RESEARCH NOTE
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Contamination of Street Food by Salmonella in Chittagong City

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The study was conducted to determine the contamination of Salmonella for different types of street foods in different places of Chittagong city area. A total of 76 shops from where 120 food samples of ten types were collected. Microbiological examination of Salmonella was done after dividing the foods into two categories of dry and wet foods where overall about 28% samples were positive. In case of wet food, salad shows the highest contamination of 58% flowed by water, chicken raw meat and raw milk makes up 50%, 42% and 33% respectively. For wet food, vegetable role and egg chop show the same 25% contamination where kabab and beef stick were not contaminated. A chi-square (χ^2) test was used to examine the equality of observed proportions for each item of food where significant difference among the observed proportion for Salmonella (Chi-square = 82.67; p-value<0.001) for different items of food were observed and an odds ratio (OR) was measured of association between an exposure and an outcome where the probability of contamination of Salmonella in dry food was lower than wet food (OR=0.17 and CI: 0.07 to 0.44). The comparatively high bacteria in wet samples indicated contamination from water, practice of inadequate hygienic measures, mishandling, improper storage, inadequate cooking and above all unhygienic condition of the retail shops.

Keywords: Contamination, Roadside food, Salmonella

Introduction

Food with proper nutritional value, hygienic in quality and appropriate in quantity is the topmost priority items for maintaining growth and development. Food is essential for good health and active life (Potter, 1978). It was reported that, 90% of the population in Bangkok goes out a majority of the time for meals outside the homes. A total of 30% of the consumers were buying street food on a daily basis were 84.4% were contaminated (Haque,1999). Potential for serious food poisoning out breaks due to microbial contamination (WHO, 1992).The transmission of human diseases through food, water and wastewater is a global problem, particularly of developing countries where gastrointestinal diseases are one of the most important causes of morbidity and mortality. (WHO, 1974 and 1976). Salmonellosis continues to be a major public health problem worldwide because, 16 million annual cases of typhoid fever, 1.3 billion cases of gastroenteritis and 3 million deaths worldwide due to Salmonella (Bhunia, 2008).Salmonella are widely distributed in nature and they survive well in a variety of foods. Poultry, eggs and dairy products are the most common vehicles of salmonellosis. In recent years, fresh produce like fruits and vegetables have gained concern as vehicles of transmission (Bouchrif et al ., 2009). Human get infected when eating the food or drinking the water that is contaminated with Salmonella (Newell et al ., 2010).The qualitative and quantitative study of bacterial contamination was done by Kawser (1997).

Bangladesh, being a developing country, sanitary practices of street food shops are very poor. Because only few vendor and consumer know about the hygienic condition of food. Although the study related to microbiological contamination of food is not so common in Bangladesh, but it is very important from the view point of public health as the significant number of city people used to take the road side foods. Chittagong is the second largest city of Bangladesh with more than 4 million people. The study was conducted in different area of Chittagong city to assess contamination of different types of street foods by Salmonella.

Materials and Methods

The study was conducted in different areas of Chittagong Metropolitan City from 11th September 2012 to 12th December 2012.Five types of food samples, 12 from each items, were collected from both dry and wet food.

Food sample preparation

Homogenate food samples were prepared by taking 10 g of both superficial and inner layers of samples and were mashed in a motor and pestle which was sterilized by autoclaving and washing with alcohol before. These meshed samples were inserted aseptically into sterile cotton plugged conical flask containing 0.9% sterile sodium chloride solution by using sterile forceps. After that these were mixed thoroughly by shaking for 20 times. The solution was allowed to stand for 5-10 minutes.

Preparation of agar plate

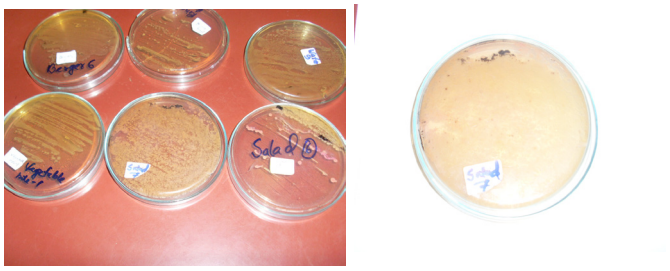
Duplicate plates were used for each sample. The petridishes were arranged and marked in a reasonable order for use. An aliquot was aseptically collected from the appropriate dilution and poured into the bottom of each petridish. After delivery the tip of the pipette was touched once to a dry spot in the dish. A separate sterile pipette was used to transfer an aliquot to each set of petridishes for each sample or sample dilution used.

Pouring Agar Plates

Melted and cooled (45 ± 1°C) agar medium of not less than 12 mL (usually 12-15 mL) was added to each petridish containing an aliquot of the sample or its dilution. The inoculated medium was mixed carefully to prevent spilling. The medium was allowed to set, then inverted and incubated for 18-48 hours.

Culture of Salmonella

Salmonella and Shigella agar (SS agar) were used for culture of Salmonella. For the desired volume, the chemical ingredients of each media were first weighed and distilled water was added. The media was dissolved in water bath at boiling temperature. pH of the media was adjusted to 7.4-7.6 and then autoclaved. Inoculated plates were incubated for 24 hours at 37°C to facilitate Salmonella growth and identified by cultural characteristics of round, smooth and yellow colonies in positive cases within 18-24 hours of inoculation as in Figure 1(a) and black color precipitation of Hydrogen sulphhide as in Figure1(b).



(a) (b)

Figure1 a. Colony of Salmonella on SS agar
b. Production of hydrogen sulphide (black precipitation) by Salmonella

Data Analysis

A chi-square test was applied to examine whether the observed proportion contaminated by Salmonella are equal or not for each item for dry and wet food respectively. An odds ratio was tested to examine the association between contamination of dry and wet food.

Results and Discussion

About 28% whole collected samples were found to be salmonella positive (Table 1).

Table 1. Salmonella test of food samples

Name of the foods	No. of sample	(+)ve	(-)ve	% of (+)ve sample
Dry Food				
Vegetable role	12	3	9	25
Kabab	12	0	12	0
Beef stick	12	0	12	0
Burger	12	1	11	8.33
Egg chop	12	3	9	25
Wet Food				
Salad	12	7	5	58.33
Water	12	6	6	50
Raw milk	12	4	8	33.33
Chicken raw meat	12	5	7	41.67
Shop raw beef	12	4	8	33.33
Total	**120**	**33**	**87**	27.5

Kawser (1997) reported that, 49.58% of samples were contaminated and 50.52% were sterile. This low contamination of present study was due to this study include solely Salmonella. In case of wet foods, salad shows the highest contamination that makes up 58% flowed by water, chicken raw meat and raw milk constitutes 50%, 42% and 33% respectively. This result is similar to the study of Bouchrif et al. (2009) where Poultry, eggs and dairy products are the most common vehicles of salmonellosis For wet food, vegetable role and egg chop show the same 25% contamination where kabab and beef stick were not contaminated. There were significant difference among the observed proportion for Salmonella (Chi-square = 82.67; $p-<0.001$) for different items of food and an odds ratio (OR) expressed the association between an exposure and an outcome where the probability of contamination of Salmonella in dry food was lower than wet food (OR=0.17 and CI: 0.07 to 0.44).

Conclusions

The highest rate of contamination was found in wet foods whereas in dry foods the rate of contamination was low. This comparatively higher bacterium in wet samples suggests contamination from water. Practice of inadequate hygienic measures such as mishandling, improper storage, inadequate cooking and above all unhygienic condition of the retail shops are the major causes.

References

Bhunia, A. K. (2008). Foodborne microbial pathogens: Mechanisms and pathogenesis. United States of America: Springer Science and Business Media, LLC.

Bouchrif, B., Paglietti, B., Murgia, M., Piana, A., Cohen, N., Ennaji, M., Rubino, S., and Timinouni, M. (2009). Prevalence and antibiotic-resistance of Salmonella isolated from food in Morocco. Journal of Infection in Developing Countries 28(3): 35-40.

Newell, D. G., Koopmans, M., Verhoef, L., Duizer, E., Aidara-Kane, A., Sprong, H., Giessen, J. v. d. and Kruse, H. (2010). Food-borne diseases-the challenges of 20 years ago still persist while new ones continue to emerge. International Journal of Food Microbiology.139:S3-S15

Potter N N (1978). "Food Science", Third ed. CBS publishers & Distributors, p-64.

Haque M Z (1999). Socio-Economic and Environmental Aspects of Street Foods in Dhaka City, M.S.c thesis, I.N.F.S.D.U., p 8-14.

WHO (1974) Expert committee microbiological aspects of food hygiene: WH0 Tech Rep Ser. 598.

WHO (1976) Expert committee microbiological aspects of food hygiene: WH0 Tech Rep Ser. 598:6, 50-52.

WHO (1992) Essential Safety Requirements for street Vended Foods. World Health Organization, Food safety unit.p12.

Kawser M (1997). Study of microbial aspect of different fastfoods and drinks to determine the fitness for human consumption. M.S.c thesis, I.N.F.S.D.U., p 1-10