Research Article

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ASSESSMENT OF SIGNIFICANT ROLE OF MURCHANA SAMSKARA OF GHRITA BY PHYSICO-CHEMICAL ANALYSIS

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Received on: 25/04/17 Accepted on: 30/05/17

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DOI: 10.7897/2277-4343.082104

ABSTRACT

Among the sneha (lipid preparations) mentioned in Ayurvedic classical text, ghrita is most easily available and wholesome (satmya) to all human beings. It is used extensively in the form of food, anupana (adjuvant) and medicine. Before the preparation of medicated ghee (aushadhi siddha ghrita), ghrita murchana samskara (processing of ghee) is mentioned in Bhaishajya Ratnavali for both taila and ghrita kalpana to reduce amadosa, durgandhata (bad odour), and other dosha and this process also enhances the viryata (potency) of the sneha. Now-a-day's most of the ayurvedic pharmaceutical companies do not follow this method due to increase in cost and time consumption. To evaluate the significance of murchana samskara (processing of ghee), amurchita ghrita (ghee) and murchita ghrita (processed ghee) samples were subjected for physico-chemical parameters which have shown increase in the specific gravity, saponification value, iodine value, ester value, total fatty acids and decrease in acid value, viscosity, density etc. murchana process imparts changes in good colour, odour, minimizing rancidity & increasing stability facilitates better dissolution of bio constituents in ghrita (ghee),

Key words: ghrita murchana (processing of ghee), murchana, physico- chemical Analysis

INTRODUCTION

Sneha kalpana (lipid preparations) is one of the commonly prescribed ayurvedic dosage form used in day to day practice. Although, lot of varieties of oils and fats are described in classical ayurvedic texts, the most common amongst them are taila and ghrita kalpana (oil and ghee preparations). Before the preparation of medicated ghee formulations (aushadhi siddha ghrita) ghrita murchana samskara (processing of ghee) is mentioned in Bhaishajya Ratnavali.

Any impurities present in the ghrita (ghee) will be removed by ghrita murchana (processing of ghee). With this process ghrita (ghee) will attain qualities like change in varna (colour) and gandha (odour) and it also ensures the addition of therapeutic properties in medicated ghee (aushadhi siddha ghrita) [1].

If medicated ghrita (ghee) is prepared, without ghrita murchana (processing of ghee), it may not contain standard qualities and not give the expected results. Therefore, to get standard qualities and expected results, ghrita murchana (processing of ghee) is required in addition to its physical stability, chemical and therapeutically useful properties in aushadhi siddha ghrita (medicated ghee).

The term analyses mean a detailed examination of the drug. It reveals minor important aspects regarding the standardization of the drug. Without analytical study, research of a drug is incomplete. It provides some standards to judge its quality and also helps to interpret the pharmacokinetics and pharmacodynamics of the drug.

Aims & objectives

To analyze the changes expected after murchana (processing of ghee)

To compare the analytical results of amurchita ghrita (ghee) & murchita ghrita (processed ghee)

MATERIALS AND METHODS

Raw drugs required for the murchana of ghrita were collected from the teaching pharmacy and ghrita murchana was conducted at Rasashastra and Bhaishajya Kalpana practical laboratory of Sri Dharmasthala Manjunatheshwara College of Ayurveda, Hassan as per the reference of Bhaishajya Ratnavali. Analytical study was conducted at Sri Dharmasthala Manjunatheshwara Research Center for Ayurveda and Allied Sciences, Udupi and Care Keralam, Koratty.

The samples of plain ghrita and murchita ghrita were subjected for analysis as per the references available in protocol for testing published by CCRAS

Colour
Odour
Refractive index at 25 ºC
Specific gravity
Saponification value
Acid value
Iodine value
Loss on drying at 105 ^{0}C
Viscosity
Ester value
Weight per milliliter

Rancidity
Peroxide value
Free fatty acids
Total fatty acids
Solubility
Shelf life
pH value

OBSERVATIONS AND RESULTS

Organoleptic evaluation

Organoleptic evaluation is used most effectively to resolve unsatisfactory product problems. It refers to evaluation of the drug by colour, odour, taste, consistency, texture, etc. It is a technique of qualitative evaluation based on the study of sensory profiles of the drug. In this study parameters like colour, taste and consistency were considered.

Table 1: Organoleptic characteristic of ghrita (ghee) samples

Parameters	**Ghrita (ghee)**	**Murchita Ghrita** (processed ghee)
Colour	Light yellow	Dark yellow
Odour	Characteristic odour of ghee	Aromatic odour
Taste	Characteristic taste of ghee	Astringent Taste
Consistency	Liquid	Viscous

Physicochemical Analysis

Table 2: Results of Physico- chemical parameters

Parameter	**Ghrita (ghee)**	**Murchita Ghrita** (processed ghee)
Refractive index[2]	1.45656	1.45656
Specific gravity at 25°[3]	0.90576	0.91096
Saponification value[4,5]	243.452	295.63
Acid value[6,7]	2.256	1.046
Iodine value[8]	7.184	7.654
Loss on drying [9,10]	0.530	0.713
Viscosity at 29^{0}C[11]	63.696	58.878
Ester value[12]	241.196	294.584
Weight/ml[13]	0.820 g/ml	0.809 g/ml
Rancidity[14]	Not rancid	Not rancid
Peroxide value[15,16]	Absent	Absent
Free fatty acid[17]	0.27	0.28
Total fatty acid[18]	0.53	0.55
Solubility[19]	87.70%	82.9%

DISCUSSION

Murchana (processing of ghee) process converted the yellow colour of ghrita (ghee) into dark yellow in case of murchita ghrita (processed ghee). This colour may be due to drugs used in murchana (processing of ghee) process like haridra (*Curcuma longa*) which contains *Curcumin.*

The characteristic odour of ghrita (ghee) is converted into aromatic in case of murchita ghrita (processed ghee) is due to the drugs used in murchana (processing of ghee) process like musta (*Cyprus rotandus*), haridra (*Curcuma longa*), etc.

The characteristic taste of ghrita (ghee) is converted into astringent in case of murchita ghrita (processed ghee) and this is due to the drugs used in murchana process like musta (*Cyprus rotandus*), haridra (*Curcuma longa*), etc.

Viscosity of murchita ghrita (processed ghee) is due to incorporation of bio constituents into ghrita (ghee) from the drugs used for preparation.

There is no change in the refractive index of ghrita (ghee) and murchita ghrita (processed ghee)
As ghee is denser than air, refractive index is always more than one, this is confirmed in this study. Refractive index of ghee also depends on the chain length, with increase in chain length, refractive index of ghee increases.

Specific gravity of murchita ghrita (processed ghee) is more compared to ghrita (ghee). Increase in specific gravity after murchana (processing of ghee) indicates addition of some bio constituents from the drugs used for murchana (processing of ghee).

Saponification value indicates breaking down of oil into glycerol and free fatty acids by treatment with alkali. The higher saponification value of murchita ghrita (processed ghee) indicates the content of low molecular weight fatty acids. It suggests that the increased low molecular weight fatty acid content is much beneficial in the increased rate of absorption of the ghee, leading to the increased efficacy of the murchita ghrita (processed ghee).

Analytical values shows increase in the saponification values of ghrita (ghee) after murchana samskara (processing of ghee) which is suggestive of beneficial effect of murchana in increasing the degree of unsaturation indicating the important role of unsaturated fatty acids in reducing the cholesterol and LDL cholesterol levels.

Acid value normally reflects the amount of acidity which is due to free fatty acids, acid phosphates and amino acids. This acidity is neutralized by treating with alkali which is known as refining of fats. Analytical parameters shows decreased acid values in murchita ghrita (processed ghee) indicating that murchana process (processing of ghee) has beneficial effect in refining of

ghee and decrease in the degree of rancidity, ultimately reducing the toxic properties of ghrita.

Analytical parameters shows that Iodine value of ghrita (ghee) has increased after Murchana process which is suggestive of beneficial effect of murchana (processing of ghee) in increasing the degree of unsaturation indicating the important role of unsaturated fatty acids in reducing the cholesterol and LDL cholesterol levels .

Loss on drying is indicative of moisture content of the preparation present. The higher the value more will be the amount of moisture and ghee will be more susceptible for rancidity. Loss on drying value of murchita ghrita (processed ghee) is increased after murchana (processing of ghee) process is due to addition of water in preparation.

Viscosity of murchita ghrita (processed ghee) is decreased after murchana process (processing of ghee) is due to addition of drava dravya (liquids) like water as these are less viscous than ghrita (ghee).

Ester value = saponification value- acid value. Esters are the fatty acids with glycerol. As the esters are increased rancidity chance is decreased. Ester value of murchita ghrita (processed ghee) is increased after murchana (processing of ghee) process indicating the fewer chances of rancidity.

Weight /ml at 25^0C**:** Density of ghrita was decreased after murchana (processing of ghee). With this result one can presume that murchana (processing of ghee) process facilitates better dissolution of bio constituents in ghrita (ghee).

Rancidity: Both the samples of ghrita (ghee) have shown no rancidity, which shows the presence of tocopherols as natural antioxidant. Rancid fat forms harmful free radicals in the body, which are known to cause cellular damage and have been associated with diabetes, Alzheimer's disease and other conditions. Rancid fats can also cause digestive distress and deplete the vitamins B and E of body.

Peroxide value: The most common cause of milk fat deterioration is rancidity which is due to oxidation, thereby affecting its flavor and quality. The acceptability of ghee largely depends on the extent to which the oxidative deterioration has occurred. It is generally considered that the first product formed by oxidation of an oil or fat is a hydroperoxide. The peroxides further decompose to secondary oxidation products i.e., aldehydes and ketones which imparts bad flavor in ghee.

Peroxide value is an indicator of products of primary oxidation and thus measures the rancidity or degree of oxidation but not the stability or shelf-life of a fat. Fresh ghee has a peroxide value equal to zero. According to its peroxide value, ghee is graded as follows

Table 3: Grading of ghrita (ghee) samples based on peroxide values

Peroxide value	Grade
Below 1.5	Very good
1.6 to 2.0	Good
1.1 to 2.5	Fair
2.6 to 3.5	Poor
3.6 to 4.0	Not acceptable

This is an indication of the extent of oxidation suffered by ghee. Peroxide value of ghee indicates the degree of rancidity of ghee. The increase value shows that the ghee is turned rancid or spoiled. Ghee with a high degree of unsatuaration is most susceptible to auto-oxidation. Auto – oxidation is a free radical reaction involving oxygen that leads to deterioration of ghee which imparts bad flavors. As the normal peroxide value ranges in ghee is below 4 that is within the permissible limits of rancidity. But more peroxide value signifies its higher tendency for rancidity.
Above values of both samples indicates that they are free from rancidity

Free fatty acids: Free fatty acids are unattached fatty acids present in the fat. Some unrefined oils may contain as much as several percent free fatty acids. The levels of free fatty acids are reduced after refining. The acidity (free fatty acid) of a fat is normally a measure of the extent to which hydrolysis has liberated the fatty acids from there ester linkage with the parent glycerides molecule. Partly for this reason, acidity of ghee is extensively quoted as a free fatty acid content percent (% FFA). The FFA content of fresh ghee varies from 0.09 to 0.28% with an average of 0.16%. The sensory quality of ghee deteriorates with increase in FFA content. As per FSSAI Rules (2011), ghee should not contain FFA more than 3%.

In case of murchita ghrita (processed ghee), free fatty acid value slightly (0.01) increased which is negligible. The free fatty acid ratio is an important quality characteristic. The lower it is, the better the storage and shelf life of the respective oil or fat will be. Crude pressed oils usually have a ratio of 0.1 or 3%, refined oils 0.01 to 0.1%.[4]

Total fatty acid: In case of murchita ghrita (processed ghee), total fatty acid value slightly (0.02) increased which is negligible.

Solubility: It is one of the parameter to judge the purity, percentage composition of ghrita (ghee), murchita ghrita (processed ghee). Both the samples were very soluble in hexane, indicative of good miscibility of samples with these organic solvents. Solubility is decreased after murchana in ghrita

CONCLUSION

Murchana (processing of ghee) process imparts dark yellow colour, aromatic odour and astringent taste and contributes increase in the specific gravity which indicates addition of some bio constituents, saponification value and iodine value which suggests the beneficial effect in increasing the degree of unsaturation indicating the important role of unsaturated fatty acids in reducing the cholesterol & LDL cholesterol levels. Both the samples show negative result for rancidity, peroxide value, permissible percentage of free fatty acids and solubility in hexane. Loss on drying value indicates the addition of water in preparation, ester value indicating the less chances of rancidity, total fatty acid value which indicates addition of some bio constituents, content of low molecular weight fatty acids, increase in the degree of unsaturation and less chances of rancidity. There was decrease in acid value, viscosity and density which indicates decrease in the degree of rancidity. Murchana (processing of ghee) process attributes good colour, odour, minimizing rancidity, increasing stability & facilitates better dissolution of bio constituents in ghrita (ghee).

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Cite this article as:

Vinay R. Kadibagil and R. S. Sarashetti. Assessment of significant role of murchana samskara of ghrita by physico-chemical analysis. Int. J. Res. Ayurveda Pharm. 2017;8(Suppl 2):162-165 http://dx.doi.org/10.7897/2277-4343.082104

Source of support: Nil, Conflict of interest: None Declared