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Quality evaluation of selected ice cream samples sold in the market of Bikaner city (Rajasthan)

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Milk and milk products play an important role in human nutrition as they are having excellent nutritional qualities. Ice creams which are highly palatable, nutritious and commercially important dairy product can sometimes become a potential source of health hazard, by causing food poisoning outbreaks or by acting as a carrier of pathogens or by adulteration. The present study was attempted to evaluate the quality of ice creams. For this, samples were collected in triplicates in previously sterilized containers, from five prominent shops of Bikaner city. The average moisture, crude protein, fat, total ash, carbohydrate, energy, calcium and phosphorus content was ranged from 59.74-65.06 g %, 3.06-4.46 g %, 9.00-14.06 g %, 2.35-3.12 g %, 18.24-21.04 g %, 175-222 Kcal, 589-757mg %, and 648-784 mg %, respectively. Forty per cent , 20 per cent and 60 per cent ice cream samples were noted to be of satisfactory quality with respect to SPC, faecal; E.coli, coliform and ; psychrophilic count, respectively. Presence or absence of adulterants like starch and metanil yellow were also detected, but all the samples were found to be devoid of adulterants.

Key Words : Quality, Bacteriological examination, Adulteration, Health hazard, Microbial count

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INTRODUCTION

Quality ice cream production has become an important activity of the dairy industry in India. Ice cream is a highly palatable, nutritious and commercially important dairy product. Because of the large population being vegetarian this product have a special place in the dietary pattern to supply high quality protein and other nutrients. Ice cream which is one of the most popular and nutritious dairy product can sometimes become a potential source of health hazard, by causing food poisoning outbreaks or by acting as a carrier of pathogens or by adulteration. There are many causes for microbial contamination and adulteration of ice cream being mainly the poor quality of ingredients, improper processing or pasteurization, prolong aging of mix at low temperature, improper cleaning and sanitizing the equipments, improper handling and storage of the finished product (Yadav *et al.*, 1993 and Pooran *et al.*, 2012). With respect to the possibility of adulteration and microbial contamination, quality of ice cream remains in question. An attempt was therefore made in the present investigation to study the quality of ice cream with respect to nutritional, adulteration and bacteriological aspects.

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METHODOLOGY

Samples of ice cream (vanilla) were procured in triplicates and in previously sterilized containers from five different prominent shops of Bikaner city (Rajasthan). All the samples were immediately brought to laboratory under cold conditions and stored in refrigerator till used

for analysis

Analysis of the ice cream samples was carried out using standard methods for moisture, crude protein, total ash, fat, carbohydrate, energy (AOAC, 1995), calcium (Talpatra *et al*., 1940), and phosphorus (Gupta *et al*., 1988). Bacteriological qualities were assessed on the basis of standard plate count (APHA, 1960), staphylococcal count (Chapman, 1946), psychrophilic count (APHA, 1978), coli form count (APHA, 1960), *E. coli* count (APHA, l960) and faecal streptococcal count (NCFA, 1968). The presence of adulterants, if any, like inedible colour (metanil yellow) and exogenous starch were analyzed by using the methods prescribed by AOAC (1995) and Plummer (1971), respectively.

OBSERVATIONS AND ASSESSMENT

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Nutritional analysis :

The average moisture, crude protein, fat, total ash, carbohydrate, energy, calcium and phosphorus content of ice cream ranged from 59.74-65.06 g per cent, 3.06-4.46 g per cent, 9.00-14.06 g per cent, 2.35-3.12 g per cent, 18.24-21.04 g per cent, 175-222 Kcal, 589-757 mg per cent and 648-784 mg per cent, respectively (Table 1). Statistically significant difference (1 % level) was found between the ice cream samples for all the above nutrient contents (Table 1). Values of these nutrient content were noted to be comparable with the standards, prescribed by PFA (2000). Based on the nutritional analysis one serving of ice cream (100 g or 1 small cup), was found to be providing 3.84 g protein, 11.48 g fat, 19.31 g carbohydrate, 196 Kcal energy, 644 mg calcium and 726 mg phosphorus, respectively.

Bacteriological examination :

On the basis of ISI (1964) standard, only 40 per

Table 1 : Nutrient composition of ice cream samples

Sample number	Moisture g%	Protein g%	Fat g%	Ash g%	Carbohydrate g%	Energy KCal	Calcium mg%	Phosphorus mg%
Sample I	65.06	3.72	9.56	3.12	18.54	175	655	784
Sample II	61.99	4.46	11.25	3.03	19.27	196	757	756
Sample III	62.07	3.59	13.50	2.60	18.24	209	598	648
Sample IV	64.35	3.06	9.00	2.55	21.04	177	620	702
Sample V	59.74	4.38	14.06	2.35	19.47	222	589	741
Standard error of mean (SEM)	0.35	0.014	0.137	0.018	0.456	1686	1.48	2.78
CD value	1.09	0.045	0.43	0.06	1.09	5.31	4.67	8.76

CD : Critical difference

Table 2 : Bacteriological examination of ice cream samples

Sample	SPC/g or ml	Quality	Stephy-lococcal Count / g or ml	Quality	Psychrophlic count/g or ml	Quality	Coliform Count/g or ml	Quality	E.Coli count/g or ml	Quality	Faecal Strepto-coccus Count/g or ml	Quality	Overall bacterial quality
Standard	$<2.5 \times 10^5$ (ISI,1964)	S	Zero	S	$<5\times10^4$ (Mergyl,1984)	S	<100 (ISI,1964)	S	Zero	S	Zero	S	S
Sample I	3.4×10^5	US	2.5×10^3	US	3×10^4	S	3.5×10^2	US	2.5×10^3	US	2.8×10^2	US	US
Sample II	7.5×10^5	US	3.4×10^3	US	5×10^4	S	1.6×10^3	US	3×10^3	US	1.6×10^2	US	US
Sample III	1.5×10^5	S	5.3×10^3	US	8.4×10^4	US	70	S	0	S	0	S	US
Sample IV	1.2×10^5	S	2.8×10^3	US	8×10^4	US	1.6×10^3	US	4×10^3	US	0	S	US
Sample V	6.8×10^5	US	2×10^3	US	1×10^4	S	9×10^2	US	2×10^3	US	1.8×10^2	US	US
Percentage of S/US samples	60%US 40%S		100%US		40%US 60%S		80%US 20%S		80%US 20%S		60% US 40%S		100%US

S : Satisfactory
US : Unsatisfactory

Table 3 : Detection of presence/absence of adulterants in ice cream samples

Sample number	Adulterants	
	Starch	Colour (Metanil Yellow)
Sample I	Absent	Absent
Sample II	Absent	Absent
Sample III	Absent	Absent
Sample IV	Absent	Absent
Sample V	Absent	Absent

cent of ice cream samples were found to be satisfactory with respect to SPC. Hundred per cent of ice cream samples were noted to be of unsatisfactory grade with respect to presence or absence of staphylococcal count. As per standard given by Mergyl (1984), 40 per cent of ice cream samples were of unsatisfactory quality having more than 50,000 psychrophilic organisms per ml. On the basis of ISI (1964) standard, 80 per cent of ice cream samples were found to be of unsatisfactory quality with respect to coliform count. In ice cream samples, presence of *E. coli* count was 80 per cent. Sixty per cent of ice cream samples were contaminated with faecal streptococci count (Table 2).

Adulteration analysis :

Results of the adulterant analysis showed that none of the ice cream samples analyzed were adulterated with exogenous starch as well as with metanil yellow (Table 3). It is possible that shopkeepers have become aware of the fact that only standard marked food ingredients are to be used.

Summary :

Overall quality of ice cream samples when adjudged on the basis of their nutritional, bacteriological and adulteration analysis, the ice cream was found to be nutritious as well as free from exogenous starch and metanil yellow. But on the basis of bacteriological examination all the ice cream samples under study, had high percentage of microbial count, indicating significance of sanitary methods used during processing, handling, storage and distribution of milk and milk products.

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