WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.084
Volume 13, Issue 2, 559-567. Research Article ISSN 2277–7105

PHARMACEUTICO - ANALYTICAL STUDY OF KHANDA PREPARED FROM VAYAHSTHAPANA MAHAKASHAYA

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Article Received on
22 Nov. 2023,

Revised on 12 Dec. 2023,
Accepted on 02 Jan. 2024

DOI: 10.20959/wjpr20242-30892

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ABSTRACT

Ayurveda is science of life and science of longevity, *charaka* has mentioned ten drugs under *vayahsthapana mahakashaya*. From the basic formulations number of other formulations are prepared. *Khanda kalpana* is a granular form accepted by all age groups. *Khanda* is prepared from *vayahsthapana mahakashaya*, milk, *khanda sharkara*. Its analytical results showed 66% total sugar, 2% reducing sugar, 58.6% water soluble extractive. Obtained results in the present research provided the preliminary standards.

KEYWORDS: *Vayahsthapana*, *Mahakshaya*, *Khanda*, Granules, Analysis.

INTRODUCTION

Ayurveda is a science of life which focuses on prevention of diseases and self-care to restore health quickly and effectively.[1] *Ayurveda* is also called the “science of longevity” because it offers a complete system to live a long healthy life. It offers programs to rejuvenate the body through lifestyle management that incorporates diet, exercise, psychotherapeutic practicesand botanical medicines.[2] Numerous single drugs and compound formulations are described in books of Ayurveda which will help in prevention of aging and promoting longevity.[3] *Vayahsthapana mahakashaya*[4] is one such group of ten drugs namely: *Amrita (Tinospora cordifolia), Abhaya (Terminalia chebula), Dhatri (Emblica officinalis), Muktha (Alpinia galanga), Shwetha (Clitoriaternatea), Jeevanti (Leptadenia reticulata), Athirasa (Asparagus*

racemose), Mandukaparni (Centellaasciatica), Sthira (Desmodiumgangeticum), Punarnava (*Boerhaviadiffusa*) which possesses longevity action. In *Ayurveda* therapeutics, there is a well-developed- sub-discipline- entirely devoted to drug formulations known as "*Bhaishajya Kalpana*" and this branch is based on five basic formulations like *swarasa* (Expressed juice), *kwatha* (Decoction), *kalka* (Paste), *hima* (Cold infusion), *phanta* (Hot infusion) meant for instant use. Further from the basic forms a number of other formulations like *sandhana kalpana* (Fermented preparations), *avalehya kalpana* (Semi-solid preparation meant for licking), *khanda Kalpana* (Granular preparations), *sneha Kalpana* (Medicated Ghee) are derived.[5] Also, according to *acharya Vagbhata*, depending on the condition of an individual any suitable dosage forms like decoction, medicated ghee and granules can be prepared. Different dosage forms are developed by keeping in mind to increase the stability, palatability, acceptance and other parameters. *Khanda kalpana* is a granular form of medicament which can be prepared in the presence of specified liquid media, sweetening substances, and other condiments. It is accepted by all age groups as it is palatable, have higher shelf life, pleasing appearance and is easy to dispense. In general, *khanda* can be taken in the dose of 12 gram. The present study was taken up to prepare *vayahsthapana mahakashaya* drugs in *khanda* form and to analyse with the suitable parameters.

METHODOLOGY

The raw drugs needed for the preparation of *khanda* from *vayahsthapana mahakashaya* are procured and authenticated by its morphological features. Pharmaceutical study was carried out at the teaching pharmacy, Department of Rasashastra and Bhaishajya Kalpana Sri Dharmasthala Manjunatheshwara College of Ayurveda and Hospital Hassan.

Pharmaceutical study

The ingredients from Sl. No 1 to 10 of the table 1 were taken and pounded in *khalwa yantra*. It was sieved in a cora cloth to get the fine powder. In a pan, mentioned quantity of milk was taken, fine powder of above drugs was added and it was boiled. When it attained khoa consistency, it was fried with quantity sufficient ghee, when ghee was separated from drug mass, heating was stopped and the contents were transferred to a stain steel plate. In another pan specified quantity of candy sugar was dissolved by adding sufficient quantity of water and filtered through a cloth. It was then heated in mild fire till it attains 3-4 thread consistency. Later, khoa consistency drug mass was added and heating was continued with frequent stirring. When the contents become a thick mass heating was stopped but stirring of

the contents was continued. The contents were totally cooled to room temperature. Next day it was taken out and pounded to obtain the granular consistency. Obtained *vayahsthapana khanda* was weighed and stored in an air tight container, used for further study.

Table 1: Ingredients needed for *Vayahsthapanakhanda.*

Sl. No.	Drugs	Botanical name	Quantity
1	*Amruta*	*Tinospora cordifolia*	10 g
2	*Abhaya*	*Terminalia chebula*	10 g
3	*Dhatri*	*Emblica officinalis*	10 g
4	*Muktha*	*Alpinia galanga*	10 g
5	*Shwetha*	*Clitoria ternatea*	10 g
6	*Jeevanti*	*Leptadenia reticulata*	10 g
7	*Athirasa*	*Asparagus racemosus*	10 g
8	*Mandukaparni*	*Centella asiatica*	10 g
9	*Sthira*	*Desmodium gangeticum*	10 g
10	*Punarnava*	*Boerhavia diffusa*	10 g
11	Candy sugar	-	400 gm
12	Milk	-	400ml
13	Ghee	-	5ml

Analytical study

Sample was analysed with organoleptic and physico-chemical parameters for quality standards according to the guidelines given in "Laboratory guide for the analysis of Ayurveda and Siddha formulations"at quality control lab Sri Dharmasthala Manjunatheshwara College of Ayurveda and Hospital Hassan.

A) Total ash

To analyse the total ash, two gram of the sample was incinerated in a crucible at temperature not exceeding 450℃ until carbon free ash was obtained. Percentage of ash was calculated with reference to weight of the sample.[6]

B) Acid insoluble ash

Prepared ash was transferred from crucible to a 250 ml beaker added with 100ml of dilute hydrochloric acid. Crucible was washed with 10ml of acid and washings are transferred to the beaker. Then heated till liquid boils and it was filtered through ashless filter paper (Whatman No. 41). Insoluble matter collected on filter paper was washed with hot water until the filtrate become neutral. It was then dried on hot plate and ignited at 600℃ in muffle furnace (Until it becomes white ash). The residue was allowed to cool in suitable desiccator for 30 minutes

and weighed without delay. Procedure was repeated until constant weight was obtained. Acid insoluble ash was calculated with reference to the air-dried drug.[7]

C) Alcohol soluble extractive

Alcohol soluble extractive was analysed by accurately weighed five gram of the sample in a glass stoppered flask. To this 100ml of distilled alcohol was added. The mixture was shaken occasionally for 6 hours allowed to stand for18 hours. Then filtered rapidly to a beaker by taking care not to lose any solvent. 25ml of the filtrate was pipetted out in a pre-weighed shallow dish. It was evaporated to dryness on a hot water bath. It was kept in hot air oven at 105℃ for 6 hours cooled in desiccators for 30 minutes and weighed. The percentage of alcohol-soluble extractable matter of the sample was calculated.[8] The experiment was repeated with distilled water instead of alcohol to obtain the water-soluble extractive.[9]

D) Total sugar

Total sugar was analysed by adopting following steps. It involves the preparation sugar standard stock solution, working standard, sample solution as reagents, then titration was done for blank and sample solution. **Step one** involves preparation of the 'Sugar standard stock solution'. Five gram of sucrose was weighed and transferred to 500ml standard flask added 2.5ml conc. hydrochloric acid, followed by 100 ml of distilled water. The contents of the flask were allowed to stand for 3 days at room temperature. After three days, distilled water was added to make up the final volume 500ml. This was labelled as stock solution. **Step two** involves the preparation of 'Working standard'. For this 62.5 ml of stock solution was transferred to 250 ml standard flask; two drops of phenolphthalein indicator were added followed by 20% NaOH until the pale pink colour appears. After that water was added to make up the final volume up to 250 ml. This was labelled as working standard. **Step three** involves preparation of 'Sample solution'. Measured 50 ml of water-soluble extract of the sample was taken in a 100 ml standard flask, added with 2.5 ml of conc. hydrochloric acid, flask was shaken and allowed to stand overnight. After 24 hours, two drops of phenolphthalein indicator and 20% NaOH solutions were added until pale pink colour appears and 4 drops of NH_4CL was added until the formed pale pink disappears. Later, water was added to make up the final volume 100 ml and sample was mixed properly, labelled as Final sample content. With the prepared reagents titration has to be done for blank and the sample solution. **Step four** involves the 'Blank titration'. Five ml each of Fehling's solution A and B were taken in a clean conical flask, it was added with 30 ml of distilled water and

placed on a pre-heated hot plate along with the magnetic stirrer inside. During the process of heating colour changed to bright orange. After two minutes of heating four drops of 1% methylene blue was added it became dark blue and it was then titrated until the bright orange colour re-appeared, and the final burette reading of blank titration was noted. **Step five** involves the 'Sample titration': In a clean flask 5ml each of Fehling's solution A and B were taken added with 5ml of prepared sample solution and 50 ml of distilled water. Magnetic stirrer was placed inside the flask and it was heated. The colour changed to bright orange. After two minutes of heating four drops of 1% methylene blue was added it became dark blue. It was then titrated until the bright orange colour re-appears. Obtained values were substituted in the formula and percentage of total sugar was calculated.[10]

E) Reducing sugar

10% aqueous solution of the sample was prepared. One ml of the sample was mixed with 2 ml of Benedict's reagent and heated in a bath of boiling water for 3 to 5 minutes. Changes in colour were observed. Percentage of reducing sugar was noted.[11]

F) Non reducing sugar

Loss on drying was analysed by using ten grams of powdered sample. It was placed in a tared evaporating dish. It was dried at 105℃ for 5hrs in hot air oven and weighed. The drying was continued until difference between two successive weights was not more than 0.01 after cooling in desiccators. Percentage of loss was calculated with reference to weight of the sample.[12]

OBSERVATION AND RESULTS

Table 2: Results obtained in pharmaceutical study of *Vayahsthapana Khanda.*

Particulars	Results
Quantity of water used to dissolve the *khanda sharkara*	150ml
Quantity of ghee used to fry the khoa consistency drug mass	5ml
Temperature when drug and milk mixture attain khoa consistency	61.7℃
Temperature when sugar syrup attains 4 thread consistency	96℃
Total duration for preparation of *Vayahsthapana khanda*	256min
Quantity of obtained *Vayahsthapana khanda*	585gm

Table 3: Results obtained in organoleptic study of *Vayahsthapana Khanda.*

Sl. No.	Test	Organoleptic characters
1.	Color	Dark brown
2.	Odor	Characteristic odor
3.	Appearance	Granular
4.	Taste	Sweet followed by slightly bitter
5.	Touch	Rough

Table 4: Results of Physico-chemical analysis of *Vayahsthapana Khanda.*

Sl. No	Tests	*Vayahsthapana khanda*
1	Total ash	1.5%
2	Acid insoluble ash	0%
3	Alcohol soluble extractive	14.4%
4	Water soluble extractive	58.6%
5	Total sugar	66%
6	Reducing sugar	2%
7	Loss on drying	9.2%

DISCUSSION

In the present study, during the preparation of *khanda* from the *vayahsthapana mahakashaya* drugs, it is observed that water become brownish colour after dissolving the candy sugar and it was filtered because it has physical impurities in it. While pouring fine powders of herbal drugs to milk it should be continuously stirred to avoid the formation of lumps. An important step in pharmaceutical procedure of *khanda kalpana* is that four thread consistency of sugar syrup was prepared to obtain desired characteristics of granules otherwise the final product will be in the semisolid consistency. This preparation becomes solid due to the heat of crystallization of sugar. In addition, the final product taste was sweet and slightly bitter. May be due to the presence of candy sugar the taste become sweet and the characteristic taste of *Guduchi* and *Mandukaparni* drugs may have attributed to the bitter taste.

In analytical study the results showed that, Total ash value suggests the formulation is having less inorganic substance (like Na^{+}, Ca^{2+}) and raw drugs were free from adulteration of silica. Acid insoluble ash value of *Vayahsthpana khanda* was zero indicates the sample has no silica in it. Water soluble extractive is more compared to alcohol soluble extractive suggest that, more chemical constituents can be extracted in water media than in alcohol media. Along with the sugar present in *khanda sharkara* (candy sugar), the carbohydrate present in the raw drugs and milk has also contributed for the total sugar of *vayahsthapana khanda*. In this study presence of milk, also contributed to reduce the benedict's solution along with sugar content

present in the herbal drugs which suggest presence of reducing sugar. The moisture content which was present in the milk and ghee was also contributed to get value of loss on drying.

CONCLUSION

In the present work, *khanda* was prepared according to the general method from *Vayahsthapana mahakashaya* drugs. All the ten drugs of *Vayahsthapana mahakashaya* were available and there was no constraint in preparation. In pharmaceutical study yield was 64%. The prepared sample was subjected to organoleptic and physico-chemical analysis. Obtained results from the physico-chemical parameters of *vayahsthapana khanda* provided the preliminary standards.

FIGURES

Fig. 1: *Amruta*

Fig. 2: *Abhaya*

Fig. 3: *Dhatri*

Fig. 4: *Muktha*

Fig. 5: *Shwetha*

Fig. 6: *Jeevanti*

Fig. 7: *Athirasa*

Fig. 8: *Mandukaparni*

Fig. 9: *Shalaparni*

Fig. 10: *Punarnava*

Fig. 11: Candy sugar

Fig; 12: Milk

Fig. 13: Khoa consistency

Fig. 14: 3-4 thread consistency

Fig. 15: Vayahsthapana khanda

Fig. 16: Total ash

Fig. 17: Water and Alcohol soluble extractive

Fig. 18: Reducing sugar

Fig. 19: Total sugar

Fig. 20: Loss on drying

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