

Microbial contamination of protein contained Fast food in retail outlet from selected areas of Sylhet Metropolitan City

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Abstract

Context: The food safety regulation is of significant importance to the current situation of Bangladesh.

Objective: The study was conducted with a view to demonstrate the bacterial loads in some fast food items to the retail outlets of Sylhet metropolitan city corporation.

Materials and Methods: Bacteriological investigation was conducted on 55 of different types of fast food at three main markets namely Sibjong bazar, Tilaghor and Zindah bazaar at Sylhet Metropolitan city from November 2011 to February 2012. The viable count was calculated according to ISO (1995). Bacteriological analysis was done according to the Bergeys manual of determinative bacteriology. The result was expressed in CFU/gm of sample, mean value of total viable count (TVC) and total coliform count (TCC) per gram of fast food item (Chicken sandwich, chicken roll, koliza singara and beef burger). The results were compiled tabulated and analyzed by general linear model to measure the association where Duncan Multiple Range Test (DMRT) was used for significance test.

Results: Examination of protein reached fast food collected from Sibjong, Tilaghor and Zindah Bazar of Sylhet Metropolitan City were calculated the Total viable count (TVC) and Total coliform count (TCC) and compared their mean value. The highest mean values of TVC and TCC for chicken sandwich were $119.4 \times 10^9 \pm 14.17$ and $90.4 \times 10^3 \pm 10.89$ in Tilaghor at Sylhet Metropolitan City. Similarly the highest mean values TVC and TCC for chicken roll were $94.60 \times 10^9 \pm 2.06$ and $82.60 \times 10^3 \pm 7.62$ in Sibgong Baraz. The Bacterial uppermost status (TVC and TCC) of Koliza singara was observed $125.00 \times 10^9 \pm 12.86$ and $99.20 \times 10^3 \pm 1.66$ in Tilaghor area at Sylhet Metropolitan City. In Burger, peak Bacterial stack (TVC and TCC) was $98.20 \times 10^9 \pm 4.33$ and $46.80 \times 10^3 \pm 5.09$ at Tilaghor area of Sylhet Metropolitan City.

Conclusion: The high load of bacterial organisms in different fast food items may be due to unskilled, unorganized and unhygienic production and processing practices.

Key words: Microbial contamination, fast food, retail outlet and bacterial load.

Introduction

Fast food (also known as Quick Service Restaurant or QSR within the industry itself) is the term given to food that can be prepared and served very quickly. While any meal with low preparation time can be considered to be fast food, typically the term refers to food sold in a restaurant or store with preheated or precooked ingredients, and served to the customer in a packaged form for take-out/take-away. In recent, the epidemiology of food borne diseases is changing with new or unexpected pathogens often emerging on a countrywide or worldwide scale, new foods expanding the range of potential vehicles of pathogens, wider social contexts being involved and new classes of individual being at higher risk (MacKenzie *et al.*, 2004 and Tauxe, 1999). In Bangladesh perspective fast food include koliza singara, Chicken roll Beef burger and Sandwich. Among that fast food, Koliza singara is sold as a street food. The street food industry offers a significant amount of employment, often to persons with little education and training. There is a high risk of contamination (not only affecting fruits and vegetables) at all stages of production, processing and distribution which are very difficult to control. Microorganisms in fast and traditional fast foods are responsible for many human diseases (Al-Turki *et al.*, 1998; Angelillo *et al.*, 2000). Furthermore, it was reported the prevalence of *Campylobacter spp.*, *Staphylococcus spp.*, *Escherichia coli*, *Salmonella spp.*,

Yersinia Spp. and *Listeria* on meat, sea foods, vegetable ingredients, chicken sharmas, raw. and cooked foods, raw chicken, beef burger sandwiches, ready-to eat salad vegetables, commercial mayonnaise, frozen chicken, poultry products and on the hands of food workers (Kaneko *et al.*, 1999 and Pelczar *et al.*, 2006). Pathogen contaminating foods may endanger human life by causing infection or intoxication. Microbial infections of food borne origin are a major public-health problem internationally and a significant cause of death in developing countries (WHO, 2007). There are lots of fast food producing industries has developed without having proper facilities. Besides that their food processing and quality control procedure they are not taking help from the respective authorities. For this reason peoples are not getting wholesome food or food product always. This could happen in the developing countries like Bangladesh. Hence through isolation and identification of harmful microbial agent of some selected fast food items assessing into the market is to be urgent. Food safety control aims to safeguard public health and provide assurance on food safety (CFS, 2014). To this end, microbiological analyses are useful to assess the safety and quality of food involved. Keeping in mind this situation, present study was undertaken to evaluate the status of microbial load of some fast food items. The objectives of the study were to quantitative analysis of pathogenic microorganism present in different brands of fast food.

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Materials and Methods

A total number of 55 fast food sample were examined from different fast food outlet located at Sibjong bazar (n=15), Tilaghor (n=20) and Zindah bazar (n=20) at Sylhet Metropolitan city. Protein reached Fast foods samples were obtained from fast food restaurants in Sylhet Metropolitan area in winter season from November 2011 to February 2012. The whole work was performed in the laboratory of the Department of Microbiology and Immunology, Sylhet Agricultural University (SAU). To determine the extent of bacterial load, the samples were subjected to total viable count (TVC), Total coli form count (TCC) by using plate count agar, violet red bile agar.

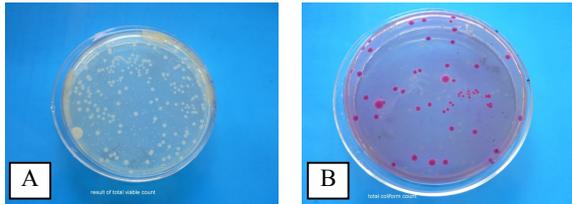


Figure 1. Figure shows Total Viable count (A) and Total Coli form Count (B)

The viable count was calculated according to ISO (1995). Bacteriological analysis was done according to the Bergeys manual of determinative bacteriology (1994). In all cases standard method were followed for conducting these test described by Cowan (1985). The microbiological quality depends on specific food borne pathogens and their load in food which was classified according to the European Food Safety Authorities (EFSA, 2005) was in below.

Guidance on the interpretation of results for Aerobic Colony Count (ACC) levels [30°C/48 hours] in various (Sliced meats, cut pies, pâté, sandwiches without salad, hot smoked fish) ready-to-eat foods, Cooked foods and chilled but with some handling prior to sale or consumption.

Satisfactory: Colony-forming unit (cfu)/g] and (Escherichia coli) coliform count were $<10^5$ and <20 . The test results indicating good microbiological quality that is satisfactory.

Borderline: Colony-forming unit (cfu)/g] and (Escherichia coli) coliform count were 10^5 - $<10^7$ and 10 to 200. The test results that are not unsatisfactory but are also not satisfactory, are on the upper limit of acceptability and which indicate the potential for development of public health problems and of unacceptable risk.

Unsatisfactory: Colony-forming unit (cfu)/g] and (Escherichia coli) coliform count were $>10^7$ and <200 . The test results which indicate investigating reasons for high count may be considered.

Statistical analysis

Data collected from fast food outlets were compiled tabulated and analyses in accordance with the objectives of the study. General Linear Model analysis was done to measure the association and strength of association between the potential influencing factors location and items. Duncan Multiple Range Test (DMRT) was used for test of significance of means with unequal subclass number ((Steel and Torrie, 1980). Mean effects were systematically included in the model. Random effects were assumed independently and identically distributed. General Linear Model (GLM) test i.e. University (Post Hoc) for multiple comprises for observed mean was performed.

Results and Discussion

Examination of protein reached fast food collected from Sibjong, Tilaghor and Zindah Bazar of Sylhet Metropolitan City were calculated the Total viable count (TVC) and Total coliform count (TCC) and compared their mean value in various table.

Table 1. Bacterial status (TVC and TCC) of Chicken Sandwich in the different area at Sylhet Metropolitan City

Area	Result of TVC in CFU/gm	Mean±SE (in 10^9)	Result of TCC in CFU/gm	Mean±SE (in 10^3)
Shibgonj	70×10^9	66.8 ± 8.29^b	42×10^3	51.8 ± 3.35^a
	51×10^9		47×10^3	
	79×10^9		60×10^3	
	45×10^9		58×10^3	
Tilaghor	89×10^9	119.4 ± 14.17^c	52×10^3	90.4 ± 10.89^b
	150×10^9		80×10^3	
	90×10^9		120×10^3	
	105×10^9		71×10^3	
	157×10^9		113×10^3	
Zinda bazar	95×10^9	35.6 ± 31.11^a	68×10^3	32.8 ± 2.69^a
	30×10^9		25×10^3	
	41×10^9		28×10^3	
	32×10^9		37×10^3	
	45×10^9		39×10^3	
	30×10^9		35×10^3	
F value		19.63**		18.85**

Figure indicate Mean±SE Value, n = Number of observation, abc values having different superscripts differed significantly. NS = Non significant * = Significant at 5% levels ** = Significant at 1% levels *** = Significant at 0.1% levels DF = Degree of freedom

From table 1 showed that the mean value of TVC and TCC that was obtained from different areas of fast food item and results were expressed in CFU/gm of sample. Mean value of TVC and TCC per gram of Chicken sandwich were found $66.8 \times 10^9 \pm 8.29$ and $51.8 \times 10^3 \pm 3.35$ $119.4 \times 10^9 \pm 14.17$ and $90.4 \times 10^3 \pm 10.89$ and $35.6 \times 10^9 \pm 31.11$ and $32.8 \times 10^3 \pm 2.69$ at Sibjong, Tilaghor and Zindah Bazar at Sylhet Metropolitan City, respectively. Total viable count and total coliform count had significant ($P < 0.01$) effect at different area in Sylhet Metropolitan City was 'Unsatisfactory' by EFSA, 2005 standard. The study was partially agreed by Rahman *et al.* (1998).

Table 2. Bacterial load (TVC and TCC) in Chicken roll at the different area at Sylhet Metropolitan City

Name of the Area	Result of TVC in CFU/gm	Mean±SE (in 10^9)	Result of TCC in CFU/gm	Mean±SE (in 10^3)
Shibgonj	100×10^9	94.60 ± 2.06^c	79×10^3	82.60 ± 7.62^b
	91×10^9		94×10^3	
	89×10^9		73×10^3	
	95×10^9		105×10^3	
	98×10^9		62×10^3	
Tilaghor	50×10^9	65.60 ± 7.63^b	88×10^3	85.60 ± 1.63^b
	90×10^9		81×10^3	
	52×10^9		90×10^3	
	77×10^9		83×10^3	
	59×10^9		86×10^3	
Zindabazar	40×10^9	47.20 ± 3.73^a	35×10^3	53.20 ± 7.21^a
	56×10^9		57×10^3	
	39×10^9		74×10^3	
	56×10^9		39×10^3	
	45×10^9		61×10^3	
F value		21.94**		8.53*

Figure indicate Mean ± SE Value, n = Number of observation, abc values having different superscripts differed significantly. NS = Non significant * = Significant at 5% levels ** = Significant at 1% levels *** = Significant at 0.1% levels DF = Degree of freedom

From table 2 showed that the mean value TVC and TCC per gram of Chicken roll were found $94.60 \times 10^9 \pm 2.06$ and $82.60 \times 10^3 \pm 7.62$; $65.60 \times 10^9 \pm 7.63$ and $85.60 \times 10^3 \pm 1.63$ and $47.20 \times 10^9 \pm 3.73$ and $53.20 \times 10^3 \pm 7.21$ at Sibjong, Tilaghor and Zindah Bazar at Sylhet Metropolitan City, respectively. Total viable count and total coliform count had significant effect at ($P < 0.05$) and ($P < 0.01$) level in different area at Sylhet Metropolitan City. Rahman *et al.* (1998) observed similar result. The values of the results also compared with EFSA, 2005 and match with 'Unsatisfactory' level.

Table 3. Bacterial status (TVC and TCC) of Koliza singera in the different area at Sylhet Metropolitan City

Name of the Area	Result of TVC in CFU/gm	Mean±SE(in 10 ⁹)	Result of TCC in CFU/gm	Mean±SE (in 10 ³)
Zindabazar	61 × 10 ⁹	65.40±3.54 ^a	45 × 10 ³	39.80±4.32 ^a
	55 × 10 ⁹		31 × 10 ³	
	65 × 10 ⁹		45 × 10 ³	
	75 × 10 ⁹		28 × 10 ³	
	71 × 10 ⁹		50 × 10 ³	
Shibjong	94 × 10 ⁹	95.80±4.35 ^b	40 × 10 ³	57.00±9.18 ^a
	82 × 10 ⁹		32 × 10 ³	
	107 × 10 ⁹		60 × 10 ³	
	103 × 10 ⁹		78 × 10 ³	
	93 × 10 ⁹		75 × 10 ³	
Tilaghor	173 × 10 ⁹	125.00±12.86 ^c	100 × 10 ³	99.20±1.66 ^b
	130 × 10 ⁹		95 × 10 ³	
	111 × 10 ⁹		101 × 10 ³	
	102 × 10 ⁹		104 × 10 ³	
	109 × 10 ⁹		96 × 10 ³	
F value		13.52*		26.46**

Figure indicate Mean±SE Value, n = Number of observation, ^{abc} = values having different superscripts differed significantly. NS = Non significant * = Significant at 5% levels ** = Significant at 1% levels *** = Significant at 0.1% levels DF = Degree of freedom

From table 3 showed that the mean value of TVC and TCC that was obtained from there different areas of fast food item. Mean value of TVC and TCC per gram of Koliza singera were found $65.40 \times 10^9 \pm 3.54$ and $39.80 \times 10^3 \pm 4.32$; $95.80 \times 10^9 \pm 4.35$ and $57.00 \times 10^3 \pm 9.18$ and $125.00 \times 10^9 \pm 12.86$ and $99.20 \times 10^3 \pm 1.66$ at Sibjong, Zindah bazar and Tilaghor at Sylhet Metropolitan City, respectively. Total viable count and total coliform count had significant effect at ($P < 0.01$) and ($P < 0.05$) level in different areas at Sylhet Metropolitan City. The result was indicated as 'Unsatisfactory' by EFSA (2005) standard. The author Rahman *et al.* (1998) partially agreed with current study. From table 4 showed that the mean value of TVC and TCC that was obtained from different market of fast food item and compared. Mean value of TVC and TCC per gram of Beef burger were found $63.80 \times 10^9 \pm 5.29$ and $34.20 \times 10^3 \pm 5.32$ and $98.20 \times 10^9 \pm 4.33$ and $46.80 \times 10^3 \pm 5.09$ at Zindah Bazar and Tilaghor at Sylhet Metropolitan City, respectively. Total viable count and total coliform count had significant effect at ($P < 0.05$) and non significant in different area at Sylhet Metropolitan City. Rahman *et al.* (1998) partially agreed with current study but EFSA (2005) it was indicated as 'Unsatisfactory'.

Table 4. Bacterial status (TVC and TCC) of Beef burger in the different area at Sylhet Metropolitan City

Name of the Area	Result of TVC in CFU/gm	Mean±SE(in 10 ⁹)	Result of TCC in CFU/gm	Mean±SE (in 10 ³)
Zindabazar	70 × 10 ⁹	63.80±5.20	25 × 10 ³	34.20±5.32
	55 × 10 ⁹		32 × 10 ³	
	75 × 10 ⁹		55 × 10 ³	
	48 × 10 ⁹		29 × 10 ³	
	71 × 10 ⁹		30 × 10 ³	
Tilaghor	96 × 10 ⁹	98.20±4.33	30 × 10 ³	46.80±5.09
	85 × 10 ⁹		41 × 10 ³	
	110 × 10 ⁹		50 × 10 ³	
	105 × 10 ⁹		58 × 10 ³	
	95 × 10 ⁹		55 × 10 ³	
F value		25.79*		2.925 NS

Figure indicate Mean ± SE Value, n = Number of observation, ^{abc} values having different superscripts differed significantly. NS = Non significant * = Significant at 5% levels ** = Significant at 1% levels *** = Significant at 0.1% levels DF = Degree of freedom

The study bacterial load and coliform count yielded somewhat better results in Zindabazar than Tilaghor and Shibjong, though some alarming findings arise from our results: indeed, improper practices, such as sharing of utensils for raw and cooked foods and thawing of frozen food at room temperature, appeared to be widespread among the respondents. Similar behaviours are described in several previous studies and confirm that cross-contamination is a poorly perceived food safety issue (Angelillo *et al.*, 2001 and 2001a; Askarian *et al.*, 2004 and Altekruze *et al.*, 1999).

Conclusions

The qualitative count (TVC and TCC) of Chicken Sandwich, Chicken roll, Koliza Singera and beef burger observed lowest value but 'Unsatisfactory' on EFSA standard in Zinda bazar than other areas of Sylhet Metropolitan City Corporation.

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