

Available Online at www.ijpba.info International Journal of Pharmaceutical & Biological Archives 2025; 16(1):17-23

## **RESEARCH ARTICLE**

# An Analytical Study of *Kushmanda avaleha* to Evaluate its Safest *Ayurvedic* Preparation

Ambika, Harish Kumar Singhal

Department of Ayurveda Pediatrics, Postgraduate Institute of Ayurveda, Dr. S. R. Rajasthan Ayurved University, Jodhpur, Rajasthan, India

## Received: 21-02-2025; Revised: 01-03-2025; Accepted: 12-03-2025

## ABSTRACT

Introduction: Childhood undernutrition is a contributing factor to an estimated 35% of all fatalities among children under the age of five, as well as 21% of total worldwide disability-adjusted life years lost among children under five. There is an ongoing need to provide nutritious food that is both body and nature friendly, and that successfully meets the daily caloric requirements of the developing children. Better nutrients will be made accessible to eliminate or ameliorate malnutrition-related diseases. The need of the hour is for it to be costeffective and affordable to the bulk of the targeted population with poor socioeconomic level. In this regard, Ayurvedic formulations based on the global approach can give a superior option, and following a successful trial, they might be implemented in National Nutritional Programmes. Kushmanda Avaleha is one of the traditional Ayurvedic formulation described in Vangasen's Chikitsa sara samgrah which was taken up for the present study on Karshya (undernutrition). Aims and Objectives: This study aimed to prepare Kushmanda Avaleha as per the textual reference and evaluate its organoleptic, physicochemical parameters and thin-layer chromatography according to the Ayurvedic Pharmacopoeia of India (API). Materials and Methods: Kushmanda Avaleha was prepared from 12 different ingredients viz-Kushmanda (Benincasa hispida (Thunb.) Cogn.), Pippali (Piper longum Linn.), Jeeraka (Cuminum cyminum Linn.), Sunthi (Zingiber officinale Rosc.), Tvak (Cinnamomum zeylanicum Breyn.), Ela (Elettaria cardamomum Maton), Patra (Cinnamomum tamala Nees and Eberm.), Dhanyaka (Coriandrum sativum Linn.), Marich (Piper nigrum Linn.), Ghrita, honey, and sugar. The preparation involved the preparation of powders, *Kushmanda* pulp, and a cooking process (*Paka*), followed by the combination of ingredients and storage. Analytical investigations were conducted to assess the physicochemical parameters such as loss on drying, acid-insoluble ash, total sugar, reducing sugar, nonreducing sugar, and fat content. Results: The results showed that Kushmanda Avaleha exhibited a moisture content of 5.26%, acid-insoluble ash below the quantifiable limit, total sugar content of 60.62%, reducing sugar content of 14.21%, non-reducing sugar content of 46.41%, and fat content of 5.01%. Discussion: These values were within the standard limits prescribed by API, indicating that the formulation was of high quality, with low moisture, minimal inorganic impurities, and a balanced sugar composition, which supports its stability and efficacy. Conclusion: The study concluded that Kushmanda Avaleha was found a safe, effective, and stable formulation with a long shelf life, suitable for its intended therapeutic uses.

Keywords: Avaleha, ayurveda, chikitsa sara samgrah, karshya, undernutrition, vangasena's

# INTRODUCTION

Childhood undernutrition is a contributing factor to an estimated 35% of all fatalities among

\***Corresponding Author:** Ambika Choudhary, E-mail: choudharyambika082@gmail.com children under the age of five, as well as 21% of total worldwide disability-adjusted life years lost among children under five.<sup>[1]</sup> According to the National Family Health Survey, which was conducted in 2005–2006, 40% of India's children under the age of three are underweight, 45% are stunted, and 23% are wasting.<sup>[2]</sup> Almost 11 million

children will die before the age of five, including four million in their 1<sup>st</sup> month of existence. In India, nearly one in every two youngsters goes to bed on an empty stomach.<sup>[3]</sup> Undernutrition affects both boys and girls at equal rates. Undernutrition is more prevalent in rural regions (46% vs. 33% in cities). During the first 6 months of life, 20–30% of children are malnourished, frequently due to their low birth weight. The proportion of undernutrition begins to rise around 4–6 months of age due to the introduction of unsanitary food intake, which leads to an increase in the propensity to undernutrition.<sup>[2]</sup> Nutrition is an essential factor for all age groups.

According to Ayurveda, the three pillars of life are *Ahara* (diet), *Nidra* (sleep), and *Brahmacharya* (celibacy), collectively known as *Trayopstambh*.<sup>[4]</sup> These three pillars support the body. Among them, *Ahara* is considered the best of all medicines, as it provides nourishment to the mind, body, and soul. *Acharya Kashyapa* referred to *Ahara* as *Mahabhaishajya*, meaning the greatest and best medicine.<sup>[5]</sup> *Karshya* in children is a clinical condition where the body becomes emaciated gradually due to the consumption of rough food, making a person overly lean.<sup>[6]</sup>

Kushmanda Avaleha is described in Vangasena's Chikitsa sara samgrah under the management of Raktapitta. Its use in Karshya (Undernutrition) is clearly mentioned in its Phalashruti.<sup>[7]</sup> The Panchvidha Kashaya Kalpana, or Five Basic Kalpanas, were referenced in Ayurveda. Some disadvantages of Panchvidha Kashaya Kalpana include its shorter shelf life and worse palatability. Therefore, supplementary formulations were created to get around these problems. Using fundamental formulations such as Swaras (juice), Kwatha (decoctions), and Avaleha Kalpana was created as a secondary formulation. The Avaleha mixture was made with sugar, ghee (clarified butter), honey and herbal medical medications. Kushmanda Avaleha is the best Ayurvedic formulation which provides nourishment, improves appetite and increase the body strength, it is mild formulation that can be used in children as well as old person.<sup>[8]</sup>

## **Aims and Objectives**

The aims of this study were as follows:

• To prepare *Kushmanda Avaleha* as per textual reference

To study the physicochemical parameters of *Kushmanda Avaleha* as per Ayurvedic Pharmacopoeia of India (API).

#### **MATERIALS AND METHODS**

#### **Pharmaceutical Study**

#### Procurement of raw drugs

Raw materials for the preparation and *Kushmanda Avaleha* were procured from the local market of Jodhpur, India. Pharmacognostic examination of raw drugs was done by Postgraduate Department of *Dravyaguna*, Postgraduate Institute of Ayurveda. Dr. S. R. Rajasthan *Ayurved* University Jodhpur, Rajasthan, India.

#### Preparation of Kushmanda Avaleha

The present formulation Kushmanda Avaleha is taken from Vangasena Samhita and it contains a total of 12 ingredients. Kushmanda (Benincasa hispida (Thunb.) Cogn.), Pippali (Piper longum Linn.), Jeeraka (Cuminum cyminum Linn.), Sunthi (Zingiber officinale Rosc.), Tvak (Cinnamomum zeylanicum Breyn.), Ela (Elettaria cardamomum Maton), Patra (Cinnamomum tamala Nees and Eberm.), Dhanyaka (Coriandrum sativum Linn.), Marich (Piper nigrum Linn.), Ghrita, Honey, and Sugar were the ingredients of trial drug Kushmanda Avaleha.

The general process of preparation of *Avaleha* was followed for *Kushmanda Avaleha*. According to Vangasena Samhita:

- 1. Preparation of powder (*Prakshepa Dravya*)
- 2. Preparation of Kushmanda pulp
- 3. Paka preparation
- 4. Preparation of Kushmanda Avaleha.

#### Preparation of powder (Prakshepa Dravya)

All the ingredients from *Pippali* to *Marich* were made into fine powder using pulverizer and sieves.

#### Preparation of Kushmanda pulp

The collected old, ripe, hard and well-developed *Kushmanda* fruits were washed with water to remove the physical impurities present. Peel it and throw away seeds and internal mesh.

#### IJPBA/Jan-Mar-2025/Vol 16/Issue 1

Then boil it and strain through linen and dry the pulp slightly in sun. This pulp is cooked in a copper vessel with *Go- Ghrita* till it became slightly red.

## Paka preparation

Add to it country sugar and also the juice extracted before. When ghee comes out take it down from the fire.

## Preparation of Kushmanda Avaleha

*Prakshepaka Dravyas* and honey were added, stirred well, and stored in airtight container. Flow Chart: The procedure of trial drug preparation

# **Analytical Study**

Analytical investigations are relevant to research because they may be used to determine active



principles and interpret a drug's potential mode of action. The objective parameters to set the standards for the quality of both raw pharmaceuticals and completed products are provided by physiochemical analysis. Drugs must be analyzed both qualitatively and quantitatively using contemporary scientific methods and tools to standardize the plant and drug and determine how a drug could work. Since the quality of medicinal plants determines their therapeutic efficiency, Kushmanda Avaleha was analytically evaluated using appropriate criteria to assess raw material quality and standardize final formulations. Analytical study of a drug also helps to interpret its pharmacokinetics and pharmacodynamics. Parameters for the various studies were taken according to API.

# Place of work for Analytical Study

Cultivator Phyto Lab Pvt. Ltd. Sonamukhi Nagar, Sangaria Fanta, Jodhpur, India.

Sample Registration No. - CPL/O/24/09/01474

Sample Code - CPL/2024/07729

Date of Sample sent to Lab and Sample Registration – September 12, 2023

Date of start of analysis - September 13, 2024

Date of completion of analysis – September 21, 2024 Duration – 9 days.

## **OBSERVATION AND RESULTS**

## Analytical Study was Done Under following Headings

- 1. Organoleptic characters
- 2. Physiochemical parameters
- 3. Chromatographic fingerprint thin-layer chromatography (TLC).

## **Organoleptic Characters**

Using sense organs, one can observe traits known as organoleptic qualities. These metrics are useful for assessing and contrasting sample quality. *Kushmanda Avaleha* was found to exhibit the organoleptic features, which include factors such as color, appearance, odor, touch, and taste.

## **Physiochemical Parameters**

Following parameters were required to guarantee the safety, potency, and efficacy of the prepared formulations –

- Loss on drying at 105°C/Moisture content
- Acid insoluble ash
- Total sugar
- Reducing sugar
- Non-reducing sugar
- Fat content.

# Fingerprinting of *Kushmanda Avaleha* by TLC Profile

- Sample name: Kushmanda Avaleha
- Sample Id: CPL.2024\_07729
- Sample preparation: 1 mL in 10 mL methanol
- Mobile phase: Toluene: Ethyl acetate: chloroform: methanol (8:0.5:0.5:0.2)
- Derivatization: Anisaldehyde + Sulphuric Acid + Acetic Acid
- Sample injection volume: 10 uL
- Solvent distance travelled: 8 cm
- Visualization after derivatization Rf value: 0.20, 0.33, 0.81.

The mobile phase is Toluene: Ethyl acetate: chloroform: methanol in the ratio of 8:0.5:0.5:0.2 and for derivatization - Anisaldehyde + Sulphuric Acid + Acetic acid reagent is use for the samples. Even the sample is analyzed under wavelength of 365 nm. For Kushmanda Avaleha, at the wavelength of 365 nm, 3 spots are detected with Rf values 0.20, 0.33, and 0.81, respectively. Each spot corresponds to different compounds present in Kushmanda Avaleha, reflecting the complexity and diversity of its constituents: Rf value of 0.20: This spot likely represents a more polar compound, which interacts more with the stationary phase and travels less with the mobile phase. Rf value of 0.33: This intermediate Rf value indicates a compound with moderate polarity, suggesting that it had a balance of interactions with both the stationary and mobile phases. Rf value of 0.81: This spot indicates a less polar compound that travels farther up the plate, suggesting weaker interactions with the stationary phase.

## IJPBA/Jan-Mar-2025/Vol 16/Issue 1



#### DISCUSSION

The traditional Ayurvedic medicine *Kushmanda Avaleha*, which is used to treat *Karshya* (undernutrition), is described in detail in *Vangasena's Chikitsa sara samgrah*. This formulation was prepared in the Nagarjuna Pharmacy attached to Post Graduate Institute of Ayurveda, Jodhpur. The analytical study of *Kushmanda Avaleha* was done to evaluate its safety profile. The whole analytical was done at Cultivator Phyto Lab Pvt. Ltd. Sonamukhi Nagar, Sangaria Fanta, Jodhpur, India. The values came out at the laboratory were shown in Tables 1 and 2. Following inference on *Kushmanda Avaleha* was drawn from the above analytical study.

#### **Organoleptic Evaluation**

In the context of organoleptic parameters of *Kushmanda Avaleha*, it was observed that the *Avaleha* was semi-solid, malleable, sticky preparation, dark brown in color with pungent odor and spicy-sweet taste.

#### Loss on Drying at 105°C/Moisture Content

It was observed that the loss on drying of *Kushmanda Avaleha* was found 5.26 at 105°C. This indicates that the formulation was of good

Table	1: Organoleptic	properties	s of Kushmanda Avaleha

S. No.	Macroscopic study	Kushmanda Avaleha
1	Appearance	Semi-solid, malleable, sticky preparation
2	Color	Dark brown
3	Odor	Pungent
4	Taste	Spicy-sweet

Table 2:	Physicochemical	parameters	of Kushmanda
Avaleha			

S. No.	Test parameters	Unit	Result	Test method
1	Loss on drying at 105°C/moisture content	%	5.26	API Part II Vol II: 2010
2	Acid insoluble ash	%	*BLQ (LOQ 0.1)	API Part II Vol III: 2010
3	Total sugar	%	60.62	CPL/STP/C/02
4	Reducing sugar	%	14.21	API Part II Vol II: 2008
5	Non-reducing sugar	%	46.41	API Part II Vol II: 2008
6	Fat content	%	5.01	IS 4684: 1975

\*BLQ: Below the limit of quantification, LOQ: Limit of quantification

quality, had low moisture content, and was likely to be stable with a longer shelf life, all of which were important for maintaining the efficacy of the *Kushmanda Avaleha*. Loss on drying for *Avaleha* preparations is typically considered acceptable when within the range of not more than 10%. If the moisture content exceeded the limit, it could have affected its storage and preservation.

#### **Acid Insoluble Ash**

Acid insoluble ash value was found below the limit of quantification (BLQ) (limit of quantification 0.1) for *Kushmanda Avaleha*. This was a positive result, as it indicates that the formulation contains an extremely low level (if any) of unwanted inorganic impurities like sand or silicates. For most *Ayurvedic* preparations, acid insoluble ash should generally be below 2%. A result BLQ had been excellent, confirming that *Kushmanda Avaleha* was free from significant contamination by inorganic impurities.

#### **Total Sugar**

Total sugar value was 60.62 for *Kushmanda Avaleha*. This value reflected the sweetness and

viscosity of the preparation, which aligned with the traditional preparation method of *Kushmanda Avaleha*. The high sugar content ensured a long shelf life by reducing water activity, thereby preventing microbial spoilage. For *Avaleha* preparations, the total sugar content can range from 50 to 70%, depending on the formulation.

# **Reducing Sugar**

Reducing Sugar value was 14.21 for *Kushmanda Avaleha*. In *Avaleha* preparations, the reducing sugar content generally falls within the range of 10–20%. A value of 14.21% was within the normal range, suggesting a balanced sugar composition in the formulation, with a good balance between quick energy release and longer-term preservation.

# Non-Reducing Sugar

Non-reducing sugar value was 46.41 for *Kushmanda Avaleha*. In *Avaleha* preparations, non-reducing sugar content typically ranges from 40 to 60%. A value of 46.41% was well within the normal range, indicating that the formulation had a good number of stable sugars for preservation while providing a pleasant taste and therapeutic efficacy. This balance supports the long shelf life and effectiveness of *Kushmanda Avaleha*.

# **Fat Content**

Total fat content value was 5.01 for *Kushmanda Avaleha*. In *Avaleha* preparations, fat content generally ranges from 3 to 10%, depending on the ingredients used (e.g., ghee). A value of 5.01% is within the normal range, indicating the proper formulation of the product. This balance ensures that *Kushmanda Avaleha* had the right amount of fat for therapeutic and preservative functions while maintaining a palatable texture.

# **Chromatographic Study/TLC**

In present study, the mobile phase was Toluene: Ethyl acetate: chloroform: methanol in the ratio of 8:0.5:0.5:0.2, and for derivatization- Anisaldehyde

+ Sulphuric Acid + Acetic Acid reagent was used for the samples. Even sample was analyzed under wave length of 365 nm. For Kushmanda Avaleha, at the wavelength of 365 nm, 3 spots were detected with Rf values 0.20, 0.33, and 0.81, respectively. Each spot corresponds to different compounds present in Kushmanda Avaleha, reflecting the complexity and diversity of its constituents: Rf value of 0.20: This spot likely represents a more polar compound, which interacts more with the stationary phase and travels less with the mobile phase. Rf value of 0.33: This intermediate Rf value indicates a compound with moderate polarity, suggesting that it had a balance of interactions with both the stationary and mobile phases. Rf value of 0.81: This spot indicates a less polar compound that travels farther up the plate, suggesting weaker interactions with the stationary phase.

The presence of multiple spots signifies the complexity of the formulation and indicates that *Kushmanda Avaleha* contains a variety of bioactive compounds, which could contribute to its therapeutic efficacy. Comparing these Rf values to those of standard compounds can help confirm the identity of specific active ingredients in the formulation, contributing to quality control and standardization.

The TLC analysis of *Kushmanda Avaleha* demonstrates the effectiveness of the chosen mobile phase and derivatization reagents in separating and visualizing the components of the formulation. The detected spots indicate a diverse array of constituents, essential for its efficacy in Ayurvedic practice. This analysis served as a vital tool in assessing the quality, potency, and consistency of the *Kushmanda Avaleha*.

# CONCLUSION

The present analytical study concluded that *Kushmanda Avaleha* was semi-solid, malleable, sticky preparation, dark brown in color with pungent odor and spicy-sweet taste. The physicochemical parameters of *Kushmanda Avaleha* were found within the standard limit as API.<sup>[9]</sup> The *Kushmanda Avaleha* TLC analysis showed how well the selected mobile phase and derivatization reagents separate and visualize the formulation's constituent parts.

The spots found reveal a wide range of components that are necessary for its effectiveness in Ayurvedic treatment. Thus, *Kushmanda Avaleha* was proved a safe formulation with a long self-life.

## REFERENCES

- 1. Singhal HK, Vyas PP. An ayurvedic approach on protein energy malnutrition W.S.R. to Balsosha. Int J Health Sci Res 2024;14:173-80.
- Paul VK, Bagga A. Nutrition. In: Ghai Essential Paediatrics. 8<sup>th</sup> ed. New Delhi: CBS Publishers and Distributors Pt. Ltd.; 2013. p. 95-6.
- 3. Mathad V, Shivprasad S. Malnutrition: A daunting problem for India's spectacular growth. Asian J Pediatr Pract 2012;16:1.

- Sharma PV. Charaka Samhita Text with English Translation, Sutrasthana 11/35. 9<sup>th</sup> ed., Vol. 1. Varanasi: Chaukhambha Orientalia; 2004. p. 75.
- 5. Tewari PV, Kashyapa Samhita VT. Khilsthana 4/6 ChaukhambhaVishwabharti. Varanasi: Chaukhambha Orientalia; 2016. p. 468.
- Sharma PV, Charaka Samhita Text with English Translation, Sutrasthana 21/10. 9<sup>th</sup> ed., Vol. 1. Varanasi: Chaukhambha Orientalia; 2004. p. 45.
- Saxena N. Raktapitta. In: Vangasena Samhita. Vol. 1, Ch. 13. Varanasi: Chaukhamba Sanskrit Series Office; 2004. p. 149-55.
- 8. Shrikantha M. Sharangdhar Samhita, Madhyam Khand. Ch. 8. Varanasi: Chaukhambha Orientalia; 2016. p. 113.
- Singhal HK, Vyas PP, Tyagi V, Neetu, Prajapati PK. Physicochemical analysis of murchhita yashtyadi ghrita. Int J Res Ayurveda Pharm 2024;15:63-6.