

ROLE OF DIFFERENT CONTAINERS IN SANDHANA KALPANA WITH REFERENCE TO DURALABHARISTA

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ABSTRACT

Sandhana Kalpana is the process of fermentation. The vessel to be used for the fermentation process is called *sandhana patra*. As per the classical references, different *sandhana patra*'s were used. As such, these will have some advantages and disadvantages. Hence, with the advancement of technology in the field of pharmaceuticals, these pots are replaced by different containers. In the present study the role of different types of containers were studied in the case of Duralabharista. Significant pharmaceutical analytical changes were observed among the samples of Duralabharista prepared by 5 different sandhana patra, among 5 different sandhana patra alcohol content was observed more in ceramic pot (7.85%)) and steel vessel (7.08%).

KEYWORDS:- Sandhana Patra, Fermentation, Duralabharishta.

INTRODUCTION

Ayurveda is a very distinct medical science & has some unique features and gives ample emphasis on the preventive aspects and helps in the promotion & prolongation of a healthy life.^[1] Sandhana Kalpana is one of the best dosage forms of Bhaishajya Kalpana. All the preparation resulting from fermentation procedure comes under the heading Sandhana Kalpana. Sandhana is the process of fermentation where the 'dravadravya' (Kwatha, swarasa or any other liquid preparation),

‘madhura dravya’ (Jaggery, Honey or sugar), prakshepa dravya (Fine powder of medicinal drugs) and sandhana dravya (Dhataki puspa, madhuka puspa as fermentation initiators) are put together in an inert vessel (Mud pot) and sealed for a specified time period to facilitate the process of fermentation.^[2]

Process of sandhana is depends on various factors like season, temperature, place, nature of drugs, sandhana patra, quantity of sweetening agents, prakshepa dravya, atmospheric pressure and environmental factors. The vessel to be used for fermentation process is called Sandhana patra. As per the classical text, different Sandhana patra were used. In classical references usage of earthen pot and wooden barrel to prepare asavarishta is available, very rarely they have used mettalic and gold etc, eg-Earthen pot used to prepare Draksharista,^[3] Golden vessel was used to prepare Saraswatarista (B.R)^[4] & Stone vessel was used in the preparation of Kumariasava,^[5] lauha patra used for Madhvasava^[6] but the preference was left with earthen pot, but availability of extra-large sized earthen pots is very difficult and more care is needed for handling.

Advancement of modern technology the usage of stainless steel, plastic, glass and ceramic containers became more popular in every stage of life. Hence with the technological evolution in the field of pharmaceutics earthen pots and wooden Barrel were replaced by steel, plastic and ceramic conatiners for easy preparations.

But all the above containers have their own advantages and limitations explained in many classical texts. The present study carried to analyze the final product organoleptically & physicochemically to observe all the samples prepared in 5 different containers.

In the present study different samples of DURALABHARISTA is prepared under good manufacture practice as laid down in classics by using variety of sandhana patra's such as:

1. Plastic container 2. Wooden Barrel 3. Earthen pot 4. Steel vessel 5. Ceramic pot

The DURALABHARISTA prepared as per the description available in ASTANGA HRIDAYA.^[7]

Table 1: Ingredients of duralabharista with the quantity.

Ingredients	Botanical name	Parts used	Quantity
Duralabha	<i>Fagonia cretica</i>	Whole plant	6200g
Danti	<i>Baliospermum montanum</i>	Root	800g

Pata	<i>Cyclea peltata</i>	Root	800g
Vijaya	<i>Terminalia chebula</i>	Fruit	800g
Agni	<i>Plumbago zeylanica</i>	Root	800g
Vasa	<i>Adhatoda vasica</i>	Leaves	800g
Amalaki	<i>Phyllanthus emblica</i>	Fruit	800g
Nagara	<i>Zingiber officinalis</i>	Rhizome	800g
Jala	water	-	100 lit
Sharkara	sugar	-	40kg
Phalini	<i>Callicarpa macrophylla</i>	Fruit	10g
Krushna	<i>Piper longum</i>	Fruit	10g
Cavya	<i>Piper chaba</i>	Root	10g
Ghrita	Ghee	-	10g
Madhu	Honey	-	10g

MATERIALS AND METHODS

The materials used and the methods followed in the study of Duralabharista are as follows:

- 15 litres capacity of Earthen pot- Sample 1
- 15 litres capacity of ceramic pot- Sample 2
- 15 litres capacity of plastic container- Sample 3
- 15 litres capacity of wooden barrel- Sample 4
- 15 litres capacity of steel vessel- Sample 5

Most of the raw drugs were collected from crude drug market of koppa and Anaamaya Herbals, Udupi, Karnataka state.

Method of preparation

The Duralabharista was prepared as per the reference of Sandhana Kalpana nirmana vidhi, explained by Acharya Sharangadhara.

1. Initially room and atmospheric temperature has been noted down. Room temp was 29°C and atmospheric temp, was 28°C
2. Coarse powder of above-mentioned drugs was made with Disintegrator.
3. Coarse powder was taken in the big vessel, 100 lit of water was added to it, boiled and decoction was reduced to 1/4th, i.e around 25 litres, vessel taken out from fire place, Kashaya has been filtered through clean and dry cotton cloth.
4. Then around 40 kg of khanda sharkara had been added to Kashaya and then mixed completely. Again, this solution was filtered and measured, after addition of khanda sharkara, solution became around 50 litres.

5. Final preparation i.e 50 litres of wort has been divided into 5 parts and poured into 5 different containers.
6. Before that all 5 containers had been fumigated and smeared properly.
7. This khanda sharkara mixed Duralabharista was poured into dhupita & lepita of 5 different vessels mentioned above. Whole mixture was stirred carefully.
8. The patra is kept undisturbed by temporarily closed its mouth with a cloth & lid.
9. Meanwhile onset of fermentation was observed daily for 5-6 days and soon after fermentation onset the sandhi-bandhana (sealing) of the pot was done.
10. The vessel is left undisturbed for 15 days and later the symptoms for completion of fermentation are looked for.
11. After confirming completion of fermentation, the vessel is opened and the preparation sent for analysis.

OBSERVATIONS

Before onset of fermentation

All 5 samples are dark brown in colour, Madhura tikta rasa, sugary odour and effervescence was not seen on the surface of the fermenting material, burning candle extinguished, the lime water test showed appearance of bubbles.

During onset of fermentation

All 5 samples are dark brown in colour, Madhura tikta rasa, mild alcoholic smell and effervescence was seen on the surface of the fermenting material, burning candle extinguished, the lime water test showed appearance of bubbles.

After completion of fermentation

All 5 samples are dark brown in colour, Madhura kashaya rasa, alcoholic smell and effervescence was not seen on the surface of the fermenting material, burning candle continues to burn, the lime water test showed no changes.

The total quantity of final product (yield) of Duralabharista of different samples.

Table 2: Final yield of each container.

Sl. No.	Containers	Total volume	% of loss with respect to Dravadravya	Solid residue obtained	Yield
1	Plastic	10 litres	03%	200gms	9.85 litres
2	Wooden	10 litres	10%	160gms	9.5 litres
3	Earthen	10 litres	12%	150gms	9.4 litres
4	Steel	10 litres	03%	200gms	9.85 litres
5	Ceramic	10 litres	03%	200gms	9.85 litres

Study of Physico-chemical and Phytochemical characteristics

All the 5 samples are collected and subjected to physico-chemical and phytochemical study, from A.L.N Rao Memorial Ayurvedic Medical College Quality Control Lab, Koppa.

DISCUSSION

In olden days Earthen pots and wooden barrels gained popularity in the preparation of Asava and Arishta but along with this, they have certain limitations regarding availability, durability, handling etc. Hence with the advancement of technology in the field of pharmaceuticals above, said pots are replaced by different Sandhana patra.

The pharmaceutical study reveals that the onset and completion of fermentation. 6th day fermentation started in earthen pot, wooden barrel and ceramic pot respectively, then 9th day fermentation started in stainless steel and plastic container respectively. In all the containers, fermentation was a bit late compared to other Arista preparations may be because of more Madhura Dravya.

The yield was highest in the samples of plastic, stainless steel and ceramic pot. All the 5 samples were examined organoleptically, physico-chemically and phytochemically, after 35 days of fermentation.

The study of the physical characters revealed that the colour of all the samples was dark brown, alcoholic odour, Sweet & Astringent taste, liquid in texture.

In physico-chemical tests pH value, specific gravity, Alcohol %, total sugar, reducing sugar, non-reducing sugar and solid content etc. were studied. Specific gravity of each sample of Duralabharista was similar in all container with minute fractional difference (1.271-1.276). Among all five containers, total solids were very less in steel vessel and high in wooden barrel. P^H value depends on many factors of Arista, in present study p^H of sample of plastic

container was less and more in wooden barrel. Viscosity of sample taken in plastic container was more and less in wooden barrel. In preliminary phytochemical test it was observed that the contents like carbohydrates, protein, alkaloid, cardiac glycosides, flavonoids, tannins, triterpenoids, saponin were present in all five samples. Alcohol content was observed least in plastic container (4.09%) and highest in ceramic pot (7.85%). In present study reducing sugar was observed least in steel vessel (4.12%) and highest in ceramic pot (4.32%). Non reducing sugar of the present study was observed least in plastic container (8.04%) and highest in ceramic pot (8.29%). In this study titrable acidity was recorded least in plastic container and more in earthen pot. All the samples were observed under thin layer chromatograph, all samples exhibited similar bands of same Rf values, by intensity of colours were different.

Table 3: Showing the findings of Physico-chemical Investigation.

	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
Total solids	42.02%	44.25%	37.01%	34.32%	38.53%
S. G	1.271	1.276	1.272	1.271	1.271
Viscosity	48.75	45.28	45.92	46.32	45.31
pH	3.92	4.13	4.00	3.98	4.02
Total sugar	12.25%	12.35%	12.35%	12.38%	12.61%
Reducing sugar	4.21%	4.25%	4.25%	4.12%	4.32%
Non reducing sugar	8.04%	8.10%	8.10%	8.26%	8.29%
Alcohol	4.09%	5.17%	5.83%	7.08%	7.88%
Sodium	72.5	36	36	40	39
Potassium	351	412	115	323	169
Calcium	140.5	82.1	56.91	67.11	92.30
Titrable acidity	7.6%	8.5%	8.9%	8.6%	8.5%

Table 4: Preliminary phytochemical tests.

	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
Carbohydrate	Present	Present	Present	Present	Present
Protein	Present	Present	Present	Present	Present
Alkaloid	Present	Present	Present	Present	Present
Cardiac glycoside	Present	Present	Present	Present	Present
Flavonoids	Present	Present	Present	Present	Present
Tannins	Present	Present	Present	Present	Present
Triterpenoides	Present	Present	Present	Present	Present
Saponin	Present	Present	Present	Present	Present

CONCLUSION

The ethanol content being a key factor for absorption/efficacy of formulation is of utmost importance. When alcohol is present in the formulation, it adds to several advantages, such as better keeping quality, enhanced therapeutic properties, improvement in the efficiency of

extraction of drug molecules from the herbs and improvement in drug delivery into the human body sites. Alcohol content was more in the ceramic pot and steel vessel compared with the other 3 containers.

Therefore, based on alcohol content, yield and extraction of active principles, ceramic pot and steel vessel are considered to be better among all the 5 containers.

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