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Studies on sensory evaluation of misti dahi blended with foxtail millet and finger millet flour

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Abstract

The present investigation entitled "studies on sensory evaluation of misti *dahi* blended with foxtail millet and finger millet flour" was carried out in the Department of Animal husbandry and Dairy Science, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola. The study was planned to prepared misti *dahi* by blending millets flour with cow milk at different proportion. The acceptability misti *dahi* was prepared from cow milk by blending at 2, 4, 6 parts of foxtail millet flour, 2, 4, 6 parts of finger millet flour and the combination of both millet flours was measured in terms of sensory attributes, by using 9 point hedonic scale by panel of semi trained judges. It was also observed that the overall acceptability score for millets flour blended misti *dahi* for treatments T₁, T₂, T₃, T₄, T₅, T₆, T₇, T₈, T₉ and T₁₀ were 7.76, 7.65, 7.98, 7.32, 7.78, 8.20, 7.45, 7.20, 7.00 and 6.71 respectively.

Keywords: Misti *dahi*, foxtail millet flour, finger millet flour, sensory evaluation

Introduction

Fermented foods are of great significance since they provide and preserve vast quantities of nutritious foods in a wide diversity of flavor, aroma and texture which enrich the human diet. Fermentation is used as a method of value addition and conversion of raw materials by microorganisms and enzymes into various types of products with distinct nutritional and sensory properties. Since, it's inception, human kind has been practicing fermentation of various food products based on milk, fruits and vegetable, cereals and legume etc. Indian fermented dairy products like Dahi (curd), Mishti Doi (sweetened curd), Shrikhand, Lassi and Chhach or Mohi (buttermilk), etc. are consumed frequently by the India population. This foods even find mention in our Ayurveda system of medicine for treatment of various ailments specially, gastrointestinal disorders Rasane *et al.* (2017) [7]. *Dahi* or curd is the traditional fermented milk product obtained from pasteurized or boiled milk by souring with natural microflora or by the harmless lactics or other bacterial culture. *Dahi* is popular throughout the Indian subcontinent. It is consumed either in the main course of meal, as a refreshing beverage or as dessert. Misti dahi is also known as misti doi, payodhi and lal dahi. It is traditional sweetened fermented milk product popular in the eastern part of India, notably West Bengal, Bihar and Assam. It is prepared by lactic acid fermentation of sweetened milk. Misti dahi is regarded as a special dessert on ceremonial occasions both in the rural and urban Bengal Raju and Pal, (2011) [8].

Millets are known as one of the most important cereal grains. Millets are used as food and are widely used in rural areas. Millets having amazing values in their nutrition content and play a significant role in traditional diets in many regions. India is the largest producer and consumer of millet in the world. Millet is an alkaline forming grain that is free from gluten. Millets are also rich sources of macronutrient and micronutrients; they play many important roles in the body immune system. Millets have medicinal and nutraceutical properties in the form of antioxidants which prevent deterioration of human health such as lowering blood pressure, risk of heart disease, obesity, prevention of cancer and cardiovascular diseases, diabetes and decreasing tumor cases etc. Himanshu *et al.* (2018) [3].

Foxtail millet (*Setaria italica*) is native to China. Nutritional composition of foxtail millet per 100 g includes, carbohydrate (60.9 g), protein (12.3 g), fat (4.3 g), crude fibre (8.0 g), mineral (3.3 g), energy value (351 kcal), iron (2.8 mg), calcium (34 mg) and phosphorus (290 mg). It is rich in magnesium, manganese and phosphorus. Foxtail millet is richest source of fibre among the all millets. It also contains carotenes and tocopherols.

Foxtail millet is good food for the heart as it contain high amount of magnesium. Wandhekar *et al.* (2021) [3].

Finger millet (*Eleusine corcana*) is considered to be originated in Ethiopia. It has high nutritional value and phytochemical content which makes it a super cereal which can be used for the development of functional foods Kumari and Kumar (2020) [5]. It is a good source macronutrient like protein (7.3 g/100 g), carbohydrate (71 g/ 100 g), crude fiber (3.6 g/100 g), calorific value (334 Kcal) and It is low in fat (1.5-2 g/100 g). The major fatty acids present in finger millet are oleic, palmitic and linolenic acids. It is good source of minerals and contains the highest calcium content (300-350 mg /100g) among cereals. It is also a good source of phosphorus (250 mg /100 g), iron (4.2 mg/ 100 g). Consumption of finger millet is useful for pregnant women because it improves lactation. Its consumption promotes the growth of child. It is gluten free hence it lowers the risk of gall stones. Chamoli *et al.* (2018) [1].

Materials and Methods

The materials used and methods employed during the course of present investigation on preparation of misti *dahi* from blends of cow milk with foxtail millet and finger millet flour are as under.

Collection of cow milk

In this investigation cow milk was used for conducting the experimental trials. The fresh, clean cow milk was procured from livestock instructional farm, Department of Animal Husbandry and Dairy Science, Dr. P.D.K.V., Akola.

Millets

Good quality organically produced dehulled Foxtail millet (CO-1) and Finger millet (Phule Nachani) was procured from Center for Organic Agriculture Research and Training Department of Agronomy Dr. P.D.K.V., Akola.

Starter culture

The mixed starter culture NCDC-263 (*Streptococcus thermophilus* and *Lactobacillus bulgaricus*) was procured from the National Collection of Dairy Cultures (NCDC), NDRI, Karnal. Used for inoculation. The starter culture was maintained in autoclaved reconstituted skimmed milk (12.5 g/100 mL) by sub culturing once in a fortnight for attaining high activity.

Cane sugar

Clean crystalline commercial grade cane sugar was purchased from local market of Akola city, used as per requirement.

Methods

Technique for preparation of misti *dahi* blended with foxtail millet and finger millet flour

The misti *dahi* was prepared from cow milk as per the method described Ranganadham *et al.* (2016) [10] with slight modification for addition of millets flour.

Fresh cow milk was received from the livestock instructional farm of department of Animal husbandry and Dairy Science, Dr. P. D. K. V., Akola. The milk after its receive was filtered through muslin cloth and then standardized to 3% fat using Pearson's square method. The standardized milk was pre-heated at (60-65 °C). After preheating of milk foxtail millet and finger millet flour was added slowly and milk was then stirred to avoid clot formation of flour. Then sugar was added

10 percent. It was mixed thoroughly and it was pasteurized at 90 °C for 10 minute. After pasteurization cooling of milk 25-30 °C. After cooling 2 percent active starter culture (NCDC-263) containing *Streptococcus thermophilus* and *Lactobacillus bulgaricus* was used for inoculation. The inoculated milk was packaging (Polystyrene cup) and incubated 30 °C for 10-12 hours until firm curd was obtained. Stored at refrigeration temperature (5±1 °C) for further study.

Sensory evaluation

The product so obtained was subjected to organoleptic evaluation by the semi expert panel of judges. It was evaluated for colour and appearance, flavour, taste, body and texture and overall acceptability. Score card (Appendix I) was provided to all judges comprising "9-points Hedonic Scale" as prescribed by Nelson and Trout (1964) [7].

Statistical analysis: The data obtained in the present investigation was tabulated. The data were analyzed statistically by using Completely Randomized Design (CRD).

Result and Discussion

The acceptability of the control and experimental misti *dahi* was measured in terms of sensory attributes such as color and appearance, flavor, body and texture, taste by using 9 point hedonic scale by a panel of semi trained judges. The results obtained on account of this parameter are presented in Table no.1 below.

Flavour acceptability: The average mean score for flavour were ranges between 6.75 to 8.12 for all treatments combinations. The highest score for flavour was treatment T₆ (8.12) containing 4% finger millet flour over that all of the treatments. The dietary treatment affected significantly the flavour of misti *dahi* where the mean score for control misti *dahi* there was no added millet flour (T₁) significantly lower (7.67) than that of misti *dahi* blended with 4% foxtail millet flour (T₃), and 4% finger millet flour (T₆). The score being 7.72 and 8.12 respectively. While, the score of (T₁) was significantly higher over the treatments T₂, T₄, T₅, T₇, T₈, T₉, and T₁₀ the score being 7.59, 7.48, 7.60, 7.50, 7.26, 7.10 and 6.75 respectively. These results are in agreement with results showed by Ramanathan and Sivakumar (2013) [9] prepared fiber enriched and vitamin-C fortified sweetened probiotic *dahi*. More *et al.* (2020) [6] also observed that the proportion of bajra flour increased there was decreased in flavour score of *dahi*.

Table 1: Effect of incorporation of different levels of foxtail millet and finger millet flour on flavour, colour and appearance, taste, body and texture and overall acceptability of misti *dahi* (Max. Score 9)

Treatment	flavour	Colour and appearance	taste	Body and texture	overall acceptability
t ₁	7.67 ^{bc}	7.46 ^{cd}	7.75 ^{bc}	7.69 ^{bc}	7.76 ^c
t ₂	7.59 ^c	7.40 ^d	7.61 ^c	7.49 ^c	7.65 ^c
t ₃	7.72 ^b	7.74 ^b	7.90 ^b	7.77 ^b	7.98 ^b
t ₄	7.48 ^d	7.20 ^e	7.22 ^{de}	7.38 ^f	7.32 ^{de}
t ₅	7.60 ^c	7.50 ^c	7.79 ^b	7.63 ^{cd}	7.78 ^c
t ₆	8.12 ^a	8.08 ^a	8.16 ^a	8.10 ^a	8.20 ^a
t ₇	7.50 ^d	7.25 ^e	7.32 ^d	7.56 ^{de}	7.45 ^d
t ₈	7.26 ^e	7.10 ^f	7.10 ^{ef}	7.24 ^g	7.20 ^e
t ₉	7.10 ^f	7.00 ^g	7.00 ^f	6.90 ^h	7.00 ^f
t ₁₀	6.75 ^g	6.61 ^h	6.60 ^g	6.70 ⁱ	6.71 ^g
S.E.(m) ±	0.03	0.03	0.05	0.03	0.04
C. D. at 5%	0.09	0.09	0.15	0.09	0.14

Colour and appearance acceptability

The average score of colour and appearance attributes ranges between 6.61 to 8.08. That the means of all treatment were acceptable and secured score for the point of like slightly to like very much on 9 point hedonic scale for colour and appearance. The highest score of colour and appearance was recorded for treatment T₆ (8.08) prepared by using 4% finger millet flour as per treatment whereas, treatment T₁₀ was showed lowest score i.e. (6.61) because the combination of two different millet flour 6% foxtail millet flour and 6% finger millet flour using for blending in to the misti *dahi*. The treatment T₁, T₂ and T₅ were at par with each other and also treatment T₄ and T₇ were at par to each other and other treatment was found significantly different. These results are in agreement with results noted Syama *et al.* (2014) ^[12] and More *et al.* (2020) ^[6] reported that colour and appearance score of *dahi* decreased with increase in level of millet flour.

Taste acceptability

The average taste of control and develop misti *dahi* for treatment T₁, T₂, T₃, T₄, T₅, T₆, T₇, T₈, T₉ and T₁₀ were 7.75, 7.61, 7.90, 7.22, 7.79, 8.16, 7.32, 7.10, 7.00 and 6.60 respectively. The highest score for taste was recorded for treatment T₆ i.e. 8.16 and the lowest taste score was recorded for treatment T₁₀ i.e. 6.60. Treatment T₆ was significantly superior over the all treatments. The treatment T₁, T₃ and T₅ were at par to each other.

Body and Texture acceptability

The mean score for body and texture for the all treatments T₁, T₂, T₃, T₄, T₅, T₆, and T₇, T₈, T₉ and T₁₀ were 7.69, 7.49, 7.77, 7.38, 7.63, 8.10, 7.56, 7.24, 6.90 and 6.70 respectively. The highest score for body and texture was recorded for treatment T₆ (8.10) whereas lowest score was recorded for treatment T₁₀ (6.70). Treatment T₆ was significantly superior over the all treatments. All treatments were acceptable on 9 point hedonic scale secured more than 6 point. When we looked regarding body and texture, it was clearly indicated that as the increased in proportion of foxtail millet and finger millet flour as per treatment score of body and texture was decreased which might be due to increase in viscosity because of higher dietary fibre content in both millet flour. These results are in agreement with results showed by Ramanathan and Sivakumar, (2013) ^[9] and Johari *et al.* (2014) ^[10] also observed the decreasing trend in the body and texture score of misti *dahi*.

Overall acceptability

The mean score for overall acceptability of millets flour added misti *dahi* for treatment T₁, T₂, T₃, T₄, T₅, T₆, T₇, T₈, T₉ and T₁₀ were 7.76, 7.65, 7.98, 7.32, 7.78, 8.20, 7.45, 7.20, 7.00 and 6.71 respectively. significantly highest score found (8.20) and lowest score (6.71) acceptability score was received to misti *dahi* fortified with 4% finger millet flour (T₆) and 6% foxtail millet flour and 6% finger millet flour (T₁₀). The treatment T₁, T₂ and T₅ are found significantly at par to each other. It is observed that the overall acceptability score was found to be in decreasing order as the proportion of flour in the milk increased. The acceptability score was reduced proportionately with the increased in proportion of millets flour. These result are also in agreement with the results noted by Ramanathan and Sivakumar (2013) ^[9], Dympep *et al.* (2019) ^[12] and More *et al.* (2020) ^[6].

Conclusion

Dahi and its related products were, are and will remain an

essential part of the daily diet of Indian population. Innovation and value addition to *dahi* and its related products will provide ample opportunities to food manufacturing Goods Company and co-operative food industries for increasing their products. It concluded that organoleptically acceptable misti *dahi* containing foxtail millet and finger millet flour could be implemented in future as a beneficial for health to eradicate the malnutrition problems from developing and under developed countries. The misti *dahi* prepared by added 4% percent finger millet flour was found more suitable on sensory attributes.

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