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PRELIMINARY PHARMACEUTICAL AND PHYSICO-CHEMICAL ANALYSIS OF SURA- MADYA KALPANA

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ABSTRACT

Sandhana kalpana are secondary preparations under bhaishajya kalpana (Ayurveda pharmaceutics) formed as a result of fermentation. It is mainly classified into madya (alcoholic) and shukta (acidic) fermentations. Sura is one among the madya type of sandhana kalpana, which is unique in its method of preparations, involves fermentation of properly cooked rice only and results in formation of five different layers like prasanna, kadambari, jagala, medaka and surabija. On Pharmaceutical study, after completion of fermentation only three layers of sura were appreciated, so preparation is divided into five equal parts and analysis carried out. The analytical study showed the Specific gravity of prasanna (sample1), kadambari (sample2) was found to be 1.034 and 1.002 respectively. Alcohol content of prasanna was found to be 6%, kadambari 2% and remaining 3 layers were found to be 0%. Reducing sugar in all the five different layers found to be 1-1.5%. Total solid content of the successive layers was found to be 5.8, 5.8, 6, 6.1 and 7 respectively. There was a gradual increase in the refractive index of successive layers like 1.353, 1.353, 1.354, 1.354 and 1.356. For prasanna, jagala and surabija each layer is described with separate indications, out of which Prasanna is more beneficial in comparison with other layers.

Keywords: Sura, prasanna, kadambari, alcohol content, reducing sugar

INTRODUCTION

Bhaishajya kalpana is the branch of ayurveda dealing with Ayurveda pharmaceutics, mainly herbal preparations. It includes primary and secondary preparations. Sandhana kalpana comes under secondary preparations, which involves Sandhana kriya (fermentation). Sandhana kalpana is classified into madya (alcoholic preparation) and shukta kalpana (acidic preparation) **[1-4]**. Madya kalpana involves sura, sidhu, varuni, asava and arishta. Shukta kalpana involves sukta, tushambu, sauvira, kanjika and sandaki. The factor that makes difference is that in madya kalpana fermentation takes by yeast cells and in sukta kalpana fermentation takes by acid bacilli **[2-6]**. The references about sura kalpana are mentioned in veda, purana and in brihatrayee. Sura is unique in its preparation which involves fermentation of only cooked rice, devoid of madhura dravya **[3-8]**. Distinct indications of different layers of sura are explained in Sushruta Samhita.

After complete fermentation of cooked rice different layers like 1) prasanna 2) kadambari 3) jagala 4) medaka and 5) surabija can be appreciated. The thickness in the consistency of layer increases successively from above downwards. The first layer is prasanna, a clear supernatant liquid, kadambari is comparatively thicker to earlier one, jagala is thicker to both the above layers. Medaka is a semisolid layer and surabija is a lowermost layer. Sura is used in wide range of diseases both internally and externally. It is indicated in diseases like kasa (cough), arsha (hemorrhoids), grahani (malabsorption syndrome), mutraghata (urinary obstruction), rakta kshaya (blood loss). Specific indications are given separately for layers like prasanna, jagala and surabija. Prasanna (supernant clear portion of sura) alleviates chardhi (vomiting), arochaka (anorexia), hrit-kukshi toda (pain in heart and abdomen), kaphavata dosha, arsha (piles), vibhandha (constipation) and anaha (abdominal distension) **[4]**. Jagala is lower sediment which is ushna veerya (hot potency), pakta (digestive), ruksha (rough) and produces trishna (thirst), oedema and kaphakara (aggravates kapha). Therapeutically jagala is indicated in pravahika (dysentery), atopa (gurgling sound in abdomen), durnama (piles), shosha (consumption) and vataja disorders **[5-12]**. Surabija is a solid part, described as a hritasara (devoid of essence), vishtambi (constipating), vatakopana (aggravating vata), deepana (appetizer), srusta vinmutra (laxative and diuretic), alpamada (causing mild intoxication) and guru (heavy) **[6]**. So to appreciate the layers practically and to elucidate preliminary analytical parameters like alcohol content, reducing sugar, etc. the present study was carried out.

MATERIALS AND METHODS:

Pharmaceutical Study:

Collection of raw materials:

Raw material was collected from teaching pharmacy, SDMCA&H, Hassan. Ingredients of sura preparation are given in **Table 1**.

Table 1: List of ingredients

Sl. No.	Ingredients	Quantity
1	Raw rice	200gm
2	Water	2800ml

Preparation of anna kalpana and sura alpana

200 gm of raw rice was taken and washed with water, after washing; it was added with 2800ml of water and kept on stove, on mandagni (mild heat) at a temperature of 238^{o}C. It took 2 hours to get the rice cooked. Dhupana (fumigation) of the plastic container was done and cooked rice was transferred to it. Sandhi bandana (sealing with Multani Matti) was done and the preparation was kept in a heap of tusha (husk). The preparation was kept undisturbed for over 30 days. On 30th day the preparation was opened. The test of fermentation was performed to confirm the complete process of fermentation.

Results of Pharmaceutical Study

After 30 days of fermentation, the total quantity of sura obtained was 1640ml. Only three layers were appreciated. So the whole preparation was equally divided into five parts. And cautiously the content was transferred in five different beakers and analytical parameters were carried for each sample.

Table 2: Results of pharmaceutical study

Sl. No.	Samples	Quantity obtained
1	Sample 1/ Prasanna (1st layer)	330ml
2	Sample 2/ Kadambari (2nd layer)	330ml
3	Sample 3/ Jagala (3rd layer)	340ml
4	Sample 4/ Medaka (4th layer)	350ml
5	Sample 5/ Surabija (5th layer)	290ml

RESULTS OF ANALYTICAL STUDY:

Table 3: Organoleptic Characters:

SL No.	Sample	Color	Odor	Taste	Consistency
1	Sample 1	Straw yellow	Alcoholic fermenting	Madhura (sweet), amla (sour), katu (pungent)	Liquid
2	Sample 2	Straw yellow	Alcoholic fermenting	Madhura (sweet), amla (sour), katu (pungent)	Liquid
3	Sample 3	Creamy white	Alcoholic fermenting	Amla (sour), Madhura (sweet)	Semisolid
4	Sample 4	Creamy white	Alcoholic fermenting	Amla (sour), Madhura (sweet)	Semisolid
5	Sample 5	Creamy white	Alcoholic fermenting	Amla (sour), Madhura (sweet)	Semisolid

Table 4: Physicochemical-parameters:

SL No.	Parameters	Sample 1 (Prasanna)	Sample 2 (Kadambari)	Sample 3 (Jagala)	Sample 4 (Medaka)	Sample 5 (Surabija)
1	pH[7]	3.26	3.31	3.48	3.50	3.43
2	Specific gravity[8]	1.034	1.002	-	-	-
3	Refractive index[9]	1.353	1.353	1.354	1.354	1.356
4	Total solid content	5.8	5.8	6	6.1	7
5	Viscosity[10]	0.0128	0.0127	-	-	-
6	Reducing Sugar[11]	1-1.5%	1-1.5%	1-1.5%	1-1.5%	1-1.5%
7	Alcohol Content[12]	6%	2%	0%	0%	0%

Table 5: Results of test of fermentation:

SL No.	Test	Results
1	Candle light test	Burning candle continues to burn
2	Odor	alcoholic odor
3	Hissing sound	Absent
4	Effervescence	Absent
5	Alcoholic odor and taste	Presence of strong alcoholic odor and taste


Raw rice


Adding water to rice

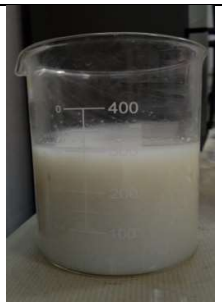

Dhupana of the plastic container


Prepared sura


Candle light test positive

Sample 1


Sample 2



Sample 3


Sample 4


Sample 5

Figure 1: preparation of anna,sura and different layers of sura

DISCUSSION:

It took 2 hours to cook anna in mandagni, at temperature of 281°C. Dhupana was done for 5-6 minutes with powders of jatamansi (*Nardostachys jatamansi*), musta (*Cyperus rotundus*) and haridra (*Curcuma longa*) And after 30 days of fermentation candle test was done, the light continued to burn indicating completion of fermentation. Only three layers could be appreciated, so entire preparation was equally divided into 5 parts and cautiously collected. The first two samples were clear, transparent and had strong alcoholic odor. The third part was semisolid and thinner than the fourth layer. The fourth, fifth layer is thicker than the third sample. Specific gravity, viscosity could not be carried for 3rd, 4th and 5th layer because of semisolid consistency. The first two layers were having madhura, amla rasa along with katu sensation in throat. The remaining 3 layers were predominant in amla rasa. The pH varied between 3.26-3.50 indicating acidic nature. Specific gravity and viscosity were carried out for only first two layers since they are in liquid state. The specific gravity of first two layers is close to water indicating lesser concentrations. There is a gradual increase in Refractive index from layer 1 to layer 5, indicating increase in density. There is increase in total solid contents from layer 1 to layer 5, increasing in thicker consistency.

Viscosity was carried out for only first two layers as they were in liquid state, and not

carried for remaining layers. The viscosity of first two layers was almost same and near to water, indicating less viscous nature. The percentage of reducing sugar in all the layers varies between 1-1.5%. Since rice is a major source of carbohydrate, there is a presence of reducing sugar in all 5 layers of sura. In classical texts, acharya have told that the percentage of alcohol content will gradually decrease from above downwards, and the same is elucidated in the present study, Alcohol content of layer 1 is 6%, layer 2 is 2% and remaining layers is 0%.

CONCLUSION

Sura kalpana is not in practice now a days. It is an economically beneficial preparation, since it contains only rice and water which are easily available. Prasanna is having more therapeutic activity in comparison to remaining layers.

The mention of decrease in alcohol percentage from above to downward layers in texts of ayurveda pharmaceutics could be elucidated from physico-chemical analysis, which showed that the there is decrease in alcohol content from above downwards, and prasanna contains maximum percentage of alcohol(6%) in comparison to other layers. So, Sura kalpana could be brought into practice to have its fruitful results.

REFERENCES:

[1] Angadi R, A text book of Bhaishajya Kalpana, ed. 2021, New Delhi: Chaukhamba Surbharati Prakashana; 2021: pg 289

[2] Angadi R, A text book of Bhaishajya Kalpana, ed.2021, New Delhi: Chaukhamba Surbharati Prakashana; 2021:pg 290

[3] Sharma C R, Sura- a sovereign sandhana kalpana,WJPR,2022 September 14,Volume 11, Issue13, 741-750

[4] Prof. K. R. Srikantha Murthy, Shushruta Samhita, #ed. 2017. Sutra Sthana; Dravadravya Vidhi, 45, 177, Varanasi, Chaukhamba Orientalia, 2017, pg no 360

[5] Prof. K. R. Srikantha Murthy, Shushruta Samhita, #ed. 2017. Sutra Sthana; Dravadravya Vidhi ,45, 180, Varanasi, Chaukhamba Orientalia, 2017, pg no 360

[6] Prof. K. R. Srikantha Murthy, Shushruta Samhita, #ed. 2017. Sutra Sthana; Dravadravya Vidhi, 45, 181, Varanasi, Chaukhamba Orientalia, 2017, pg no 360

[7] Prof Lavekar G S, *et al*, Laboratory guide for the analysis of ayurveda and siddha formulations, New Delhi, Central Council for Research in Ayurveda and Siddha Department of AYUSH, Ministry of Health and Family welfare Government of India, 2010, pg 66

[8] Prof Lavekar G S, *et al*, Laboratory guide for the analysis of ayurveda and siddha formulations, New Delhi, Central Council for Research in Ayurveda and Siddha Department of AYUSH, Ministry of Health and Family welfare Government of India, 2010, pg 31-32

[9] Prof Lavekar G S, *et al*, Laboratory guide for the analysis of ayurveda and siddha formulations, New Delhi, Central Council for Research in Ayurveda and Siddha Department of AYUSH, Ministry of Health and Family welfare Government of India, 2010, pg 33-36

[10] Prof Lavekar G S, *et al*, Laboratory guide for the analysis of ayurveda and siddha formulations, New Delhi, Central Council for Research in Ayurveda and Siddha Department of AYUSH, Ministry of Health and Family welfare Government of India, 2010, pg 67-70

[11] Prof Lavekar G S, *et al*, Laboratory guide for the analysis of ayurveda and siddha formulations, New Delhi, Central Council for Research in Ayurveda and Siddha Department of AYUSH, Ministry of Health and Family welfare Government of India, 2010, pg 74

[12] Prof Lavekar G S, *et al*, Laboratory guide for the analysis of ayurveda and siddha formulations, New Delhi, Central Council for Research in Ayurveda and Siddha Department of AYUSH, Ministry of Health and Family welfare Government of India, 2010, pg 54-56.