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Microbiological Contamination of the Traditional Chocolate Ice Cream Sold in the Northwest Region of Iran

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Abstract: Ice cream is a dairy product which favors the growth of microorganisms. This is a popular dairy product throughout the world. In this study, samples (30) of the traditional chocolate ice creams were collected from dairy stores in Tabriz and Khoy cities during June 2009 to October 2009. Samples were examined for total bacterial and coliforms contamination. The means of total bacterial count were 8.77 ± 0.25 log cfu/g and 6.28 ± 0.25 log cfu/g in Tabriz and Khoy, respectively. 73.33% of all samples had the coliform contamination more than Iranian standard limit (50/g). This study showed that the overall risk associated with the consumption of the traditional ice-cream is high in the northwest region of Iran. There is need for continuous monitoring of this nutritious product by educating producers, distributers and retailers on good sanitary practices during processing and sale of the product.

Key words: Ice cream · Chocolate · Total Plate Count · Coliform Count · Iran

INTRODUCTION

Ice cream is a nutritionally enriched dairy product produced by freezing pasteurized mixture of milk solids other than fat, sugar, emulsifier and stabilizer. Flavor enrichment of ice cream is an optional addition of fruit nuts, candies, syrups and other flavoring ingredients. Ice cream is undoubtedly one of most popular and favorite food product for Iranian children and adults especially during summer season. Several Iranian national brands of ice cream in variety of flavors have been marketed here [1].

Quality of ice cream depends on both extrinsic factors that include manufacture procedure and intrinsic factors that include proportion of ingredients used. Ice cream, a milk based product is a good medium for microbial growth due to high nutrient value, almost neutral pH value and long storage duration. Primary sources of microbial contamination to ice cream include water and raw milk whereas secondary sources include flavoring agents, utensils and handling. Although freezing and hardening steps in production can estimate most of the microbial hazards, but still numerous health hazards are persistent due to various conditions [1].

There are numerous reports on the incidence of human pathogens in ice cream (*Listeria monocytogenes, Salmonella species, Staphylococcus aureus, Yersinia enterocolitica, Bacillus cereus*, etc) [2].

Microbial quality of ice cream is determined by significant total microbial count, coliform count and presence of pathogenic microorganisms. Microbial quality determination is completely used to reflect hygienic practice in production [3]. The aim of this study was to determine the microbial quality of sold traditional chocolate ice cream in Tabriz and Khoy cities (Iran).

MATERIALS AND METHODS

Ice Cream Samples: At this survey, samples (30) of the traditional chocolate ice creams were collected from dairy stores in Tabriz and Khoy cities during June 2009 to October 2009 randomly. Samples were examined for total bacterial and coliforms contamination. For each sample, approximately 100 grams of ice cream were taken for analysis and three replicates of each test were done. The samples were placed in an ice-filled container during transport to inhibit the multiplication of any microbial flora that may be present.

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Table 1: Total bacterial, total and fecal coliform count values of traditional chocolate ice cream sold in the northwest region of Iran

City	No. of samples	Total bacterial count (mean± SE) log cfu/g	Total coliform count (mean± SE) log cfu/g	Fecal coliform (Number of positive samples)
Tabriz	15	8.77 ± 0.25	3.58 ± 0.27	0
Khoy	15	6.28 ± 0.25	4.42 ± 0.30	2

Bacteriological Analysis of the Collected Samples: Standard procedures for the aerobic plate count, MPN/g for fecal coliforms and MPN/g for total coliforms were used. Traditional microbiological methods and media were used for the isolation and enumeration of total aerobic mesophilic bacteria [4].

RESULTS

The means of total bacterial count (TBC) were 8.77 ± 0.25 log cfu/g and 6.28 ± 0.25 log cfu/g in Tabriz and Khoy, respectively. 73.33% of all samples had the coliform contamination more than Iranian standard limit (10/g)[5]. Ice cream is considered having unacceptable hygienic quality when the TBC exceeds 4.69 log cfu/g according to the Iranian Food Codex (IFC) for ice cream[5]. Of all samples, 26 (86.66%) exceeded standard value of mesophilic aerobic count (Table 1).

DISCUSSION

Ice cream is a fairly complex food containing sugar, emulsifiers and fats. As long as no bacteria or other harmful microorganisms contaminate any of the ingredients after processing, then ice cream while frozen is one of the safer commodities. Depending on the available water, bacterial growth could be rapid in melted ice cream. If melted ice cream is contaminated and allowed to remain at elevated temperatures, freezing temperatures later would not make the product safe [3].

This study presents the current status of microbial quality of ice cream being sold in the northwest region of Iran. All analyzed traditional cacao ice cream samples (n=30) showed positive growth (7.52 ± 0.25 log cfu/g) on plate count agar indicating the presence of aerobic microorganisms. However, %86.66 of the tested samples exceeded standard value of mesophilic aerobic count (4.69 log cfu/g, Iranian Food Standard) [5] and %73.33 samples exceeded the standard value for total coliform count (50/g, Iranian Food Standard) [5].

These findings support the results of Mokhtarian *et al*. [6] showed that 91% of ice creams sold in mashhad city, exceeded the standard value of mesophilic aerobic count. Jazayeri *et al.* [4] showed that 75% of ice creams produced in Tehran's confectionaries and 94.7% produced in workshops were contaminated. Shakerian *et al.* [7] made studies on microbial contamination of traditional ice creams in shahr-e-kord, Iran and they found that 100 out of 200 samples (50%) had mesophilic aerobic bacterial count more than 5×10^5 per gram of ice cream, 99 samples showed count more than 100 per gram of ice cream and 2 samples were *Escherichia coli* positive [7]. Shekarfroush and Jafarpour [8] reported that 92.6% of samples were contaminated with coliform. Incidence rates of 72% and 70% were reported by Shadan *et al*.[9] and hazhir *et al.* [10] from different cities in Iran which are nearly similar to our results.. In Turkey, Kanbakan *et al.* [11] reported that 25% of sold ice cream samples had higher total bacterial counts than safety limits of Turkish Standards for ice cream.

In Nepal, It was reported that 61.1%, 68.1% and 22.2% of 44 samples exceeded the standard value of mesophilic aerobic count, total coliform count and Staphylococcal count respectively [3].

Yaman *et al.* [12] studied a total of 73 ice cream samples collected in 2004 in Kars, Turkey and reported that 4.1 % of the samples had unacceptable hygienic quality according to the criterion (105 cfu/g) recommended in Turkish Food Codex (TFC). Masud [13] reported that 46 % of the samples (n=50) were contaminated with *E. coli* and various incidence rates of 3.33 %, 22 % and 70 % were also reported by Erol *et al.* [14], Kivanc *et al.* [15] and Toklu and Yaygin [16], respectively in different areas of Turkey.

In conclusion, the current investigation has indicated a poor overall level of hygiene in the service of traditionally sold ice cream in the northwest region of Iran. The counts of microorganisms above the recommended criteria and the presence of some groups of pathogenic bacteria may pose a risk for public health particularly for children and vulnerable elderly people. The mandatory adoption of a food safety management system based on the Hazard Analysis Critical Control Point (HACCP) should improve the quality of ice cream [17].

REFERENCES

1. Ahmad, K. and A. Hussein, 2008. Microbiological quality of ice cream sold in Gilgit town, Pak. J. Nut., 8: 1397-1400.
2. Kokkinakis, E.N., G.A. Fragkiadakis, S.I. Ioakeimidi, I.B. Giankoulof and A.N. Kokkinaki, 2008. Microbiological Quality of Ice Cream after HACCP Implementation: a Factory Case Study, Cz. J. Food Sci., 26: 383- 391.
3. Joshi, D.R., P.K. Shah, S. Manandhar, S. Sharma and P. Banmali, 2004. Microbial Quality of Ice Cream Sold in Kathmandu, J. Nepal Health. Res. Council., 2: 37-40.
4. Jazayeri, A., H. Sadeghei pour, M. Effatpanah, R. Mehrdad, A. Nazarinia and M. Mohseni, 2003. Determination of microbial contamination in traditionally manufactured ice creams and handmade fruit juices in Tehran, Hakim Res. J., 6: 31-36.
5. Anonymous, 2008. Microbiology of milk and milk products Specifications. Institute of Standards and Industrial Research of Iran, 2nd Edition.
6. Mokhtarian, H., M. Mohsenzadeh and M. Khazrei, 2004. Bacterial contamination of ice cream in Mashhad, Ghonabad Med. Sci. J., 10: 42-46.
7. Shakerian, A., G. Karim, E. Tajbakhsh and M. Shafiei, 2005. Investigating the microbial contamination of traditional ice creams in shahr-e-kord, Iranian. J. Food. Sci. Tech., 4: 21-27.
8. Shekarfroush, S. and B. Jafarpour, 2006. Comparison of microbial contamination in the traditional ice cream with Iranian Food Standards in Shiraz, Iranian. J. Food. Sci. Tech., 2: 11-16.
9. Shadan, M.R., F. Khoushabi and F. Safari, 2001. The evaluation of physicochemical and microbial status of traditional ice creams in Zahedan, J. Tabiat. Shargh., 4: 215-221.
10. Hazhir, M.S., K. Rashidi, N. Senobar, N. Reshadmanesh and N. Mofarrah, 2005. physicochemical and microbial status of traditional ice creams in Kordestan, Sci. J. Kordestan. Med. Fac., 10: 53-60.
11. Kanabakan, U., A.H. Con and A. Ayar, 2004. Determination of microbialagical contamination sources during ice cream production in Denizli, Turkey, Food Control., 15: 463-470.
12. Yaman, H., M. Elmali, Z. Ulukanli, M. Tuzcu and K. Genctav, 2006. Microbial quality of ice cream sold openly by retail outlets in Turkey, Revue. Med. Vet., 157: 457-462.
13. Masud, T., 1989. Microbiological quality and public health significance of ice cream. J. Pak. Med. Assoc., 39: 102-104.
14. Erol, I., O. Kupulu, B. Siriken and T.H. Celik, 1998. Ankara'daki cesitli pastanelere ait dondurmalarin mikrobiyolojik kalitelerin belirlenmesi. Tr. J. Veterinary and Animal Sci., 22: 345- 352.
15. Kivanc, M., M. Yamac and B. Kunduhoglu, 1994. Eskisehir'de halkin tuketimine sunulan dondurmalarin mikrobiyolojik analizi. Gida. 19: 317-322.
16. Toklu, G.S. and H. Yaygin, 2000. Antalya piyasasinda satilan dondurmalarin hijyenik kalitesi ve kimyasal ozellikleri. Gida Bilimi ve Teknoloji Derg., 4: 38-45.
17. El-sharef, N., K.S. Ghenghesh, Y.S. Abognah, S.O. Gnan and A. Rahouma, 2006. Bacteriological quality of ice cream in Tripoli-Libya, Food Control., 17: 637-641.