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Research Article

EVALUATION OF MICROBIOLOGICAL QUALITY OF ICE CREAM AND MOMOS IN JAMMU

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Abstract: Consumption of ready-to-eat (RTE) foods is on the rise encouraged by growing urban population and public demand for their cheapness and readily availability. However, the generally unregulated street food vendors tend to follow poor hygienic practices leading to various public health problems. A total of 68 samples comprising of two RTE products *viz*. ice-cream (36 samples) and momos (32 samples) obtained from four different zones of Jammu district were screened for microbial quality. The standard plate count estimated for each zone *i.e.,* East Zone, West Zone, North Zone and Central Zone for ice-cream was (Mean±SE) 3.89±0.19, 4.09±0.16, 3.78±0.28 and 4.29±0.24 log10cfu/g respectively, and for momos it was found to be 3.92±0.22, 4.21±0.14, 4.01±0.15and 3.86±0.45 log10cfu/g respectively, and making the average standard plate count (Mean±SE) 4.02±0.11 and 4.00±0.48 log10cfu/g, for ice-cream and momos, respectively.

Keywords: Ice-Cream, Momos, Bacterial Load, Spc

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Introduction

Although ready-to-eat food sare relatively cheap and easily accessible but have been associated with several health problems [1][2]. These foods get readily contaminated from different sources, thereby increasing the risk of food borne illnesses [3]. Food borne illnesses are defined as diseases weather infectious or toxic, caused by agents that enter the body through the ingestion of food [4]. Such food borne diseases contribute to both human morbidity, mortality as well as to health care costs [5]. Millions of people fall sick or die because of eating unsafe food [6]. In 2005, 1.8 million people reportedly died from diarrhoeal diseases [7]. Food borne outbreaks occur commonly in both developed and developing countries of the world. Many countries have reported an increase in the incidence of food borne diseases, for instance, a total of 17,094 outbreaks of food borne diseases were reported during 1990-2008 in the United States in which 370,266 persons got ill [8]. About 76 million cases of food borne diseases, resulting in 325,000 hospitalizations and 500 deaths annual have been reported [9]. In India, 721 food-borne outbreaks and 1,199 sporadic cases of food-borne disease were recorded in the cities of Hyderabad and Secunderabad alone during 1984-89 [10]. Further, WHO reported 20 per cent of child deaths (under five years) due to diarrheal diseases [11] and as per the UNICEF, about 1,000 children below the age of five year die every day due to diarrhoea in India [12]. Since India is also adapting these ready-to-eat foods like other developing and developed countries and Jammu and Kashmir is no exception. The processing practices of these foods are of low standards that may lead to contamination which in turn can predispose people to food borne pathogens thus leading to food borne illnesses. Keeping in view this the present study was carried out to study microbiological quality of ready to eat food products in and around Jammu.

Material and Methods

Place of Work

The study was conducted in the Division of Veterinary Public Health and Epidemiology, Faculty of Veterinary Sciences and Animal Husbandry, SKUAST-J, R.S. Pura, Jammu and Kashmir.

Collection of Samples

A total of 68 ready-to-eat food sample products that included 36 ice-cream and 32 momos, were collected aseptically from various retail outlets and street vendors of four zones of Jammu city *i.e*. East Zone, West Zone, North Zone and Central Zone [Table-1]. The samples were collected in sterile containers and whirl packs (Hi Media, Ltd Mumbai, India) and transferred to laboratory over ice within 2-3 hours of collection with all aseptic precautions. Plate Count Agar Media used in the present study was procured from Hi-Media with composition as casein enzyme hydrolysate, yeast extract, dextrose agar. The media was prepared by suspending 23.5 grams in 1000 ml of distilled water followed by sterilization by autoclaving at 15lb (121°C) for 15 minutes.

Enumeration of SPC

Standard Plate Count in the samples were enumerated following the methods of American Public Health Association (APHA, 1984) [13] with suitable modifications wherever necessary. For serial dilution, a 10g portion of RTE product was aseptically weighed and transferred to pre-sterilized mortar containing 90 ml of sterile Normal Saline Solution (NSS) so as to give 10-1 dilution. The sample was homogenized using sterile pestle for uniform dispersion. This was further serially 10 fold diluted till 10-5 dilution.

Table-1 Details of ready-to-eat food samples collected

Type of RTE food	East Zone (Gandhi Nagar)	West Zone (TalabTillo)	North Zone (Rehari, Sarwal)	Central Zone (Jewel/Bus Stand)	Total
Ice-cream	9	9	9	9	36
Momos	8	8	8	8	32
					Total= 68

Table-2 Mean±SE of SPC in ice-cream and momos samples

Zone	SPC (Ice cream) (log_{10}cfu/g)	SPC (Momos) (log_{10}cfu/g)
East Zone (*n*=9)	3.89±0.19	3.92±0.22
West Zone (*n*=9)	4.09±0.16	4.21±0.14
North Zone (*n*=9)	3.78±0.28	4.01±0.15
Central Zone (*n*=9)	4.29±0.24	3.86±0.45
Total (*n*=36)	4.02±0.11	4.00±0.48

The number of CFU per gram of test sample (N) was calculated using the formula adopted from Diane *et al*., (1995) [14].

$$N=C/V\ (n_1+0.1n_2)\ d$$

Where

C = sum of the colonies on all plates counted
V = volume applied to each plate
n1 = no. of plates counted at first dilution
n2 = no. of plates counted at second dilution
d = dilution from which first count was obtained

Standard Plate Count (SPC)

For evaluating Standard Plate Count (SPC), the spread plate technique was followed using 10-3 and 10-4 dilutions. Briefly, 0.1 ml of the two dilutions were spread plated in duplicate on solidified plates of Plate Count agar and incubated at 37±20C for 24 hrs. The plates containing between 30-300 colonies at two consecutive dilutions were selected to calculate the results.

Result and Discussion

The results of the SPC of ice cream and momos from different zones of Jammu district are shown in [Table-2]. In the present study a total of 36 ice-cream and 32 momos samples collected from four different zones of Jammu city *i.e*. East Zone, West Zone, North Zone and Central Zone were analyzed to evaluate the microbiological quality.The standard plate count of each zone was estimated to be (Mean±SE) 3.89±0.19, 4.09±0.16, 3.78±0.28 and 4.29±0.24 log10cfu/g respectively, for ice cream it was calculated to be (Mean±SE) 3.92±0.22, 4.21±0.14, 4.01±0.15 and 3.86±0.45 log10cfu/g respectively. The average standard plate count estimated was (Mean±SE) 4.02±0.11 and 4.00±0.48 log10cfu/g respectively for ice-creams and momos. Jadhav *et al*. (2014) [15] found almost similar results (3.82±0.23 log10cfu/g) in ice-cream samples. Desai and Vardraj (2009) [16] and Yusuf *et al*. (2013) [17] found mean counts ranging between 3.7±0.2 to 4.3±0.7 log10cfu/g and 3.92±1.1 to 4.52± 0.25 log10cfu/g in Mysore and Nigeria, respectively. Higher counts were observed in studies conducted by Feglo and Sakyi, 2012 [18] in Ghana (5.58±0.52 log10cfu/g), Ansary*et al*.2014 [19] in Alexandria (5.04 log10cfu/g), Joshi *et al*., 2004 [20] in Kathmandu (7.2 log10cfu/g) and Ambily and Beena, 2012 [21] in Kerala (6.8 log10cfu/g). According to Indian Food Safety Standards and Regulations (2011), total bacterial count of ice cream should not exceed 2,50,000 cfu/g. SPC of the collected ice-cream samples was found to be within the prescribed limits except few samples collected from west zone and central zone having slightly higher counts rendering it unsafe; which may have resulted from inadequate processing, such as improper initial cooling of the hot ice cream mix, which may lead to multiplication of microorganisms present in ice cream immediately after pasteurization and inadequate cleaning of the equipment and premises of sale. Similar reasons for higher counts in ice-cream were also ascribed by Ojokoh, (2006) [22]. Gupta and Goya 2017, [23] has also documented that bacteriological contamination in all the ice cream samples in his study, may have arisen due to sanitary methods used during processing, handling, storage and distribution of milk and milk products. Likewise for momos variable findings have been observed as 4.12 log10cfu/g by Thapa *et al*., 2008 [24] in Nepal, (102~ <103cfu/g) DU *et al*., 1996 [25] in Taiwan. Higher and lower counts were also observed which included; 6.9 log10cfu/g [26] in Kathmandu; 5.5 log10cfu/g [27] in Chandigarh and 2.02 log10cfu/g [28] in Gangtok; 2.53±0.21 log10cfu/g [29] in West Delhi; 2.4 log10cfu/g [30] in Dehradun, respectively. The acceptable and hazardous limits as per International Commission on Microbiological specifications for foods (ICMSF, 1978) [31] for cooked, ready to serve foods is 104 and 106, respectively. Findings recorded during assessment of momos samples were within the acceptable limits excluding few samples collected from all the zones which showed higher counts. Momos in general are made up of various ingredients, like vegetables, spices etc. Contamination of momos on a whole could occur due to use of already existing contaminated ingredients. In several studies, considerable Bacillus cereus count has been reported in open and packed vegetables, which further indicate potential risk of RTE foods including moms in which vegetables are being used [32]. Such higher counts may also get resulted due to inappropriate steaming and poor quality of water for processing of momos. Apart from this unhygienic handling of food materials and equipment's may have contaminated this food product.

Conclusion

There is a comparatively higher SPC for ice-cream in Central Zone (Jewel/Bus Stand) and for momos in West Zone. In Jammu city, RTE food products are being sold by food vendors and consumed by people on daily basis. These RTE products are processed under unsatisfactory hygienic conditions. So, a risk of food poisoning outbreak is always inevitable. It is thus concluded that the RTE foods should be processed under strict hygienic conditions with constant microbial monitoring using latest molecular techniques. Moreover, emphasis on good manufacturing practices and good hygienic practices need to be adopted alongwith consumer awareness need to be emphasized so that to avoid the health problems associated with their consumption.

Application of research: The research is applicable for food manufacturers, especially street vendors and open restaurants, as well as for consumers so that they can adopt good hygienic practices while manufacturing food as well as take keen observation over the conditions in which RTE food have been kept and served while consumption.

Research Category: Veterinary epidemiology, Veterinary microbiology

Abbreviations: SPC (Standard Plate Count), APHA (American Public Health Association), NSS (normal saline solution), WHO (world health organisation), UNICEF (United Nations International Children's Emergency Fund), ICMFS (International Commission on Microbiological specifications for foods), RTE (ready-to-eat).

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