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Research Article

ASSESSMENT OF MICROBIAL STABILITY OF *SHALAPARNI* [*DESMODIUM GANGETICUM* (L.) DC.] USED IN THE MANAGEMENT OF *KASA* (COUGH) UNDER DIFFERENT TEMPERATURE AND HUMIDITY CONDITIONS

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ABSTRACT

Shalaparni (*Desmodium gangeticum* (L.) DC.) is an important *Dashamoola* drug traditionally indicated in the management of *Kasa* (cough) and other *Tridoshaja* disorders. *Kwatha* (decoction) is prepared freshly before administration; therefore, the drug is stored as *Yavakuta* (coarse powder). Assessing its microbiological stability during storage is essential for ensuring the quality and safety of the freshly prepared decoction. **Aim:** To evaluate the microbial stability of *Shalaparni Panchanga Yavakuta* and the microbiological quality of freshly prepared *Kwatha* at different time intervals under varying temperature and humidity conditions. **Materials and methods:** Ten kilograms of *Shalaparni Panchanga* (whole plant) collected from Sasoi Dam, Jamnagar, were shade-dried, processed into *Yavakuta*, and stored in an airtight container at room temperature. *Kwatha* was freshly prepared by reducing 16 parts of water to one-eighth. Monthly microbiological evaluation was conducted for 12 months using Gram staining, 10% potassium hydroxide wet mount, aerobic bacterial culture, and fungal culture. Temperature ranged from 22.2–38°C and relative humidity from 34–80%. **Results:** Capsulated Gram-negative rods identified as *Enterobacter* species were detected during initial examination of the stored *Yavakuta* identified as commensals, while fungal elements were absent. All subsequently prepared *Kwatha* samples showed no detectable bacterial or fungal growth throughout the 12-month study despite seasonal variations. **Conclusion:** *Shalaparni Panchanga Yavakuta* maintained satisfactory microbiological quality under the studied storage conditions. Freshly prepared *Kwatha* remained free from detectable bacterial and fungal contamination, supporting the traditional practice of storing the drug as *Yavakuta* and preparing the decoction freshly before administration.

INTRODUCTION

Shalaparni (*Desmodium gangeticum* (L.) DC.) is an important medicinal plant of Ayurveda and one of the ten constituent drugs of *Dashamula*.[1] It has been traditionally employed in the management of various disorders, and its therapeutic potential has been attributed to the presence of diverse bioactive phytoconstituents and a broad spectrum of pharmacological activities.[2,3]

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It possesses *Madhura, Tikta Rasa* (sweet and bitter taste), *Ushna Veerya* (hot potency), *Madhura Vipaka* (sweet post digestive effect), and *Guru, Snigdha Gunas* (heavy and unctuous quality) due to which it pacifies all the three *Doshas* (humors).[4] References of its *Kasahara* (curing cough) activity are abundantly available in Ayurvedic classical texts like Bhavaprakasha Nighantu, Kaiyadeva Nighantu and Shaligrama Nighantu and it has also been mentioned in many formulations used in *Kasa* (cough). [5,6] Hence it a potent drug in the management of *Kasa* (cough) caused by the vitiation of any of the three *Doshas* (humors).

The *Panchanga* (whole plant) of *Shalaparni* is used therapeutically in different Ayurvedic preparations, including *Kwatha* (decoction).[7]

Kwatha is an important dosage form described under *Panchavidha Kashaya Kalpana* (five basic pharmaceutical preparations), in which the coarse powder of the drug is boiled with water to obtain the aqueous decoction. [8]

Traditionally, *Kwatha* is a dosage form intended for fresh preparation and administration and is not generally meant for prolonged storage.[9] Therefore, for *Kwatha* administration, the *Panchanga* of the drug stored in the form of *Yavakuta* (coarse powder) serves as the pharmaceutical raw material, from which the decoction is freshly prepared before administration according to the prescribed method.[10] Although *Yavakuta* contains considerably less moisture than an aqueous preparation, it may still be susceptible to microbial contamination during various stages of collection, drying, pulverization, handling, packaging, and storage.[11] Microbial contamination of herbal raw materials may adversely affect their quality and safety and may subsequently influence the quality of the preparation obtained from them. Therefore, maintaining the microbiological quality of the stored *Shalaparni Panchanga Yavakuta* is an important consideration in ensuring the quality of the freshly prepared *Kwatha*.

The concept of stability can be correlated to the classical Ayurvedic concept of *Saviryata Avadhi* (shelf life) referring to the period during which a medicine is expected to retain its quality and therapeutic potency. Various Ayurvedic texts, including Vangasena, Sharangadhara Samhita, and Yogaratnakara, have described specific periods of use or stability for different dosage forms. [12] Scientific evaluation of stability parameters is therefore important for establishing the quality and safety of Ayurvedic medicines.

In modern pharmaceutical science, stability refers to the ability of a pharmaceutical product to maintain its specified physical, chemical, microbiological, therapeutic, and toxicological characteristics throughout its intended storage period. [13]

Microbial survival and multiplication are influenced by several factors, including temperature, relative humidity, moisture availability, pH, nutrient availability, duration of storage, and handling practices.[14] Microbiological analysis provides an objective means of assessing the microbial quality of herbal materials. It may involve estimation of the total viable aerobic microbial load and fungal count, along with detection of specified or objectionable microorganisms. Such examination helps determine whether microbial contamination increases, decreases, or remains within acceptable limits during storage.[15] The World Health Organization recommends microbiological quality assessment as an important component of quality control of medicinal plant materials and herbal products. [16]

AIM

To evaluate the microbial stability of *Shalaparni Panchanga Yavakuta* and the microbiological quality of freshly prepared *Kwatha* at different time intervals under varying temperature and humidity conditions.

OBJECTIVE

To ensure adherence to standardization and quality control measures in the preparation and storage of *Desmodium gangeticum Yavakuta* by evaluating its microbial profile throughout the study period.

MATERIALS AND METHODS

Details of Drug Collection

- Botanical name of Drug: *Desmodium gangeticum* (L.) DC.
- Month of collection: May 2025 (Collection completed on 23rd May 2025)
- Quantity: 10kg
- Geographical details of the habitat: Sasoi Dam area, Jamnagar (Gujarat)
- Latitude: 22° 20' 44.52'' N
- Longitude: 69° 57' 29.70 '' E

Processing of Drug: The collected sample of *Shalaparni Panchanga* was separated of extraneous matter, the material was thoroughly cleaned, shade dried, coarsely powdered using sieve size 40 into *Yavakuta* form. The final *Yavakuta* was packed in sterile containers and stored at room temperature. Since the dosage form to be administered was as *Kwatha*, which is a *Sadya Prayoga Kalpana* (preparation intended for immediate use), it is recommended to freshly prepare and administer the decoction for each dose. Hence, the material used for microbiological examination was also the freshly prepared decoction which was made by the classical method by adding 16 times water to the coarse powder and heating till bubbling, with temperature reaching to approximately 121°C, till it reduced to 1/8th part (approximately 20 minutes) followed by straining. The decoction so prepared was studied to check microbial contamination at regular intervals for a period of 12 months. Microbiological study has been carried out in Microbiology Laboratory, I.T.R.A., Jamnagar. Mainly 02 studies were carried out to rule out the presence of any bacteria or fungi in the prepared drug in its final dosage form (decoction form).

The initial microbiological study was done on the 46th day after the date of completion of collection, after properly drying and coarsely powdering the drug, before starting patient enrollment. It was conducted on the *Yavakuta* of the drug. Then the final dosage form, i.e., decoction prepared by boiling the samples from same container was subjected to microbiological testing regularly at monthly intervals during different

seasons. The microbial stability was monitored from July 2025 to June 2026 under standard storage conditions, during which temperature ranged from 22.2–38°C and relative humidity ranged from 34% to 80%.

Storage Conditions

Yavakuta of *Shalaparni Panchanga* was stored in an air-tight food grade, plastic container, kept in an openly lit area at room temperature. Clean and dry stainless-steel spoon was used to take medicine.

Microbial profile

Microbial contamination was assessed by two methods to check any mycological findings and bacteriological findings.

Smear Examination

A) 10% K.O.H. Preparation

B) Gram's stain

Culture Study

A) Fungal culture

B) Aerobic culture

The details of the procedures followed are given below:

Smear examination

Procedure for 10% KOH preparation

i. Take potassium hydroxides pellets (of HiMedia Lab. Pvt. Ltd.) in distilled water to prepare 10% of the same in clean glass tube and mix well.
ii. Take clean grease free glass slide
iii. Put a-drop of specimen and add freshly prepared 10% KOH then cover with grease free cover glass.
iv. Allow it to react for 15-20 minutes to remove extra debris other than fungal particles.
v. Observe under high power (40x) lens.
vi. Report as per findings.

Procedure for gram's stain test (Figure 1 and 2)

i. Take clean grease free glass slide to prepare dry equal thick preparation (i.e. smear).
ii. Fixed prepared smear by passing 3-4 times over the flame of Bunsen burner (the fixation kills vegetative form of microbes and render them permeable to stain, make material stick to the surface of slide and prevent autolytic changes).
iii. Cover fixed prepared smear with Gram's crystal violet solution and allow to remain for mentioned time as per kit procedure.
iv. Washed off smear to remove excessive reagent with tap water.
v. Cover smear with Gram's iodine solution and allow to remain for mentioned time as per kit procedure.
vi. Washed off smear to remove excessive reagent with tap water.
vii. Decolorize smear with Gram's decolorizer by holding the slide at slope position and pour gram's decolorizer acetone from its upper end upto removal of colour of primary dye (i.e. Gram's Crystal violet) or as per kit procedure.
viii. Washed off smear to remove excess acetone with tap water.
ix. Cover smear with safranin solution and allow to remain for mentioned time as per kit procedure.
x. Washed off smear to remove excessive reagent with tap water.
xi. Blot and allow to dry smear.
xii. Examine under oil immersion lens and report as per findings.

Culture Study

Fungal Culture Method

Respective materials were collected with sterile cotton swab for inoculation purpose on selected fungal culture media (i.e., an artificial preparation).

- Name of media: Sabouraud Dextrose Agar Base (SDA), Modified (Dextrose Agar Base, Emmons)
- Company: HIMEDIA Laboratories Pvt. Ltd.
- Required time duration: 05 to 07 days
- Required temperature: 37°C
- Use of media: For selective cultivation of pathogenic fungi.

Procedure For Fungal Culture (Figure 3)

i. In the clinical microbiology laboratory culture method are employed for isolation of organisms (The lawn/streak culture method is routinely employed).
ii. Choose appropriate selective solid media for inoculation purpose.
iii. Inoculate selected specimen by Sterile cotton swab or by nichrome wire (24 5.W.G. size) loop [first sterile loop in Bunsen burner oxidase blue flame and allow it to cool than loop is charged with selected specimen to be cultured. One loopful of the specimen is transferred onto the surface of well dried culture media].
iv. Dry selective solid media in hot air oven before specimen inoculation, allow to cool dried medium before specimen inoculation.
v. After selected incubation period examined growth by naked eye in form of colony or ariel growth by performing different related biochemical reactions and different related staining procedures. After that report isolates.
vi. After inoculation/streaking process Incubate inoculated medium in inverted position at 37°C for 05 to 07 to 21-days in incubator (incubation days are as per growth requirement) under aerobic atmosphere.

Aerobic Culture Method

Respective materials were collected with sterile cotton swab for inoculation purpose on selected fungal culture media (i.e. an artificial preparation).

- Name of media: MacConkey Agar (MA) and Columbia Blood agar (BA)
- Company: HIMEDIA Laboratories Pvt. Ltd.
- Required time duration: 24 to 48 hours
- Required temperature: 37°C
- Use of media: For selective cultivation of pathogenic bacteria.

Procedure For Aerobic Culture (Figure 4)

i. In the clinical microbiology laboratory, culture methods are routinely employed for the isolation of microorganisms. The streak culture method was used for obtaining isolated colonies.

ii. Appropriate selective solid culture media were selected according to the requirements of the specimen and the microorganisms under investigation.

iii. The selected solid media were dried in a hot-air oven before inoculation. The media were subsequently allowed to cool to room temperature before inoculation.

iv. The selected specimen was inoculated onto the surface of the cool, dried culture medium by the four-flame streaking method using a sterile nichrome wire loop (24 S.W.G.). The loop was first sterilized in the oxidizing zone of the Bunsen burner flame (blue flame) and allowed to cool. It was then charged with the selected specimen, and one loopful of the specimen was transferred onto the surface of the culture medium. The specimen was streaked systematically over the agar surface to obtain isolated colonies. The loop was flamed and allowed to cool between successive sets of streaks, resulting in four flame cycles.

v. After inoculation, the culture plates were incubated in an inverted position at 37°C for 18–24 hours in an incubator under appropriate atmospheric conditions, i.e., aerobic or 10% CO_2 atmosphere, as required for the selected culture conditions.

vi. Following the prescribed incubation period, the inoculated media were examined for visible microbial growth in the form of colonies by naked-eye observation. The isolated colonies were further subjected to appropriate staining procedures and relevant biochemical tests for identification and confirmation of the isolates.

vii. Based on the colony morphology, staining characteristics, and biochemical reactions, the isolated microorganisms were identified and recorded accordingly.

RESULTS

The samples were subjected to the microbiological study monthly, from the date of the completion of collection and processing to the date of last microbiological study.

Results are shown in table 1. (Figure 5 and 6)

Table 1: Microscopic Profile of Samples Preserved at Room Temperature (Drug Collection Completion Date: 23/05/2025)

S.No.	Date and duration after collection of raw material (days)	Temperature (˚C)	Relative Humidity (RH) (%)	Microbiological Observations			
				Gram's Stain	Aerobic culture	Wet mount / 10% KOH	Fungal culture
*Shalaparni (*Desmodium gangeticum (L.) DC. *Panchanga Yavakuta*							
1.	07/07/2025 46th Day	29.4˚C	78%	Presence of capsulated gram-negative rods arranged singly.	Enterobacter species isolated	Fungal filaments not seen	No fungal pathogen isolated
Shalaparni (Desmodium gangeticum (L.) DC. *Panchanga Kwatha*							
2.	10/07/2025 49th Day	29.4˚C	78%	Micro-organisms not seen	No organisms isolated	Fungal filaments not seen	No fungal pathogen isolated
3.	11/08/2025 81st Day	28.3˚C	80%	Micro-organisms not seen	No organisms isolated	Fungal filaments not seen	No fungal pathogen isolated
4.	15/09/2025 116th Day	28.3˚C	77%	Micro-organisms not seen	No organisms isolated	Fungal filaments not seen	No fungal pathogen isolated
5.	16/10/2025	29.4˚C	56%	Micro-organisms	No organisms	Fungal filaments	No fungal pathogen

	147th Day			not seen	isolated	not seen	isolated
6.	10/11/2025 172nd Day	26.1˚C	47%	Micro-organisms not seen	No organisms isolated	Fungal filaments not seen	No fungal pathogen isolated
7.	18/12/2025 210th Day	22.2˚C	48%	Micro-organisms not seen	No organisms isolated	Fungal filaments not seen	No fungal pathogen isolated
8.	19/01/2026 242nd Day	28˚C	52%	Micro-organisms not seen	No organisms isolated	Fungal filaments not seen	No fungal pathogen isolated
9.	17/02/2026 271st Day	30˚C	47%	Micro-organisms not seen	No organisms isolated	Fungal filaments not seen	No fungal pathogen isolated
10.	16/03/2026 298th Day	33˚C	34%	Micro-organisms not seen	No organisms isolated	Fungal filaments not seen	No fungal pathogen isolated
11.	15/04/2026 328th Day	34˚C	40%	Micro-organisms not seen	No organisms isolated	Fungal filaments not seen	No fungal pathogen isolated
12.	19/05/2026 362nd Day	38˚C	50%	Micro-organisms not seen	No organisms isolated	Fungal filaments not seen	No fungal pathogen isolated
13.	15/06/2026 389th Day	33˚C	69%	Micro-organisms not seen	No organisms isolated	Fungal filaments not seen	No fungal pathogen isolated

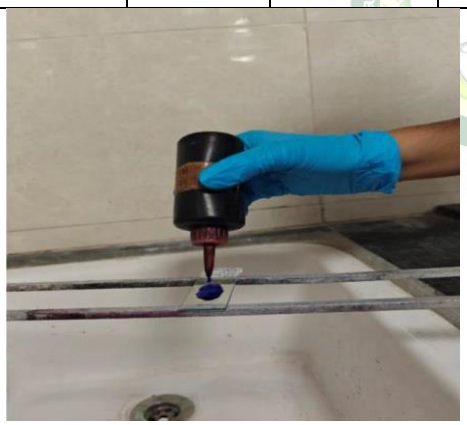


Figure 1: Smear Staining Procedure

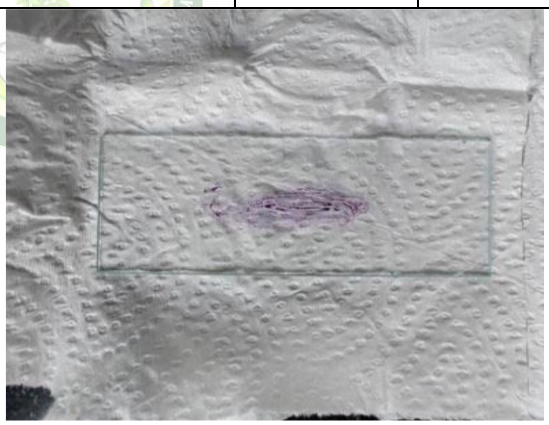


Figure 2: Stained Smear

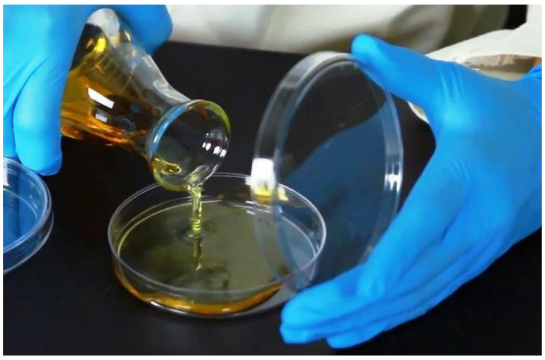


Figure 3: Fungal culture media preparation with Sabouraud Dextrose Agar Base (SDA)

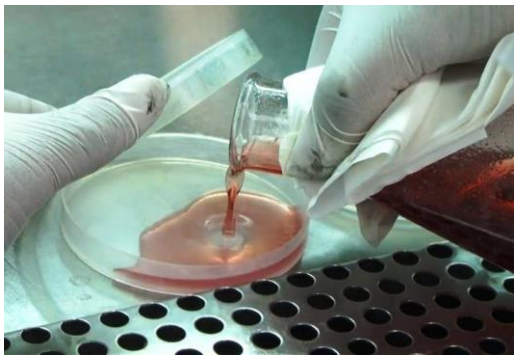


Figure 4: Aerobic culture media preparation with MacConkey Agar (MA)

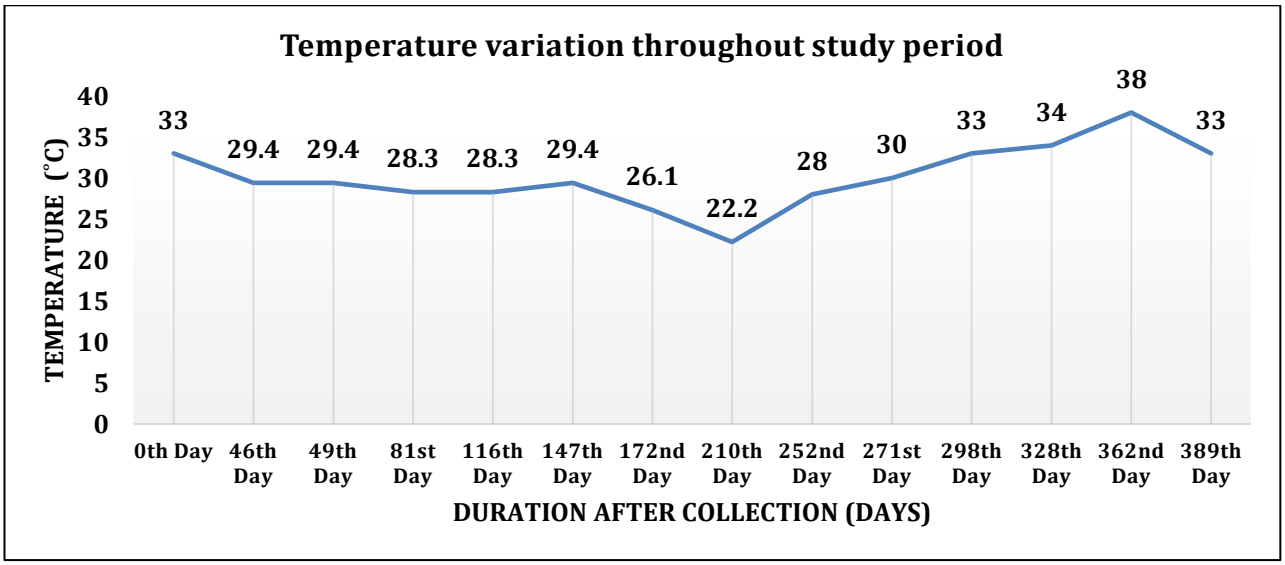


Figure 5: Variation in Temperature Throughout the Study Period

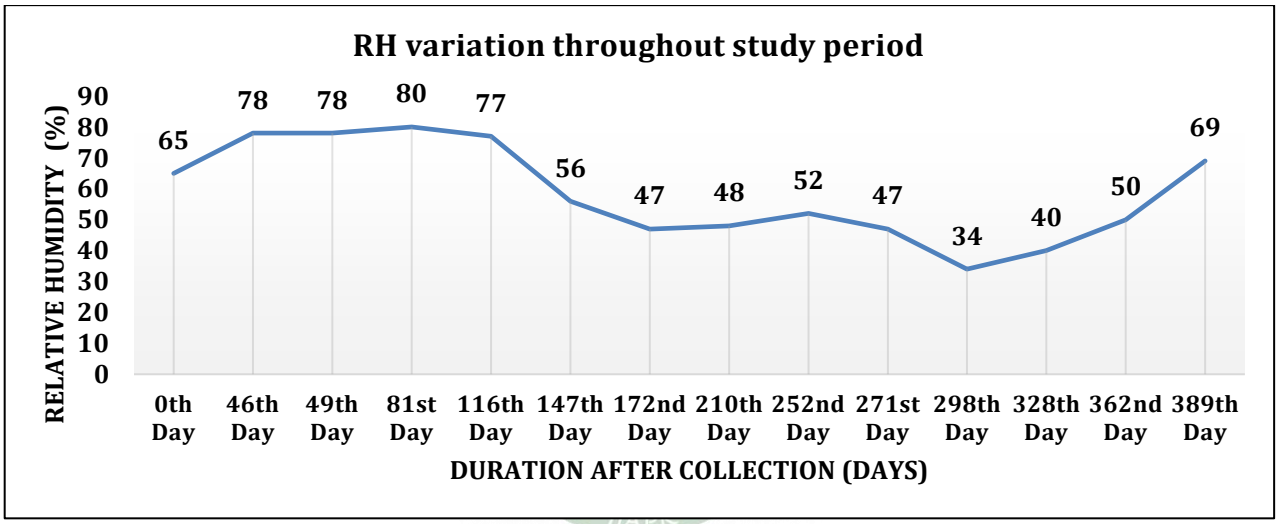


Figure 6: Variation in Relative Humidity Throughout the Study Period

DISCUSSION

The present study was undertaken to assess the microbiological stability of *Shalaparni* [*Desmodium gangeticum* (L.) DC.] *Panchanga* during storage and to evaluate the microbiological quality of its freshly prepared *Kwatha*, which was used in the management of *Kasa*. Since herbal drugs are obtained from natural sources, their microbial quality can be influenced by environmental exposure and by various stages of collection, processing, handling, and storage.

The *Shalaparni Panchanga* used in the study was collected from the Sasoi region and subsequently stored at Jamnagar. The study period included considerable seasonal variations, with temperature ranging from 25–41°C and relative humidity from 34–80%. Such variations provided an opportunity to observe the microbiological behaviour of the stored drug under routine environmental conditions. Despite these fluctuations, periodic microbiological examination did not demonstrate progressive microbial contamination in the stored material.

During the initial microbiological examination of the *Yavakuta*, capsulated Gram-negative rods were observed on Gram staining and were subsequently identified as *Enterobacter* species by culture. The detection of an environmental organism in plant material does not, by itself, establish pathogenic contamination. These organisms represent the natural microbial flora (commensals) found in the genus *Desmodium,* rather than pathogenic contamination responsible for cross infection. Therefore, the observation was considered in relation to the subsequent microbiological findings rather than as evidence of deterioration of the drug.

The therapeutic dosage form used in the study was *Kwatha*, which was prepared freshly from the stored *Yavakuta*. Following preparation by the prescribed decoction procedure, microbiological examination did not reveal detectable bacterial or fungal growth. Similar findings were obtained during the subsequent monthly assessments. The absence of detectable microbial growth in the prepared *Kwatha* throughout the observation period indicates that the preparation procedure, together with appropriate

handling practices, contributed to maintaining its microbiological quality.

Fungal elements were not detected during the study. This is particularly relevant because fungal proliferation can adversely affect the quality of plant-based materials during storage. The absence of fungal growth throughout the observation period suggests that the adopted drying, packaging, storage, and handling conditions were adequate to prevent detectable fungal contamination under the conditions investigated.

The repeated observations over 12 months are noteworthy because the study encompassed different climatic conditions, including periods of increased humidity. Nevertheless, the microbiological quality of the freshly prepared *Kwatha* remained satisfactory. These findings indicate that storing *Shalaparni Panchanga* in the *Yavakuta* form and preparing the *Kwatha* immediately before administration can be a suitable approach from a microbiological quality perspective.

Overall, the study demonstrates that *Shalaparni Panchanga* maintained acceptable microbiological quality under the investigated storage conditions, while the freshly prepared *Kwatha* remained free from detectable bacterial and fungal growth during the study period. The findings further highlight the importance of proper drying, storage, hygienic handling, and fresh preparation of the decoction for maintaining the microbiological quality of Ayurvedic herbal preparations.

CONCLUSION

The present microbial stability assessment indicates that *Shalaparni* (*Desmodium gangeticum* (L.) DC.) *Panchanga Kwatha* maintained satisfactory microbiological quality throughout the study period. Repeated microbiological examinations at monthly intervals under ambient environmental conditions, with temperatures ranging between 22.2°C to 38°C and relative humidity between 34% to 80% showed no detectable bacterial or fungal growth in the subsequent samples following its preparation. Fungal filaments and fungal pathogens were not detected at any stage of the study. *Enterobacter* species were isolated at an early observation point from the *Yavakuta* form, but it is a commensal organism associated with the plant species. Therefore, their detection in raw plant material does not necessarily indicate pathogenic organisms as a contamination responsible for producing cross infection. The organism was not detected in the subsequent samples of the *Kwatha* prepared by proper boiling. This finding suggests that appropriate processing through boiling may play an important role in reducing microbial contamination and maintaining the microbiological quality of the final *Kwatha* preparation.

Overall, the findings suggest that properly processed and stored *Shalaparni Panchanga Kwatha* remained microbiologically stable throughout the period of observation and was suitable for use under the studied conditions. They also support the traditional practice of storing the drug as *Yavakuta* while preparing *Kwatha* fresh before consumption, thereby ensuring microbiological safety and quality. Nevertheless, adherence to proper hygienic practices during preparation, handling, and storage, along with appropriate periodic microbial evaluation, is essential to maintain its microbiological quality and safety. Further studies may be conducted to evaluate the microbial stability of *Shalaparni Panchanga Yavakuta* under controlled storage conditions and for longer durations. Quantitative microbial analysis and assessment of different processing and storage conditions may help establish standardized microbiological quality parameters.

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REFERENCES

1. Bhavmishra, Bhavaprakasha Nighantu, Commentary by Padmshri Prof. K. C. Chunekar, edited by Late Dr. G. S. Pandey. Guducyadi varga. Ver. 47-49, Ed Reprint, Varanasi: Chaukhambha Bharati academy; 2018. p. 281-282
2. Rastogi S, Pandey MM, Rawat AKS. An ethnomedicinal, phytochemical and pharmacological profile of Desmodium gangeticum (L.) DC. and Desmodium adscendens (Sw.) DC. J Ethnopharmacol. 2011; 136(2): 283-296. doi:10.1016/j.jep.2011.04.031.
3. Bora G, Bora D, Baruah D, Gautam MK, et al. Phytochemical and pharmacological profile of Desmodium gangeticum (L.) DC.: A comprehensive review. Recent Adv Food Nutr Res. 2024; 10(4): e230523217246. doi:10.2174/2215083810666230523145738.
4. Bhavmishra, Bhavaprakasha Nighantu, Commentary by Padmshri Prof. K. C. Chunekar, edited by Late Dr. G. S. Pandey. Guducyadi varga. Ver. 31-33, Ed Reprint, Varanasi: Chaukhambha Bharati academy; 2020. p. 273
5. Kaiyadev, Kaiyadev nighantu, edited by Acharya Priyavrata Sharma and Dr.Guru Prasada Sharma, Ausadhiya varga. Ver. 44-46. Ed Reprint, Varanasi: Chaukhambha Orientalia; 2009. p.11-12

6. Vaishya Shaligramji, Shaligram Nighantu bhushanam, Guduchyadi Varga. Ed Reprint, Mumbai: Khemraj Shrikrishnadass; 2004. p. 205
7. Government of India, Ministry of Health & Family Welfare, Department of AYUSH. The Ayurvedic Pharmacopoeia of India. Part I. Vol 6. 1st ed. New Delhi: Government of India; 2008. p. 139.
8. Sharangadhara. Sharangadhara Samhita with Dipika Hindi commentary, Edited by Dr. Brahmanand Tripathi. Madhyama Khanda, Chapter 1. Swarasadi Kalpana. Ver 1 Varanasi: Chaukhambha Surbharati Prakashan. p. 125
9. Sharangadhara. Sharangadhara Samhita with Dipika Hindi commentary, Edited by Dr. Brahmanand Tripathi. Madhyama Khanda, Chapter 2. Kwathadi Kalpana. Ver 2. Varanasi: Chaukhambha Surbharati Prakashan. p. 133
10. Sharangadhara. Sharangadhara Samhita with Dipika Hindi commentary, Edited by Dr. Brahmanand Tripathi. Madhyama Khanda, Chapter 2. Kwathadi Kalpana. Ver 1. Varanasi: Chaukhambha Surbharati Prakashan. p. 133
11. World Health Organization. WHO Guidelines on Good Agricultural and Collection Practices (GACP) for Medicinal Plants. Geneva: World Health Organization; 2003.
12. Verma P, Galib, Patgiri B, Prajapati PK. Shelf-life evaluation of Rasayana Churna: a preliminary study. Ayu. 2014; 35(2): 184-186. doi:10.4103/0974-8520.146247.
13. International Council for Harmonisation of Technical Requirements for Pharmaceuticals for Human Use. ICH Harmonised Tripartite Guideline Q1A(R2): Stability Testing of New Drug Substances and Products. Geneva: ICH; 2003.
14. World Health Organization. Quality Control Methods for Herbal Materials. Geneva: World Health Organization; 2011.
15. World Health Organization. WHO Technical Report Series No. 1010, Annex 1: WHO Good Practices for Pharmaceutical Quality Control Laboratories. Geneva: World Health Organization; 2018.
16. World Health Organization. Quality control methods for medicinal plant materials. Geneva: World Health Organization; 1998

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