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A Comparative Pharmaceutico-Analytical Study of *Kapha-Kethu*-Rasa Prepared by Two Different Methods

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ABSTRACT

Kapha-Kethu-Rasa is an important Herbo-mineral formulation which is predominantly used for the treatment of *kasa*, *swasa* and *prathishyaya*. Many references are available in classics regarding the preparation of *Kapha-Kethu-Rasa*. Researchers and practitioners have difficulty using this drug, for a longer duration as it contains Vathsanabha. Different references show quantity variation of *vathsanabha*, so it is quite essential to know the variation in analytical values of *Kapha-Kethu-Rasa* prepared with two different methods.

KEYWORDS

Kapha-Kethu-Rasa, Herbo-mineral formulation

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INTRODUCTION

Rasa shastra is one of the 8 branches of Ayurveda, which came in to existence around 8 century AD. The use of mineral and metallic preparations has been described in detail for the cure of various diseases in this shastra. Kapha-Kethu-Rasa (KKR) is one such beautiful combination of mineral and herbal drugs, which is predominantly used for the treatment of *Kasa, Swasa and Prathishyaya.* Main ingredients of Kapha Ketu Rasa are Tankana, Shankha, Pippali, Vathsanabha[1] etc. but may vary according to different references. Shodhana of vathsanabha, a major part of this kalpa is described in Rasa Tarangini (R.T), and has been used for the preparations of the kalpas, Kapha Ketu Rasa method 1(KKR1) and Kapha Ketu Rasa method 2 (KKR2), as per the references from Bhaishajya Rathnavali (B.R), wherein the quantity of Vathsanabha differs. For fruitful results of this Herbo-mineral formulation, the ratio of vathsanabha is a key factor. For the above said purpose an analytical study to compare the quality of Kapha Ketu Rasa prepared by different methods was very essential. Keeping in mind the various methods of preparation and its Vathsanabha concentration this study was planned. This study concentrated on the analytical factors of Kapha-Kethu-Rasa which was prepared by two different quantities of vathsanabha. The analytical factors of the drug prepared in two methods have been compared.

MATERIALS AND METHODS

For the preparation of KKR1 and KKR2 in different ratios of vathsanabha, Shodhita Vathsanabha was used. Other drugs needed for the formulation were acquired from SDM Pharmacy, Udupi.

KKR1 reference was taken from B.R.[2] (RASEDNDRA CHINTHAMANI MADYAMAKHANTA)

टङ्कण मागधी शङ्ख वत्सनाभ समं समं।
आर्द्रक स्वरस नाथ दापयेत् भुवनत्रयम् ॥८४२॥
गुञ्जामानं प्रदातव्यमाईकस्वरसैर्युतम्।
पीने श्वास से च शिरोरोग गलग्रह।
कफरोगान्निहन्त्याशु कफकेतुरयं रसः

KKR2 reference was taken from B.R. (RASA RAJA SUDHAKAR)

दग्धशङ्ख त्रिकटुकं टङ्गणं समभागिकम्।
विषञ्च पञ्चभिस्तुल्यौद्रतोयेन मर्दयेत् ॥८४४॥
वारत्रयं रक्तिकाभां वटी कुर्याद्विचक्षणः।
प्रातः सायञ्च वटिकाद्वयमार्द्रकवारिणा ॥८४५॥
कफकेतुः कण्ठरोगं शिरोरोगञ्च नाशयेत्।
पीनसं कफसङ्घातं सन्निपातं सुदारुणम् ॥८४६॥

METHOD OF PREPARATION

Kapha Ketu rasa was prepared after purification and processing of the raw drugs in practical lab of department of Rasa-shastra, S.D.M.C.A, Udupi. Shodhana of Vathsanabha was done by soaking the vathsanabha in Gomutra over a period of three days.

Preparation of Kapha Ketu rasa 1

Reference: B.R.

Ingredient and quantity:

Shuddha Vatsanabha churna:1part

Tankan bhasma: 1part

Shankha bhasma: 1part

Pippali churna: 1part

Ardraka swarasa: quantity sufficient

Step1: Shuddha Vatsanabha churna, Shankha bhasma, Tankana bhasma and Pippali choorna were mixed properly with the use of Khalva Yantra and were added to the edge runner grinder and to this ardraka swarasa was added till all the ingredients got soaked.

Step2: Then it was triturated till the mixture became completely dried. This was considered as one bhavana.

Step3: This process was repeated 3 times. Then vati preparation was done. In the size of one gunja pramana or 125 mg and was kept for shade drying.

Preparation of Kapha Ketu rasa 2

Reference': B.R.

Ingredient and quantity:

Shuddha Vatsanabha churna: 5 parts

Tankan bhasma: 1part

Shankha bhasma: 1part

Pippali churna: 1part

Shunthi churna: 1part

Maricha churna: 1part

Ardraka swarasa: Quantity sufficient

Procedure:

Equipments: Edge runner grinder, Spoon, Weighing machine, measuring jar.

Drugs: shodhitha vathsanabha churna, Shankha bhasma, shodhitha tankana churna, Pippali churna, shunthi churna and maricha churna

Step 1: The above said drugs were mixed properly using Khalva Yantra and were added to the edge runner grinder. Ardraka swarasa was added till it soaked the mixture.

Step2: It was then triturated till the ardraka swarasa got absorbed completely. This was considered as one bhavana. This process was repeated thrice.

Step 3: Then vati preparation was done in the size of one gunja pramana or 125 mg and was kept for shade drying.

ANALYTICAL STUDY

The organoleptical characters and physicochemical natures of two samples

were studied through some laboratory parameters. The following was the explanation of the various characters studied.

Organoleptical characters

KKR1

Colour: Brown

Odour: Characteristic odour of Shodhita Vathsanabha

Taste: Pungent

Appearance: Circular.

KKR2

Colour: Dark Brown

Odour: Characteristic odour of Shodhita Vathsanabha (stronger in nature)

Taste: Pungent

Appearance: Circular

PHYSICO-CHEMICAL ANALYSIS

1. *Loss on drying at 105^{0}C*[3]:

Samples of Ten grams each was weighed and placed in tarred evaporating dish. It was dried at 105^{0}C for 5 hrs in hot air oven and weighed. Later (drying the) the difference between two successive weights were not more than 0.01. Thus, calculation of the moisture content with reference to weight of the sample was done.

2. *Total ash*[4]:

The ground drug was weighed accurately and about 2gm to 3gm was incinerated in a tared platinum or silica dish at a temperature not exceeding more than 450°C / until it was free from carbon.

Another method for collection of carbon free ash if not obtained in the classical method was to exhaust the charred mass with hot water and then the residue was collected on an ash less filter paper, then the residue and filter paper was incinerated. the filtrate was added and evaporated to dryness. Then was ignited at a temperature not exceeding 450°C.

The prior method was practiced in this particular experiment. Then it was allowed to cool and was then weighed. Then Calculated the percentage of ash with reference to the air-dried drug.

3. *Acid insoluble ash*[5]:

The ash obtained in acid insoluble ash was boiled for 5 minutes with 25 ml of dilute hydrochloric acid and the insoluble matter was collected on an ash less filter paper. It was later washed with hot water and was ignited to constant weight. The percentage of acid-insoluble ash with reference to the air-dried drug was then finally calculated.

4. 4.*Water soluble ash*[6]:

Boiling of the ash or 5 minutes with 25 ml of water; and later collected the insoluble matter in a Gooch crucible/ on an ash less filter paper. Then washed with hot water, and ignited for 15 minutes at a temperature

not exceeding 450°C. The weight of the insoluble matter was subtracted from the weight of the ash. The difference in weight represented the water-soluble ash. Calculation of the percentage of water-soluble ash with reference to the air-dried drug was estimated.

5. Determination of pH level[7]: The measurement of pH was generally done with a suitable potentiometric meter known as the pH meter fitted with two electrodes, one was constructed of glass and sensitive to hydrogenation activity and the other was a calomel reference electrode. The determination was carried out at temperature of 254°C +/- 2°C. Here the Standard buffer solution was taken to be pH 4 and the pH meter was calibrated accordingly. Later one tablet each of KKR1 and KKR2 was dissolved separately in 100ml distilled water. **Determination of pH**: 10 µl of each sample was pipped and the determination was carried out at temperature of 254°C.

PHARMACEUTICAL PARAMETERS[8]

6. Uniformity of weight:

20 tablets were selected randomly and weighed from both the groups. The average weight was calculated. The individual weights of the tablets were taken. Not more than two of the individual weights deviated from the average weight by more than the percentage shown in the following Table no 1. and none of them deviated by more than twice their permissible percentage.

Table 1 Comparison between the average weight of the tablet and their percentage deviation.

Average weight of tablet	Percentage deviation
120 mg or less	+/-10
More than 120mg but less than 250 mg	+/-7.5
300 or more	+/-5

7. Hardness test:

From each group, 5 tablets were selected randomly and tested for hardness. The lower plunger was placed in contact with the tablet whereas the upper plunger played a role of against force by turning a threaded bolt until the tablet fractured. The force of fracture was then recorded.

8. Disintegration time: The tank of the disintegration apparatus was filled with distilled water up to the mark. 750 ml of distilled water in each of the 1000 ml beaker was taken. The timer of the instrument was set for 60 minutes. The temperature of water in beakers was set to 37°C and that of water in the main tank was set to 37.5°C. One tablet was introduced into each tube and, added a disk to each tube. The assembly was suspended in the beaker containing water and the apparatus was operated. The time duration at which the tablet disintegrated was noted.

9. Friability test: A total of 10 tablets are weighed together and then placed in the chamber of Roche friabilator. The friabilator was operated at 100 revolutions and the tablets are subjected to the combined effects of abrasion and shock because the plastic chamber carrying the tablets droped them at a distance of six inches with every revolution. The tablets are then dusted and reweighed. The loss in weight should not exceed 1.0% of their original weight.

CHROMATOGRAPHY

10. HPTLC:

A tablet of Kapha-Kethu-Rasa I and Kapha-Kethu-Rasa II was powdered and 1gm from each was taken. Then the powdered drug was mixed with 10 ml of alcohol. From that 6µl of extract was applied on a pre- coated silica gel F254 on aluminium plates to a band width of 8 mm using linom at 5 TLC applicator. Then the plate was developed in toluene: EA: FA (4:1.5:0.5). The developed plates were visualised in UV 254, 366 and after derivatisation with vanillin-sulphuric acid, it was scanned under UV 254 and 366nm. R_f, colour of the spots and densitometric scan was recorded.

RESULT

As depicted in the table no 2, Analytical study was done to get the standard parameters for obtaining a quality drug. Two samples of *Kapha-Kethu-Rasa* prepared in the form of *vati* were analysed. The pH level of KKR I and KKR II was observed as 8.94 and 8.4, respectively. This indicated that both samples were alkaline in nature. Here KKR I was more alkaline than KKR II because of presence of more quantity of Tankana and Shankha Bhasma. Total Ash Value of KKR I was 30.15 and KKR II was 19.825, depicting the presence of more inorganic substance in KKR I. Acid soluble ash value of KKR I and KKR II was observed as 0.321% and 0.873% respectively. Water soluble ash value of KKR I was 10.26% and KKR II was 8.615% respectively. Moisture content of KKR I and KKR II was 15.179% and 10.14% respectively. This indicated that KKR II was more stable than KKR I.

Table 2 Comparison between the parametric reading of both groups.

Parameters	KKR I	KKR II
Loss on drying	15.179	10.34
Total ash	30.15	19.825
Acid insoluble ash	0.321	0.873
Water soluble ash	10.26	8.615
Uniformity of the weight	Complies with the limit	Complies with the limit
Hardness test (kg/cm)	2.333	4
Disintegration	36 min	35 min
Friability	LT 1%	LT 1%
PH	8.94	8.4

LT- less than	result=3(% w/w)

PHARMACEUTICAL PARAMETERS

Uniformity of the weight

Weight variation in the size of the vati in both KKR I and KKR II were within the normal limits. This showed that the size of the vati was uniform.

Hardness

Both KKR I and KKR II were subjected to hardness test and the value was observed as 2.333kg/cm, and 4kg/cm respectively. Hardness was more in KKR II; this would have been due to the less moisture present in KKR II compared to KKR I.

Friability

The weight of the tablets weighed before and after revolution showed the weight loss than 1% in KKR I and KKR II which was within the permissible limits. This showed the stability of the samples to withstand the mechanical aberrations.

Disintegration test

The vati of KKR I and KKR II disintegrated in 36 min. and 35 min. respectively. The rate of disintegration was a bit more in KKR II compared to KKR I, which was indicative of quick absorption of the drug.

CHROMATOGRAPHY

Fig.1 shows the developed silica plate of HPTLC for KKR I and KKR II. As seen in Fig.2 and Fig.3 almost all the peaks were common for KKR I and KKR II as seen at 254nm. The additional peak as seen in Fig.4 and Fig.5, in KKR II at 366nm was suggestive of the additional ingredients. The additional peaks in KKR I at 254nm was because of more percentage of drugs present in the formulation. The peak which had same R_f 0.02 showed almost double percentage of area in KKR II which suggested as indication of *vathsanabha* which was double in KKR II when compared to KKR I.

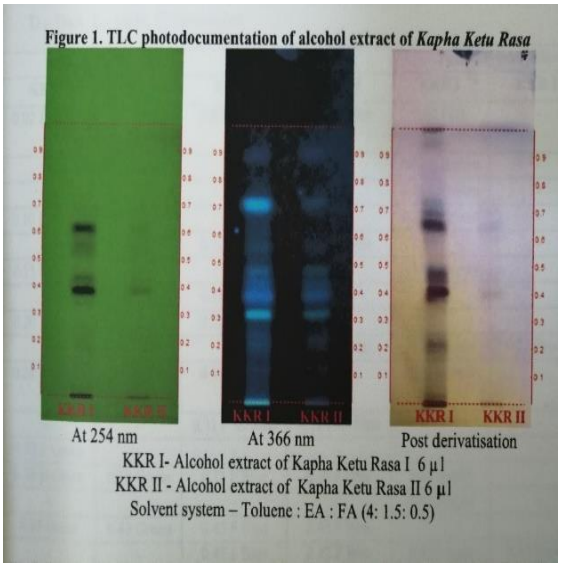

Figure 1 Developed silica plate

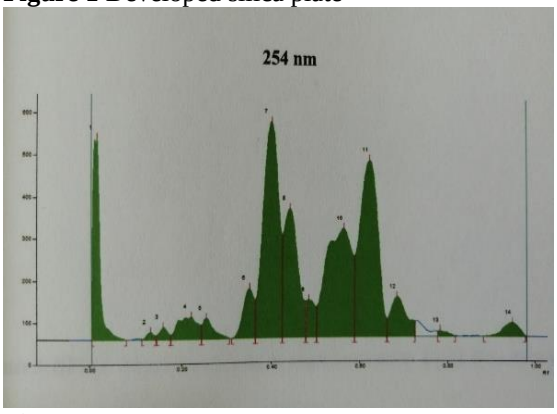

Figure 2 KKR 1 at 254 nm

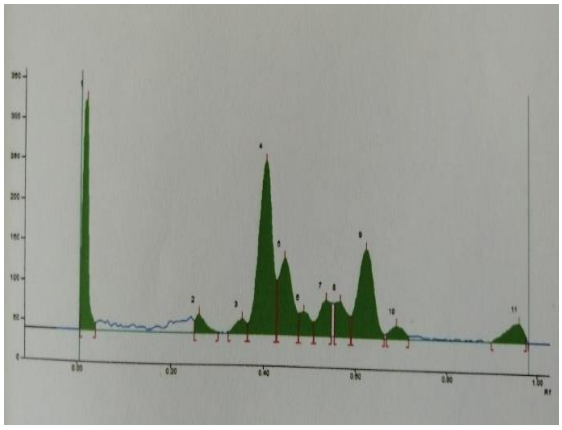

Figure 3 KKR2 at 254 nm

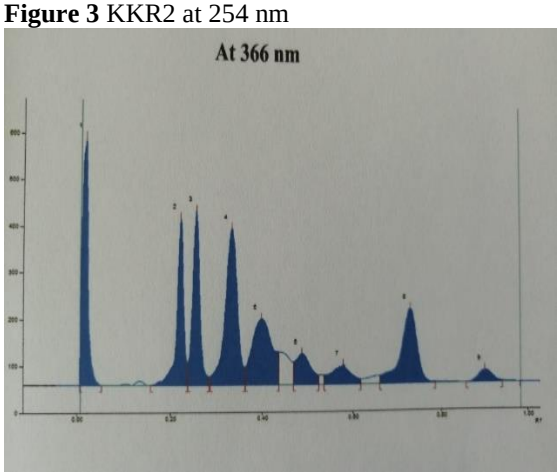

Figure 4 KKR1 at 366 nm

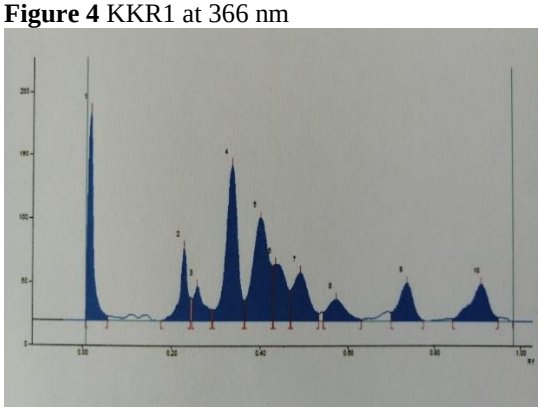

Figure 5 KKR2 at 366 nm

CONCLUSION

Both the samples were alkaline in nature but had an easy disintegration indicating the faster absorption into the body. The overall result seen was more in KKR I sample than in KKR II. Further studies may be taken up to clinically prove the efficacy of the drug through the various methods of preparation and also the preclinical studies about the toxicity and the dosage may be carried out to further refine the findings from this study.

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