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ANALYTICAL STUDY OF *NAVEEN* AND *PURANA GUDA* (JAGGERY) W.S.R. TO IMPORTANCE OF *PURANA GUDA* AS PER CLASSICAL REFERENCE

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ABSTRACT

Jaggery (also known as *guda*) is one of the most important sweeteners in India. It is one of the major plant products which are easily available in market. It is mainly prepared from sugarcane. Jaggery is a popular food material and an important raw drug used in *Ayurveda* for therapeutic and pharmaceutical preparations. It has medical properties as well as it acts as medical preservative. The investigations were carried out to study the analytical difference in *Naveen guda* and *Purana guda*, to evaluate most efficacious and useful stage of jaggery among *Naveen and Purana* stages (*Avastha* due to aging) of *guda*. Analytical tests were conducted on *Naveen* and *Purana guda*, which includes organoleptic test, Moisture content, Total ash, Acid Insoluble ash, Water Insoluble matter, Total sugar percentage and Sucrose percentage. Analytical study shows significant difference in the moisture content, total ash and sucrose percent. The changes in Physico-chemical parameters in *Purana guda* due to aging is highlighted. Properties of *guda* and *Purana guda* mentioned in classical text is compiled.

KEYWORDS: *Guda*, jaggery, *Naveen guda*, *Purana guda*.

INTRODUCTION

Any product requires certain analytical standards or parameters. These are more essential, particularly in case of drug and formulations. Analytical standards are the dimensions to

evaluate a product. It is compulsory to describe a product by analytical standards since these standards speak of **quality**, **authenticity** and **purity** of the product.[1]

Jaggery is a pure, wholesome, unrefined sugar which contains the natural goodness of minerals and vitamins produced from sugarcane. It is a good source of minerals like calcium, iron, phosphorous and protein. Jaggery is healthy alternative to white refined sugar.

In *Ayurveda*, *guda* is used for external as well as for internal use. Externally *guda* is mainly used for *agnikarma, varti kalpana* and internally in many formulations.[2] It is used as a media for the preparation of different *Ayurvedic* formulations such as *Asava, Arishtas, Avaleha, Gudapak* etc. It is used as binding material in *gutivati* i.e. tablets. It is used as *prakshepa dravya* in *kwath* and used in *churna*. It acts as a preservative.[2] It is also used as an important *anupana* (vehicle) during administration of drug.

Purity and quality of jaggery must be ensured on public health ground and changes due to aging, must be noted as it is a popular food item and used as sweetening agent based on the therapeutic purposes in *Ayurvedic* medicine. Hence in this study 2 samples of jaggery, *Naveen* and *Purana* were included, and analytical study was done, to evaluate difference in *guda* due to aging. The same sample from *Naveen guda* was stored in air tight container for 1 year for analysis as *Purana guda.* All the available classical references on *guda* is compiled and tabulated, and importance of *Purana guda* is noted according to its properties.

MATERIALS AND METHODS

Method of sample collection

Two samples of jaggery were included in this study.

First sample was *Naveen guda*.

Second sample was 1-year aged (*Purana guda*) sample. For this *Naveen* sample was stored in air tight container for 1 year.

METHODOLOGY

Organoleptic characters and Physico-chemical evaluation of jaggery samples i.e. Determination of moisture content, total ash, acid insoluble ash, water insoluble matter, total sugar and sucrose. The Organoleptic characters include appearance, colour, taste and texture.[3]

Moisture content

The moisture content was determined by using *Dean* and *Stark's apparatus*. 5 g of the jaggery was taken into a round bottom flask and *xylene* was added to cover the jaggery. Round bottom flask was connected to *Dean* and *Stark's apparatus*, which was connected to a water condenser. It was heated within an electric mantle for about one hour. The moisture in the jaggery gets evaporated and get condensed and collected into the graduated tube of the apparatus. The heating was continued till the level of the water remains constant, the level of water content in the graduated tube. Reading was taken through lower meniscus. The percentage of water content in the jaggery was calculated by dividing the water content by the weight of the original sample taken and multiplying it by 100.[4]

Determination of total ash

About 2 to 3 g accurately weighted jaggery was incinerated, in a previously weighed silica crucible at a temperature not exceeding 450^0C until free from carbon, cooled and weighed. (If a carbon free ash cannot be obtained by this way, exhaust the charred mass with hot water, collect the residue on an ash less filter paper, add the filtrate, evaporate to dryness and ignite at a temperature not exceeding 450^0C.) The percentage of ash was calculated with reference to the air dried jaggery.[3]

Determination of acid insoluble ash

All the steps as per mentioned in the procedure for determination of total ash value of jaggery were proceeded. After that the ash was washed from the dish used for total ash, into a 100ml beaker, using 25ml of *dilute hydrochloric acid* (HCL). Boil it for five minutes. Filtered through an ash less filter paper (Whatman 41) and wash the residue with hot water until it was free from acid. It was confirmed by litmus paper test. The filter paper and residue together were transferred into the original crucible, dried on hot-plate and ignited to constant weight. Allow to cool. Weighed the residue and calculated acid insoluble ash of jaggery with reference to air dried sample of the jaggery.[3]

Determination of water insoluble matter

10 gm of sample was taken; added 200 ml hot distilled H_2O and brought to boiling. Allow to cool at room temperature. Filter through a tared gooch crucible having a bed of asbestos or sintered glass filter. The residue was washed with hot water till the filtrate became sugar-free (perform molisch test). The gooch crucible or sintered glass was filtered at 135 ± 2^0C and weighed. Expressed as % insoluble matter.[3]

Determination of total sugar

25 ml of the solution was placed from the 100 ml stock solution prepared for the reducing sugars in 100 ml beaker. To this, added 5 ml of *hydrochloric acid*: purified water (1:1v/v), mixed well and allow to stand at room temperature for 24hr for inversion. Neutralize the sample with 5 N sodium hydroxide and make up to 50 ml with purified water. From this diluted sample, use 1 ml of aliquot for the estimation of total soluble sugars using the method described in preparation of calibration curve for dextrose.[3]

Determination of Sucrose

An aliquot of 100 ml was taken in a 500 ml volumetric flask and added 10ml of HCL and let stand for 1&1/2 days at 25^0C and above. Diluted to 500 ml. Transferred an aliquot of 100 ml to a 250ml volumetric flask, neutralized with NaOH and make up to volume and mixed. This solution was taken in a burette having an offset tip. Proceed with the titration against Fehling A and B.

Calculation: - Sucrose% = [Total reducing sugar%-Reducing sugars%] × (0.95).[3]

RESULTS AND OBSERVATIONS

Nature of jaggery samples were solid blocks, not sticky and well dried. It had its characteristic smell, taste and flavor. Samples are having different shades of colour i.e. light yellow to reddish brown or dark brown/ dark blackish brown. Jaggery was clean and free from insect infestation, live or dead insects, excreta, mould and vegetable debris. It was free from dirt or soil, musty odour, fermented odour. No fungal or bacterial contamination in the samples when examined with naked eyes in daylight. The samples were kept in air tight plastic cover.

Analytical values of study samples are arranged in table (1) and (2).

Table (1): Organoleptic characters of samples in study.

Characters	***Naveena guda***	***Purana guda***
Appearance	Dried pieces	Dried pieces
Colour	Dark Brown	Dark Blackish Brown
Taste	Sweet	Sweet
Texture	Smooth	Smooth

Table (2): Physico-chemical values of studied sample.

Samples of Jaggery	Moisture Content (%)	Total Ash (%)	Acid Insoluble Ash (%)	Water Insoluble Matter (%)	Total Sugar (%)	Sucrose (%)
Naveena guda	8.09	1.70	0.05	0.49	91.88	76.22
Purana guda	4.98	2.06	0.04	0.21	90.74	74.45

Foreign matter is NIL in all the study samples.

Moisture content

Moisture content percentage of both the study samples lies within the specified percentage which is mentioned in API. The specified limit in API is NMT 10%. Moisture content in *Purana guda* is significantly reduced due to aging i.e. from 8.09% it reduced to 4.98%.

Total ash

The percentage of total ash of both the study samples lies within the specified percentage which is mentioned in API. The specified limit in API is NMT 6%. Total ash percentage was increased in *Purana guda* i.e. from 1.70% to 2.06%., this may be due to loss in moisture.

Acid insoluble ash

The percentage of acid insoluble ash of both the study samples lies within the specified percentage which is mentioned in API. The specified limit in API is NMT 0.5%. Acid insoluble ash is reduced in *Purana guda* i.e. from 0.05% to 0.04%.

Water insoluble matter

The percentage of water insoluble matter of both the study samples lies within the specified percentage which is mentioned in API. The specified limit in API is NMT 2%. Water insoluble matter is reduced in *Purana guda* i.e. from 0.49% to 0.21%.

Total sugar

Total sugar percentage of both the study sample lies within the specified percentage which is mentioned in APT. The specified limit in API is NLT 90%. Total sugar percentage is reduced in *Purana guda* i.e. from 91.88% to 90.74%.

Sucrose

The percentage of sucrose of both the study sample lies within the specified percentage which is mentioned in API. The specified limit in API is NLT 60%. Sucrose percentage is reduced in *Purana guda* i.e. from 76.22% to 74.45%.

DISCUSSION

For centuries, jaggery has been used throughout India as a healthy sweetener. Jaggery actually comes from the sap of either the sugarcane plant or from several species of sugar palm tree. To convert the sap into jaggery, simple evaporation or crude centrifugation is the only process. No chemicals or bleaches are added. It is then simply poured into moulds to form small cakes.

Indian Ayurvedic Medicine considers jaggery to be beneficial in treating throat and lung infections. While refined sugar mainly consists of glucose and fructose, jaggery contains glucose and sucrose. But jaggery also has minerals and vitamins which lacks in the refined sugar. Jaggery has a mineral content of approximately 60 times that of refined white sugar.

The mineral content of jaggery includes calcium, phosphorus, magnesium, potassium, iron, traces of zinc and copper. The vitamin content includes folic acid and B-complex vitamins. It is good source of energy; it also prevents rheumatic afflictions, prevents disorders of bile, helps in relieving fatigue, relaxation of muscles, nerves and blood vessels, maintains blood pressure and reduces water retention, increases hemoglobin level and prevent anemia.

As the jaggery contains hygroscopic substance such as reducing sugars, minerals like chlorides, sodium, potassium, makes jaggery liable for moisture absorption and microbial degradation, particularly during monsoon periods when the Relative Humidity values exceed. Hence packing of jaggery cubes in appropriate containers assumes importance.

Ayurveda gives much importance to *Guda* (Jaggery). Jaggery is a traditional product of sugarcane. It is produced almost throughout India. The manufacturing of jaggery holds a very important place in the rural India.[5]

In this Analytical study the jaggery sample is procured from market of Uttar Pradesh, North India. As Uttar Pradesh accounts for 45% of the total production of guda.

The states like Maharashtra, Andra Pradesh, Karnataka and Tamilnadu, together account for 30% of the total production of our country.

The same sample which was procured from north was stored in proper air tight container for 1 year to do analytical study of *purana guda* and study the difference in *Naveen* and *Purana guda* due to aging (*kala prabhava).*

Classical References of Jaggery are arranged in table (3), (4), (5) and (6).

Table (3): Properties of *Dhaut guda* and *Adhauta guda* mentioned in classical text.

Dhauta means purified, *Nirmala* or pure. According to *Ayurvedia-shabdakosha* (dictionary) the word *dhauta* is explained as '*Sanskaravasha-anna-nirmalam'* i.e. purification by the specific (method) *Sanskara.*[6]

In *Sushruta Samhita Acharya Sushruta* uses the term '*Shudho'* for *Dhauta.* And *Adhauta* is unpurified. According to *Acharya Vagbhata AH 5*-chapter *Dhauta guda* is '*para'* i.e. of a high standard and Adhuta guda is '*apara'* i.e. not of good quality.[7]

Types	*Dhauta guda*	*Adhauta guda*
AH	*Naati-shleshmakar* (mild increase of kapha), *Srustha-mutra, srustha-shakruta* (bountiful elimination of urine and faeces).	*Prabhuta krumi, majja, asruka, meda, mansa, kapha* (increases intestinal worms, bone marrow, blood, fat, muscles and *kapha*).
AS	Same as above	same as above
SS	*Pittaghna* (mitigates *pitta*), *madhura rasa, vataghn*a (mitigates *vata*), *asrukprasadana,*	*Skshara-madhura, naati-sheeta, snigdha, mutra-rakta shodhak, alpa-pittajeet, vaatghna, meda-krumi-kaphakar, balya, vrushya*.
KN	*Naati-sleshmakar, vataghna, asrukprasadana, swadupaka-rasam, snigdham, sakrunmutranuloman.*	*Swadu, sakshrama,vata-pitta-agni krut, snigdha, mutra-rakta-vishodhana, medo-mansa-krumi-sleshma-majja-asra-bala-shrukra krut.*

Table (4): Properties of *Naveen guda* mentioned in classical text.

Sr. no.	Properties	AH	AS	BP	SNB
1.	*Sleshmakrut*	✓	✓	✓	✓
2.	*Agnisadkrut*	✓	✓		✓
3.	*Agnikrut*			✓	
4.	*Shwasa krut*			✓	✓
5.	*Kasa krut*			✓	
6.	*Krumikar*			✓	✓

Table (5): General properties of *Guda* mentioned in classical text.

Sr. no.	Properties	*SS*	*BP*	*MPN*	*DN*	*KN*	*SNB*	*YR*
1.	*Madhuram*	✓		✓	✓	✓		✓
2.	*Sakshram*	✓		✓	✓			✓
3.	*Katu*					✓		
4.	*Teekshnam*					✓		
5.	*Guru*		✓	✓	✓	✓	✓	✓
6.	*Snigdham*	✓	✓				✓	

7.	*Saram*			✓				
8.	*Ushnam*				✓	✓		✓
9.	*Natisheetam*	✓						
10.	*Vataghnam*	✓	✓		✓		✓	✓
11.	*Kaphaghnm*				✓			✓
12.	*Natipittaghnam*	✓	✓					
13.	*Natipittakar*						✓	
14.	*Vatapittakar*			✓				
15.	*Kaphakaram*	✓	✓	✓			✓	
16.	*Ahita-pitta*				✓			✓
17.	*Mutra-shodhan*	✓	✓	✓			✓	
18.	*Rakta-shodhan*	✓		✓				
19.	*Ahita-rakta*				✓			✓
20.	*Balya*	✓	✓	✓			✓	
21.	*Ruchya*					✓		
22.	*Vrushyam*	✓	✓				✓	
23.	*Agnikrut*			✓				
24.	*Brimhanam*					✓		
25.	*Medo-vardhak*	✓	✓				✓	
26.	*Krumikaram*	✓	✓	✓			✓	

Table (6): Properties of *Purana guda* mentioned in classical text.

Sr. no.	**Properties**	***AH***	***AS***	***SS***	***BP***	***MPN***	***DN***	***RN***	***KN***	***SNB***	***YR***
1.	*Madhuram*				✓			✓	✓	✓	✓
2.	*Laghu*				✓	✓		✓	✓	✓	✓
3.	*Snigdham*							✓		✓	✓
4.	*Tridoshahara*							✓		✓	✓
5.	*Pittaghnam*				✓			✓		✓	✓
6.	*Vataghnam*				✓			✓		✓	✓
7.	*Anabhishyandi*				✓	✓			✓		
8.	*Rasayanam*						✓				✓
9.	*Vrushyam*				✓						
10.	*Hridyam*	✓	✓			✓		✓	✓	✓	✓
11.	*Pathyam*	✓	✓	✓	✓	✓		✓	✓	✓	✓
12.	*Ruchyam*							✓		✓	✓
13.	*Shramaharam*							✓		✓	✓
14.	*Agnijanak*				✓	✓		✓	✓	✓	✓

15.	*Pustikaram*				✓	✓					
16.	*Asrukprasadanam*				✓						
17.	*Jwarahara*							✓		✓	✓
18.	*Santapa-shantiprad*							✓		✓	✓
19.	*Malavikar-nashan*							✓		✓	✓
20.	*Mutravikar-nashan*							✓		✓	✓
21.	*Pandurog-nashak*							✓			✓
22.	*Prameh-nashak*							✓		✓	✓
23.	*Kandu-nashak*									✓	

AH- Ashtanga Hridayam;[7] AS- Ashtanga Sangraham;[8] SS- Sushrut Samhita;[9] BP- Bhavaprakasha;[10] MPN- Madanpala Nighantu;[11] DN- Dhanvantari Nighantu;[12] RN- Raja Nighantu;[13] KN- Kaiyadeva Nighantu;[14] SNB- Shaligram Nighantu Bhushana;[15] YG- Yogaratnakara.[16]

CONCLUSION

Parameters of analytical study of *Naveena* and *Purana* jaggery samples lies in the specified limits as mentioned in API (*Ayurvedic* Pharmacopoeia of India). So according to these parameters both the samples can be utilized in pharmaceutical preparations, but according to properties mentioned in classical text *purana guda* is more beneficial as there is enhancement in *gunas* due to *kala sanskara.*

According to *Acharya Vagbhat Naveen guna* is '*Agnisada krut'* and as it gets aged it becomes *Pathyatam* and *Hrudya*.

As shown in table no.2 the moisture content % is reduces due to aging, this reduction in moisture content of *guda* is more suitable for any pharmaceutical preparation as it helps in increasing shelf life of any formulation.

According to classical text *guda* has many properties and as it gets aged, it becomes *pathytam*, more efficacious and attains *vyadhi-nashana* property like *pandurog-nashak* etc. (as shown in table no 6).

REFERENCES

1. Angadi DR. A Textbook of Bhaishajya kalpana vijnana Pharmaceutical science. 2nd ed. Varanasi: Chaowkhamba Vidyabhawan, 2016.

2. Deshmukh A, Amrutkar M, Chavan S. Morden and Ayurvedic aspects of guda with special reference to Jaggery. Ayurpub.com. 2017 february; 2: 275-281.
3. The Ayurvedic Pharmacopoeia of India part 1 vol 6. 1st ed. Delhi: The cntroller of publications civil lines, 2008.
4. Rajesh C, Shajahan MA, Shahul Hameed A. Analytical study on different samples of guda (jaggery) collected from Thrissur, Kerala. Ayurpharm- International Journal of Ayurveda and Allied Sciences, 2016 April; 5: 52-58.
5. Rajesh CK, Shajahan M, Shahul Hameed A. Ayurvedic Review on Guda (Jaggery). Ayurpharm- International Journal of Ayurveda and Allied Science, 2016 May; 5: 68-78.
6. Joshi AV. Ayurvediya Shabdakosha Mumbai: Maharashtra Sahitya Ani Sanskrita Mandala, 1968.
7. Tripathi DB. Ashtanga Hridayam Delhi: Chaukhamba Sanskrita Pratishthan, 2010.
8. Sharma DS. Ashtanga Sangraham. 2nd ed. Varanasi: Chaukhamna Sanskrita Series Office, 2008.
9. Sharma AP, Dr. Anantrama Sharma. Sushruta Samhita Varanasi: Chaukhamba Surbharti Prakashan, 2012.
10. Chunekar PK, Pandey DG. Bhavaprakasha Nighantu Varanasi: Chaukhanbha Bharati Academy, 2010.
11. Pandey PDG. Madanpal Nighantu. 1st ed. Varanasi: Chaukhambha Orientalia, 2012.
12. Kamat DSD. Dhanvantari Nighantu. 1st ed. Varanasi: Chaukhamba Surbharti Prakashan, 2002.
13. Tripathi DI. Rajanighantu Varanasi: Chaukhanbha Krishnadas Academy.
14. Sharma AP, Sharma DG. Kaiyadeva Nighantu Pathyapathya vibodhak. Varanasi: Chaukhanbha Orientalia, 2009.
15. Shaligram Nighantu Bhushan Bombey: Khemraja Shree Krishnadasa Prakasna.
16. Shastri VS. Yogratnakar Varanasi: Chaukhambha Prakashan, 2017.