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Research Article

ANALYTICAL EVALUATION OF ROLE OF SARSHAPATAILA MURCHANA IN THE PREPARATION OF GANDHAKATAIALA

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ABSTRACT

'Aadousammurchayet sneham' the famous quotation has been explained in the classical text Bhaishajya Ratnavali. Prior to the preparation of any type of medicated oils, murchana a kind of pharmaceutical processing on crude oil is must. This process has aided significantly at enhancing the acceptability of the oil in the form of good odour and colour, as well as potency of medicated oils. Hence in this study an attempt was made to evaluate the importance of Sarshapataila murchana in the preparation of Gandhakataila through analytical parameters. Sarshapataila, murchita Sarshapataila, Gandhakataila prepared with murchita and amurchita Sarshapataila are separately analyzed with the basic analytical methods in terms of Organoleptic characters, physico-chemical parameters and chromatographically changes. Results of the study revealed that application of murchana process on the basic oil Sarshapataila must be strictly included as per the pre-requisites of Gandhakataila.

Key words: Tailamurchana, Sarshapataila, Gandhakataila, Analytical study, GLC

INTRODUCTION

Indian system of medicine cannot remain confined to the use of conventional, conservative norms of medication. It has to accept the new challenges and be prepared to answer the queries of the modern man who would have a right to know about the drug he is consuming. To meet this new trust of inquisitiveness analysis of Indian system of medicine is need of the hour.

Tailakalpana is one among the major secondary preparations mentioned in Ayurvedic pharmaceuticals. Classics claim it is mandatory for any taila to undergo the process of murchana before subjecting it to tailapaka. Yogaratnakara, a pioneer of the concept of murchana, refers to the details of tailamurchana along with the proportion of drugs ¹. Author of Bhaishajya Ratnavali ², Acharya Govindadas and the commentary of Sharangadhara Samhita, Gudartha Dipika by Kasiram had mentioned about this murchana process ³. It is the best method to remove the impurities and foul smell of the crude oil that eventually helps in the maintenance of the stability of oil. It also increases the potency of the oil by imparting special capability to the crude oil to extract more active principles from the added drugs during tailapaka. The variation in the qualities of the oil, which has been obtained through murchana process prior to tailapaka can be accessed through analytical study of oils at different stages of pharmaceutical processing.

Gandhakataila is an herbo-mineral topical formulation specified by Yogaratnakara under karnarogadhikara ⁴. It comprised of purified Gandhaka, purified Manhashila, Haridra, juice of Dattura leaves and Sarshapataila as basic oil. As per the general rules of Snehapaka, Sarshapataila should be initially subjected to

murchana process to attain the desired therapeutic efficacy. Hence in this study an attempt was made to determine the importance of Sarshapataila murchana in the pharmaceutical procedure of Gandhakataila on the basis of changes that has been taken place in organoleptic characters, solubility, wt/ml at 250C, refractive index, acid value, saponification value, ester value, iodine value, peroxide value, specific gravity, loss on drying viscosity, pH and GLC.

OBJECTIVES OF THE STUDY

To do the analytical study and GLC of Sarshapataila, murchita Sarshapataila, Gandhakataila prepared with murchita Sarshapataila and amurchita Sarshapataila.

To compare the organoleptic characters, analytical and GLC results of all the four oil samples.

MATERIALS AND METHODS

Raw drugs required for the murchana of Katutaila and for the preparation of Gandhakatailas were collected from the Udupi market and herbal garden of S.D.M. College of Ayurveda, Udupi. Procedures like Katutaila murchana, preparation of Gandhakataila with murchita and amurchita Sarshapataila were conducted at Rasashastra and Bhaishajya Kalpana practical laboratory, S.D.M. College of Ayurveda, Udupi as per the reference of Bhaishajya Ratnavali and Yogaratnakara respectively. Analytical study was conducted at S.D.M. Research Centre, Udupi.

Table 1 Ingredients of Sarshapataila murchana with quantity

No.	Ingredients	Latin name	Quantity
1.	Amalaki	<i>Emblia officinalis</i>	1/64 part
2.	Haridra	<i>Curcuma longa</i>	1/64 part
3.	Musta	<i>Cyprus rorandus</i>	1/64 part
4.	Bilwaphala majja	<i>Agile marmelos</i>	1/64 part
5.	Dadima	<i>Punic granatum</i>	1/64 part
6.	Nagakesara	<i>Mesuaferrea</i>	1/64 part
7.	Krishna jeera	<i>Crum bulbocastanum</i>	1/64 part
8.	Hribera	<i>Pavonia odorata</i>	1/64 part
9.	Nalika	<i>Cinnamomum tamala</i>	1/64 part
10.	Vibhitaki	<i>Terminaliabellerica</i>	1/64 part
11.	Manjista	<i>Rubio cordifolia</i>	1/8 part
12.	Sarshapataila	<i>Brassica campestris</i>	1 part
13.	Jala	Water	4 part

Table 2 Ingredients of Gandhakataila

No.	Ingredients	Latinname/English name	Quantity
1.	Shuddha Gandhaka	Sulpher	1/3 part
2.	Shuddha Manhashila	Realgar	1/3 part
3.	Haridra churna	<i>Curcuma longa</i>	1/3 part
4.	Datturapatra swarasa	<i>Datura metal</i>	32 part
5.	Murchita/amurchita Sarshapataila	<i>Brassica campestris</i>	8 part
6.	Jala	Water	32 part

Plan of the study**Samples**

Sample no.1: Sarshapataila

Sample no.2: Murchita Sarshapataila

Sample no.3: Gandhakataila prepared with murchita Sarshapataila

Sample no.4: Gandhakataila prepared with amurchita Sarshapataila

Methods

All the four samples were subjected to

- Organoleptic evaluation: Colour, odour, taste, consistency
- Physicochemical evaluation: solubility, wt/ml at 25°C, refractive index, acid value, saponification value, ester value, iodine value, peroxide value, specific gravity, loss on drying, viscosity, pH
- Chromatography: GLC

Organoleptic evaluation

Organoleptic evaluation refers to evaluation of the drug by colour, odour, taste, consistency etc. It is a technique of qualitative evaluation based on the study of sensory profiles of the drug. Organoleptic characters are very useful parameters to determine and compare the quality of the samples ⁵.

Physicochemical evaluation**Solubility**

Qualitatively, solubility is defined as a spontaneous interaction of two or more substances to form a homogenous molecular dispersion. It is one of the parameter to judge the purity, percentage composition, extent of impurities etc. of the drugs and excipients in a dosage form⁶. In this study, solvent and solute both are in liquid form. Solubility study was conducted on all the four samples by taking different organic solvents such as hexane, chloroform, ethyl acetate, and methanol and in water.

Weight per milliliter

Every oil does have its own density and it varies with temperature. If we multiply density to volume, we will get weight at particular temperature. Density defined in a qualitative manner as the measure of the relative 'heaviness' of liquids with a constant volume. Density may also refer as to 'how closely pack' or 'crowded' the liquid appears to be ⁷. During processing of fats and oils the density decreases linearly with temperature; at lower temperature range the change is greater. Density of oil varies depending on how much refining it has undergone. Large molecular weight compound will generally have higher density and some oils may have suspended solids which will increase the density. The weight per milliliter of a liquid is the weight in gram of 1ml of a liquid when weighed in air at 25°C, unless otherwise specified.

Procedure: A pycnometer of 25 ml capacity was cleaned, dried and weighed. It was filled up to the mark with water at 25°C and weighed. The pycnometer was next filled up to the mark with the sample at the same temperature and weighed. Subtracted the tare weight of the pycnometer from the filled weight of the pycnometer. The weight per milliliter was determined by dividing the weight in air, expressed in gm, of the quantity of liquid which filled in the pycnometer at 25°C, by the capacity expressed in ml, of the pycnometer at the same temperature.

Refractive index

Refractive index is a very important physical property of fats and fatty acids as it is a unique method for their identification. When a ray of light passes from one medium to another of different density, it is bent from original path. Thus the ratio of the velocity of light, in vacuum to its velocity in the oil or fat, is termed as refractive index of the second medium. More generally, it expresses the ratio between the sine of angle of incidence to the sine of angle of refraction when a ray of light of known wave length passes from air in to the oil or fat⁸. Refractive index is used to identify and assess the purity of the substance as well as to determine the concentration of a substance dissolved in a liquid ⁹.

Procedure: Refractometer is calibrated by means of suitable standard. A drop of sample solution is placed upon the surface of the lower prism of the refractometer. Upper and lower prisms are

clamped and the critical ray emerging from the upper prism is viewed by means of telescope. When viewed through the telescope, the field of view is divided into bright and dark portions. When edge of the bright portion coincides with the cross wire of the telescope, the scale reading was noted.

Acid value

The acid value is one of the measures of quality. It indicates the amount of free acid present in the oil or fat. An increase in the free fatty acids in a sample of oil indicates hydrolysis of triglycerides. Free fatty acids are a source of flavors and aroma¹⁰. It is defined as the number of milligrams of KOH required to neutralize the free acid present in one gram of the oil or fat. It is determined by dissolving a weighed amount of oil or fat in alcohol and titrating it against a standard solution of KOH using phenolphthalein as an indicator¹¹.

Procedure: Accurately weighed 5gms of sample was placed in 250 ml flask and 50 ml of a mixture of equal volumes of alcohol and solvent ether, which has been neutralized after addition of 1ml of the solution of phenolphthalein, was added. This mixture was heated gently on water bath and titrated with 0.1 N KOH, shaking constantly until the pink colour which persists for 15 seconds was obtained. The number of ml of KOH required was noted.

Acid value = No. of ml of 0.1N KOH x 0.00561x1000/ Wt. in gm of the sample

Saponification value

It is a measure of fatty acids present as esters in oils or fats. The saponification value is an index of mean molecular weight of the fatty acids of glycerides comprising of fat. It is defined as the number of milligrams of KOH required to saponify one gram of the oil or fat or number of milligrams of KOH required to neutralize the free acids resulting from the hydrolysis of one gram of an oil or fat¹². The saponification number is inversely proportional to the molecular mass. The smaller the saponification value, the higher the molecular mass. The saponification value is characteristic of particular fat or oil and serves for its identification¹³.

Procedure: 2gms of sample was accurately weighed in a tared 250ml flask and 25 ml of the alcoholic solution of KOH was added to it. A reflux condenser was attached and boiled on a water bath for an hour shaking frequently. When the contents of the flask cool, 1ml of solution of phenolphthalein was added and titrated the excess of alkali with 0.5 N hydrochloric acid. Number of ml of hydrochloric acid required was noted (a). Experiment was repeated with the same quantities of the same reagents in the manner omitting the sample. Number of ml of hydrochloric acid required was noted (b).

Saponification value = (b-a) x 0.02805 x 1.000/Wt. in gm of the sample

Ester value

The Ester value is the number of milligrams of potassium hydroxide required to saponify the esters present in 1 gram of the sample. This method consists of hydrolysis of the esters present in a test portion by heating in the presence of a standard volumetric solution of potassium hydroxide in dimethylsulfoxide and back titration of the excess potassium hydroxide with a standard volumetric solution of sulfuric acid or hydrochloric acid¹⁴.

Ester value = Saponification value – Acid value

Peroxide value

Peroxide value is defined as the amount of peroxide oxygen per 1 kg of fat or oil. Peroxide value of oil is used as a measurement of the extent to which rancidity reactions have occurred during storage. Oils with a high degree of unsaturation are most susceptible to auto-oxidation. Lower is the peroxide value, the better is oil quality and its status of preservation¹⁵.

Procedure: Accurately weighed 5gms of the sample was placed in a glass-stoppered conical flask. 30 ml of a mixture of 3 volumes of glacial acetic acid and 2 volumes of chloroform added to it and swirled until complete dissolution and 0.5 ml volumes of saturated potassium iodide solution was added. This solution was allowed to stand for exactly 1 minute, with occasional shaking and 30 ml of water was added to it and titrated gradually, with continuous and vigorous shaking, with 0.01 M sodium thiosulphate until the yellow colour almost disappears. 0.5ml of starch solution was added and titration was continued until the blue colour just disappears (a ml). This operation was repeated omitting the sample being examined (b ml).

Peroxide value = 10 (a-b) / Wt. in gm of the sample

Iodine value

Iodine value is also called as iodine number in analytical chemistry, measure of the degree of unsaturation of oil. It is defined as the number of grams of iodine taken up by 100 grams of oil or fat for saturation. As iodine does not react readily, in actual practice, iodine monochloride is used. Iodine monochloride is known as Wij's reagent. The more iodine is attached, the higher is the iodine value; and the more reactive, less stable, softer and more susceptible to oxidation and rancidification is the oil or fat¹⁶.

Procedure: Accurately weighed sample was placed in dry iodine flask and 10ml of carbon tetra chloride was dissolved in it. 20 ml of iodine monochloride was added to it and allowed to stand in a dark place at a temperature of about 17°C for 30 minutes after inserting with the stopper, previously moistened with the solution of potassium iodide. Again 15 ml of solution of potassium iodide and 100ml of water was added and shaken well. This mixture was titrated with 0.1 N sodium thiosulphate using solution of starch as indicator. Number of ml of sodium thiosulphate required was noted (a). The same procedure was repeated, without the sample being tested, and the number of ml of sodium thiosulphate required was noted (b)

Iodine value = (b-a) x 0.01269 x 100/ Wt. in gm of the sample

Specific gravity

The specific gravity of a liquid is the weight of given volume of the liquid at 25°C compared with the weight of an equal volume of water at the same temperature, all weighing being taken in air¹⁷.

Procedure: Procedure adopted was similar to the procedure mentioned for Wt, per ml. But specific gravity was obtained by dividing the weight of the sample contained in the pycnometer by the weight of the water contained, both determined at 25°C.

Loss on drying

Loss on drying is the loss of weight expressed as percentage w/w resulting from water that can drive off under specified conditions. It is determined by heating the drug at 105°C in an oven to a constant weight ¹⁸.

Procedure: Accurately weighed 10 gm of sample was taken in a tared evaporating dish and dried at 105°C for 5 hours and weighed. Drying and weighing at one-hour interval was continued until difference between two successive weighing corresponds to not more than 0.25 per cent. Constant weight was reached when two consecutive weighing after drying for 30 minutes and cooling for 30 minutes in a desiccator, show not more than 0.01 gm difference.

Viscosity

It is an index of resistance to the flow of liquids. It is a quality control tool for evaluating flow properties of dosage forms. Factors like pressure, temperature and added substances influence the viscosity of the liquids ¹⁹.

Procedure: The oil sample was filled in a U tube of viscometer in accordance with the expected viscosity of the liquid so that the fluid level stands within 0.2mm of the filling mark of the viscometer when the capillary was vertical and the specified temperature was attained by the test oil sample. The oil sample was sucked to the specified height of the viscometer and the time taken for the sample to pass the two marks is measured. Viscosity was measured using the formula $n_1 = \frac{p_1 t_1}{p_2 t_2} \times n_2$ where n_1 = Viscosity of the sample, n_2 = Viscosity of water, t_1 & t_2 = time taken for the sample and water to pass the meniscus, p_1 & p_2 = Density of the sample and water

pH

The pH value conventionally represents the acidity or alkalinity of an aqueous solution. pH of the liquids must be controlled in pharmacy particularly in the formulations of eye drops, ear drops etc. pH is defined as negative logarithm of hydrogen ion concentration, expressed in grams ²⁰.

Procedure: In this study PH was determined by preparing 10% of aqueous solutions of samples and these solutions were filtered. The PH of the filtrate was determined by using pH indicator paper (PH 1-10 universal indicator)

Chromatography

OBSERVATIONS AND RESULTS

Organoleptic evaluation

Table 3 Results of organoleptic evaluation

Sl.No.	Parameters	Sample no.1	Sample no.2	Sample no.3	Sample no.4
1.	Colour	Yellow	Brownish yellow	Dark brownish yellow	Brownish green
2.	Odour	Spicy	Aromatic	Not characteristic	Not characteristic
3.	Taste	Pungent	Pungent	Bitter	Bitter
4.	Consistency	Oily	Viscous oily	Viscous oily	Viscous oily

Chromatography is a non-destructive procedure for resolving a multi-component mixture of trace, minor, or major constituents into individual fractions. It may be defined as a method of separating a mixture of components into individual components through equilibrium distribution between two phases. Essentially, the technique of chromatography is based on the differences in the rate at which the components of a mixture move through a porous medium (called stationary phase) under the influence of some solvent or gas (called moving phase).

Gas liquid chromatography (GLC): Gas chromatography (GC) is probably most utilized of all the chromatographic techniques. In gas liquid chromatography, the mobile phase is a gas and the stationary phase is a thin layer of a non-volatile liquid bound to a solid support. It separates volatile substances by percolating a gas stream over a stationary phase. The primary limitation is that the sample must be capable of being volatilized without undergoing decomposition. In pharmaceutical analysis, GLC is applied in three types of problems;

Assay of the starting materials and drug substances,
Quantification of drug in formulations,
Assay of impurities in the raw material or in drug substances ²¹.

Present study details

Instrument details:

Make: PerkinElmer Clarus 500
Column Type: Capillary Column Elite – 5MS (5% Phenyl 95% dimethylpolysiloxane)
Column length: 30m
Column id: 250 µm

GC Conditions:

Oven Program: 50°C @ 80°C/min to 220°C (2min) @ 8 °C/min to 290°C (10 min)
Injector temp.: 290°C
Carrier gas: He @ flow rate 1ml/min
Split ratio: 1: 10

MS Conditions:

Mass Range: 40 -600 amu
Type of ionization: Electron ionization (EI)
Electron energy: 70eV
Library: NIST 2005
Sample injected: 1microlitre

Physicochemical evaluation

Table 4 Results of physic-chemical evaluation

NO.	TESTS	Sample no.1	Sample no.2	Sample no.3	Sample no.4
1.	Solubility				
	Hexane	Very soluble	Very soluble	Very soluble	Very soluble
	Chloroform	Very soluble	Very soluble	Very soluble	Very soluble
	Ethyl acetate	Very soluble	Very soluble	Very soluble	Very soluble
	Methanol	Practically insoluble	Practically insoluble	Practically insoluble	Practically insoluble
	Water	Practically insoluble	Practically insoluble	Practically insoluble	Practically insoluble
2.	Wt/ml at 25°C	0.9182gm/ml	0.9966gm/ml	0.9243gm/ml	0.9119gm/ml
3.	Refractive index	1.4750	1.4720	1.4800	1.4740
4.	Acid value	0.3147	0.3251	0.3289	0.2155
5.	Saponification value	196.7289	81.9723	92.9173	193.4372
6.	Ester value	196.4142	81.6472	92.5884	193.2217
7.	Peroxide value	0.3951	0.1918	0.0990	0.2939
8.	Iodine value	102.8583	99.2250	95.8920	104.0332
9.	Test for Vitamin A	Positive	Negative	Negative	Negative
10.	Specific gravity	0.9105	0.9135	0.9125	0.9147
11.	Loss on drying	0.0981	3.164	0.1582	2.034
12.	p^H	6	6	6	6
13.	Viscosity	75.478	87.466	110.10	85.710

Gas liquid chromatography

Total number of constituents present in Sarshapataila –36

Total number of constituents present in murchitaSarshapataila - 44

Total number of constituents present in Gandhakataila with murchitaSarshapataila- 55

Total number of constituents present in Gandhakataila with amurchitaSarshapataila -42

DISCUSSION

Sarshapataila, is a fixed oil obtained from matured seeds of *Brassica nigra* (L) Koch, family Cruciferae. This is prepared by expression. It is yellow coloured liquid of strong spicy odour and pungent taste until refined. Oils in their pure state, are colourless, odourless and tasteless liquids They possess characteristic smell and taste because of some other substances. Colour of natural vegetable oil is due to the presence of pigments.

In this study unrefined Sarshapataila was used as a base for the preparation of Gandhakataila, because, in Sarshapataila medicinal properties are due to allylthiocyanate which will be lost by refining²². Glucosinolate the pungent principle in Sarshapataila has anti-bacterial, antifungal and anti-carcinogenic properties. Murchana process, converted the yellow colour of Sarshapataila in to brownish yellow. This colour is imparted by the murchana dravyas. Manjista contains colouring matter Purpurin and Haridra which contains Curcumin as colouring matter. The characteristic spicy smell of Sarshapataila was converted in to aromatic due to the contact of murchana drugs like Musta, Nalika, Hribra etc. No change is observed in taste. Viscous oily consistency may be due to dissolution of bioconstituents to the oleaginous matter and removal of watery portion. The colour of Gandhakataila prepared with murchita Sarshapataila was dark brownish yellow. Pungent taste of murchita Sarshapataila was changed to bitter. Aromatic odour of murchita Sarshapataila was changed. Change in colour, taste, odour and consistency indicates attainment of more qualities of the drugs in to the oil media. Gandhakataila prepared with amurchita Sarshapataila was brownish green in colour and taste was bitter. This is imparted by Datturapatra swarasa, which is green in colour and bitter in taste. Characteristic spicy odour of Sarshapataila was changed.

Solubility is one of the parameter to judge the purity, percentage composition of Sarshapataila, murchita Sarshapataila, Gandhakataila prepared with murchita Sarshapataila and Gandhakataila prepared with amurchita Sarshapataila. All the four samples were very soluble in hexane, chloroform and ethyl acetate, indicative of good miscibility of samples with these organic solvents. Though there are extra constituents in murchita Sarshapataila and both Gandhakatailas, base used for all the three is same i.e. Sarshapataila, hence the same solubility of Sarshapataila can be expected. This indicates that, added constituents do not interfere with solubility of Sarshapataila.

Wt/ml at 25°C/ Density of Sarshapataila taken in the study was 0.9182 gm/ml. This value falls within the standard density range mentioned for Sarshapataila i.e. 0.914 – 0.923 gm/ml²². Density of murchita Sarshapataila and Gandhakataila prepared with murchita Sarshapataila was found increased to 0.9966gm/ml and 0.9243gm/ml respectively. This indicates that murchana is one such a process which increases the density of Sarshapataila. This might be due to the suspended solid particles or dissolved bio constituents of the drugs used during processing. But the density of Gandhakataila prepared with murchita Sarshapataila (0.9243gm/ml) was decreased markedly when compared to the density of murchita Sarshapataila (0.9966gm/ml). Hence slight reduction in molecular weight can be suspected. Density of Gandhakataila prepared with amurchita Sarshapataila was 0.9119gm/ml, which is less when compared to the density of Gandhakataila prepared with murchita Sarshapataila i.e. 0.9243. With this result one can presume that murchana process facilitates better dissolution of bio constituents in Sarshapataila.

Refractive index of standard Sarshapataila is 1.472 -1.473321. Refractive index of Sarshapataila taken for the study was 1.4750, which is almost nearer to the standard value. This variation might be due to the presence of some chemical as it is a plant origin drug. There was not much difference in the refractive indices of Sarshapataila, murchita Sarshapataila and Gandhakataila prepared with amurchita Sarshapataila i.e 1.4750, 1.4720, 1.4740 respectively. But refractive index of Gandhakataila prepared with murchita Sarshapataila was increased to 1.4800. Increase in refractive index of Gandhakataila prepared with murchita Sarshapataila, indicates the increase of its density. It might be due to the dissolution of bio constituents in sarshapataila which is translucent or opaque to the light rays. With this result one can presume that, assimilation bio constituents in sarshapataila increases by murchana process.

Acid value indicates the amount of free fatty acid present in oil. Gradual increase in acid value is observed in Sarshapataila, murchita Sarshapataila and Gandhakataila prepared with murchita Sarshapataila i.e. 0.3147, 0.3251 and 0.3289 respectively. Whereas acid value was found decreased in Gandhakataila prepared with amurchita Sarshapataila i.e. 0.2155. Free fatty acids are a source of flavors and aromas, which was observed in Sarshapataila murchita Sarshapataila and Gandhakataila prepared with murchita Sarshapataila. Short chain free fatty acids tend to be water soluble and volatile with characteristic smell. Long chain unsaturated free fatty acids are more prone to oxidation where as long chain saturated free fatty acids are less prone to oxidation. So the rancidity of oil depends on percentage of saturation and unsaturation of oil.

Saponification value is an index of mean molecular weight/ chain length of the fatty acids of glycerides comprising of oil or fat. Lower the saponification value larger the molecular weight/ chain length of fatty acids in the glycerides and vice versa. Saponification value of Sarshapataila (196.7289) was found markedly decreased after murchana process (81.97232). Slight increase was observed in Gandhakataila prepared with murchita Sarshapataila (92.9173). Whereas saponification value of Gandhakataila prepared with amurchita Sarshapataila (193.4372) was remained nearer to the value of Sarshapataila (196.7289). This indicates that murchana process increases the molecular weight / chain length of Sarshapataila.

Ester value = Saponification value – Acid value.

Esters are the fatty acids with glycerol. As the esters are increased rancidity chance is decreased. It was markedly decreased by murchana process. Ester value of Sarshapataila was 196.4142. This was reduced to 81.6472 after murchana of Sarshapataila. Further slight increase was observed in Gandhakataila prepared with murchita Sarshapataila (92.5884). But Ester value of Gandhakataila prepared with amurchita Sarshapataila was 193.2217.

Peroxide value of oil indicates the degree of rancidification of oils. The increase value shows that the oil is turned rancid or spoiled. Oils with a high degree of unsaturation are most susceptible to auto-oxidation. Auto-oxidation is a free radical reaction involving oxygen that leads to deterioration of oils which form off flavours and off odour. In this study peroxide value of Sarshapataila was 0.3951. Murchana process reduced it to 0.1918. Further reduction was observed when Gandhakataila prepared with murchita Sarshapataila (0.0990). Whereas peroxide value of Gandhakataila prepared with amurchita Sarshapataila was 0.2939. As the normal peroxide value ranges in any oil is below 10 that is within the permissible limits of unrancidification. But more peroxide value signifies its higher tendency for rancidification. This indicates that all the four samples are free from rancidity. But chances of rancidity are more in Sarshapataila and among two Gandhakatailas, the one which prepared with amurchita Sarshapataila has higher tendency for rancidification.

Iodine value indicates the degree of unsaturation, which inturn denotes the rancidification of oils. Iodine value of Sarshapataila was 102.8583. This was reduced to 99.2250 after murchana. Further reduction was observed in Gandhakataila prepared with murchita Sarshapataila (95.8920). But for Gandhakataila prepared with amurchita Sarshapataila it was 104.0332. It signifies that degree of unsaturation is more in Gandhakataila prepared with amurchita Sarshapataila. Murchana process reduces the degree of unsaturation. So chances of rancidity are less after murchana process.

Specific gravity of Sarshapataila (0.9105) was increased after murchana process (0.9135). It might be due to the addition of some bio constituents from the drugs used for murchana. Duration of heating also affects the specific gravity. But this specific gravity was found reduced, when Gandhakataila prepared with murchita Sarshapataila (0.9125). Compared to all the three samples specific gravity of Gandhakataila prepared with amurchita Sarshapataila was more i.e. 0.9147.

Loss on drying is an indicative of moisture content of the preparation present. The higher the value more will be the amount of moisture and oil will be more susceptible for rancidity. Loss on drying of Sarshapataila and Gandhakataila prepared with murchita Sarshapataila were 0.0981% and 0.1582% respectively however murchita Sarshapataila and Gandhakataila prepared with amurchita Sarshapataila showed 3.164% and 2.034%. Moisture content in Sarshapataila was very minimum (0.0981%). This was increased after murchana process (3.164%). The Gandhakataila prepared with same murchita Sarshapataila had 0.1582% of moisture. Whereas Gandhakataila prepared with amurchita Sarshapataila had 2.34% of moisture.

Viscosity is an index of resistance to the flow of liquids. In this study the viscosity of Sarshapataila murchita Sarshapataila and Gandhakataila prepared with murchita Sarshapataila was found gradually increased respectively i.e. 75.478 ,87.466 ,110.00. Whereas viscosity of Gandhakataila prepared with amurchita Sarshapataila was 85.710. This is the indicative of extraction of more active constituents by murchita Sarshapataila than amurchita as the viscosity of oil increases with added substances.

PH: The suspension of 10% w/v of all the test samples in water showed PH similar to distilled water used for the preparation of the suspension.

The Gas liquid chromatography of the four samples also indicates the presence of many components, out of which some 6 components are in the major quantity. The components like Hexanal, 2-Octenal, Nonanal, 2-Nonenal, Decanal and 2,4-Decadienal are observed in all the samples. In Sarshapataila the component named Z,E-2-Methyl-3,13-Octadecadien-1-ol is present in large quantity (57.0876%). In murchita Sarshapataila, Z,E -2,13-Octadecadien-i-ol has present in large quantity (55.7959%). But both were absent in remaining samples. The quantity of Hexanal is markedly increased in both the Gandhakatailas (18.1208%, 7.9867%).

CONCLUSION

Murchana process imparts brownish yellow colour, aromatic odour to the Sarshapataila and Gandhakataila prepared with it. Increase in the values of density, specific gravity and refractive index and viscosity of Gandhakataila prepared with murchita Sarshapataila indicates, murchana process facilitates the better dissolution of medicaments in sarshapataila. Free fatty acids are a source of flavours and aromas, which is true in case of murchita Sarshapataila and Gandhakataila prepared with murchita Sarshapataila. Due to increase in percentage of long chain saturated free fatty acids, Gandhakataila prepared with murchita Sarshapataila has less prone to auto-oxidation. Extent of variation in acid value, saponification value, iodine value and ester value of Sarshapataila due to processing, signifies the presence of medicinal substances in it. Difference in number of contents in GLC of Gandhakataila prepared with murchita Sarshapataila and Gandhakataila prepared with amurchita Sarshapataila indicates the importance of murchana process in the preparation of medicated oils.

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