CHEMICAL PROPERTIES OF LOW-FAT FROZEN YOGHURT INFLUENCED WITH ADDITION OF DIFFERENT AMOUNT OF FRUITS PULP

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Abstract: A study were conducted to prepare low-fat frozen yoghurt mix with different amount of locally available fruit pulp of Banana, Lychee and Mango during 2014-15 and 2015-16 at the Warner School of Food and Dairy Technology, Sam Higginbottom Institute of Agriculture, Technology and Sciences (Deemed To-Be University, Formerly AAI-DU), Allahabad-211007 (U.P), India. There were four fat per cent 0.5(F1), 1.0 (F2), 1.5 (F3) and 2.0 (F4), three fruits banana (B), lychee (L) and mango(M) and each fruit having three pulp level 1(5%), 2(10%) and 3(15%). The total treatment combinations were 36 and replicated thrice. The objectives of studies was to analyze the chemical properties of low-fat frozen yoghurts prepared with mixing of three fruits (Banana, Lychee and Mango), its three pulp per cent i.e. (5, 10 and 15) and four fat per cent (0.5, 1.0, 1.5 and 2.0). This was prepared using standard procedure and it was also analyzed with using well developed methodology for its chemical properties i.e. moisture, fat, total solids, acidity, protein, carbohydrate and ash. The results clearly indicated that the addition of mango was better than lychee and banana in frozen yoghurt with 0.5%, 1.0%, 1.5% and 2.0% fat. The high valued frozen yoghurt was made with mango pulp at 10% than 5% and 15% that showed exceptional results as compared to other. The fruit additives are the better options for increasing flavored value of low-fat frozen yoghurt its quality and acceptability.

Keywords: Fat percent, fruits pulp percent, frozen yoghurt.

1.0 Introduction: Yoghurt is most preferred fermented milk which is widely consumed in India and abroad. It is highly safe, tasty and nutritionally potential, preferred food stuff in Asia, Africa, Europe and USA due to its therapeutic and nutritive. The nutritional and potentially therapeutic value of food is a key characteristic in the development of new value-added products manufactured for health conscious consumer [1]. The lactic acid bacteria are used as starter culture containing Streptococcus thermophilus and Lactobacillus delbrueckii ssp. bulgaricus. These two genera are used in yoghurt preparation for milk acidification and synthesis of aromatic compounds and also increase lactic acid content in yoghurt [2-3]. Their profit compositions in similar to used milk with high biological value with components are added. Yoghurt is an excellent source of protein, carbohydrate, calcium, phosphorus, Vitamins (B1, B2, and B12), fat and a valuable source of folate, niacin, magnesium and zinc. Yoghurt is one of the most popular easily digestible fermented milk products that improve overall quality of the diet and has gained widespread consumer acceptance as a healthy food [4].

The addition of fruits in yoghurt preparation improved composition properties and enhanced taste, make delicious pleasing flavor product that contains refreshing flavor of fruit and beneficial effect of yoghurt. Fresh fruits, fruit juice, canned preserved fruits, frozen fruits and miscellaneous fruit products are used in manufacturing of new generation flavored generic yoghurt regulated by international standard of the country. Now-a-days demands are increasing for a new range of traditional dairy products including yoghurt having low-fat content [5]. As per norm of the FAO/WHO the concentrations of fruit for fruit yoghurt are
varying 5 to 15 percent. An effort were made to analyze the chemical properties of low-fat frozen yoghurt prepared with addition of different amount of fruits pulp of Banana, Lychee and Mango in the Warner School of Food and Dairy Technology, Sam Higginbottom Institute of Agriculture, Technology and Sciences (Deemed To-Be University, Formerly AAI-DU), Allahabad-211007 (U.P), India.

2.0 Materials and Methods

2.1 Preparation of Fruit Pulp: Banana, Lychee and Mango were collected from the local market of Allahabad. Fruits were thoroughly washed with clean water and outer layer or rind was separated with the help of knife. Fruit pulp were prepared by crushing of skinned fruits and kept for pasteurization at 95°C for 15 min. and filled into jars at ambient temperature until added to yoghurt.

2.2 Preparation of Low-fat Frozen Yoghurt with Incorporation of Different Fruits: Fruit flavoured frozen yoghurt mix was prepared by using skim milk standardization of fat 0.5%, 1.0%, 1.5% and 2.0%, and 12% milk SNF (solid not fat) with the addition of 12% sugar and 0.2% stabilizer and emulsifier. The mix was homogenized, pasteurized at 85°C and was cooled 42°C to 43°C. Yoghurt starter culture was added at a ratio of 2% and mix was incubated at 42°C until desired titratable acidity was reached 0.4% to 0.5%. Then mix was cooled to 5°C. Ageing of mix was done at 5°C for 3-4 hours. Then different fruit pulps (Banana, Lychee & Mango) in various ratios (5%, 10% & 15%) were mixed in yoghurt and freeze in batch freezer at -4°C to -5°C. Packaging and hardening were followed using standard procedure as prevailed in the market.

2.3 Chemical Analysis

Moisture: The moisture percentage in frozen fruit mix yoghurt was determined by over drying method as per the procedure given in Association of Analytical chemist [6].

Total Solids: The total solids in frozen mix yoghurt were determined gravimetrically as per the procedure for milk laid down [7].

Acidity: Titratable acidity of frozen mix yoghurt samples was determined by titration method as per procedure laid down [7].

Protein percent: The Protein content of frozen mix yoghurt was determined by Kjeldahl method as per the procedure given in Association of Analytical chemist [6].

Carbohydrate percent: The Carbohydrate was calculated by subtracting sum of the Moisture, Protein, Fat and Ash from 100.

Ash percent: The ash content in frozen mix yoghurt was determined by charring method as per the procedure given in Association of Analytical chemist [6].

Fat Percent: The Fat percent in frozen mix yoghurt was determined by digital pH meter.

pH: The pH of frozen mix yoghurt was determined by digital pH meter.

2.4 Statistical Analysis: The data obtained were statistically analyzed by using factorial design and critical difference (C.D.) technique [9].

3. Results and Discussion

The data related with chemical properties i.e. moisture, fat, total solids, acidity, protein, carbohydrate and ash for the different fruit pulp based frozen yoghurt prepared by different concentration of Banana, Lychee and Mango pulp in 5%, 10% and 15% respectively are included in table. There were variations in the results alone and in combination of different treatments. The highest moisture content was recorded in the treatment F1M3 80.71 and the lowest moisture content was F4B3 77.33. It is might be due to the addition of fruit and amount of pulp as it decreases the TS of frozen yoghurt and therefore increases the moisture content. The ascending range of treatments were F4B3 22.67 and F4B2 21.67 and the lowest protein content was F1M3 19.29. The addition of fruit pulp increases in the moisture content and there was decrease in the TS of low fat frozen yoghurt. The ascending value of treatment combination were F1B1 19.31 < F1M3 18.47 < F1L2 17.91 < F1L1 16.91 < F2M3 16.37 < F1B2 14.71 < F2M1 14.01 < F2L1 13.91 < F2B1 13.91 < F3L3 13.81 < F3L2 13.11 < F3L1 12.91 < F3B3 12.91 < F3B2 12.11 < F3B1 11.81 < F4L3 11.71 < F4L2 11.01 < F4L1 10.81 < F4B1 10.41 < F4B2 10.21. The highest protein content was recorded in the treatment F1B1 3.12 and the lowest total solid content was F1M3 19.29. The addition of fruit pulp increases in the moisture content and there was decrease in the TS of low fat frozen yoghurt. The ascending value of treatment combination were F1B1 19.31 < F1M3 18.47 < F1L2 17.91 < F1L1 16.91 < F2M3 16.37 < F1B2 14.71 < F2M1 14.01 < F2L1 13.91 < F2B1 13.91 < F3L3 13.81 < F3L2 13.11 < F3L1 12.91 < F3B3 12.91 < F3B2 12.11 < F3B1 11.81 < F4L3 11.71 < F4L2 11.01 < F4L1 10.81 < F4B1 10.41 < F4B2 10.21. The highest protein content was recorded in the treatment F1B1 3.12 and the lowest protein content was F4M3 2.85. The ascending order of treatment combinations were F1B1 18.31 < F4L3 17.41 < F4M3 16.37 < F1L3 15.81 < F3M3 15.31 < F4L2 14.71 < F4M2 14.11 < F4L1 13.71 < F4B1 13.31 < F4B2 13.11 < F4B3 12.71 < F4M2 12.11 < F4M1 11.71 < F4L3 11.31 < F4L2 10.71 < F4L1 10.31 < F4B1 9.91 < F4B2 9.51.
The highest acidity content was recorded in the treatment F4L3 0.66 and the lowest acidity content was F1B1 0.25. The increase in acidity of low fat frozen yoghurt might be due to the acidity of banana, lychee and mango fruits. The ascending order of treatment combinations were F1B1-F2B1-F3B1-F4B1-F2B2-F1B2-F3B2-F4B2-F2B3-F1B3-F4B3-F3B3-F1B1-F2B1-F3B1-F4B1-F2L1-F3L1-F4L1-F2L2-F3L2-F4L2-F4L3. The highest content of carbohydrate was recorded in the treatment F1B3 15.68 and the lowest carbohydrate content was F4M1 14.64. The ascending order of treatment combinations were F1B1-F2M1-F3M1-F4M1-F2M2-F3M2-F4M2-F2M3-F3M3-F4M3-F2L1-F3L1-F4L1-F2L2-F3L2-F4L2-F4L3.<br>

The highest fat content was F4B3-F1M2-F3M1-F1B1-F2B1-F1L1-F1L2-F2L1-F3L2-F4L1-F2B2-F3L2-F4L2-F3L3-F4L3. The highest fat content was F4B3-F1M2-F3M1-F1B1-F2B1-F1L1-F1L2-F2L1-F3L2-F4L1-F2B2-F3L2-F4L2-F3L3-F4L3. The highest fat content was F4B3-F1M2-F3M1-F1B1-F2B1-F1L1-F1L2-F2L1-F3L2-F4L1-F2B2-F3L2-F4L2-F3L3-F4L3. The highest fat content was F4B3-F1M2-F3M1-F1B1-F2B1-F1L1-F1L2-F2L1-F3L2-F4L1-F2B2-F3L2-F4L2-F3L3-F4L3.<br>

The highest content of ash was F1B3 0.25. The increase in acidity of low fat frozen yoghurt might be due to the acidity of banana, lychee and mango fruits. The ascending order of treatment combinations were F1B1-F2M1-F3M1-F4M1-F2M2-F3M2-F4M2-F2M3-F3M3-F4M3-F2L1-F3L1-F4L1-F2L2-F3L2-F4L2-F4L3.<br>

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4. **Conclusion:** The results showed a better understanding of chemical properties imparted by the addition of fruits and amount of fruits pulp to the frozen yoghurt. Chemical properties of experimental frozen yoghurt were analyzed for moisture, total solids, protein, acidity, carbohydrate, ash, fat and pH. The results of the present study revealed that the incorporation of mango was better followed by lychee and banana in frozen yoghurt with 0.5%, 1.0%, 1.5% and 2.0% fat. The high valued experimental frozen yoghurt was with the mango pulp at 10% showed exceptional results as compared to other. The results of this study concluded that fruit additives are the better options for increasing frozen yoghurt quality and its acceptability.

**References**