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Indigenous fermented milk products: A microbiological study in Bhagalpur town

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Milk is a natural secretion of the mammary glands of all mammals. Its purpose is to nourish the young of species. It is one food for which there seems to be no substitute. It is a complex mixture of lipids, proteins carbohydrates and many other organic compounds and inorganic salts dissolved or dispersed in water. Milk is one of the most affordable sources of nutrients. Many people do not like to consume milk in its liquid form. Therefore, there are several products which are made out of milk called dairy products. Milk products cover a very wide range of raw materials and manufactured products. One class of such products is the fermented dairy products. These fermented products such as-Dahi, Lassi, Mattha, and Kalakand etc., are taken into the consideration for the investigation. This investigation on these dairy products is a documentation of findings, suggestions about the quality improvement and safety issues.

Key Words : Fermented milk product, Microbiological

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INTRODUCTION

The primary function of food is to provide nutrients and maintaining health condition. Fermentation is the means of preservation for several foods. It improves the nutrients availability and digestibility. For several centuries man has adopted fermentation as a means of preservation and also found them to have nutritional and therapeutic advantages. Fermented milk products constitute a vital component of the human diet in many regions of the world. Milk products are also classified as 'indigenous milk products'. Dahi, lassi, Mattha and kalakand etc. are such indigenous milk products and are the prominent part of human diet. Indigenous milk products refer exclusively to dairy products of a particular region or country. In India, the significance of milk in human nutrition is now well established as it is considered the best, ideal and complete food for all age groups. Milk and dairy products are an excellent source of calcium, phosphorous and magnesium. The minerals in optimum ratio are present in milk and required for optimum growth and maintenance of bones. These also contain vital vitamins. Milk and milk products are good culture media for the development of pathogens and other microbes for the spoilage and development of toxicity. A Variety of pathogenic organisms may grow in milk and milk products from different sources and cause different types of food borne illnesses. Recent development regarding quality and safety management systems such as ISO and HACCP (Hazard Analysis and Critical Control Points) has reduced the risk of such illnesses. ISI in 'specification for fermented milk products' has clearly defined the acceptable quality of such products, which would be the safe for consumption. This study has been attempted to carry out a survey of some local suppliers of Bhagalpur town and rural areas.

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METHODOLOGY

These studies were conducted over a period of 18 months to see the difference in the quality in different seasons. The period of study was between June 2009 to November 2011.

Sampling of dairy products from market:

Representative samples of different dairy products like Dahi, Lassi, Mattha and Kalakand were picked up from retail market at random from retailer and composite samples were made, of each product from each retailer, in the laboratory. The samples were then subjected to different tests were made such as pH, temperature, colour, odour and feel of consistency. These were then subjected to chemical tests like estimation of fats (Fig.1) and estimation of moisture content. The moisture content of all the products have been shown (Fig. 2).

Estimation of titrable acidity:

The titrable acidity of all samples was detected as per standardized method which is the average results of 12 samples of each products (Fig. 3).

Microbiological analysis:

The samples were homogenized in a blender using sterile physiological saline (0.9% NaCl solution).

Coliform count:

The supernatant of the above mentioned suspension was diluted 1:10 and was directly plated on violet red bile agar. The inoculated plates of this medium were incubated at 37^{0}C for 48 hr. (Fig. 4). In case of suspected colonies, the samples were then enriched in brilliant green lactose bile broth (BGLB) having dehydrated ox bile-2 per cent, lactose-1per cent, peptone-1 per cent and 1.3 ml of 1.0 per cent solution of brilliant green in water, final pH 7.2. The tubes were incubated at 37^{0}C for 48h. The growth in these tubes were then inoculated on Hicrome *E. coli* agar. The plates were incubated at 30^{0}C for 4 hr., and then at 44^{0}C for 18 hr. (Table 1).

Micrococcus aureus:

Since milk is very good nutrient for *Micrococcus aureus*, the supernatant of the homogenized samples were subjected to detection of this microorganism, which is a potent exotoxin producer. The isolates were checked for coagulase positive nature using defibrinated plasma (Table 2).

Salmonella:

Detection of *Salmonella* was also carried out.

Shigella:

The presence or absence of *Shigella* spp. was carried out as per (IS: 5887, 1999).

Listeria monocytogenes:

The detection of *Listeria monocytogenes* was done as per (ISO 10560, 1999).

OBSERVATIONS AND ASSESSMENT

It can be visualized from the Fig. 1 that only in case for Kalakand and fruit Kalakand, there was a large unjustifiable deviation from the standard, which often does more harm than good. It is only in case of Kalakand where the titrable acidity was below standard. This low acidity in case of kalakand may cause spoilage by microorganisms. The low acidity also allows food poisoning organisms like *Micrococcus aurenus* to grow and take the product not fit for human consumption (Fig. 3). It may be also noted from the Fig. 2 that moisture content of the products are well within the limit. However there is no standard for Dahi, Lassi and Mattha, these parameters were not checked as there is no means of comparision. In Fig. 1, fat content of products is displayed. The standard values shown in figures were as per PFA-1954 (2009).

It is clear from the result that 2 out of 3 products showed high coliform count which is not good for the safety point of view and may cause serious complications to consumers (Fig. 4).

It is also clear from the Table 1 that *E.coli* was present in 6 samples out of 12 samples and *Micrococcus aureus* was present in 3 out 12 samples. This means that chances of contracting an enteric disease through consumption of such

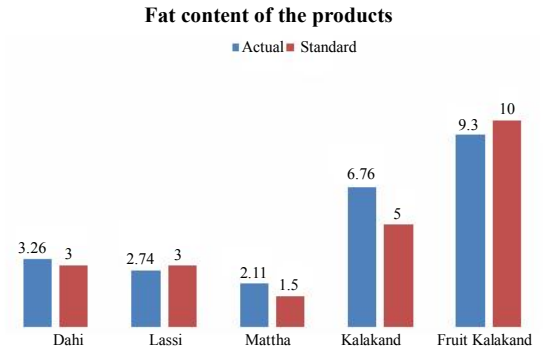

Fig. 1. Fat content of the products examined. The standard values are as per PFA-1954 (2009)

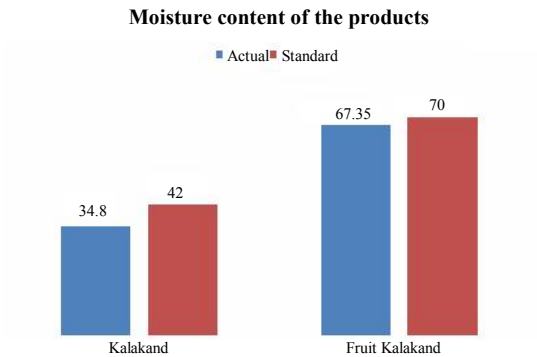

Fig. 2. Moisture content of the products. The standard values shown in figure are as per PFA-1954 (2009)

curd is nearly 66 per cent.

Kalakand is a sweetened product in which sugar is added only to develop the flavour. Since the sugar content is not as high as 70 per cent and hence, the sugar does not play the role of arresting the water activity (a_w). However, certain spices play the role of antimicrobial activity but, in Table 2 we observed that out of 12 samples 4 contained *E.coli* and *Micrococcus aureus* were present in 2 out of 12

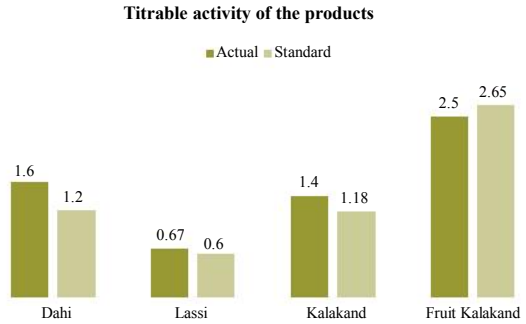

Fig. 3. Titrable acidity of the different products. The standard values shown in fig. are as per PFA-1954 (2009)

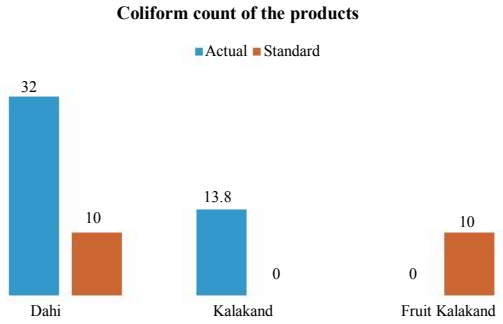

Fig. 4. Coliform count of different products. The standard value shown in fig. are as per PFA-1954 (2009)

Table 1. Microbial analysis of different dahi samples

Sr. No.	Body and texture	Ent *E.coli*/g	*Salmonella*/g	*Shigella*/g	*Micrococcus aureus*/g	*Listeria monocytogenes*/g
1.	Loose	ND	ND	ND	ND	ND
2.	Firm	Present	ND	ND	ND	ND
3.	Loose	Present	ND	ND	ND	ND
4.	Loose	ND	ND	ND	ND	ND
5.	Loose	ND	ND	ND	Present	ND
6.	Loose	Present	ND	ND	ND	ND
7.	Loose	Present	ND	ND	ND	ND
8.	Loose	Present	ND	ND	ND	ND
9.	Loose	ND	ND	ND	Present	ND
10.	Firm	Present	ND	ND	ND	ND
11.	Firm	ND	ND	ND	ND	ND
12.	Loose	ND	ND	ND	ND	ND

ND : Not defined

Table 2. Microbial analysis of kalakand samples samples

Sr. No.	Ent *E.coli*/g	*Salmonella*/g	*Shigella*/g	*Micrococcus aureus*/g	*Listeria monocytogenes*/g
1.	ND	ND	ND	ND	ND
2.	ND	ND	ND	Present	ND
3.	Present	ND	ND	ND	ND
4.	ND	ND	ND	ND	ND
5.	Present	ND	ND	ND	ND
6.	ND	ND	ND	ND	ND
7.	ND	ND	ND	ND	ND
8.	ND	ND	ND	Present	ND
9.	Present	ND	ND	Present	ND
10.	ND	ND	ND	ND	ND
11.	Present	ND	ND	ND	ND
12.	ND	ND	ND	ND	ND

ND : Not defined

Table 3. Microbial analysis of kalakand with mango pulp samples

Sr. No.	Ent *E.coli*/g	*Salmonella*/g	*Shigella*/g	*Micrococcus aureus*/g	*Listeria monocytogenes*/g
1.	ND	ND	ND	ND	ND
2.	ND	ND	ND	ND	ND
3.	ND	ND	ND	ND	ND
4.	ND	ND	ND	ND	ND
5.	ND	ND	ND	ND	ND
6.	Present	ND	ND	Present	Present
7.	ND	ND	ND	ND	ND
8.	ND	ND	ND	ND	ND
9.	ND	ND	ND	ND	Present
10.	ND	ND	ND	ND	ND
11.	ND	ND	ND	ND	ND
12.	ND	ND	ND	ND	ND

ND : Not defined

Table 4. Microbial analysis of lassi samples

Sr. No.	Ent *E.coli*/g	*Salmonella*/g	*Shigella*/g	*Micrococcus aureus*/g	*Listeria monocytogenes*/g
1.	Present	ND	ND	Present	ND
2.	Present	ND	ND	Present	ND
3.	Present	ND	ND	Present	ND
4.	Present	ND	ND	Present	ND
5.	Present	ND	ND	ND	ND
6.	Present	ND	ND	ND	ND
7.	ND	ND	ND	ND	ND
8.	ND	ND	ND	ND	ND
9.	ND	ND	ND	ND	ND
10.	Present	ND	ND	ND	ND
11.	ND	ND	ND	ND	ND
12.	Present	ND	ND	Present	ND

ND : Not defined

samples. The presence of such exotoxin producer microorganisms states about the unhygienic preparation. Therefore, these two product have more chances of giving food poisoning cases.

The kalakand with fruit pulp was found to be safe as only one of it showed the presence of *E.coli*.

This product was prepared from curd and water was mixed to get certain pulp density. There is no standard of pulp density, so, producers take chance to mix water into it to a desirable level. It is a sweetened product and may contain sugar syrup or corn starch syrup as the flavouring agent. Table 4 shows that out of 12 samples, there were about 8 samples which had enteric *E.coli* and 5 out of 12 contained *Micrococcus aureus*.

The production of lassi is mostly in the unorganized sector (Only the Sudha Lassi is branded and has definite outlay) and rest has no brand and no standard is made for the pulp density. This libration for the addition of additional water to the curd is the real cause of contamination.

Conclusion:

Most of the indigenous fermented milk products were prepared by traditional methods in the unorganized sector, where there is lacking of safety rules and quality control parameters. Such unhygienic methods often bring about contamination of various microorganisms including pathogens. To avoid production of such unhygienic products require atomization which is a costly affairs. But, from the health point of view, licensing is very necessary. This could be the only way to control the quality of products. Water that is used for the preparation and even for cleaning the utensils should have a standard quality.

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