



## **Studies on Organoleptic Properties of Herbal Whey Based Beverage**

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### **ABSTRACT**

The beverage obtained was subjected for organoleptic evaluation by panel of judges during the storage. These experiment have four different treatment combinations viz., T-1(80% whey with 20% beet root extract), T-2 (80% whey with 20% beetroot extract and 2% mentha extract), T-3 (80% whey with 20% beetroot extract and 4% mentha extract) T-4(80% whey with 20% beetroot extract and 6% mentha extract). The amount of sugar was fixed at 7 percent in 100 ml of beverage in all treatments. The different organoleptic characteristics viz., colour and appearance, flavour, taste, consistency and overall acceptability were recorded of fresh beverage. Among the tested treatments with regards to the organoleptic characteristics, it was observed that treatment T-4 was significantly superior over other treatments which had the highest score viz., 8.51 of whey beverage prepared by using 6 % mentha extract. The acceptability of the whey beverage was measured in terms of sensory attributes such as, colour and appearance, flavour, consistency and taste/ mouth feel using 9 point hedonic scale by a panel of five semi-expert judges. The data so obtained were analyzed using Completely Randomized Block Design (CRBD).

**KEY WORDS-** Paneer whey, Herbal whey beverage, Mentha extract, Beetroot extract, Organoleptic

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### **INTRODUCTION**

The development of health promoting food is one of the set targets in food process engineering. Research during the last two decades has shown that the combination of routine food with medicinal herbs having any special health beneficial effect can be an excellent source for development of functional food. The significance of traditional knowledge, their combination with scientific know-how and the demand from consumers for variety and health consciousness have prompted to look for variation in products such as herbal drinks. During the recent years, there has been an increasing interest in understanding the relationship between food and health all over the world. The conversion of whey into beverage by adding different food ingredient is one of the most attractive avenues for the utilization of whey for human consumption. By realizing the functional properties of whey, many industries targets upon utilizing whey as the functional food ingredient.

Menthol (*Mentha arvensis*) which belongs to the family Libeaceae is a common edible and aromatic perennial herb which is cultivated throughout the India. Its common name is *puđina*. The physico-chemical properties of menthol are melting point 43°C (106-109°F), freezing point is 27-28°C, boiling point is 212°C (414°F). Molecular formula C<sub>10</sub>H<sub>20</sub>O and molecular weight is 156.27 g/mol. It has an antioxidant, antimicrobial, cytotoxic and analgesic activities of *Mentha arvensis* extract [18]. Herbal extract of *Mentha arvensis* has preventive and curative value. It is used to treat sour throat, gastric problems and other problems related to gastrointestinal tract [5, 12]. The aromatic leaves widely used for flavouring foods and beverages. Whey based mango herbal beverage prepared with 2% *Mentha* extract has been found to be highest overall acceptability on the day of preparation as well as after 30 days of storage [21]. In beverages menthol is used for the cooling effect and flavouring, [22].

Beetroot (*Beta vulgaris*) is botanically classified as an herbaceous biennial from Chenopodiaceous family and has several varieties with bulb colours ranging from yellow to red. Deep red-coloured beetroots are the most popular for human consumption, both cooked and raw as salad or juice. The roots and leaves of the beet have been used in folk medicine to treat a wide variety of ailments [10]. Beetroot juice lower the blood pressure (BP) in men when consumed as a part of normal diet in free-living healthy adults. There is growing interest in the use of natural food colours, because synthetic dyes are becoming more and more hazardous [16]. But in food processing, as compared with anthocyanin and carotenoids, betalains are less commonly used, although these water-soluble pigments, they are stable between pH 3 and 7. To improve the red colour of tomato pastes, sauces, soups, desserts, jams, jellies, ice creams, sweets and breakfast cereals, fresh beet/beet powder or extracted pigments are used. It also contributes to consumer's health and wellbeing because it is known to have antioxidants because of the presence of nitrogen pigments called betalains, mainly comprise of red-violet-coloured betacyanins (betanin, isobetanin, probetanin and neobetanin) and yellow-orange-coloured betaxanthins [20].

Whey is a by-product of the manufacture of cheese, paneer and casein and has several commercial uses. It contains 45-50 per cent of total milk solids, 70 per cent of milk sugars (Lactose), and 20 per cent of milk proteins, 70-90 per cent of milk minerals and almost all water soluble vitamins present in milk (Horten,1995). Considerable work has been done throughout the world to utilize whey for production of whey protein concentrates (WPC), whey protein isolates and whey powder, Lactose, Lactic acid, whey paste etc. [19]. Whey and its biological components have proven its effects in treatments of cervical chronic diseases like cancer, cardiovascular, HIV etc. As it is nutritionally too rich it can also be used in beverages of infants; gastric and athletic foods [7]. Hence, the conversion of whey into beverage is one of the most attractive avenues for utilizing whey for human consumption [9].

## MATERIAL AND METHODS

The study was carried out in the Department of Animal Husbandry and Dairy science, College of Agriculture, Latur (M.S.) in the year 2016. All the raw materials sugar, beetroot. Milk, *Mentha arvensis* etc were collected from the local market of Latur. The damaged and off type fruits and mentha leaves were discarded.

### Preparation of beet root extract

For the preparation of beetroot extract, fresh and healthy beetroot was used. Beetroot were sorted without injury and washed thoroughly under the tap water, cleaned and dried using cloth. After cleaning beetroot were peeled manually and cut into small pieces. Further, pieces were ground in mixer grinder with *paneer* whey (1:1 proportion) and extract were collected in 250 ml beaker.

### Preparation of *Paneer* whey and mentha Extract

The milk was heated in a stainless steel vessel to 86°C and cooled to 76°C at room temperature. The hot milk was acidified by addition of citric acid 0.5 per cent with continuous stirring, resulted in complete coagulation of milk protein (casein). The liquid (*paneer* whey) was filtered through muslin cloth. Mentha extract was prepared from fresh leaves. The leaves were washed, ground in a mixer grinder with whey at proportion (1: 0.5) and filtered using muslin cloth.

### Preparation of herbal whey beverage

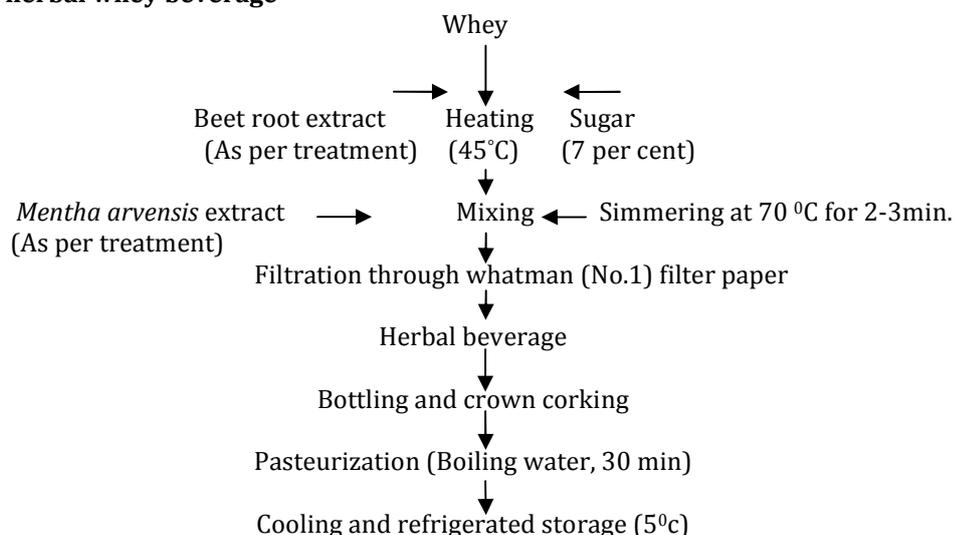


Fig.no.1. Preparation of herbal whey beverage.

For preparation of herbal whey beverage as per the treatment combination. The *paneer* whey was heated at 45°C temperature. Then added the cane sugar @ 7 per cent was maintained in all treatments. After that the beetroot and *mentha* extract was added as per the treatment combinations. Simmering was done at 70°C for 2-3 min and filtered through (whatman No.1) filter paper and filled into pasteurized glass bottles (100 ml) and sealed. Pasteurization of filled bottles was done in boiling water for 30 min [14] and cooled to room temperature and stored at refrigerated condition (5°C).

The observation on different organoleptic characteristics viz., colour and appearance, flavor, taste, consistency and overall acceptability were recorded of fresh product. The evaluation was done on nine point hedonic scale by five semi expert panel of judges from the different departments of College of Agriculture, Latur (M.S.).

## RESULTS AND DISCUSSION

In the process of food development the sensory evolution are the main steps, without which others effects may be fruitful less. When product pass in this stage, then the achievement be in the hands of developers. The acceptability of the whey beverage was measured in terms of sensory attributes such as, colour and appearance, flavour, consistency and taste/ mouth feel using 9 point hedonic scale by a panel of five semi-expert judges. The data so obtained were analyzed using Completely Randomized Block Design (CRBD).

**Table 1: Details of treatment combination**

S.N	Treatment combination	symbols
1	control (80 per cent <i>paneer</i> whey with 20 per cent beetroot extract )	T- 1
2	<i>paneer</i> whey - beetroot extract – <i>Menthe arvensis</i> extract (80:20:2 per cent)	T- 2
3	<i>paneer</i> whey - beetroot extract – <i>Menthe arvensis</i> extract (80:20:4 per cent)	T- 3
4	<i>paneer</i> whey - beetroot extract – <i>Menthe arvensis</i> extract (80:20:6 per cent)	T- 4

**Table 2: Effect of recipe treatments on organoleptic characteristics of herbal whey based beverage**

Treatments.	Colour	Flavour	Taste	Consistency	Mean
	Colour	Flavour	taste	ency	Mean
T <sub>1</sub>	8.10	8.10	7.90	8.00	8.03 <sup>a</sup>
T <sub>2</sub>	8.60	8.40	8.30	8.35	8.41 <sup>b</sup>
T <sub>3</sub>	8.30	8.50	8.50	8.40	8.43 <sup>b</sup>
T <sub>4</sub>	8.00	8.60	8.45	8.60	8.51 <sup>b</sup>
S.E. ± 0.0537				C.D. at 5% 0.1656	

The values with different small letters superscripts row wise differ significantly at 5 per cent level of significance.

### Colour and appearance

It was observed that from table number.2 the mean score of beverage in treatments T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub> were 8.10, 8.60, 8.30 and 8.00, respectively. The treatment T<sub>2</sub> was significantly superior over treatments T<sub>1</sub>, and T<sub>4</sub> and at par with T<sub>3</sub>. In the next treatments dusty appearance increased progressively i.e. in T<sub>3</sub> and T<sub>4</sub> which is incorporated 4 per cent and 6 percent *mentha* extract, respectively. It may be concluded that, 2 per cent *mentha* extract adding to the whey beverage was preferred by the judges, as far as colour and appearance character was concerned. Colour and appearance score were match with the score observed by Baljeet *et al.* [2], the average sensory score of beverage for colour were 8.00, 8.00, 8.50, 8.00 and 8.00 for treatment H<sub>0</sub>, H<sub>1</sub>, H<sub>2</sub>, H<sub>3</sub> and H<sub>4</sub> respectively in mixed herbal beverage. Further, the results recorded in the present investigation for colour were comparable for trend/pattern observed in the studies of Dubey *et al.* [8], Babar *et al.* [4] and Moarefian *et al.* [17] conducted to convert milk whey as beverages by using different fruits ingredients.

### Flavour

It was observed that the mean scores for flavour of beverage for treatments T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub> were 8.10, 8.40, 8.50 and 8.60, respectively. The treatment T<sub>4</sub> was higher over all the treatment and significantly superior to T<sub>1</sub> and T<sub>2</sub>. It would like to highlight here that the flavor scored observed by Kamte, 2015 was progressively reduced in successive treatments due to the effect benny/bitter flavor of beetroot contributed in her study was masked here owing to the menthol and judges scored and preferred higher treatment T<sub>4</sub> for flavor contain 6 % *menthe* extract. It clearly indicated that the adding of *mentha* extract more than 6 per cent for preparing herbal whey beverage might be milestone to development of functional beet root whey beverage and give hint to researcher to develop more functional herbal whey-beet root beverage after investigating the higher dose (> than 6 per cent) of menthol and beet root

extract in future. The results recorded in the present investigation for flavour were secured higher score and progressive pattern than of Bhavsagar *et al.* [3], reported the average score of pineapple flavored beverage for flavour were 7.7, 7.6, 8.0 and 7.3 for treatment T<sub>0</sub>, T<sub>1</sub>, T<sub>3</sub> and T<sub>4</sub>, respectively; Baljeet *et al.* [2] developed the whey based pineapple (*Ananas comosus*) and bottle gourd (*Lagenaria siceraria*) mixed herbal beverage and reported that the average score of freshly prepared beverage for flavour 7.50(T<sub>0</sub>), 8.00(T<sub>1</sub>), 8.00 (T<sub>2</sub>), 8.00(T<sub>3</sub>), 7.00(T<sub>4</sub>). It may be due to the effect of menthol used in present investigation.

#### **Taste/mouthfeel**

Table 2 reflected the mean score of taste for the treatments T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub> as, 7.90, 8.30, 8.55 and 8.45, respectively. From the above observations it was clearly indicated that the taste of beverage was improved over control (7.90) in all developed treatments due to the use of menthol extract and secured high score by T<sub>3</sub> (8.55). The treatment prepared by using four part of menthol extract was significantly superior than treatments T<sub>1</sub> and T<sub>2</sub> and at par with T<sub>4</sub>, indicate that addition of menthol enhance the test and mouth feel particularly due to chilling effect attributed by menthol. The results recorded for taste were found more superior than the results recorded by Yadav *et al.* [22] in whey based banana herbal beverage for taste scored 7.60, 8.10, 8.10, 7.20 and 6.90 in P<sub>0</sub>, P<sub>1</sub>, P<sub>2</sub>, P<sub>3</sub> and P<sub>4</sub> respectively and Baljeet *et al.* [2] in whey based pineapple (*Ananas comosus*) and bottle gourd (*Lagenaria siceraria*) mixed herbal beverage were 8.00(T<sub>0</sub>), 8.00(T<sub>1</sub>), 8.00 (T<sub>2</sub>), 7.50(T<sub>3</sub>), 7.00(T<sub>4</sub>), might be credited to the use of menthol extract in preparation of whey based beverage in present investigation.

#### **Consistency**

The average sensory score for consistency of herbal whey beverage in treatment T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub> was 8.00, 8.35, 8.40 and 8.60, respectively. It was observed that, Treatment T<sub>4</sub> was significantly superior over T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub>. It is revealed from table that the *mentha* extract mixed treatment was shown good consistency than control, higher in T<sub>4</sub> (8.60) and lower in T<sub>1</sub> (8.00). As far as consistency is concerned, the treatment T<sub>4</sub> beverage blends with 6% per cent of the *mentha* extract was acceptable by panel of judges. Continuous increasing score was observed for consistency in present study, which was reduced in the studies of Babar *et al.* [4] for *chakka* whey beverage (CWB) from pomegranate juice were 8.47, 8.65, 8.82 and 8.36 in treatment T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub>, respectively and Bhavsagar *et al.* [3] in pineapple flavored beverage from *chhana* whey i.e. consistency score recorded was the highest for T<sub>2</sub> as 7.8 followed by 7.7 for T<sub>1</sub> and lowest for T<sub>3</sub> as 7.4. The results and trends recorded in the present investigation for consistency were in comparable and more progressive than these mentioned research workers.

#### **Overall acceptability**

Table 2 shows that the mean overall score of acceptability of herbal whey based beverage for treatments T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub> and T<sub>4</sub> were 8.03, 8.41, 8.43 and 8.51, respectively. It was observed that, Treatments T<sub>4</sub> was significantly superior over others treatments which had the highest mean score of whey beverage prepared using 6 per cent *mentha* extract. Treatment T<sub>2</sub> was obtained high score for colour and appearance, T<sub>3</sub> was acceptable or high scored in the taste but overall acceptance was towards treatment T<sub>4</sub> due to the high score preference in consistency and taste. The treatment T<sub>1</sub> had least mean overall score i.e. 8.03. Landge *et al.* [15] studied on preparation and sensory evaluation of whey beverage. Three level of sugar combinations were used for the standardization of whey beverage i.e. S (10 per cent), S1 (12 per cent) and S2 (14 per cent). The overall acceptability score of whey beverage for various treatments varied in between 6.61 to 7.50. [2] studied on development and storage of whey based pineapple (*Ananas comosus*) and bottle gourd (*Lagenaria siceraria*) mixed herbal beverage. In the preparation of beverages the volume of pineapple and bottle gourd juice 10(T<sub>0</sub>), 10 (T<sub>1</sub>), 10 (T<sub>2</sub>), 10 (T<sub>3</sub>) and 10 (T<sub>4</sub>) per cent and 0, 1, 2, 3 and 4 per cent *Mentha* extract respectively with 8 per cent sugar was mixed in *chakka* whey. They reported that the average score of freshly prepared beverage for overall acceptability 7.87(T<sub>0</sub>), 8.25(T<sub>1</sub>), 8.37 (T<sub>2</sub>), 8.00(T<sub>3</sub>), 7.62(T<sub>4</sub>). Further, beetroot whey beverage studied by (Kamte2015), recorded over all acceptability for treatments T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> were 7.90, 8.33, 8.51 and 8.37, respectively and concluded same reducing effect with its reason of bitter test and flavor attributed by beet root.

The results recorded for overall acceptability were lower than the results obtained in present investigation might be due to the masking effect of beet root benny flavor and thrusting and chilling properties of menthol.

All treatments secured more than 8 point out of 9 point of hedonic scale which indicated that these treatments were appreciated by the judges and accepted on the sensory parameters coated ranking between like very much and like extremely (i.e. between 8 to 9).

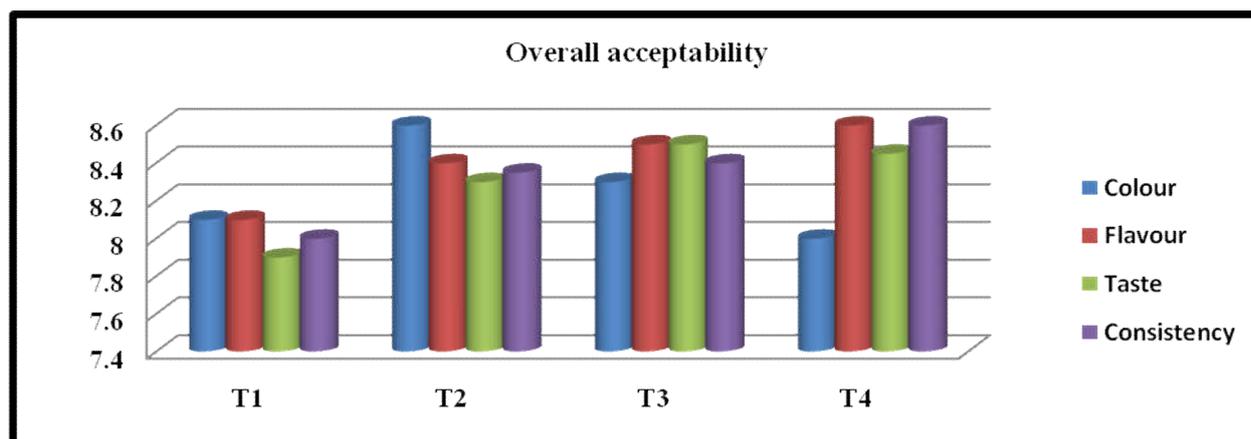


Fig. 1: Overall acceptability of herbal whey beverage.

## CONCLUSION

From present investigation it can be concluded that the *Mentha* extract can be very well utilized for organoleptic properties in beverage. On the basis of sensory scores the treatment T-4 viz., 6 per cent *mentha* extract in 80 per cent *paneer* whey and 20 per cent beetroot extract on weight basis the development of health promoting food is possible, which might be countable for prevailing cold drinks present in market. Product developers seeking out functional and nutritional attributes of whey to tap the tremendous growth opportunities in the beverage industry can move forward for the development of such herbal whey beverages based upon whey, beetroot and menthol to exhaust nutritional, therapeutic as well as medicinal properties of beetroot and menthol.

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