STUDIES ON THE PHYSICAL AND BACTERIAL QUALITY OF DAHI WITH SPECIAL REFERENCE TO PUBLIC HEALTH

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Abstract

One hundred and fifty three dahi (yoghurt) samples were colledted from Lahore Milk Plant (L.M.P.), various houses and city market. Dahi prepared at LMP was better in quality than homemade or market made dahi in respect to texture, flavOur and taste. The fat percentage and pH values ranged from 2.5% to 4.4% and 3.4 to 6.0 respectively, whereas total bacterial count ranged from 1 .1XlO to 1 .0x109 organisms per ml. Different types of organisms involved in dahi production were Streptococcus lactis, Streptococcus therm ophilus, ía ctoba cl//us acidophilus, Lactobadi/us case1, Lactobadil/us bu/garlcus and Leuconostoc cltrovorum. In few specimens Streptococcus faeca/is, Streptococcus aureus, Escherlchia co/I, Enterobacter aerogenese, Bacillus cereus, yeasts and moulds were also found. (JPMA 36:87,1986).

INTRODUCTION

Fermented nilk appears to be a popular beverage in Central Europe, Russia, Yoguslavia, Middle East and Indo-Pakistan under the names of yoghurt, Leben, Goidu, and Dahi. A standard dahi should possess the qualities of a smooth texture a semi-solid but firm body without any lumps, a velvety appearance, and a pleasant flavour. To achieve these results, desired flora like Streptococcus lactis or/and Leuconostoc citrovorum, Streptococcus thermophihus and Lacto bacillus bulgaricus or Lactobacillus acidophilus act as starter. Alongwith these normal flora, various pathogenic organisms could also survive in fermented milks of high acidity resulting in the spread of various diseases like, Salmonellosis, Brucellosis, Typhoid, EnterotoxTemia and dysentery[1-3]. The present study was conducted to determine the physical appearance ,of dahi alongwith the bacteriological analysis in the winter season, with special reference to organisms of public health importance.

MATERIAL AND METHODS

Sources of specimens

One hundred and fifty three samples of dahi were collected from various sources i.e. Lahore Milk Plant (51 samples).

Preliminary Examination

1. The physical examination of each sample was made at the source of collection regarding their flavour, appearance and taste.
2. A pH meter was used to determine the pH values of each specimen, after mixing it thoroughly.
3. Tryptone Glucose Extract Agar (Oxoid CM 127) was used for bacterial viable count applying agar dilution technique. For yeasts and moulds count potato Dextrose Agar (BBL 11549) was used.
4. The samples were analysed for the estimation of fat percentage by Garber method.

Cultivation, isolation and identification of organisms

The following media were used for detailed bacteriological examinations: Blood agar (Blood agar base,

Oxoid CM 55+7% defibrinated horse blood); Rogosa agar (Oxoid PM 227); M.R.S. borth (Oxoid CM 359); Mac-Conkey agar (Oxoid CM 7b); Milk agar; Nutrient agar (Oxoid CM 3); Litmus milk (BBL 11342). Each specimen was cultured on various media to purify each type of organism present in the specimen. The colonial and microscopic examination was undertaken followed by various biochemical and miscellaneous tests, to identify each type of organisms[4].

RESULTS

Most of the samples of Lahore Milk Plant dahi were of good physical appearance, sweet in taste and 58% of them gave typical aroma. The pH ranged from 3.5 to 5.9 and butter fat was 3.8%; whereas total bacterial count ranged from 2x107 to 1x109 organisms per ml.

Among home-made dahi, 60% had a good texture and typical aroma; 30% were a bit acidic and mildly sour in taste. A few were very sour and two bitter in taste, pH ranged from 34 to 6.0 and the butter fat varied from 3.2 to 4.4%. The total bacterial count ranged from 2.5x107 to 9.8xl08.

Thirty five percent dahi samples from the market were found slightly sour in taste with watery texture, whereas 65% showed fairly good texture and sweet taste with fat contents from 2.5 to 4.3%. The pH values ranged from 3.4 to 4.9. The total bacterial cOunt ranged from 1.lxlO6 to 9.5x107 organisms per ml. (Table I).

Table I
Bacteriological and Chemical Analysis of Dahi Samples.

Sources	No. of samples	viable bacterial count (per gram of dahi)	pH Values	Fat
Lahore Milk Plant	51	$2x10^7$–$1x10^9$	3.5-5.9	3.8-3.9
Home made	51	$2.5x10^7$-$9.8x10^8$	3.4-6.0	3.2-4.4
Market made	51	$1.1x10^6$-$9.5x10^7$	3.4-4.9	2.5-4.3

The common organisms isolated from all the three sources were Streptococcus lactis, Streptococcus thermophilus, Lacto bacillus acidophillus, Lactobacillus bulgaricus, Leuconostoc citrovorurn, Escherichia colt, Bacillus cereus, Enterobacter aerogenese, yeasts and moulds. However, Streptococcus faecalis, Lactobdcillus casei and Staphylococcus aureus were found only in a few samples among home made and market-made dahi (Table II).

Table II
Distribution of Organisms.

Organisms	Types of dahi examined alongwith number of various isolates.		
	LMP-made	Home-made	Market-made
Streptococcus lactis	48	45	43
Streptococcus thermophilus	47	45	30
Streptococcus faecalis	-	7	12
Staphylococcus aureus	-	2	5
Lactobacillus casei	-	1	4
Lactobacillus acidophilus	45	35	25
Lactobacillus bulgaricus	35	40	48
Leuconostoc citrovorum	10	12	15
Escherichia coli	5	10	26
Enterobacter aerogenese	2	8	18
Bacillus cereus	2	5	12
Yeasts	2	6	7
Moulds	1	2	3

DISCUSSION

Variation in the physical appearance of dahi seems to be due to difference in milk handling procedure, size of inoculum, incubation temperature and packing of the product.

The product was packed in polythene pouches at Lahore Milk Plant and was stored at 6°C after 6 hours of incubation at 37°C. This procedure did not allow the product to attain a firm texture. In case of market-made dahi and home-made dahi, earthenware pans were used so the texture was usually firm

where as the flavour and taste were usually variable due to the use of starter of unknown bacterial composition. Facility for inoculation and proper storage were also not available which also affected the quality of the product.

The milk used at Lahore Milk Plant was always pasteurized hence more chances of unwanted bacterial contamination could happen during the handling of milk after inoculation and or at the time of packing. The procedure for the handling of milk was variable in case of market made dahi preparation. The milk was sometimes simmered for hours and then cooled down before inoculation, where as in some cases the evening milk was added, without heating, to already boiled morning milk which was later on inoculated, so the pathogenic organisms might have survived. Mother factor was the selling procedure of the product, as dahi was usually sold in uncovered earthenware pans so the chances of air borne contamination were always there. In the case of home made dahi, contamination could have been due to improper cleaning of stensiles and/or handling of the product by a carrier.

In the current study the major organisms found, as normal flora of dahi, were Streptococcus lactis, Lactobacillus bulgaricus and Streptococcus thermophilus. Their isolation has also been reported by many workers,[5,6] from other types of fermented milks. Lactobacillus acidophilus and Lactobacillus casei, were also found in a few samples. These findings were in accordance with some other workers[6,7]. Various organisms of public health importance were also found among the tested specimens, i.e. Staphylococcus aureus, Streptococcus faecalis, Escherichia coli, Enterobacter aerogenese, Bacillus cereus, yields and moulds. The presence of such types of undesirable microorganisms has also been objected by many workers.[2,3,6] The presence of Streptococcus faecalis, Enterobacter aerogenese and Escherichia coli was an indication of faecal contamination which could have occurred both before and/or after the preparation of dahi.

This study revealed the normal dahi flora in Lahore city and indicated standard of hygienic measures observed during its preparation. So the provision of standard starter, hygienic atmosphere, suitable incubation temperature and storage of the product were important to observe for getting a good quality product which is free from any pathogen.

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