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Studies on sensory qualities of whey-based mango beverage flavoured with different herbs using natural sweetener as stevia

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Abstract

The objective of the current study is to evaluate the sensory qualities of whey-based mango beverages flavored with various herbs and sweetened with stevia, a natural sweetener. The panner whey, mango pulp, mint, and ginger extract were used to make the whey-based mango herbal beverage at four different treatments such as 80 percent whey, 20 ml of mango pulp (T₁), 71 percent whey, 20 per cent of mango pulp, 9 per cent of mint extract (T₂), and 74 per cent whey, 20 per cent mango pulp, 6 per cent ginger extract (T₃), 65 per cent whey, 20 per cent mango pulp, 9 per cent mint extract, 6 per cent ginger extract (T₄). Stevia 1gm was taken in constant amount to prepare whey based mango herbal beverage. A nine-point hedonic scale was used to assess the sensory qualities of the various treatment products. Colour and appearance (7.98, 7.13, 7.74, 7.28), flavour (8.13, 7.18, 8.58, 7.60), taste or mouth feel (8.00, 7.28, 8.60, 7.65), consistency (8.20, 7.90, 8.05, 7.75), and overall acceptability (8.20, 7.40, 8.60, 7.81) were those aspects where the highest scores were obtained. Treatment T₃ (74% whey, 20 per cent mango pulp, and 6 per cent ginger extract) was found to have the highest overall hedonic score across every parameter.

Keywords: sensory evaluation, mango pulp, mint extract, ginger extract, panner whey beverage.

Introduction

The highly nutritious and valuable by-product of the dairy industry is whey. It is produced when casein, cheese, panner, shrikhand, and chhana are made. The primary component is lactose, with whey proteins, water-soluble vitamins, and minerals making up the secondary ingredients. Nutritious proteins such as immunoglobulins, β -lactalbumin, serum albumin, lactose, and milk salts are found in whey (Puranika and Rao, 1996) [9].

The content of whey is approximately 45–50% total milk solid, 70–90% milk sugar, 20% milk proteins, 70–90% milk minerals, and, most significantly, nearly all of the water soluble vitamins that were first found in milk. Since whey has a high biological oxygen requirement of 35000 to 50000 ppm, it is not used beneficially and a significant amount is being drained out of the world's dairy supply (Yadav *et al.* 2010) [14]. Even with the advancement of modern technology, India is yet to utilize the full potential of internet service. Given a growing focus on environmental and economic factors, the technologies for disposing of dairy waste and the efficient use of whey are becoming more important (Sirohi, 2005) [13].

The mango, or *Mangifera indica* L., is a popular fruit in tropical and subtropical climates. It is one of the best fruits because of its great flavor, wonderful aroma, mouthwatering taste, and high nutritious content (Pal, 1998) [6]. Mango fruits have beta-carotene and are an excellent source of potassium, vitamins A and C, and other nutrients. Mangoes have a high fiber content but are low in calories (around 110 per medium-sized mango), fat, and salt.

When mint is consumed, the menthol gives off a feeling of freshness. Menthol is typically used in toothpastes and breath fresheners due to its fresh flavor and antibacterial qualities (Anonymous © 2012) [1]. An essential immune system mediator is mint. Because of its abundance of antioxidants, it helps lower the risk of diseases linked to reactive oxygen species (Qiao *et al.* 2005) [10].

Zingiber officinale, the botanical name for ginger, is closely related to cardamom, galangal, and turmeric. It is a member of the Zingiberaceae family. The major bioactive component of

ginger is utilized to help with digestion and to reduce nausea. Research has shown that gingerol has potent anti-inflammatory and antioxidant properties. It aids in lowering oxidative stress, which is brought on by the body producing too many free radicals. Many conditions include arthritis, cramps, sore throats, constipation, indigestion, hypertension, fever, and infectious disorders have been treated with ginger. Studies have shown the anti-tumor, anti-diabetic, anti-clotting, analgesic, cardiotoxic, and other effects of ginger (Shahrajabian *et al.* 2016) [12].

Stevia rebaudiana is a perennial herb used for therapeutic purposes. It belongs to the family Compositae. Additionally, it is utilized as a natural remedy for various tonic conditions such as cardiac tonic, diuretic, hypotensive, and hypoglycemia. Diabetic patients can use it as a sugar substitute because it contains no calories. Stevia leaf powder is used to treat hypotension, diabetes, obesity, depression, and exhaustion. Lowering the level of uric acid is also beneficial. (Kumar *et al.* 2006) [7].

Therefore, preserving whey for use in beverages is one of the most significant ways to use whey in the human food chain, given consumer preferences and market demands. Attempts were made to use paneer whey in combination with mango pulp, mint, and ginger extract to make a tasty, refreshing beverage, keeping in mind the nutritional and functional qualities of whey.

Materials and Methodology

Collection of Milk

The fresh, clean milk of buffalo was procured from the Department of AHDS, College of Agriculture, VNMKV Parbhani.

Collection of Mango pulp

Good quality of mango pulp was procured from local market.

Collection of Herbs

Mint and Ginger were purchased from local market of Parbhani city.

Stevia

Stevia powder was purchase from medical store of Parbhani.

Muslin cloth

Clean, suitable size muslin cloth piece was used for straining of whey.

Glassware, equipment

Test tube, beaker, measuring cylinder, Gerber apparatus, butyrometer, glassware (Corning Borosil brand) was used for analytical work.

Methods

Preparation of whey-based mango beverage flavoured with herbs

Phase 1- Preliminary trials

For the preparation of whey-based mango herbal beverage, the preliminary trials were conducted to finalize the levels of mango juice and herbs extract.

Optimization of levels of extract

Addition of mint extract

The whey samples were prepared using six, nine, and twelve parts of mint extract. A range of samples of herbal extracts based on whey were subjected to sensory evaluation. Based

on sensory assessments, a 9-part mint extract level was selected for the experimental trial. Equal amounts of stevia and the most popular mango juice was consumed in order to make the whey-based herbal beverage.

Addition of ginger extract

Whey samples containing 3, 6, and 9 parts of ginger extract were prepared. Samples of whey-based herbal extract were evaluated by the senses, and 6 parts of ginger extract level was chosen to conduct an experimental trial based on the scores obtained from the senses. The most well-liked mango juice and stevia were used in a consistent amount to prepare the whey-based mango herbal beverage.

Preparation of whey based mango beverage flavoured with herbs

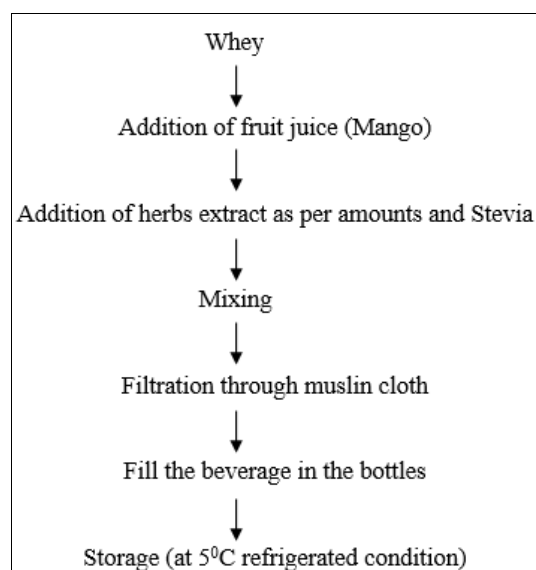


Fig 1: Flow chart for preparation of herbal mango whey beverage (Yadav *et al.*, 2010) [14]

Phase 2- Experimental trials

On the basis of sensory evaluation, the following treatment combination were finalized for preparation of whey based mango beverage flavoured with herbs.

T₁- Control (80 parts Panner whey with 20 parts mango pulp) + 1 gm Stevia

T₂- 71 parts panner whey + 20 parts mango pulp + 9 parts mint extract + 1 gm Stevia

T₃- 74 parts panner whey + 20 parts mango pulp + 6 parts ginger extract + 1 gm Stevia

T₄- 65 parts panner whey + 20 parts mango pulp + 9 parts mint extract +6 parts ginger extract + 1 gm Stevia

Sensory evaluation

A panel of semi-expert judges assessed the acceptability of whey beverage using a 9-point hedonic scale, taking into consideration sensory factors such color and appearance, flavor, taste or mouthfeel, consistency, and overall acceptability.

Statistical Analysis of data

According to Panse and Sukhatme (1985) [8], the data from the current study were tabulated and statistically analyzed using completely randomized design (CRD).

Results and Discussion

Table 1: Sensory evaluation of whey based mango beverage flavoured with herbs

Treatments	Colour and appearance	Flavour	Taste	Consistency	Overall acceptability
T ₁	7.98 ^a	8.13 ^b	8.00 ^b	8.20 ^a	8.20 ^b
T ₂	7.13 ^c	7.18 ^d	7.28 ^d	7.90 ^{ab}	7.40 ^d
T ₃	7.74 ^b	8.58 ^a	8.60 ^a	8.05 ^a	8.60 ^a
T ₄	7.28 ^c	7.60 ^c	7.65 ^c	7.65 ^b	7.81 ^c
SE ±	0.058	0.112	0.093	0.117	0.098
CD at	0.180	0.345	0.289	0.361	0.302

Colour and appearance

The beverage's colour and appearance scores were 7.98, 7.13, 7.74, and 7.28 in treatments T₁, T₂, T₃, and T₄. The panel of judges determined that treatment T₁ was better for color and appearance since it was significantly superior than treatments T₂, T₃, and T₄.

The scores for appearance and colour are comparable. Dhumale (2016) [4] found that the average sensory score for colour in Nagpur Mandarin beverages ranges from 8.13 to 7.72.

Flavour

The mean beverage flavor scores for treatments T₁, T₂, T₃, and T₄ were, in that order, 8.13, 7.18, 8.58, and 7.60. The treatment T₃ was higher over all the treatment and significantly superior to T₂ and T₄. In terms of flavor, it was clear that the judges' panel favored a 6% ginger extract blend when making a whey-based mango herbal beverage.

The whey-based mixed herbal beverage of pineapple (*Ananas comosus*) and bottle gourd (*Lagenaria siceraria*) was produced by Baljeet *et al.* (2013) [2]. They found that the average flavor score of the freshly produced beverage was 7.50 (T₀), 8.00 (T₁), 8.00 (T₂), 8.00 (T₃), and 7.00 (T₄).

Taste or mouth feel

The treatments T₁, T₂, T₃, and T₄ had average taste scores of 8.00, 7.28, 8.60, and 7.65, respectively. The above results

made it clearly clear that the addition of ginger extract enhanced the beverage's flavor above control (8.00) and helped T₃ achieve a high score of 8.60.

The obtained results are correlated with the results of Baljeet *et al.* (2013) [2] in their whey-based pineapple (*Ananas comosus*) and bottle gourd (*Lagenaria siceraria*) mixed herbal beverage, which scored 8.00 (T₀), 8.00 (T₁), 8.00 (T₂), 7.50 (T₃), and 7.00 (T₄). Yadav *et al.* (2010) [14] found that their whey-based banana herbal beverage scored 7.60, 8.10, 8.10, 7.20, and 6.90 in P₀, P₁, P₂, P₃, and P₄, respectively.

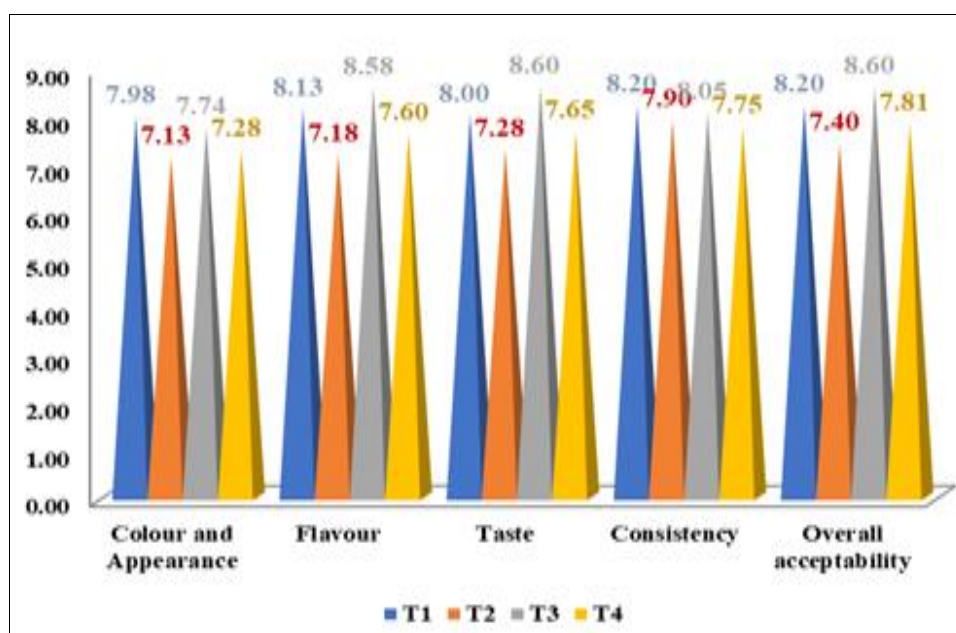
Consistency

The mean sensory score for consistency of herbal whey beverage in treatment T₁, T₂, T₃ and T₄ was 8.20, 7.90, 8.05 and 7.65, respectively.

The results of present study agree with Bhavsagar *et al.* (2010) [3] in pineapple flavored beverage from chhana whey i.e. consistency score recorded was the highest for T₂ as 7.8 followed by 7.7 for T₁ and lowest for T₃ as 7.4.

Overall acceptability

For treatments T₁, T₂, T₃, and T₄, the overall acceptability mean score was 8.20, 7.40, 8.60, and 7.81, correspondingly. The two that were the most liked were T₃ and T₁. The panel of judges found the T₂ and T₄ beverage blends with mint and ginger extract to be satisfactory in terms of consistency. The data obtained in this study corresponded closely with the conclusions of Baljeet *et al.* (2013) [2] conducted research on the production and preservation of a blended herbal beverage made with pineapple (*Ananas comosus*) and bottle gourd (*Lagenaria siceraria*) based on whey. In order to prepare the beverages, chakka whey was combined with a quantity of pineapple and bottle gourd juice (10 (T₀), 10 (T₁), 10 (T₂), 10 (T₃), and 10 (T₄) percent, as well as 0, 1, 2, 3, and 4 percent Mentha extract, with 8 percent sugar. According to their study, the average score for the acceptability of freshly made beverages was 7.87 (T₀), 8.25 (T₁), 8.37 (T₂), 8.00 (T₃), and 7.02 (T₄).

**Fig 1:** Sensory

Conclusion

From the present study it was concluded that *panner* whey beverage flavoured with herbs using mango pulp at 20 per

cent, mint extract 9 ml and ginger extract 6 ml levels was found suitable on the basis of sensory quality finished product, it was observed that addition of mango pulp at 20 per

cent and 6ml ginger extract level improved sensory parameters such as flavour (8.58), taste (8.60), overall acceptability (8.60) respectively.

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