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SHARKARA - A REVIEW WITH MODERN AND AYURVEDIC POINT OF VIEW

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ABSTRACT

Sugar is a natural sweet substance produced by sugar cane plant and is one of the most valued as well as appreciated natural substance known to mankind since ancient times. Of all the natural foods rich in carbohydrates sugar is the most wholesome and delicious. The medicinal quality, taste, texture, color and aroma of sugar differs according to the geographical area and the species of plants from which it has been made. Sugar is called as sharkara in Ayurveda. Three types of sharkara are described in Ayurveda depending on their physical appearance and properties. Etymology, synonyms, varieties, method of collection, chemical constituents, properties, adulterants, chemical tests, and the usages ofJaggeryare gathered from text books, experienced Ayurvedic physicians and from internet.Sharkara usedto treatjwara, raktavikara, pittavikara, vatavikara. Sharkara is used in many Ayurvedicpreparations like gutivati i.e. tablets and also used as binding material. It is also used as prakshepakadravya in kwatha, used in churna, for preparation of asava and arishta it is a main mediator and also act as a preservative, hence sharkarakalpana (syrup) having more stability period. The present work aims at the review of sugar or sharkara explained in Ayurveda andbiomedical science.

Keywords: Sugar, Sharkara, Ayurveda, Syrup, Prakshepakadravya

INTRODUCTION

For many centuries, sugar has been used in vital alternative medicine of Ayurveda and is one among the foods having religious significance. In Hindu religion shadrasa bhojana is important and in which madhuara rasa is one of the main rasa. In some auspicious days sharkara also given as devine food. Sharkara is also one important ingredient in Ayurvedic medicine preparations. Sugar has been produced in the Indian subcontinent since ancient times. It was not plentiful or cheap in early times and honey was more often used for sweetening in most parts of the world. Originally, people chewed raw sugarcane to extract its sweetness. Sugarcane was a native of tropical South Asia and Southeast Asia. Different species seem to have originated from different locations with *Saccharum barberi* originating in India and *S. edule* and *S.officinarum* coming from New Guinea. One of the earliest historical references to sugarcane is in Chinese manuscripts dating back to 8th century BC that state that the use of sugarcane originated in India.

Sugar was found in Europe by the 1st century AD, but only as an imported

medicine, and not as a food. The Greek physician Dioscorides in the 1st century Pliny the Elder (AD) described sugar in his medical treatise De Materia Medica and 1st century (AD) Roman, described sugar in his Natural History

VERNACULAR NAMES &SYNONYMS[1]

sanskrit	*Minandi, Matsyandika, sita, sikta, sitopala, Sukla, Shubhra*
Assamese	*Chini*
Bengali	*Chini*
English	Sugar
Gujrati	*Shaakar*
Hindi	*Chini*
Kannada	*Sakkare*
Malyalam.	*Panchasara*
Marathi.	*Sakhara*
Oriya	*Chini*
Punjabi.	*Chini*
Tamil.	*Sarkkarai*
Telgu.	*Panchadhara, Chekkera*
Urdu.	*Sakkara*

***Gana* mentioned in Ayurvedic text**

Charaka samhita[2] *- Ikshuvarga, Jwarahara mahakashaya, Daha-prashamana mahakashaya, shonita-sthapana mahakashaya*

Sushrut samhita[3]*- Ikshuvarga*

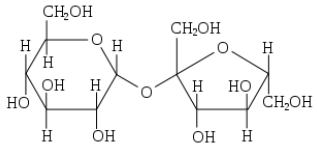
Ashtanga Hridaya[4] *-Ikshuvarga*

Scientific classification[5]: of ***Saccharum officinarum***

Kingdom	**Plantae**
(Unranked)	Angiosperms
(Unranked)	Monocots
(Unranked)	Commelinids
Order	Poales
Family	Poaceae
Subfamily	Panicoideae
Tribe	Andropogoneae
Genus	Saccharum
Species	S. Officinarum

Production[6]: Sugarcane (*Sacchrum officinarum)* is a perennial grass in the family Poaceae. It is cultivated in tropical and sub-tropical regions for the sucrose that is found in its stems. It requires a frost-free climate with sufficient rainfall during the growing season to make full use of the plant's great growth potential. The crop is harvested mechanically or by hand, chopped into lengths and conveyed rapidly to the processing plant. Here it is either milled and the juice extracted with water or extracted by diffusion. The juice is then clarified with lime and heated to destroy enzymes. The resulting thin syrup is concentrated in a series of evaporators, after which further water is removed by evaporation in vacuum containers. The resulting supersaturated solution is seeded with sugar crystals and the sugar crystallizes out and is separated from the fluid and dried. Molasses is a by-product of the process and the fiber from the stems, known as bagasse, is burned to provide energy for the sugar extraction process. The crystals of raw sugar have a sticky brown coating and either can be used as they are or can be bleached by sulfur dioxide or can be treated in a carbonization process to produce a whiter product. About 2,500 litres (660 US gal) of irrigation water is needed for every one kilogram of sugar produced

Chemical composition of sugar:[6]



Sucrose: a disaccharide of glucose (left) and fructose (right), important molecules in the body.

IDENTITY PURITY AND STRENGTH[1]

Moisture content	Not more than 1.5% by wt
Acid-Insoluble Ash	Not more than 0.7% by wt.
Sucrose	Not more than 93% by wt
Sulphur dioxide	Absent
Calcium Oxide	Not more than 100 (mg/100g)
Heavy Metal	Complies with API
Microbial Limit	Complies with API
Pesticide Residue	Complies with API

Storage: Should be stored in air tight container.

Types of sugars:-

Monosaccharides[6]

Fructose, galactose, and glucose are all simple sugars, monosaccharides, with the general formula $C_6H_{12}O_6$. They have five hydroxyl groups (−OH) and a carbonyl group (C=O) and are cyclic when dissolved in water. They each exist as several isomers with dextro and laevorotatory forms that cause polarized light to diverge to the right or the left.

Fructose, or fruit sugar, occurs naturally in fruits, some root vegetables, cane sugar and honey and is the sweetest of the sugars. It is one of the components of sucrose or table sugar. It is used as high-fructose syrup, which is manufactured from hydrolyzed corn starch that has been processed to yield corn syrup, with enzymes then added to convert part of the glucose into fructose.

In general, **galactose** does not occur in the free state but is a constituent with glucose of the disaccharide lactose or milk sugar. It is less sweet than glucose. It is a component of the antigens found on the surface of red blood cells that determine blood groups.

Glucose, dextrose or grape sugar, occurs naturally in fruits and plant juices and is the primary product of photosynthesis. Most ingested carbohydrates are converted into glucose during digestion and it is the form of sugar that is transported around the bodies of animals in the bloodstream. It can be manufactured from starch by the addition of enzymes or in the presence of acids. Glucose syrup is a liquid form of glucose that is widely used in the manufacture of foodstuffs. It can be manufactured from starch by enzymatic hydrolysis.

Disaccharides[6]

Lactose, maltose, and sucrose are all compound sugars, disaccharides, with the general formula $C_{12}H_{22}O_{11}$. They are formed by the combination of two monosaccharide molecules with the exclusion of a molecule of water.

Lactose is the naturally occurring sugar found in milk. A molecule of lactose is formed by the combination of a molecule of galactose with a molecule of glucose. It is broken down when consumed into its constituent parts by the enzyme lactase during digestion. Children have this enzyme but some adults no longer form it and they are unable to digest lactose.

Maltose is formed during the germination of certain grains, the most notable being barley, which is converted into malt, the source of the sugar's name. A molecule of maltose is formed by the combination of two molecules of glucose. It is less sweet than glucose, fructose or sucrose. It is formed in the body during the digestion of starch by the enzyme amylase and is itself broken down during digestion by the enzyme maltase.

Sucrose is found in the stems of sugarcane and roots of sugar beet. It also occurs naturally alongside fructose and glucose in other plants, in particular fruits and some

roots such as carrots. The different proportions of sugars found in these foods determine the range of sweetness experienced when eating them. A molecule of sucrose is formed by the combination of a molecule of glucose with a molecule of fructose. After being eaten, sucrose is split into its constituent parts during digestion by a number of enzymes known as surcease.

Types of sugar as per Ayurveda: [3,4,7]

According to physical appearance Sharkara is divided into three types

1. Matsyandika: they are small crystals looked like eggs of ants.
2. Khanda sharkara (Sharkara): Large crystalline form.
3. Sitopala: Powder form, sand type structure.

Synonyms of sharkara: [3,4,7]

1. Matsyandika: Minakshi, Vallaka, Palika, Sita
2. Khanda sharkara:Khanda, Sita, Pinda-sharkara
3. Sitopala: Ahichatra, Shweta, Shubhra

Gunas of sharkara: [3,4,7]

1. Matsyandika: Guru, Saraka, Shukravardhaka, balakaraka, Raktapittahara, chardighna, murchahara, jwarahara, dahanashaka, trishnahara.
2. Khanda sharkara: Netrya, Kshata-kshinahara, Saraka, Shukravardhaka, balakaraka, Rakta-pittahara, chardighna, vatanashaka
3. Sitopala: Saraka, LaghuShita, Vata-Pitta hara.

According to Acharya Sushruta and Acharya Vagbhata there is no difference in properties of Matsyandika, Khanda-sharkara, and Sitopala (Sharkara) but their intensity of gunas are in increasing order respectively. There gunas are as follows, sheeta, snigdha, guru, madhura, raktapittahara, trishnahara, Kshata-kheena hara.

According to origin types of sharkara[8,2,7, 9]

In Ayurveda specifically they described different types of sugar or sharkara with their different origins: and their medicinal properties also mentioned in the texts. Now days these sharkara are not in use, these are follows.

1. Madhu-sharkara:Made from madhu (honey) Kashaya, madhura rasa, chardinashaka, trishnahara, atisara-nashaka, rakta-pitta hara, Kapha-nissaraka
2. Guda-sharkara: Made from guda (Jaggery), kshata-kshaya hara, trishna hara, rakta-pittaghna, jwara hara, shukravardhaka, kricchasnehayukta.
3. Yavasa sharkara: Made from yavasa (decoction of durlabha), kashaya-madhura rasa, ruksha, swedajanana, alahadjanana, jwarahara, raktavikarnashaka.
4. Tavaraja sharkara: saraka, ruksha, kashaya, kaphaghna, trishna hara, daha hara, shrama hara
5. Poundraja sharkara: snigdha, shukravardhaka, kshata-hara
6. Pushpasita: made from flowers, sheeta, laghu, rakta-pitta hara.

Therapeutic Uses[1]

Arsha, Aruchi, Bhrama, Chardi, Daha, Dourbalya, Jwara, Krimi, Kshina, Kshaya, Madatyaya, Moha, Murcha, Raktapitta, Raktastruti, Raktavikara, Shrama, Trushna, Vatarakta, Vishavikara.

DISCUSSION

Since ancient time sugar was known to the mankind and mentioned in Ayurveda as sharkara. There are different types of sharkara mentioned in Ayurvedic text books. Acharya Vagbhata and Acharya Sushruta

mentioned three types of sharkara but in different physical forms, same as in Kaiyyadeva nighantu. In Dhanvantari nighantu and charakasamhita they have mentioned three types but according to their different origins, same in Bhavprakasha nighantu they have mentioned 6 types of sharkara according to their origin and also mentioned three types of sharkara according to physical form. Here chemical constituents of sugar and standard value of sugar according to API is mentioned. Sugar is valuble product and use in medicine for their treatment value as well as for their test and as preservative. In present life style sugar which is used is made from ikshu rasa. In Ayurvedic pharmacies mainly for medicinal preparations khandasharkara (Sugar candy) is used which is less processed compared to mastyandika.(Normal sugar). Other varieties and their nutritional values has to be calculated and their standards should be derived.

CONCLUSION

It can be concluded that sugar is an invaluable natural substance with many diverse usages. It is used in many diseases as a medicine. In diarrhea and hypoglycemia sugar is a vital medicine. It also useful in the preparations of various medicines as binding agent or as preservative or as a main ingredient. Selected sugar must be pure and genuine.

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