MICROBIOLOGICAL QUALITY AND PUBLIC HEALTH SIGNIFICANCE OF ICE-REAM

Pages with reference to book, From 102 To 104

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Abstract

Fifty samples of ice-cream were subjected to microbiological examination. Of these 72% had total viable count over 106/g while 66% had coliform count between 102 — 1o3/g. The micro-organisms isolated were Escherichia co/i (46%), Enterobacter aerogenes (34%), Staphylococcus aureus (26%), proteus species (16%), Streptococcus facca/is (12%), Citrobacter species (10%) and Bacillus cereus (4%). The results showed that commercially prepared ice-cream sold in the market was not satisfactory for human consumption and preventive measures should be enforced for the supply of satisfactory products. (JPMA 39: 102, 1989).

INTRODUCTION

Earlier studies from different countries revealed that ice-cream also acts as a vehicle of food-borne diseases.[1-3] The food industries in Pakistan do not conform to the international hygienic standards and this results in health risk to hundred of persons. [4] The present study was undertaken to assess the risk to public health by ice-cream as presently prepared and distributed in Pakistan.

MATERIAL AND METHODS

Collection of Samples

Fifty samples of commercially prepared ice-cream supplied by four different enterprises were purchased from retail shops of Rawalpindi/ Islamabad and were immediately transported to the Dairy Technology Lab, of N.A.R.C. Islamabad for quantitative and qualitative microbiological analysis.

Microbiological Analysis

The microbial profile of ice-cream was studied by mixing 1 gram of sample in 99 ml of phosphate buffer saline (PBS) pH 7.2. Appropriate inocula were used to obtain Standard Plate Count at 37°C as well as counts of indicator organisms like coliform and staphylococci. Total counts were obtained by using standard procedures[5], For the determination of coliform and staphylococcal counts MacConkey's agar and Staphylococcus medium No. 1 l0(S-1 10) respectively were used. Cultural and morphological examinations were undertaken, followed by various biochemical tests to identify each type of organism as described by Cruickshank et al[6]. The confirmation of Staphylococcus aureaus was done as per recommendations of the sub-committee on toxonomy of staphylococci and micro-cocci. [7] The methods of Lachica et al[8] and Robbin et al[9] were adopted to study the thermonuclease positive and enterotoxigenicity respectively by S. aureus isolates.

RESULTS

TABLE I. Total viable count, Coliform count and Staphylococcal count in Ice-Cream Samples.

Analysis	Minimum	Maximum	Geometric mean
Total viable count	1.8×10^3	6.5×10^9	4.2×10^7
Coliform count	8.0	2.0×10^4	$1.1 sx 10^3$
Staphylococcal count	3.0×10^2	4.0×10^4	2.0×10^3

Table 1 shows the total viable, coliform and staphylococcal counts obtained from 50 samples of ice-cream. The mean viable counts/g were 4.2×10^7 log. Most of the samples (72%) had counts over 10^6/g and only 4 samples had counts less than 10^5/g. The mean colifonn counts/g were 1.1×10^3. Thirty three samples (66%) had total coliform counts between 102 to 10^3/g. Of 50 samples' examined 9 yielded no coliform. The mean staphylococcal count was 2×10^3 while 16 samples did not yield any staphylococcal count.

TABLE II. Distribution of Pathogenic Strains isolated from Ice-Cream.

Types	Number	Percentage
Escherichia coli	23	46.00
Enterobacter aerogenes	17	34.00
Staphylococcus aureus	13	26.00
Proteus spp.	8	16.00
Streptococcus faecalis	6	12.00
Citrobacter spp.	5	10.00
Bacillus cereus	2	4.00

Table II shows bacterial strains isolated from ice-cream on the basis of morphological, biochemical and serological characteristics. Twenty three out of 50 samples (46%) were positive for Escherichia coil, other organisms isolated were Enterobacter aerogenes, Staphylococcus aureus, proteus species, Streptococcus faecalis, Citrobacter species and Bacillus cereus in 17, 13,8, 6, 5 and 2 samples

respectively.

DISCUSSION

Quality control of many foods depends mainly on its microbiological evaluation. The increase of total plate count of any food indicates poor hygienic conditions prevailing, increase of colilorm and streptococcal counts indicate faecal contamination while increase of staphylococcal count indicates unhygienic handling which may cause various diseases like diarrhoea, dysentery and vomiting[10]. The high total viable count, coilform count and staphylococcal count recorded in the present study may be due to the use of inferior quality of raw ingredients (milk, milk fat, nonfat milk solids, fruits and food additives), inadequate cleanliness of processing equipments coupled with Spoor personal hygiene. These observations are consistent with the eariler studies reported in Egypt[11] and India[12]. In Egypt the mean total viable count and coliform count recorded in 40 ice-cream samples were 2.5 x 10^9 /g and 1.3 x 10^3/g respectively while in India it was 5 x 10^5/ g and 7 x 10^3/g respectively. Hobbs[13] reported that food suspected of causing poisoning gives higher counts ranging from one million to 10 million per gram of the food. Furthermore in dairy products the permissible range recommended[10] for total viable count, E. Coli and coagulase positive staphylococci count were> 100000, >20 and > 100 respectively. Thus 72% studied samples could be a potent source of food-borne infection. The presence of bacterial strains presented in Table II were similar to those reported by others[11,12]. These findings indicate poor personal hygiene of workers and questionable sanitary conditions under which the ice-creams were being made. The occurrence of outbreaks of enteritis due to coagulase positive Staphylococcus aureus had been widely recognized. In this study 13 samples were found to harbour this, which is an alarming incidence. This finding agrees with other studies reported in Yugoslavia[14] and India[12] where the recovery percentage of Staphylococcus aureus was 92% and 23% respectively. This source of S. aureus in ice-cream may be either from utensils or due to post-contamination from infected workers handling the products. In the present study the contamination of S. aureus by food handlers was further proved by the identification of S enterotoxigenic strains of S. aureus out of 13 tested strains Among the identified toxigenic strains enterotoxin ‘A’ was most prevalent as compared to others which indicates human contamination. Similar views are expressed by earlier studies[15,16]. Results of the present study reveal that ice-cream sold in the market is unsatisfactory for human consumption and poses a major health hazard to the public. The situation could be resolved successfully provided the manufacturers and public health authorities realize their responsibilities and embark upon vigorous quality control programmes, avoid using substandard products, adopt strict hygienic measures during the processing and carry out regular checks on the finished product before marketing it for general use.

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