WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.084
Volume 10, Issue 6, 1068-1075. Research Article ISSN 2277– 7105

PHYSICO-CHEMICAL ANALYSIS OF *SUNTHI* (ZINGIBER OFFICINALE ROSC.)

Dr. Shweta S. Hardas*[1], Dr. Sukhada S. Joshi[2] and Dr. Ninad Sathe[3]

[*1]PG Scholar (Rasashastra Evum Bhaishajya Kalpana Department),

[2]PG Scholar (Rasashastra Evum Bhaishajya Kalpana Department),

[3]Professor (Rasashastra Evum Bhaishajya Kalpana Department), Vice Principal,

DR. G.D. POL Foundation's Y.M.T. Ayurvedic Medical College, Kharghar, Navi Mumbai, Maharashtra.

Article Received on
31 March 2021,

Revised on 21 April 2021,
Accepted on 11 May 2021

DOI: 10.20959/wjpr20216-20543

***Corresponding Author**
Dr. Shweta S. Hardas
PG Scholar (Rasashastra Evum Bhaishajya Kalpana Department), Dr. G.D. Pol Foundation's Y.M.T. Ayurvedic Medical College, Kharghar, Navi Mumbai, Maharashtra.

ABSTRACT

The method and the process used for drug formulation have been modified from time to time. The quality of drug obtained now when compared to the quality of drug obtained during ancient time shows huge difference due to improper processing or adulteration or use of low quality drug. All these factors made standardization an important step, may it be standardization of raw material or standardization of manufacturing process. The present study was aimed at the standardization of five *Sunthi* samples collected from various sources. During this study some basic but important analytical tests like Organoleptic test, pH, Foreign matter, Loss on drying, Total ash, Acid insoluble ash, Water soluble extractive value and Alcohol soluble extractive value were performed. The observed values of the samples were correlated with the standard limits mentioned in The Ayurvedic Pharmacopoeia of India for *Sunthi*.[1] From the overall study it was concluded that of all the five samples, Sample 2, Sample 3, Sample 4 and Sample 5 were authentic as well as standard and could be used for further purpose whereas Sample 1 was not authentic and standard as its Total ash value and Acid insoluble ash value obtained was found to be beyond the standard limit. The current study could be used as reference for further study.

KEYWORDS: *Sunthi*, Physico-chemical analysis, *Zingiber officinale*, Standardization.

INTRODUCTION

Ayurveda being traditional branch of Indian medicine has been practiced from ages. It consists of plants, minerals and animal origin substance that exhibit numerous medicinal properties which help in treating many ailments. Ayurveda has described each and everything in deep may it be *Anupan*, *Rutucharya*, *Dincharya*, *Ratricharya* or *Aushadhi sanghrah*.

Ayurveda has not only given importance to the drug but also to the specific seasons most favoured for collection process of the drug because Ayurvedic formulations are crucially dependant on the quality of raw material. However, nowdays due to increase in demand of herbomineral formulation the raw material is collected as and when required as per the convenience. This raw material is then stored in the warehouses for many days without further processing. Also to preserve this material various preservatives are used. Some of the drugs are very rare to find. All these factors have led to malpractices like adulteration of drugs or use of low grade quality drugs thus overall hampering the shelflife and potency of the drug. Medicine prepared from such low grade quality drug is unable to give desired action on the disease. This therefore has necessiated the need of standardization of raw material to maintain the therapeutic efficacy of drugs. Taking this into consideration authentication and standardization parameters are formed by the government.

Sunthi, basically dry ginger, an unique flavour spice is popularly used in not only Asian cuisines but also in traditional Indian medicines since ancient times. Its synonym *Vishwabheshaj*[1] itself explain its value in Ayurveda. Department of AYUSH has also mentioned *Sunthi* in Essential Drugs List (EDL) Ayurveda.[2] It is commonly used in practice due to its various medicinal properties. So standardization of such important drug is essential. For this purpose pharmaceutical and analytical study is carried out to get the best quality in order to increase the potency of the formulation. Taking this into view the present study was planned wherein five different samples of *Sunthi* were analyzed and standardized in the laboratory.

AIM OF THE STUDY

To standardise *Sunthi* through physico-chemical analysis.

OBJECTIVE OF THE STUDY

To analyse *Sunthi* physico-chemically as per the standard parameters.

MATERIAL AND METHOD

A] Materials

Raw drug: The crude drugs were collected from different suppliers in dry form.

Instruments: Instruments used for the analysis of samples are given below.

Sr.No.	Instrument	Sr.No.	Instrument
1.	Weighing balance	14.	Muffle furnace
2.	Oven	15.	Tongs
3.	Silica crucible	16.	Spatula
4.	Desiccator	17.	Petri dish
5.	Magnetic stirrer	18.	Iodine flask with stopper
6.	Magnet	19.	Whatman filter paper 41
7.	Filter paper	20.	Tissue paper
8.	Waterbath	21.	Thermometer
9.	Measuring cylinder	22.	Funnel
10.	Beaker	23.	Stirrer
11.	pH meter	24.	Forcep
12.	Dropper	25.	Magnifying glass
13.	Watchglass		

Chemicals: Ethanol, Buffer solution 4, Buffer solution 7, Chloroform water, Dilute HCl, Distilled water.

B] Method

It can be divided into two steps.

1. Pharmaceutical study
2. Analytical study

1. Pharmaceutical study

This step involves collection and authentication of raw drug for standardization.

Collection and authentication of raw material.

The crude drugs were collected from different suppliers in dry form and all the necessary tests were conducted for authentication at Central Research Laboratory by Dravyaguna Department at YMT Ayurvedic Medical College and Hospital, Kharghar, Navi Mumbai District, Maharashtra.

2. Analytical study[3]

The analytical evaluation of the samples were carried out at Central Research Laboratory of YMT Ayurvedic Medical College and Hospital, Kharghar, Navi Mumbai, Maharashtra. The samples were analyzed and compared with standards mentioned in The Ayurvedic

Pharmacopoeia of India.[1] The following organoleptic and physico-chemical tests were performed and tabulated.

Organoleptic characters

Various organoleptic properties such as colour, odour, taste, touch of the samples were observed.

pH

1% solution of the samples was prepared by adding 50 ml of distilled water to 500 mg of powdered sample. This solution was kept stand still for 4 hrs covered by watchglass. After calibrating pH meter by buffer 4 and buffer 7 solution, the solution of samples were examined and reading was noted.

Foreign matter

100g of the sample was weighed and was spread out in thin layer. The foreign matter was detected by inspection with the unaided eye and by using a magnifying glass. It was separated and weighed and the percentage was calculated.

Loss on Drying / Moisture content

5 g of drug was accurately weighed in a tared evaporating dish and it was then kept in hot air oven at 105^0C for 5 hours and weighed. Drying and weighing at one hour interval was done until constant weight was obtained.

Total ash

2 g of sample was taken in a tared silica crucible. This silica crucible was then kept in Muffle furnace at a temperature not exceeding 450^0C until carbon free ash was obtained, and it was cooled in desiccator and weight was taken. The percentage of ash was then calculated.

Acid-insoluble ash

The ash obtained in Total ash was kept for just boiling with 25 ml of dilute hydrochloric acid, and was filtered through Whatman filter paper 41 (ashless filter paper). This ash free filter paper along with its contents was kept in preconditioned Muffle furnace and incinerated until carbon free ash was obtained. Crucible was desiccated and weighed till carbon free ash was obtained. Percentage of acid-insoluble ash was calculated after obtaining carbon free ash.

Water soluble extractive

5 g of the sample, finely powdered, with 100 ml of chloroform water was taken in a closed iodine flask containing magnet and was kept on magnetic stirrer for intermittent stirring for six hours and was allowed to stand for eighteen hours. After 24hrs, mixture was filtered taking precautions against loss of solvent through filter paper. 25 ml of the filtrate was taken in per-conditioned petridish. This petridish was then kept on waterbath for evaporation at 105^0C until dry. After cooling the petridish in desiccator the residue was measured and percentage of aqueous soluble extractive was calculated.

Alcohol soluble extractive

5 g of the sample, finely powdered, with 100 ml of ethanol was taken in a closed iodine flask containing magnet and was kept on magnetic stirrer for intermittent stirring for six hours and was allowed to stand for eighteen hours. After 24hrs mixture was filtered taking precautions against loss of solvent through filter paper. 25 ml of the filtrate was taken in per-conditioned petridish. This petridish was then kept on waterbath for evaporation at 105^0C until dry. After cooling the petridish in desiccator the residue was measured and percentage of alcohol soluble extractive was calculated.

OBSERVATIONS AND RESULT

The observations of the organoleptic and physico-chemical tests are given in table below. The observed organoleptic characters are given in table 1. The observed values of physico-chemical analysis of five different samples are given in Table 2.

Fig 1: whole plant[4]

Fig 2: fresh rhizome[5]

Fig 3: dried rhizome[6]

Fig 4: dried rhizome powder[7]

***Zingiber officinale* Rosc.**

Table 1: Observed organoleptic characters.

Sr. No	Characters	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
1.	Colour	Dark creamish	Creamish	Light creamish	Creamish	Creamish
2.	Odour	Characteristic aromatic	Characteristic aromatic	Characteristic aromatic	Characteristic aromatic	Characteristic aromatic
3.	Taste	Pungent	Pungent	Pungent	Pungent	Pungent
4.	Touch	Fine powder	Fine powder	Fine powder	Fine powder	Fine powder

Table 2: Observed values of physico-chemical analysis.

Sr. No	Parameters	API* Standards	Unit	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
1.	pH	Not mentioned	-	5.19	4.34	4.32	4.35	4.34
2.	Foreign matter	Not more than 1 per cent	Total%	0.0	0.0	0.0	0.0	0.0
3.	Loss on drying	Not mentioned	%w/w	2.69	11.33	11.32	11.35	11.26
4.	Total ash	Not more than 6 per cent	%w/w	8.88	4.94	5.0	4.98	4.92
5.	Acid-insoluble ash	Not more than 1.5 per cent	%w/w	3.31	0.94	0.1	0.98	0.93
6.	Water- soluble extractive	Not less than 10 per cent	%w/w	16.69	11.84	11.85	11.88	11.68
7.	Alcohol- soluble extractive	Not less than 3 per cent	%w/w	6.80	6.80	6.78	6.75	6.72

***API :** *The Ayurvedic Pharmacopoeia of India*

DISCUSSION

Sunthi (*Zingiber officinale* Rosc.) consists of the peeled or unpeeled dried rhizome of *Zingiber officinale* Rosc. of Family Zingiberaceae.[8] *Sunthi* also known as *Vishwabheshaj,*

Mahaushadhi, Aaushadh, Nagara, is called Ginger root or Ginger in English.[1] It is cultivated in states like Assam, Maharashtra, Gujarat, West Bengal, Kerala, Meghalaya and Karnataka.[9] Its major chemical constituents are Gingerol and Shogaol (pungent constituents), essential oil, resinous matter and starch. *Rasapanchak* of *Sunthi* is ***Rasa****: Katu;* ***Guna*** *: Laghu, Snigdha;* ***Virya****: Ushna;* ***Vipaka****: Madhura and* ***Karma*** *: Anuloman, Dipana, Pachan, Hrdya, Vatakaphahar and Aamdoshhar.* It is majorly used for *Agnimandya, Svasa, Adhmana, Aamvata, Pandu, Udararoga.*[1] Due to its significant medicinal properties it is widely used in many Ayurvedic formulations. To standardize such important drug various preliminary analytical tests were performed. Organoleptic characters like colour, taste, odour and touch were found to be similar in all five samples. To determine the acidity or alkalinity of *Sunthi,* pH was done and the readings indicated that all samples except Sample 1 were more towards acidic (pH in range 4.0- 4.5). Sample 1 was observed to be less acidic (pH 5.19). Foreign matters like mold, insects, stones and extraneous matter was found to be absent in all the five samples. Loss on drying (Moisture content) was found to be greater in Samples 2, 3, 4 and 5 as compared to Sample 1 which showed least loss on drying i.e. 2.69 %w/w. Total ash test used to determine the quality and purity of crude drugs, primarily represents the inorganic residue obtained after the complete combustion of drug. Of all the samples, Sample 1 showed total ash content 8.88 %w/w which is beyond the Standard limits mentioned in The Ayurvedic Pharmacopoeia of India. Acid insoluble ash denotes the siliceous impurities, which should not exceed 1.5% as per The Ayurvedic Pharmacopoeia of India. It was found to be 3.31 %w/w for Sample 1. The rest of the four samples showed value within the standard limits. Water soluble extractive .i.e. the amount of active constituent in a medicinal plant was found to be highly water soluble in case of Sample 1 as compared to other four samples. Alcohol soluble extractive value for all five samples were within the permissible range.

CONCLUSION

1. From the overall study of all the five samples, it was concluded that the Sample 2, Sample 3, Sample 4 and Sample 5 showed values within the standard limits in all parameters. While Sample 1 also showed values within the standard limits except for Total ash percentage and Acid insoluble ash percentage. This may be due to improper storage or presence of excess of extraneous matter or siliceous impurities, thus indicating that Sample 1 is of low quality compared to other four samples.
2. It can be concluded from above discussion that Sample 2, Sample 3, Sample 4 and

Sample 5 are authentic and standardised and can be used for further analysis like TLC/ HPTLC or for processing. Whereas Sample 1 is not authentic and standard and thus cannot be used for further processing.

ACKNOWLEDGEMENT

1. Dr. Sanjeev Yadav, Dean, Professor, Shalyatantra Department, DR. G.D. POL Foundation Y.M.T. Ayurvedic Medical College and Charitable Trust, Kharghar, Navi Mumbai, Maharashtra.
2. Dr. Rupa Kadam, Associate Professor, Dravyagun Department, DR. G.D. POL Foundation Y.M.T. Ayurvedic Medical College and Charitable Trust, Kharghar, Navi Mumbai, Maharashtra.
3. Asha Jadhav, Analytical Chemist, Research Methodology and Medical Statistics, Dr. G.D.Pol Foundation Y.M.T. Ayurvedic Medical College and Charitable Trust, Kharghar, Navi Mumbai, Maharashtra.

REFERENCES

1. eBook of The Ayurvedic Pharmacopoeia of India, Part- I, Volume - I, Government of India,Minnistry of Health and Family Welfare, Department of AYUSH, p. 138.
2. Essential Drug List (EDL) AYURVEDA, Department of AYUSH, Government of India, March 2013, p.21, www.indianmedicine.nic.in.
3. The Ayurvedic Pharmacopoeia Of India, Part- I, Volume- VI, First edition, p.242, www.indianmedicine.nic.in.
4. https://www.agrifarming.in/ginger-farming-techniques.
5. https://www.google.com/search?q=zingiber+officinale.
6. https://www.supaveda.com//super/26/Sunthi.html.
7. https://www.spicejungle.com/ginger-powder.
8. Quality Standards Of Indian Medicinal Plant, Vol. 8, Medicinal Plants Unit Indian Council OfMedicle Research, New Delhi, 2010, p.347.
9. https://www.statista.com/statistics/870956/ginger-production-by-state-india/