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Research Paper

STUDY OF FOOD HANDLERS AS POTENTIAL CARRIERS OF PATHOGENIC INTESTINAL BACTERIA

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ABSTRACT **Food handlers come in contact with the food from time of its preparation to serve. It is possible that the food handlers can be a potential carrier of pathogenic intestinal**

nal bacteria and can transmit the organisms to the im*munocompitant as well as immunocompromised individuals of the hospitals. An outbreak of such incidences is a common sight. Proper handling of food and a good personal hygiene of the food handlers can help in decreasing the incidences of food poisoning which are transmitted through food handlers. The aim of the study was to identify the carrier rate of pathogenic intestinal bacteria among the food handlers in a tertiary care setting and to identify the antibiotic sensitivity patterns of the isolated organisms. A total of 50 stool sample from the food handlers were taken and subjected to routine conventional microbial technique and antibiotic sensitivity testing. For ETEC, modified Biken's test was performed and for Salmonella and Shigella species, Reverse Latex Agglutination was performed. Out of the total sample studied, 8 (16%) were found carriers for pathogenic bacteria. The organisms isolated included Salmonella typhi (4%), salmonella species (2%) and Enterotoxogenic E. coli (ETEC) (10%). The isolated organisms were found sensitive to the most of the conventionally used antibiotics. Food handlers who are carriers of pathogenic intestinal bacteria are at a risk of transmitting the organisms though the food to the healthy or immuno compromised individuals of the hospital. To minimize this risk, personal hygiene and sanitation should be improved. Food handlers should be advised for their routine health check up and any positive cases should be reported and treated.*

KEYWORDS :In a country like India, where along with a fast life, food is also

INTRODUCTION

In a country like India, where along with a fast life, foodis also becoming fast, health is taking a back seat. Majority of Indians depend on outside prepared food for theirbreakfast, lunch, snacks and dinner. At such a scenario,health of the common man depends largely on the personalhygiene of the people preparing, handling and distributing the food. Intestinal bacteria can easily be transportedvia contaminated food from the handlers to the feedingpopulation. Food handlers come in contact with food fromthe time of preparation to the time of serving. They maybe infected by a wide range of enteropathogens and have been implicated in the transmission of many infections tothe public in the community and to patients in the hospital setting. Dangerous organisms present in or on the food handlers body can multiply to an infectious dose given the right condition and come in contact with the food. One of the historically notorious example is that of the American cook "Typhoid Mary" (Mary Malon) who was responsible for 7 epidemics of typhoid affecting more than 200 persons. [1] Since food handlers in a bigger eating establishment cater to larger number of people, they are epidemiologically more important than domestic food handlers in spreading the diseases. Food handlers with poor personal hygiene could be potential sources of infections of many intestinal enteropathogenic bacteria.[2] The spread of disease via food handlers is a common and persistent problem worldwide.[3] In developing countries, biological contaminants are responsible for a wide range of diseases, including cholera, Campylobacteriosis, *E. coli* gastroenteritis, *Salmonellosis*, Shigellosis, typhoid and paratyphoid fevers, brucellosis, amoebiasis, and poliomyelitis.[4] Diarrhoeal diseases,mostly caused by food or water-borne microbial pathogens are leading causes of illness and deaths in developing countries, killing an estimated 1.9 million people annually at the global level. Even in developed countries, an estimated one third of the population are affected by microbiological food borne diseases each year.[5] Apart from this, Typhoid is also one of the most wide spread of all bacterial diseases in India. An individual can asymptomatically carry the typhoid germ for days to years without showing any of symptoms of typhoid fever. In such carriers, the typhoid bacillus continues to multiply in the gall bladder. It reaches the intestine through the bile duct and can be released into the fecal matter of the person carrying them. The emergence of drug resistant pathogens poses a major challenge to the treatment and prevention of typhoid. In particular, the concern is about the spread of these multi drug resist ant strains to rural India.[6] The World Health Organization estimates 16 million new cases and 600,000 deaths of typhoid fever each year. The emergence of antimicrobial resistant *S. typhi* including resistence to chloramphenicol is a major issue.[7]

MATERIALS AND METHODS:

The study was carried out over a period of 1 year from January 2015 to December 2015 at Department of Microbiology, MGM College and hospital, Kamothe. Navi Mumbai.Stool samples were from food handlers working in food service establishments in and around tertiary care center at Kamothe, Navi Mumbai. A total of 50 stool samples were collected and studied. Inclusion Criteria was stool samples from food handlers working in food service. Exclusion Criteria was stool samples from food handlers who have taken a course of antimicrobial drugs within past 10 days. Freshly passed stool sample of the participants was collected in a sterile wide mouth container and was transported to the lab within 2 hours. The specimens were inoculated on MacConkey's agar, Xylose lysine deoxycholate agar (XLD) and Deoxycholate citrate agar (DCA) plates and incubated at 37ºC for 24 hours. A well isolated colony of lactose fermenters and non fermenters from MacConkey's agar was processed further. Suitable colonies from XLD and DCA agar was also processed using biochemicals test (Indole, Methyl red, Voges Proskauer, Citrate, Urease and Triple Sugar Iron) for the species identification. For identification of Salmonella organisms, Reverse Latex Agglutination test was performed and all the ETEC strains were identified by modified Biken's test. Antibiotic sensitivity testing was done by Kirby Bauer disc diffusion method according to CLSI guidelines.

RESULTS:

A total 50 candidates were included in this study, in which 47 were males and 3 were females.28 candidates were professionally qualified chef's , 15 were canteen helper, 5 road side cooks having a small eatery and 2 were house cooks who worked as maids. 4 out of the 50 candidates were illiterate who never had any basic qualification, 18 had qualification up to matrix while 28 were above matrix pass. The results are represented in the following tables.

Table 1: Shows the carrier rate amongst the food handlers(n = 50):

Total number of participants	Total number of carriers for bacteria
50	8 (16%)

A total 16% of the food handlers were found to be carriers of pathogenic bacteria. Among the total candidates studied, maximum

number of the carrier 33.4% were found to be females. Maximum number of the carrier 50% were between the ages of 20-30 years. Majority of the pathogens (64.2%) were isolated from canteen chefs.

Table 2: Shows hygienic practices of food handlers and its relation to parasite (n=50):

Variables	Frequency	Positive for intestinal bacteria	Relative risk
Hand washing after toilet			
Yes	28	3 (10.71%)	0.14
No	22	11 (50%)	
Hand washing after touching dirty material			
Yes	36	5 (13.8%)	0.31
No	14	9 (64.28%)	
Touching body parts			
Yes	40	6 (15%)	0.43
No	10	8 (80%)	
Medical check			
Yes	26	2 (7.6%)	0.1
No	24	12 (50%)	

Table 3: Shows the pathogenic intestinal bacteria (n=50):

Bacterial species	Frequency	Percentage
Salmonella typhi	2	4%
Salmonella species	1	2%
Enterotoxogenic E. coli	5	10%

Table 4: Shows the antibiotic sensitivity pattern of the bacterial isolates:

Antibiotic	S.typhi Sensitive (%)	Salmonella species Sensitive (%)	ETEC Sensitive (%)
Amoxicillin	2 (100%)	-	2 (40%)
Tobramycin	2 (100%)	1 (100%)	3 (60%)
Ceftriazone	2 (100%)	1 (100%)	-
Gentamycin	2 (100%)	1 (100%)	3 (60%)
Cefuroxime	2 (100%)	1 (100%)	1 (20%)
Amikacin	2 (100%)	1 (100%)	3 (60%)
Ciprofloxacin	-	1 (100%)	3 (60%)
Cefotaxime	2 (100%)	1 (100%)	4 (80%)
Chlorpromazine	2 (100%)	1 (100%)	2 (40%)
Ofloxacin	-	1 (100%)	1 (20%)
Ceftazidime	2 (100%)	1 (100%)	2 (40%)
Tetracycline	2 (100%)	1 (100%)	1 (20%)
Chloramphinicol	2 (100%)	1 (100%)	-

DISCUSSION:

In the study conducted, 50 food handlers participated, out of which 8 (16%) were carrier for pathogenic bacteria. Other studies carried out by S. Khurana et.al in Chandigarh, showed the prevalence of the enteropathogens among the food handlers to be 6.75% in the year 2006.[8] Similar studies carried out by Mohan et.al in the same year reported 16% of enteropathogens in the health and educational institute in Amritsar.[9] Most of the studies conducted in countries like Brazil and Turkey showed figures like 29.3% and 17% respectively.[10] This is quite similar to our findings. 50% of the carriers were aged between 20-30 years. The figures correlate with the studies carried out by S Khurana et [8] in which the maximum carriers for enteropathogens belonged to the young group of 20-40 years. In other studies carried out in Brazil showed that carrier rate were maxi mum (63.5%) among the age group of 35-50 years.[10]The canteen of the hospital is well maintained and is segregated as per the requirements i.e cooking area, cutting area, freezing and thawing area, distributing area and area for waste disposal. The entire member wore a unique dress code and had a head cap. However few of the members did not follow any much of personal hygiene and had un kept nails and also the dustbin was close to the food distributing area. The food preparing area by road side eatery was worst. They did not have any proper infrastructure or segregation. Cooked food was never refrigerated. The food was left open and the place had rodents running inside it. The cooks always had a prevalence of stomach pain and nausea, although the house cook had good level of personal hygiene.In the study, 50% of the participants who never washed their hands after toilet were found positive for bacteria. 64% of the participants were found positive for bacteria who did not wash their hands after touching dirty material like soiled clothes and utensils.80% of the positive candidates, did not wash their hand after touching body parts like hair nose and mouth. Among the candidates who never had any medical checkup done before, showed 50% of carrier rate. This data corelates with the other studies carried out by Abera et al [11] (47.34%, 58% and 73%) and Mohan et al [12] who showed the carrier rate to be 56%, 67% and 72% respectively. This data signifies the importance of hand washing and personal hygiene that should be followed among the food handlers.Among the enteropathogens, 10% of the sample was positive for ETEC and 4% showed the growth Salmonella typhi whereas 2% had growth of Salmonella species. S. Khurana [8] showed 0.3% with ETEC. Study by Abera et al [11] showed the prevalence of S. typhi to be 1.6% and by Mohan et al. [12] the rate was 0.41%.

Studies	ETEC	Salmonella
Sumeet khurana et al. [8]	0.3%	Salmonella spp. 1% S. typhi 0.3%
Abera et al. [11]	-	S. typhi 1.6%
Mohan et al. [9]	-	S. typhi 0.4%
Zaglool et al. [12]	2%	-
Present study	10 %	Salmonella spp. 2% S. typhi 4%

Table 5: Pathogenic bacterial carrier in various studies:

CONCLUSION

Out of the total 50 candidate studied, 16% were found to be carriers of entropathogens. In the study, 10% of cases showed the presence ETEC while 2% of Salmonella species and 4% of Salmonella typhi was reported. Numbers of the carriers were high among those candidates who did not wash their hand after using the toilet (50%) or after touching soiled material (64.28%) or body parts (80%) also majority of the positive candidates (50%) never had any medical checkup done. This shows how important it is to educate food handlers regarding hand washing, personal hygiene and regular health check up. Candidates who were found to be positive for the bacteria were given antibiotic treatment and a follow up after 3 months was also advised. The study emphasizes the importance of regular health check up of the food handlers and the importance of sanitation and personal hygiene which plays an important role in controlling and transmitting the infection to healthy as well as immunocom promised patients in the hospitals.

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