

COLIFORMS IN INDIGENOUS MILK PRODUCTS SOLD IN SALEM AND NAMAKKAL CITIES OF TAMIL NADU

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ABSTRACT

Khoa and chhana based sweets are provide a good means of conserving and preserving surplus milk solids. The present study was carried out to examine the coliform bacteria in khoa and chhana based sweets. A total 144 samples of indigenous milk products (6 each from each of the category of street vendors, local brands and renowned brands)comprising of 18 samples each of khoa, peda , burfi, gulabjamoon, kalakand, chhana, rasogolla, and sandesh were subjected to enumeration of coliforms.On comparison, the mean coliform count from street vendors had highly significant ($P<0.01$) count with that of local brands and renowned brands.The high count encountered may be attributed to unhygienic procedures practiced during production, processing ,transportation and storage of dairy products and till it reaches the consumers.Therefore, regular quality assessment procedures together with good manufacturing practices are essentially, required to maintain safety and quality of various indigenous milk products.

I INTRODUCTION

Coliform bacteria are defined as aerobic or facultatively anaerobic, gram-negative rods, that ferment lactose with the production of acid and gas. The coliforms can utilize various carbohydrates and other organic compounds for energy. Similarly, they can utilize nitrogen from a number of nitrogenous substances [1]. The presence of fecal coliforms in milk indicates unsuitability of milk for drinking[2].

One major milk product in common use is *khoa*, obtained by rapidly evaporating milk in shallow pans to a total solids of about 70 per cent and capable of being preserved as such for several days. It is used as an ingredient in making different kinds of traditional sweets such as *peda*, *burfi* and *gulabjamun*. *Peda* is prepared by mixing *khoa* with sugar in the ratio of 3:1 and then gently heated till the mixture forms firm balls. *Peda* is whitish yellow in colour and has a coarse, grainy texture. *Kesar peda* is one in which saffron is mixed along with 321lavor and colour.*Burfi* isprepared by heating *khoa* over a low fire with 25-35% sugar to form a smooth mass. Nuts and flavourings may be added while heating to produce a variety of *burfies*. *Gulabjamun* is prepared by mixing *khoa* with small amounts of wheat flour and baking powder and kneaded into uniform dough. It is then rolled into small

balls and deep fried in ghee. The balls are then put in 60% sugar solution and soaked for few hours before serving. Kalakand is prepared from granular khoa, which is light caramel in colour with a granular texture and firm body. Some citric acid is added during khoa making process to get grains, then sugar is added and stirred to mix the sugar. Flavourings and nuts may be added and allowed to set, which is latter cut into pieces. Yet another milk traditional milk product of significance is *chhana*, a product of acid coagulation of hot milk and draining out of whey. It is used in preparing different kinds of sweets such as rasagollas and 322lavor³²². Rasagolla is prepared using fresh and soft channa as the raw material, in the form of small round balls, which is cooked in sugar syrup for 15 minutes and transferred to sugar syrup of 45-50% concentration. Sandesh is prepared by mixing channa (30-35%) and sugar together and kneaded and then heated after addition of colour and 322lavor.

These Indian milk products are consumed in large quantities. Due to lack of proper refrigeration, these foods are exposed to environment which is congenial for the growth of potential food poisoning bacteria. Coliform group of bacteria in milk and milk products has been considered important in microbiological analysis on account of their importance as indicator organisms for pin pointing the unhygienic conditions during production and processing. Hence, this study has been envisaged to investigate the presence coliform group of organisms in traditional milk products available in Salem and Namakkal cities in Tamil Nadu

II MATERIALS AND METHODS

A total 144 samples of indigenous milk products (6 each from each of the category of street vendors, local brands and renowned brands) comprising of 18 samples each of khoa, peda, burfi, gulabjamoon, kalakand, channa, rasogolla, and sandesh were collected aseptically in Salem and Namakkal cities of Tamil Nadu state of India, and brought to the laboratory of Department of Livestock Products Technology (Dairy Science), Veterinary College and Research Institute, Namakkal and coliform count was estimated as per standard methods for examination of Dairy products [3]

III RESULTS AND DISCUSSION

The coliform count of 8 indigenous sweets (viz., obtained from street vendors, local brands and renowned brands are presented in Table 1.

Table.1.
COLIFORM COUNT IN VARIOUS INDIGENOUS DAIRY PRODUCTS OBTAINED
FROM DIFFERENT SOURCES

Sl.No	Product	Street vendors		Local brands		Renowned brands	
		Range cfu/gm	Mean cfu/gm	Range cfu/gm	Mean cfu/gm	Range cfu/gm	Mean cfu/gm
1.	khoa	$3.2 \times 10^2 - 2.8 \times 10^3$	$17.16 \times 10^2 \pm 4.22$	$1.1 \times 10^2 - 6.2 \times 10^2$	$3.42 \times 10^2 \pm 0.88$	$1.2 \times 10^2 - 3.2 \times 10^2$	$0.63 \times 10^2 \pm 0.32$
2.	Peda	$3.3 \times 10^2 - 3.1 \times 10^3$	$18.22 \times 10^2 \pm 4.24$	$1.2 \times 10^2 - 6.2 \times 10^2$	$3.43 \times 10^2 \pm 0.90$	$1.1 \times 10^2 - 3.3 \times 10^2$	$0.64 \times 10^2 \pm 0.33$
3.	Burfi	$3.3 \times 10^2 - 2.9 \times 10^3$	$17.22 \times 10^2 \pm 4.22$	$1.3 \times 10^2 - 6.4 \times 10^2$	$3.46 \times 10^2 \pm 0.96$	$1.2 \times 10^2 - 3.1 \times 10^2$	$0.62 \times 10^2 \pm 0.31$
4.	Gulab -jamoona	$3.9 \times 10^2 - 3.3 \times 10^3$	$20 \times 10^2 \pm 4.12$	$2.2 \times 10^2 - 1.3 \times 10^3$	$4.75 \times 10^2 \pm 1.45$	$2.1 \times 10^2 - 1.1 \times 10^2$	$1.18 \times 10^2 \pm 0.60$
5.	Kalakand	$4.1 \times 10^2 - 3.1 \times 10^3$	$19.2 \times 10^2 \pm 3.90$	$2.1 \times 10^2 - 1.2 \times 10^3$	$4.70 \times 10^2 \pm 1.43$	$2.1 \times 10^2 - 1.2 \times 10^2$	$1.17 \times 10^2 \pm 0.57$
6.	Channa	$1.1 \times 10^3 - 4.0 \times 10^3$	$22.88 \times 10^2 \pm 4.78$	$2.1 \times 10^2 - 1.1 \times 10^3$	$4.68 \times 10^2 \pm 1.41$	$2.2 \times 10^2 - 2.4 \times 10^2$	$0.75 \times 10^2 \pm 0.30$
7.	Rasagolla	$1.8 \times 10^3 - 3.6 \times 10^3$	$32.24 \times 10^2 \pm 4.58$	$1.3 \times 10^2 - 1.2 \times 10^3$	$4.42 \times 10^2 \pm 1.36$	$0.3 \times 10^2 - 1.3 \times 10^2$	$0.47 \times 10^2 \pm 0.16$
8.	Sandesh	$1.7 \times 10^3 - 3.8 \times 10^3$	$32.42 \times 10^2 \pm 4.68$	$1.2 \times 10^2 - 1.1 \times 10^3$	$4.36 \times 10^2 \pm 1.32$	$0.2 \times 10^2 - 1.4 \times 10^2$	$0.43 \times 10^2 \pm 0.13$

The coliform count of count of khoa samples from street vendors, local brands and renowned brands ranged from $3.2 \times 10^2 - 2.8 \times 10^3$, $1.1 \times 10^2 - 6.2 \times 10^2$ and $1.2 \times 10^2 - 3.2 \times 10^2$ with the mean value of $17.16 \times 10^2 \pm 4.22$, $3.42 \times 10^2 \pm 0.88$ and $0.63 \times 10^2 \pm 0.32$ cfu/gm respectively. The count obtained for local brand and renowned brand of khoa were in close agreement with the range of total coliforms in khoa to be 0-980/gm as reported by Vijayakumar and Sinha [4]. But the samples obtained from street vendors had a higher count. Kakar and Udipi[5] reported that unhygienic conditions during handling, transport and storage were the chief sources of coliforms in the milk products.

The mean coliform count of khoa based sweets viz. peda, burfi, gulabjamoona and kalakand samples from street vendors, local brands and renowned brands were $18.22 \times 10^2 \pm 4.24$, $3.43 \times 10^2 \pm 0.90$ and $0.64 \times 10^2 \pm 0.33$, $17.22 \times 10^2 \pm 4.22$, $3.46 \times 10^2 \pm 0.96$ and $0.62 \times 10^2 \pm 0.31$, $20 \times 10^2 \pm 4.12$, $4.75 \times 10^2 \pm 1.45$ and $1.18 \times 10^2 \pm 0.60$ and $19.2 \times 10^2 \pm 3.90$, $4.70 \times 10^2 \pm 1.43$, and $1.17 \times 10^2 \pm 0.57$.

The coliform count obtained for local brands and renowned brands of peda and burfi were in close agreement with the findings of Dwarakanath and Srikanta[6], who reported that coliform count of peda and burfi were 460 and 1.61×10^4 respectively. The count obtained for renowned brand of kalakand was in accordance with Khan and Malik [7], who reported that total coliform count of kalakand was found to be in the range of 0 to 310/gm. Garg and Mandokhot[8]

reported that post-processing contamination was the major sources of coliforms in Indian sweet meats like burfi and pera.

Similarly, the coliform count of channa samples from street vendors, local brands and renowned brands ranged from 1.1×10^3 - 4.0×10^3 , 2.1×10^2 - 1.1×10^3 and 2.2×10^1 - 2.4×10^2 with the mean value of $22.88 \times 10^2 \pm 4.78$, $4.68 \times 10^2 \pm 1.41$ and $0.75 \times 10^2 \pm 0.30$ cfu/gm respectively. These values were higher than the coliform count recorded by Vijayakumar and Sinha [4], who recorded a range of 7.3 to 1000/gm. The authors attributed higher incidence of coliforms to post preparation contamination and unhygienic handling of milk products as a possible cause.

And the mean coliform count of two channa based sweets viz. rasogolla and sandesh from street vendors, local brands and renowned brands $32.24 \times 10^2 \pm 4.58$, $4.42 \times 10^2 \pm 1.36$ and $0.47 \times 10^2 \pm 0.16$ and $32.42 \times 10^2 \pm 4.68$, $4.36 \times 10^2 \pm 1.32$ and $0.43 \times 10^2 \pm 0.13$ respectively. The coliform count of sandesh sample obtained from renowned brand was in accordance with the findings of Sen and Rajorhia[9], who reported that coliform count of chhanna based sandesh marketed in Calcutta was 7.1 to 7.6×10^1 /gm. However the count with regard to rasogolla was higher than the findings of Kumar and Kapoor [10], who reported that the coliform count of rasogolla sample was 14 to 20 counts/gm. Gayan and Dharampal[11] observed that poor quality of raw materials, particularly milk and sugar and adoption of unhygienic conditions during manufacture and storage were the major sources of coliforms in milk products. Kakar and Udipi[4] reported that unhygienic conditions during handling, transport and storage were the chief sources of coliforms in the milk products. Rao *et al.*[12] observed that occurrence of coliforms in milk and milk products were due to contamination from faecal matter and unsanitary conditions of production.

In general the street vendors had higher count than local brands and renowned brands. This may be due to contamination through the packaging materials, from the environment, unhygienic storage conditions and unhygienic practices adopted by the handlers.

IV CONCLUSION

Coliforms in milk and milk products beyond certain levels may be considered public health hazard as they may cause dreadful diarrhea disease. Hence greater care should be taken to prevent entry of coliforms in milk and milk products through perfect sanitation procedures during production, processing, transportation and storage of dairy products and till it reaches the consumers.

REFERENCES

- [1] BIS, IS: 1479. Part III. Indian Standard methods of test for dairy industry. ISI, Manakbhavan, 9. BahadurshahZafair Marg, New Delhi.1977
- [2] B.D.Singh, Biotechnology: Expanding Horizons (IInd Ed.). Kalyani Publishers, India, 2008.

- [3] S.N.Chatterjee, I.Bhattacharjee,S.K.Chatterjeeand G. Chandra, Microbiological examination of milk in Tarakeswar, India with special referenceto coliforms. *African Journal of Biotechnology*, 5, 2006,1383-1385.
- [4] Vijayakumar and R.N. Sinha, Incidence of coliforms in indigenous milk products. *Indian Journal of Dairy Science*, 42 (3) ,1989, 579 - 580.
- [5] D.A.Kakar, and S.A.Udipi, Microbiological quality of khoa and selected milk sweets. *Indian Journal of Dairy Science*, 50(3),1997,187.
- [6] C.T.Dwarakanath, and S.Srikanta, Studies on the microbiological quality of traditional indian sweet meat products. *Journal of Food Science and Technology*, 14,1977, 201-204.
- [7] M.K.R.Khan, and A.Malik, Microbiological quality of milk, vegetables and fruit Juices. *Journal of Food Science and Technology*,39 (2),2002,120 - 123.
- [8] S.R.Garg and U.V.Mandokhot, Studies on microbial and chemical profile of some Indian sweet meats and their significance. *Indian Journal of Dairy Science*, 37(4),1984, 226-333
- [9] D.C.Sen, and G.S.Rajorhia, Quality characteristics of sandesh marketed in Calcutta. *Indian Journal of Dairy Science*, 42(2),1989, 241-245
- [10] S.Kumar and C.M.Kapoor, Utilization of cow milk casein in rasogolla preparation. *Journal of Food Science and Technology*, 28 (4),1991,253 - 254.
- [11] D.Gayen, and Dharampal, Sensory, chemical and microbiological qualities of Delhi and Karnal market samples of Rabri. *Indian Journal of Dairy Science*, 44(1),1991,80-83
- [12] C.H.U.M.Rao, P.A.Shankar,andH.Laxminarayana, A study of *Enterococci* occurring in milk and milk products. *Indian Journal of Dairy Science*, 39(3),1986,281-285