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RESEARCH ARTICLE

OSMOTIC DEHYDRATED GINGER CANDY

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ABSTRACT

The aim of this paper is to make osmotic dehydrated ginger candy. Palm sugar syrup is used as an osmotic agent. Ginger is pretreated and osmosis is done with palm sugar syrup. The water is drained after osmosis process. The product left after draining is dried, packed and stored. The acceptability of the product is evaluated using 5 Point hedonic scale.

INTRODUCTION

Ginger also known as *Zingiberofficinale* is monocotyledonous herbaceous plant belonging to the family *Zingiberaceae* that is widely used around the world in foods as a spice. For centuries, it has been an important ingredient for the treatment of several diseases (Ali *et al.,* 2008). The rhizomes (spices of commerce) are aromatic, thick lobed, breached and scaly structures with a spicy lemon-like scent. In addition, ginger contains biologically active constitutions including the main pungent principle, the gingerols and shogaols (Singh *et al.,* 2008). Ginger root and ginger oil are also used as preservative and flavoring agent. Many products can be manufactured from ginger like dehydrated ginger, ginger candy, ginger powder, ginger oil and oleoresins and so on. Ginger is an important commercial crop with versatile applications. It is also used in many medicines as it helps digestion and absorption of food and has antiseptic properties. The peculiar hot taste and pungent taste of ginger can be attributed to the presence of an acrid compound called gingerol. Most of the health benefits of ginger are due to Gingerol. The pungency of fresh ginger is due primarily to the gingerols, which are a homologous series of phenols. The most abundant is 6-gingerol that is smaller quantities of others gingerols with different chain lengths are also present. The pungency of dry ginger mainly results from shogaols which are dehydrated forms of gingerols.

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Shogaols are formed from the corresponding gingerol during thermal processing (Ali *et al.,* 2008). These compound are also known for their antioxidant activity (Stoilova*et al.,* 2007; Kikuzaki and Nakatani, 1993; Chan *et al*., 2008), in particular, it has been shown that 6-gingerols is endowed with strong antioxidant action both *in vivo* and in vitro, in addition to strong anti-inflammatory and anti-apoptotic actions (Kim *et al.,* 2007). Ginger is a commonly used as spice which has high nutraceutical benefits. Ginger has moderate moisture content so it quickly dehydrates in room temperature itself in three or four days from harvesting. As a rhizome it has large number of soil microbes which hastens the spoilage. Ginger agent. To preserve ginger many products is manufactured from ginger, like dehydrated ginger, ginger candy, ginger powder, ginger oil and oleoresins. In that ginger candy is manufactured by cane sugar. Cane sugar is majorly used as a osmotic agent. But has no nutritional benefits. Palm sugar which is traditionally using in India as a sweetening agent has potential health benefits. Here the cane sugar is replaced by palm sugar and ginger candy was produced. Palm sugar has Lower Glycemix Index, so diabetic patients can take this candy and this canbe used in instant ginger tea. And in the sensory evaluation of palm sugar osmotic dehydrated Ginger candy scores Good. Generally, Higher Glycemix index cane sugar of 67 is used for Osmotic dehydration, we selected Palmyra sugar because it has Lower Glycemix index of 41 and it has many health benefiting micro and macro nutrients. It is good source of Thiamine, Riboflavin, Nicotinic Acid, Vitamin C and mineral salts of Phosphorus , Ca, Fe etc.,

MATERIALS AND METHODS

Raw Materials

The sound Ginger is bought from the local market near by coimbatore. And the Palm gur crystal sugar also bought from the grocery shop of Coimbatore

Fig. 1. Palm Gur

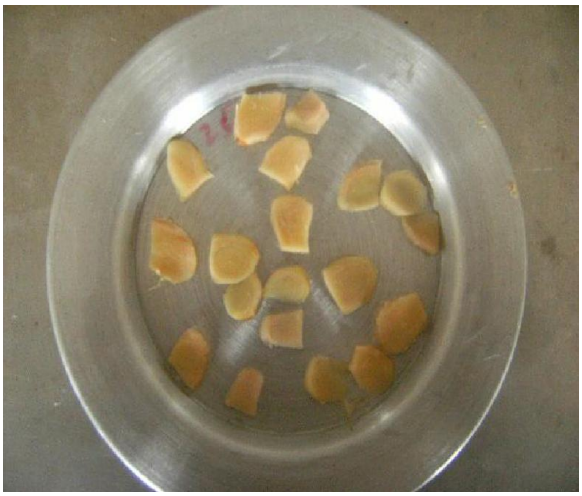

Fig. 2. Sliced Ginger

Palm Sugar Syrup Preparation Method

300 ml of water was taken and palm sugar was dissolved in it by continous boiling. After complete dissolving of palm sugar, the refractrometer reading Brix value was noted at a regular interval until the brix attains 70° Brix, thus Palm Sugar Syrup was prepared.

Osmotic dehydration

Osmotic dehydration is an important process used in the food industry and in the last years a lot of scientific studies about processing fruits and vegetables (Torreggiani, 1993), meat and meat and fish (Collingnan *et al.,* 2001) were developed. The process was initially proposed by Ponting (1966) and defined more recently by Raoult-Wack (1991) as dewatering impregnation soaking in concentrated solution. It consists in the immersion of the product into a concentrated solution such as sugar, salt, sorbitol and glycerol, generating a partially dehydrated and impregnated product. Osmotic dehydration is the process of water removal by immersion of water-containing cellular solid in concentrated aqueous solution (Ponting, 1973). The fundamental purpose of food dehydration is to lower the water content in order to minimize rates of chemical reactions and to facilitate distribution and storage.

Process of osmotic dehydration

Osmotic dehydration is the phenomenon of removal of water from lower concentration of solute to higher concentration (Sugar solution)through semi permeable membrane results in the equilibrium condition in both sides of membrane (Tiwari 2005).

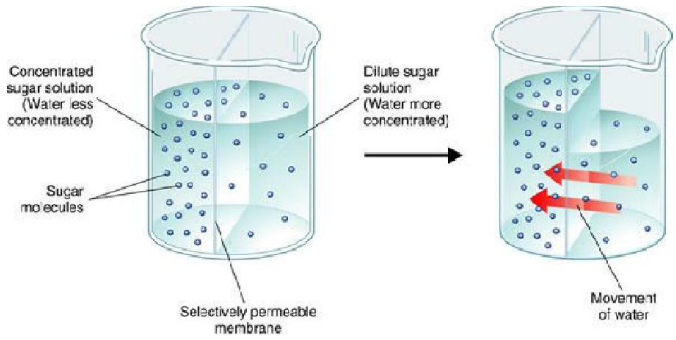

Fig. 3. Osmotic Dehydration

The ginger is washed well and the skin is peeled off. Then the ginger is sliced in 1-3 mm thickness. From that 10 g of Ginger is weighed and soaked in palm sugar solution for 3 days. Every day the brix value was decrased from 70° Brix, so it is increased by boiling the syrup*. On the third day, the osmotically dehydrated ginger is separated from the syrup and excess syrup is wiped by a tissue paper and weighed. The final weight of the product is 5.2 g. Then it is dried under room temperature for one day. Finally the Ginger candy is packed in polyethylene pouches. Artifiacial Tray drying may cause aroma loss in the product.

Fig. 4. Osmotic Dehydration of Ginger

Osmotic dehydration (OD) is a process that involves immersing a solid food in a hypertonic aqueous solution, which leads to the loss of water and a solids gain from the solution into the food. The process of osmotic solutes transferring from the solution into the product is directly related to the water exchange from the product into the osmotic solution (Barbosa Júnior, Cordeiro-Mancini, and Dupas-Hubinger (2013). OD is a drying process that provides

better control of flavor loss and tissue damage as well as improved color and nutrient retention (Nowacka, Tylewicz, Laghi, Dalla-Rosa and Witrowa-Rajcher, 2014). Sugars and salts are the two most commonly used solutes for OD, with relevance to sodium chloride and sucrose (Jokić, Gyura, Lević and Zavargó, 2007). The main bioactive components of ginger are the gingerols, which possess antioxidant, anticancer, and anti-inflammatory attributes (Ghasemzadeh, Jaafar and Rahmat, 2010).

Ginger
↓
Pre-treatment
↓
Osmotic Dehydration ← Ingredients (Palm sugar)
↓
Draining
↓
Drying
↓
Packaging
↓
Storage

Fig. 5. Osmotic dehydrated Ginger Candy

Fig. 6. Osmotic dehydrated Ginger Candy

RESULTS AND DISCUSSION

Several authors have shown that ginger is endowed with strong *in vitro and in vivo* antioxidant action of ginger has been proposed as one of the major possible mechanisms for the protective actions of the plant against toxicity and lethality of radiation (Jagetia *et al.,* 2003; Haksar *et al.,* 2006) and a number of toxic agents such as carbon tetrachloride and cisplatin (Amin and Hamza, 2006; Yemitan and Izegbu, 2006) as an anti-ulcer drug (Siddaraju and Dharmesh, 2007). Ginger's high antioxidant value has proved highly effective with its ability to scavenge a number of free radicals and protect cell membrane lipids from oxidation in a dose-dependent manner (Srivastava and Mustafa, 1989).

Sensory analysis

Sensory evaluation for Osmotic dehydrated ginger is done. It results very good in colour and aroma also retained, this is due to drying the ginger in the room temperature slowly. If we prefer tray drier aroma will be loss majorly, other parameters like colour, texture also affected. The sensory evaluation results that overall acceptability is good.

Point hedonic scale

1	Very Good
2	Good
3	Fair
4	Bad
5	Very Bad

Table 1. Sensory Evaluation

PARAMETERS	SCORE
TEXTURE	2
COLOUR	1
TASTE	2
AROMA	2
Over all Acceptability	2

Future prospectus

Palm sugar osmotic dehydrated Ginger can be developed as a nutraceuticals, because both has a therapeutic values. And it can replace the sugar while preparing Ginger Tea and it will add a new flavour.

Future plans

Optimisation

To compare the osmotic behavior of cane sugar and palm sugar ,both sugar concentration of 45°Brix and 60°Brix to be taken. And the osmotic dehydration of Ginger was took under two different temperature (30°C and 60°C). The weight loss , Solute Gain , Weight reduction were noted at 2 hours interval of time. The increased concentration and temperature shows in increased solute gain. This is done by Surface Respone Methodology.

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