

Development and Quality Evaluation of Chocolate Flavoured Milk blended with Garden Cress Seed Powder and Moringa Seed Powder

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ABSTRACT: The current investigation was carried out for the standardization of milk, cocoa powder, garden cress seed and moringa seed powder for the development of chocolate flavoured milk. The aim of the study was value addition of flavoured milk with natural herbs thereby increasing its therapeutic value. Cocoa-powder was used as the flavour enhancer. Different formulations with varying composition of milk, cocoa powder, garden cress seed and moringa seed powder were evaluated based on sensory scores. The flavoured milk was standardized accordingly with the sensory score. Four different formulations were tried and treatment T₂ was found to be the optimized formulation which had 6% sugar, 0.5% garden cress seed, 0.5% moringa seed powder and 1% cocoa powder. The colour and appearance, consistency, flavor and taste and overall acceptability were analyzed on 9-point hedonic scale. Physico-chemical properties like moisture (%), total solids (%), fat (%), protein, ash (%), carbohydrates (%) and functional properties like antioxidant activity, crude fibre, specific gravity and viscosity and specific gravity were determined by standard procedure. The data obtained were tabulated and statistically analyzed. The developed flavoured milk was highly nutritious that could be used to achieve adequacy of iron and mineral deficiency especially in women and also suitable for consumption for population of all age group.

Keywords: Flavoured Milk, Garden Cress Seed, Moringa seed Powder, Cocoa Powder, therapeutic value.

INTRODUCTION

Flavoured milk is milk to which some flavour has been added. Flavoured milk usually start with a pleasant flavour. When the term milk is used in the preparation of flavoured milk, it means the product should Flavoured milk represents one of the most popular dairy-based beverages in India contain a milk fat percentage of that milk from which it prepared. This type of milk beverages are prepared by standardizing dairy as well as non-dairy ingredients in appropriate concentration. An artificial flavour is added in manufacturing in flavoured milk. Fat and SNF is adjusted to the desired level by addition of cream for standardizing fat and reconstituted skim milk of powder is added for standardizing SNF content (Frary, 2021). Flavoured milk is highly palatable, nourishing beverage that can help anyone to meet daily dairy food and calcium intake recommendations. Despite the important nutrient contributions flavoured milk contribute to the diet, concerns about the potential effects of the added sugar and flavourings in flavoured milk have raised questions regarding the role of flavoured milk in a healthy diet. Flavoured milk provides essential nutrients, including calcium, potassium, phosphorous, protein, vitamins A, D and B12, riboflavin and niacin (niacin equivalents) (Buabeng-Baidoo *et al.*, 2017). Chocolate milk is sweetened milk flavoured with chocolate or cocoa which has dark colour and chocolaty flavour. Cocoa powder is used in making beverages

with other ingredients such as milk and sugar. Cocoa beans, as well as cocoa derived products is a rich source of phytonutrients, particularly catechins and procyanidins. The total polyphenols have been reported in many studies as bioactive compounds, with antioxidant, antiradicals and anticarcinogenic properties (Joel *et al.*, 2013). In the preparation of chocolate flavoured milk, the raw material used range from low-fat milk to full-cream milk, sugar, cocoa powder and stabilizer are standardized and blended together then it is homogenized and pasteurized/sterilized. Sugar and cocoa powder are used to flavour the milk and carageenan could used as a stabilizer in chocolate flavoured milk that helps to these flavorings in suspension. This milk is creamy and rich which has a good chocolate taste and it is not very sweet.

Garden Cress has been considered as an important nutritional and medicinal plant in India since the vedic era (between 500-1700 B.C). In Ayurveda, the indigenous medicinal system, it is described as hot, bitter, galactogogue and claimed to destroy vata (air) and kapha (phlegm). Seeds are also rich source of omega 3-fatty acids which helps to lower cholesterol in hyper cholesterolemic patients. The non-conventional food stuff namely Garden Cress (*Lepidium Sativum L.*, family – Cruciferae) was processed and the resultant processed versions were analysed for proximate principles, minerals and antinutrients. Food products dahiwala bread was developed using processed versions

of Garden Cress seeds. Results showed that Garden Cress seeds are good source of protein, fat, calcium, iron and phosphorus. Food products developed incorporating Garden Cress seeds, like the present one could be beneficial for masses as nourishing as well as therapeutic agents due to the presence of various therapeutic properties like hypoglycaemic, hypotensive, fracture healing, anticancerous, and the like (Sharma *et al.*, 2013). It is used during constipation as a laxative. It is also used to treat intestinal problems and abdominal colic issues. It is also very helpful in treating bleeding piles. Garden Cress helps purify blood and stimulates appetite and immunity (Sarkar *et al.*, 2014).

Moringa oleifera is an important food commodity which has had enormous attention as the 'natural nutrition of the tropics'. The leaves, fruit, flowers and immature pods of this tree are used as highly nutritive vegetable in many countries, particularly in India, Pakistan, Philippines, Hawaii and many parts of Africa (Anwar *et al.*, 2005). The use of Moringa seeds in water purification is expected to provide healthier, safer dry for many areas of the world in which technologically advanced methods are not available (Folkard and Sutherland 2011). It is one of most rich source of vitamin A, vitamin C, milk protein, etc. (Ganatra, 2020). Moringa is best known as excellent source of nutrition and a natural energy booster. For the treatment of different ailments in the indigenous system of medicine different parts of this plant are being employed. In addition to its compelling water purifying powers and high nutritional value, *M. oleifera* is very important for its medicinal value (Dubey *et al.*, 2017). Moringa seeds can be used to treat fungal infections as well due to the presence of pterogosperrin, a naturally occurring antibiotic present throughout the Moringa plant (Sampson, 2005). *M. oleifera* seeds have essential amino acids, including the sulphur-containing amino acids in higher levels than those recommended by the food and agriculture organization (FAO) and patterns similar to those of soyabean seeds (Ganatra, 2020). Therefore to study the suitability of moringa seed powder and garden cress seed in chocolate flavoured milk have been planned.

MATERIALS AND METHOD

Materials: The study was conducted in Department of Dairy Technology, Warner College of Dairy

Technology, Prayagraj. For the preparation of flavoured milk, good quality milk was procured from local market of Prayagraj. Quality cane sugar was procured from local market of Prayagraj. Moringa seed powder, Garden cress seed powder and cocoa powder was procured from authorized sources.

Manufacturing Process of Chocolate flavoured milk: Fresh raw milk was received and filtered. It was then standardized to 1.5% fat and 9.0% SNF. The milk was then preheated to 60° for 10 min. All the dry ingredients *viz.*, sugar, stabilizer (0.05%), cocoa powder (1%), garden cress seed powder and moringa seed powder (Varying in accordance with treatments) were added and mixed (Table 1). The milk was then subjected for homogenization. It was then pasteurized at 72° for 30 min. After proper cooling the prepared flavoured milk were filled and capped to glass bottles and then sterilized at 121° for 15 min. It was then cooled and stored at 5°. Flavoured milk containing varying formulations of moringa seed powder, garden cress seed and cocoa powder was prepared and studied for sensory and physico-chemical parameters. Sensory evaluation of fresh samples were done by ten semi trained members based on 9-point hedonic scale. Its colour and appearance, consistency, flavor and taste and overall acceptability was evaluated. Fig. 1 summarizes the procedure adopted for the manufacturing of flavoured milk.

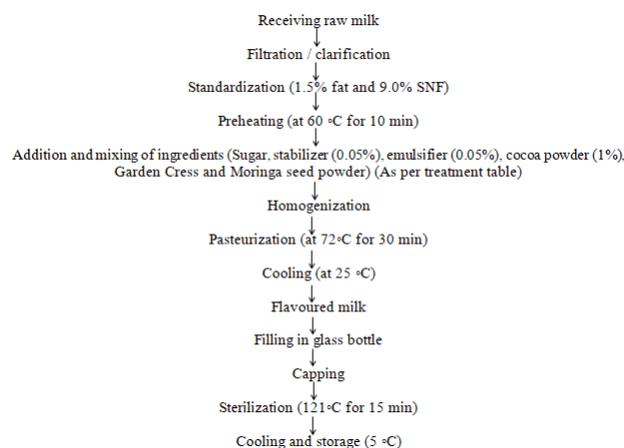


Fig. 1. Flow chart for preparation of chocolate flavoured milk blended with moringa seed powder and garden cress seed.

Table 1: Standardization of Chocolate flavoured milk with moringa seed powder and garden cress seed.

Treatment	Milk	Garden Cress Seed Powder	Moringa Seed Powder	Sugar	Cocoa Powder
T ₀	93	0	0	6	1
T ₁	92	0.5	0.5	6	1
T ₂	91.5	0.5	1	6	1
T ₃	91.5	1	0.5	6	1
T ₄	91	1	1	6	1

Statistical analysis. Sensory evaluation was done accordance to the 9-point hedonic scale with ten semi trained panel members. Panelists were instructed to evaluate flavoured milk blended with garden cress seed powder and moringa seed powder on the basis of colour

and appearance, consistency, flavor and taste and overall acceptability to check its suitability and to evaluate consumer acceptance. Panelists were provided samples coded as T₀, T₁, T₂, T₃ and T₄ in series. The data obtained was then evaluated, tabulated and

analyzed by taking into account the study objectives, hypothesis and theoretical orientation. Physico-chemical parameters of the developed product was also analyzed.

RESULT AND DISCUSSION

Flavoured milk is gaining wider consumer acceptance in recent times. It differs with unflavoured milk in

terms of added flavours and other nutritional benefits from added ingredients. Chocolate flavoured milk with moringa seed powder and garden cress seed powder has increased therapeutic effect and thereby has positive impact over consumer health. From the sensory score, Treatment T₂ with 0.5% garden cress seed powder and 1% moringa seed powder had good sensory acceptance.

Table 2: Effect of addition of garden cress seed powder and moringa seed powder on sensory attributes of flavoured milk.

Variables/attributes	Colour and appearance	Consistency	Flavor and taste	Overall acceptability
T ₀	8.5±0.18	8.3±0.00	8.4±0.11	8.4±0.33
T ₁	7.8±0.05	8.0±0.16	8.2±0.00	8.0±0.00
T ₂	8.3±0.57	7.9±0.11	8.1±0.18	8.1±0.17
T ₃	7.7±0.88	7.2±0.86	7.4±0.33	7.4±0.05
T ₄	7.5±0.05	7.1±0.78	7.1±0.18	7.2±0.28

From Table 2 the maximum mean sensory score for overall acceptability of chocolate flavoured milk was obtained in T₂ (8.1) when compared to other treatments. Colour and appearance sensory score was peak in T₂(8.3) and as the addition of moringa seed and garden cress seed powder increased the sensory score showed a declining trend in other treatments. Increased percentage of moringa and garden cress significantly affected sensory score for flavor and taste, the product has aftertaste. T₂ (8.1) had highest score for flavor and taste and least score was for T₄ (7.1). It was observed

that as addition of nutritional ingredients has progressed it adversely affected consistency and the product appeared thick. T₁ had the highest score of 8.0 for consistency and T₄ had the lowest sensory score. As the sensory scores are summarized treatment T₂ with 0.5% garden cress seed powder and 1% moringa seed powder showed good score on 9-point hedonic scale in terms of colour and appearance (8.3), consistency (7.9), flavor and taste (8.1) and overall acceptability (8.1). The obtained results were in conformity with Ghosh (2012); Mohajan *et al.* (2018).

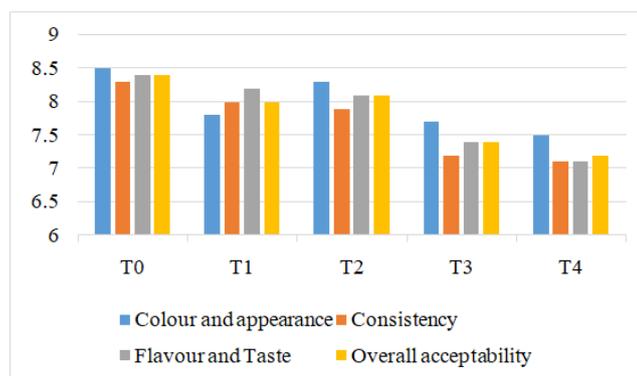


Fig. 2. Effect of addition of moringa seed powder and garden cress seed on sensory quality of chocolate flavoured milk.

Analysis of chocolate flavoured milk enriched with Moringa seed powder and garden cress seed powder: The developed chocolate flavoured milk was subjected for analysis of proximate properties like Moisture, ash,

protein, fat and carbohydrate. Comparative analysis of control sample and treatment samples are tabulated in Table 3.

Table 3: Proximate analysis of chocolate flavoured milk blended with garden cress seed and moringa seed powder.

Sr. No.	Parameters	Unit	T ₀	T ₁	T ₂	T ₃	T ₄	Reference method
1.	Moisture	%	83.58	82.80	82.42	82.31	82.02	Gravimetric Method by hot air oven
2.	Ash	%	0.74	0.81	0.86	0.83	0.88	Gravimetric method by muffle furnace
3.	Protein	%	3.58	3.81	3.93	3.92	4.04	Kjeldahl method
4.	Fat	%	1.5	1.7	1.8	1.9	0.10	Titrimetric method with NaOH
5.	Carbohydrate	%	10.6	10.88	10.99	11.05	11.16	Titrimetric method with fehling's solution

Proximate analysis could be summarized from Table 2 as compared to the moisture content of control sample (83.58%) T₂ had slightly lesser moisture content. The decrease in moisture content is due to addition of moringa seed powder and garden cress seed. Vidhani *et al.* (2016) observed that the moisture content showed gradual decrease in Flavoured milk with the increase in level of Garden Cress and Moringa seed powder. The moisture content simultaneously decreased from T₀ to T₄ may be due to addition of Garden Cress seed and Moringa seed powder. Average ash content in flavoured milk T₀ (0.74), T₁ (0.81), T₂ (0.86), T₃ (0.83) and T₄ (0.88). The highest average value of ash content (0.88) was observed in treatment T₄. The results for ash content obtained was similar to those obtained by Pratap *et al.* (2018). The ash content ranges from 0.74 to 0.88 in the developed chocolate flavoured milk. Protein content in flavoured milk was T₀ (3.58), T₁ (3.81), T₂ (3.93), T₃ (3.92) and T₄ (4.04). The highest average value of protein content is (4.04) was observed in treatment T₄. The results for protein content were in conformity to those obtained by Raut *et al.* (2015). The protein content of sample with different treatment combination was in range of 3.58 to 4.04 percent. The highest average value of fat content was observed in treatment T₃ and T₄(1.9). The results for fat content were similar to those obtained by Pratap *et al.* (2018). The higher fat content is observed in control treatment. Carbohydrate content increases as increase in the level of Garden Cress and Moringa seed powder. The highest average value of carbohydrate content is (11.16) was observed in treatment T₄. Pratap *et al.* (2018). Carbohydrate content ranged from 10.6 to 11.16.

CONCLUSIONS

The present investigation was on development of chocolate flavoured milk blended with garden cress seed and moringa seed powder. After the sensory analysis and analysis of other chemical qualities, the so developed flavoured milk was found suitable and thereby effectively helped in increasing the therapeutic value of the product. Sensory score of overall acceptability which was higher in treatment T₂ showed suitability and acceptance of experimental samples. In the present work, chocolate flavoured milk with 0.5% garden cress seed and 1% moringa seed powder was found to be superior to all other experimental samples. So, it can be concluded addition of moringa seed powder and garden cress to flavoured milk increased its therapeutic value and suitability to the consumer.

FUTURE SCOPE

In future more dairy related products can be fortified or enriched using such herbs with high nutritive and therapeutic value which will definitely experience wide acceptance among health conscious people as it provides positive effect to the consumer health.

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Conflict of Interest. None.

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