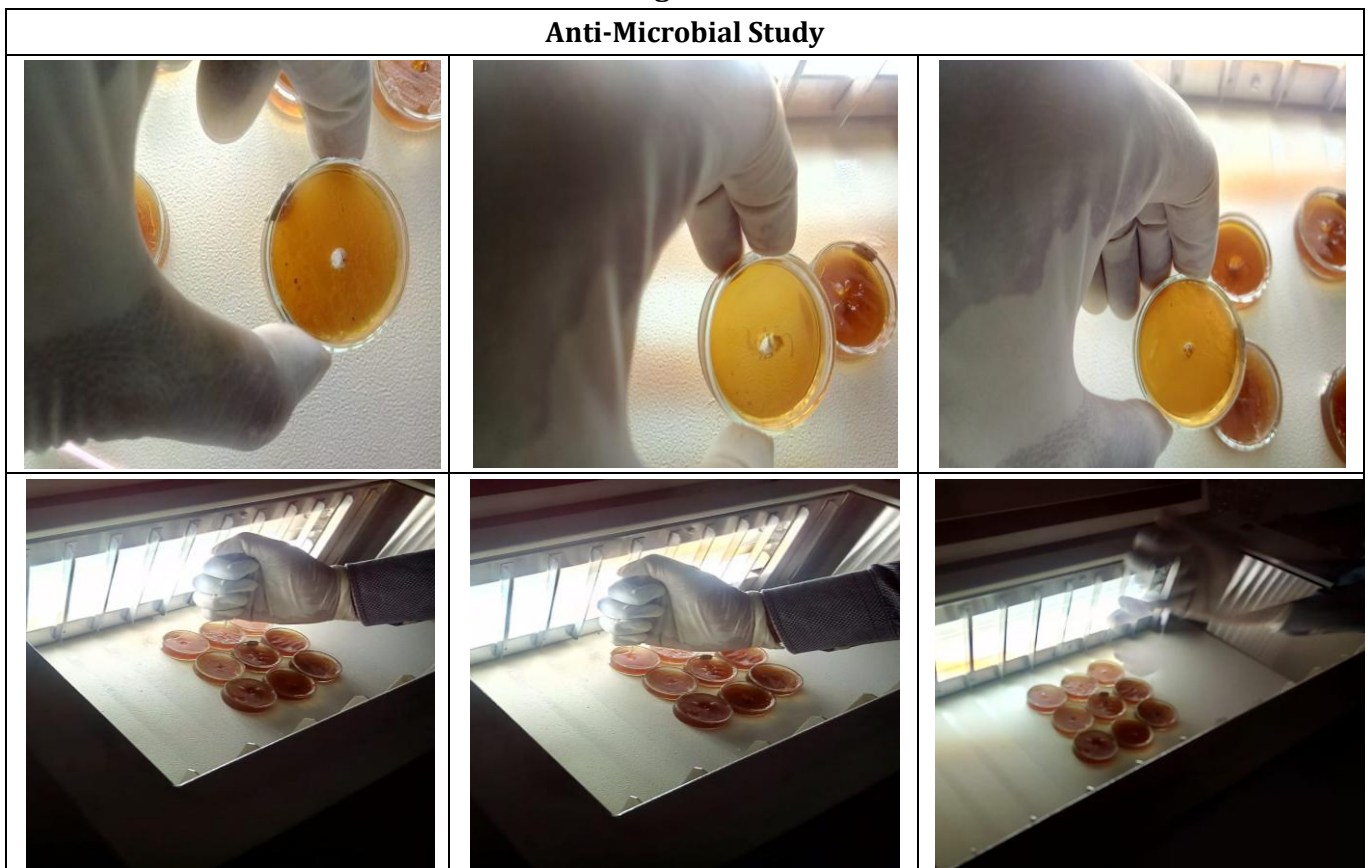
Microorganism	-ve Control DMSO Solution	Test sample <i>Vidangadi Churna</i>			+ve control 5% Vancomycin
		5 %	10 %	15 %	
<i>Klebsiella aerogenes</i>	4	7	8	12	19
<i>Escherichia coli</i>	4	8	9	14	22
<i>Pseudomonas aeruginosa</i>	4	6	9	10	24
<i>Staphylococcus aureus</i>	4	6	7	12	21

\*DMSO (Dimethyl sulfoxide) Solution

**Table 5: Activity Index**

Microorganism	Test sample ( <i>Vidangadi Churna</i> )		
	5 %	10 %	15 %
<i>Klebsiella aerogenes</i>	0.37	0.42	0.63
<i>Escherichia coli</i>	0.36	0.41	0.64
<i>Pseudomonas aeruginosa</i>	0.25	0.38	0.42
<i>Staphylococcus aureus</i>	0.29	0.33	0.57

**Figure 2**



**Figure 2: Zone of inhibition of *Vidangadi churna* in different microbial strain**

**DISCUSSION**

Nowadays, modern science has achieved great advances, particularly in dermatology, with powerful antibiotics, antifungal, antihistaminic, steroids for symptomatic relief. The use of anti-fungals and steroids suppress the dermatitis, on the cost of severe long-term toxicity, including osteoporosis, skin

fragility, susceptibility to infection and pituitary-adrenal axis suppression etc. So, the line of treatment should be more precise and cost effective. Ayurveda Science has a great potential to deal with skin related problems in comparison to other systems of medicine. In this study *Vidangadi Churna* showed the presence of

active antimicrobial phytochemical constituents. This preparation was treated with different reagents and examined under UV light. Different reagents showed different colors of the preparation at different wavelengths. The percentage of physiological active compounds like phenolic compounds, Tannins, Amino acids, alkaloids etc. were observed. In anti-microbial study, water extract of *Vidangadi churna* at 5% and 10% did not show any anti-microbial activity against *Klebsiella aerogenes*, *Escheria Coli*, *Pseudomonas aeruginosa* and *Staphylococcus aureus*. As shown in Activity index table 5, probable cause for low antimicrobial activity was low concentration of 5 and 10% of the drug but, when the concentration was increased to 15% then test solution showed its maximum antimicrobial effect in all samples except *Pseudomonas aeruginosa*. Hence, the anti-microbial activity of *Vidangadi churna* against *Klebsiella aerogenes*, *Escheria Coli* and *Staphylococcus aureus* was found more as compared to standard one.

### CONCLUSION

Standardization and Quality control of any herbal drug or formulations is very essential to provide good quality of formulation of high efficacy and potency. Such kinds of studies are needed in promoting the safe use of genuine formulations for contributing to mankind. In present study organoleptic parameters, physio-chemical analysis and thin layer chromatography were carried out as per norms of WHO guidelines. There were no microbes or heavy metal in the finished product. Anti-microbial study suggests that *Vidangadi churna* can be used as anti-microbial agent against infections caused by *Klebsiella aerogenes*, *Escherichia coli* and *Staphylococcus aureus*.

**Suggestion:** A much higher concentration could be investigated further for activity against *Pseudomonas aeruginosa*.

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