

Studies on Development and Sensory Evaluation of Whey-Based Pomegranate (Punica Granatum) Using Date Syrup As Sugar Substitute Herbal Beverage



Engineering

KEYWORDS : whey, date, pomegranate, beetroot, beverage, sensory evaluation.

Harmeet Singh Deol	M.Sc.4th semester student, Department of Food Technology Baba Farid Institute of Technology, Dehradun (U.K)-248007 India
Chandra Prakash	Assistant Professor, Department of Food Technology Baba Farid Institute of Technology, Dehradun (U.K)-248007 India
Mayank Kaushik	M.Sc.4th semester student, Department of Food Technology Baba Farid Institute of Technology, Dehradun (U.K)-248007 India
Prateek Kumar Guha	M.Sc.4th semester student, Department of Food Technology Baba Farid Institute of Technology, Dehradun (U.K)-248007 India

ABSTRACT

This study shows the development and sensory evaluation of beverage based on whey which is a nutritious by product from cheese, chhana and paneer industry containing valuable nutrients and pomegranate which is high source of antioxidant and contains various therapeutic values. Dates have been used as the sugar substitute which consist of 70% carbohydrates, most of which is in the form of sugars. Various ratios of the beverage were prepared followed by the sensory evaluation. After the standardization of various parameters the final ratio obtained was Whey: Pomegranate: Date: Beetroot i.e. 50:30:18:2 which was estimated by sensory evaluation done by 10 untrained panelists on the basis of 9 point hedonic scale. The storage study of the final product was studied in gap duration of 5 days.

INTRODUCTION:

WHEY: Whey is a nutritious by product from cheese, chhana and paneer industry containing valuable nutrients like lactose, proteins, minerals and vitamins etc., which have indispensable value as human food. Whey constitutes 45-50% of total milk solids, 70% of milk sugar (lactose), 20% of milk proteins and 70-90% of milk minerals and most importantly, almost all the water soluble vitamins originally present in milk (Horton, 1995). A widely accepted measure of the general effectiveness of a dietary protein source in providing the metabolic requirements of individual is an index called the "Biological Value". Whey proteins have been known for some time to have biological value superior to that of other naturally occurring proteins. Biological value is determined by evaluating many aspects but in particular amino acid profile and protein digestibility.

The conversion of whey into beverages through fermentation or without fermentation is one of the most attractive avenues for the utilization of whey for human consumption. In terms of functionality, whey protein enhances protein content of beverage while improving its quality. The production of a beverage from whey butter cheese and acerola juice has been shown to have good commercialization potential, uniting the benefits provided by the former with those of latter, including the ingestion of essential amino acids and increasing the vitamin C content, resulting in a product of differentiated nutritive value (Cruz et al., 2009).

DATE: Date fruit consist of 70% carbohydrates, most of which is in the form of sugars. Because of this the fruits are a high source of energy and its approximated that 100g of the flesh can provide 314 kcal of energy (Al Farsi and Lee, 2008). Drying of date decreases the water activity and this increases the sugar concentration. Because of this the shelf life of dry dates are high and are available for extend periods of time (Al-Shahib and Marshall, 2003). The sweetness of date fruit is closely related to the maturity and ripeness stage. Health benefits of eating dates are as follows:

- Weight gain.
- Improve hemoglobin.

- Against respiratory infections.
- In treatment of constipation.
- Reduce the risk of Heart disorders.
- Bone Maker.

POMEGRANATE: The ancient Egyptians used tannin-rich pomegranate root extracts for the riddance of tapeworms (Wren, 1988). Hippocrates (400 BCE) used pomegranate extractions for a wide variety of ailments, such as aplaster to reduce skin and eye inflammation, and as an aid to digestion (Adams, 1849). Other traditional uses of pomegranate products have included treatments for contraception, snakebite, diabetes, and leprosy (Lansky et al., 2000).

Today, pomegranate juice has been shown to contain polyphenol antioxidants (primarily ellagic acid and punicalagin) that may lower risk of heart disease and may slow cancer progress. The antioxidant content of pomegranate juice is among the highest of any foods (Guo et al., 2003). The most famous usage worldwide has been as a vermifugal or taenicidal agent (Kapoor, 1990), i.e., a killer and expeller of intestinal worms. Other traditional uses of these materials have included treatments for snakebite (Jain and Puri, 1984), diabetes (Singh, 1986), burns (Siang, 1983) and leprosy. The fresh fruit itself has been used as a refrigerant to lower fever.

BEE T ROOT: Chemical-induced liver injury depends mostly on the oxidative stress in hepatic tissue and underlies the pathology of numerous diseases, including cancer. There is still a lack of effective therapeutics; hence, a treatment with antioxidants has been proposed for prevention and/or attenuation of injury. Red beetroot (Beta Vulgaris L.) is a vegetable characteristic of the Eastern and Central European diet, and is also used as a popular folk remedy for liver and kidney diseases, for stimulation of the immune and hematopoietic systems, and as a special diet in the treatment of cancer. Besides other active chemicals, beetroots contain a unique class of water-soluble, non-phenolic antioxidants, the betalains, including two classes of compounds, red betacyanins (principally betanin) and yellow betaxanthines. The antioxidant effects of betalains have

been demonstrated mainly in various in vitro experiments. Beetroot is rich in several other bioactive compounds that may provide health benefits. Beetroot is as an exceptionally rich source of antioxidant compounds.

MATERIAL AND METHOD:

(a) Preparation of whey

The heated milk (84°C) was acidified by adding citric acid (2%) followed by continuous stirring resulting in complete coagulation of milk protein (casein). The liquid whey was filtered using muslin cloth.

- Heat the milk (84°C)
- ↓
- Add citric acid (2%)
- ↓
- Stir the milk continuously
- ↓
- Complete coagulation of milk
- ↓
- Liquid whey filtered by muslin cloth

Fig no.1: flow chart showing preparation of whey

(b) Preparation of pomegranate juice

The pomegranate was procured from local market of dehradun. The procured pomegranate was sorted on the basis of ripeness and acceptability, now wash them thoroughly with running tap water and then with distilled water. Remove the peel of the pomegranate and then it is blended to get the juice. This juice is filtered with the help of muslin cloth to get clear pomegranate juice.

- Collection of pomegranate
- ↓
- Sorting (ripe, not injured)
- ↓
- Washing
(Running tap water and then distilled water)
- ↓
- Peeling (manually by knife)
- ↓
- Collect pomegranate arils
- ↓
- Blending
- ↓
- Filtration (using muslin cloth)
- ↓
- Collection of Pomegranate juice

Fig no.2: flow chart showing preparation of pomegranate juice

(c) Preparation of beetroot juice

Beetroot was procured from local market of dehradun. After that it was washed thoroughly with running tap water and then with distilled water. The peel was removed and then it was blended to get the juice. The juice obtained after blending was filtered with the help of muslin cloth to get clear beetroot juice.

- Collection of beetroot
- ↓
- Washing
(Running tap water and then distilled water)
- ↓
- Peeling (manually by knife/peeler)
- ↓
- Cutting into small pieces (by knife)

- ↓
- Blending
- ↓
- Filtration (using muslin cloth)
- ↓
- Beetroot juice

Fig no.3: flow chart showing preparation of beetroot juice

(d) Preparation of date syrup

Date palm was procured from local market of dehradun. The procured date palm was sorted on the basis of ripeness and acceptability. Now seed was removed from the date palm and then it is soaked in hot water (80°C-90°C) with the ratio of 1:3 for 1 hour and then blends it with the help of blender to get the smooth consistency. Then filter it with the help of muslin cloth to get clear date juice, now heat this in a container at temperature 80°C-84°C nearly 1hour. Then syrup in maintained to 45°brix.

- Collection of date
- ↓
- Sorting (ripe, not injured)
- ↓
- Separation of pulp and seed
- ↓
- Soaking in hot water (80°C-90°C for 1hour)
- ↓
- Blending
- ↓
- Filtration (using muslin cloth)
- ↓
- Date juice
- ↓
- Heating (80°C-84°C)
- ↓
- Cool the solution at room temperature (maintain at 45° brix)
- ↓
- Collection of Date syrup

Fig no.4: flow chart showing preparation of date syrup

(e) Preparation of whey - based pomegranate beverage

The milk, dates, pomegranate and beetroot were procured from the local market of dehradun. The procured milk was heated at 84°C and 2% citric acid was added after the boiling with continuous stirring to prepare the coagulant. After the complete coagulation of milk the liquid whey was filtered by using clean muslin cloth. To that obtained whey the freshly prepared pomegranate juice and beetroot juice were added. Freshly prepared date syrup was added as the sugar substitute which after proper blending gives the final product i.e. whey based pomegranate beverage.

- Whey
- ↓
- Addition of pomegranate juice
- ↓
- Addition of beetroot juice
- ↓
- Addition of date syrup
- ↓
- Blending and mixing (hand blender)
- ↓
- Whey – based pomegranate beverage
- ↓
- Storage (low temperature)

Fig no.5: flow chart showing preparation of whey - based pomegranate beverage

Sensory Evaluation:-9 point hedonic scale

Parameter	Pan-elist1	Pan-elist2	Pan-elist3	Pan-elist4	Pan-elist5	Pan-elist6	Pan-elist7	Pan-elist8	Panelist9	Panelist10	Overall acceptability
Colour	8	7	8	7	7	7	8	7	7	8	7.4
Consistency	6	7	6.5	6	7.5	6	6	7	7.5	6	6.55
Flavor	5	6	5.5	7	6	6	7	5	7	6	6.05
Taste	7	7	6	7.5	8	6	6	8	6.5	7	6.9
Overall acceptability	6.5	6.75	6.5	6.87	7.12	6.25	6.75	6.75	7	6.5	-

Color

The overall acceptability obtained for the parameter was 7.4 which was more than the acceptability level that is 5. The acceptability was obtained by sensory evaluation done by 10 untrained panelists on the basis of 9 point hedonic scale.

Consistency

The overall acceptability obtained for the parameter was 6.55 which was more than the acceptability level that is 5. The acceptability was obtained by sensory evaluation done by 10 untrained panelists on the basis of 9 point hedonic scale.

Flavor

The overall acceptability obtained for the parameter was 6.05 which was more than the acceptability level that is 5. The acceptability was obtained by sensory evaluation done by 10 untrained panelists on the basis of 9 point hedonic scale.

Taste

The overall acceptability obtained for the parameter was 6.9 which was more than the acceptability level that is 5. The acceptability was obtained by sensory evaluation done by 10 untrained panelists on the basis of 9 point hedonic scale.

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