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Original Article

Effectiveness of an intervention package on knowledge, attitude, and practices of food handlers in a tertiary care hospital of north India: A before and after comparison study

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ARTICLE INFO

Article history:

Received 16 May 2016

Accepted 5 October 2016

Available online 30 November 2016

Keywords:

Food safety
Food handlers
Training
Intervention

ABSTRACT

Background: Food-borne illnesses have been a recognized hazard for decades. Recent promulgation of Food Safety and Standards Act (FSSA), 2006, indicates the concern of our Govt. for food safety. Research on effectiveness of food safety interventions in our country is remarkably scarce. Hence, the present study was conducted in a tertiary care hospital of north India to create evidence-based results for food safety interventions.

Methods: The study was before and after intervention trial which was registered with CTRI. Data collection was paperless using a software. All food handlers ($n = 280$) working inside the hospital were recruited. Intervention package comprised Self-Instructional Manual in Hindi for food handlers, short film for sensitization of food handlers on food safety titled 'Gravy Extra', and a documentary titled 'Food Safety from farm to Fork'. Chi square test, paired t test, and Wilcoxon sign rank test were used.

Results: The mean age of food handlers was 35 ± 2 years. Majority (61.7%) of food handlers were educated less than 10th standard. Nearly 60% of them had up to five years of experience. At base line majority (68.9%) had a fair knowledge about food safety issues. There was a significant improvement in food safety knowledge and practice score of food handlers after the intervention ($p < 0.05$). Their attitude toward food safety changed in a positive direction ($p < 0.05$). **Conclusion:** The intervention package was useful in improving the knowledge, creating a positive attitude and enhancing the food safety practices of food handlers working inside a tertiary care hospital.

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<http://dx.doi.org/10.1016/j.mjafi.2016.10.002>

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Introduction

Food-borne transmission of pathogenic and toxigenic micro-organisms has been a recognized hazard for decades.¹ Worldwide, food borne illnesses (FBI) are responsible for significant morbidity and mortality. Majority of these cases occur in children less than 5 years of age due to unsafe water and food.² In developing countries, the burden of FBI is much more enormous than developed countries, as a result of inadequate food safety provisions there. However, there is no data to show its magnitude since many such cases go unreported and unrecognized. In India also FBI is a serious public health problem.³ Integrated Disease Surveillance Programme (IDSP) reports food poisoning cases across the country.⁴ In fact, out of the total outbreaks reported to IDSP, approximately 60% are related to food-borne infections.⁵ To fight the challenges of food safety and realizing the need of safe food at all levels, WHO dedicated the World Health Day theme "From farm to plate, make food safe" on 7th April 2015. Recent promulgation of Food Safety and Standards Act (FSSA), 2006, indicates the concern of Govt. of India for food safety.

In hospitals also, food safety is an area of extreme importance. Yet, it is often neglected. Food service facilities in a hospital are used by hospital staff, patients as well as their visitors. Patients are prescribed special diets as per the disease suffered by them (renal/diabetic/hypertension diet). Hospitals should take a lead in providing safe food not only to patients but also to hospital employees and visitors.

Like everywhere else, food safety in hospital is a daily challenge. Every day, large volumes of food are prepared/ brought in by Food Business Operators (FBOs) and served to a large number of patients. Food contamination can occur at any point from its journey to procurement of raw material to it being served to the patients. Handling of food in an unsafe manner has been implicated in 97% of all FBI.⁶ However, most of these are preventable through proper implementation of food safety measures and strict enforcement of food hygiene standards. Indifferent attitude toward food safety and incorrect practices by these persons can jeopardize food safety and cause FBI. The main tools to fight this battle are implementation of legislative measures, training of food handlers and managers and sanitary inspections which in turn can improve food safety. The patients and the hospital staff would be the greatest beneficiaries, as it would result in better quality of care and safety.

Though the fact that all training interventions in public health need to be evaluated very few studies have attempted to evaluate effectiveness of training food handlers. Research on effectiveness of food safety interventions is remarkably scarce. None of such studies have been conducted in our country till now. Hence, the present study was conducted in a tertiary care hospital of north India to ascertain the determinants of knowledge, attitude, and practices of food handlers regarding food safety and to document the effectiveness of an intervention package on food safety.

Materials and Methods

This was a before and after intervention study. Prior clearance from ethics committee of institute was taken for the study. The trial was registered with Clinical Trial Registry of India. A tool was designed to elicit the knowledge, attitude, and practices of food handlers working in eating establishments of a hospital about various aspects of food safety. For creating this tool, a base line survey of all kitchens in the hospital was done and common mistakes were observed. Using this data, a questionnaire with photographs was prepared. This was a paperless study as data from food handlers was collected through interview schedule directly in software using a laptop. For assessment of food safety practices situation-based questions were asked. The software ensured that no question was skipped. The sample size was calculated using significant improvement in mean (8%) from previous studies which was 236. All food handlers ($n = 280$) working inside the hospital were recruited in the trial. 16 food handlers left the trial and final data was analyzed for 264 subjects (attrition diagram Fig. 1). Written informed consent was taken before collection of data. Intervention package on food safety was developed. It comprised the following items:

- Self-Instructional Manual in Hindi for food handlers
- Short film for sensitization of food handlers on food safety titled 'Gravy Extra' and a short documentary on safe food practices titled 'Food Safety from farm to Fork' (now made available at you tube)

After baseline data collection training sessions were held both at the site of work and centrally. Training methodology adopted was 'High Tech – High Touch' which implied that all interventions were conducted with an emotional content and

Fig. 1 – Trial attrition diagram.

personal touch. The end line observations were recorded two months after the intervention phase was over. Data was analyzed using SPSS 20 software. Chi square test, paired t test and Wilcoxon sign rank test were used.

Results

The mean age of food handlers was 35 ± 2 years. None of them was less than 14 years. Majority (61.7%) of food handlers were educated less than 10th standard. Nearly 60% of them had up to five years of experience. At base line level majority (68.9%) had a fair knowledge about food safety issues. Some (6.8%) had poor score.

Only 43% knew that food handlers should not wear rings, wrist bands/jewelry while working. Only 48% of them could correctly answer the items to be used by a food handler while at work. Even lesser number (37.5%) knew about correct way of drying utensils. 58.7% knew that disposable items could be used only once. Nearly half (45.4%) of the food handlers knew the correct way of handling ready to eat foods. Only 33.4% could correctly answer the correct way of cleaning the food contact surface and keeping of dirty mops.

Almost half (56%) enjoyed their job. 55.3% agreed that food handlers have a definite role in food safety. Food handlers were ambivalent in majority to receiving training on food safety (59.8%) and its role in improving food safety (68.1%), wearing protective clothing (81.4%), not to handle food while being sick (67.8%), punishment to those food handlers who do not practice good hygiene (82.9%). Almost all (98.4%) of food handlers washed hands before work. However, only 60.6% of subjects did so with soap. Most (87.1%) of the food handlers were followed incorrect food safety practices.

Determinants of knowledge about food safety are given in Table 1. There was a significant improvement in food safety knowledge and safety score of the food handlers after the intervention (Table 2). The number of food handlers both in knowledge and practice in the 'satisfactory' category increased and reduced in 'unsatisfactory' category (Fig. 2). There was a significant change in attitude of food handlers after intervention (Table 3). They felt valued and important. Their attitude toward food safety changed in a positive direction. The baseline attitude of food handlers was neutral to aspects like their role in food safety, receiving any training and its impact on food safety, wearing of protective clothing at work place,

Table 1 – Determinants of food safety knowledge score in food handlers.

Determinants	Food safety knowledge score			p value
	Poor	Fair	Good	
<i>Age</i>				
≤20	10	35	05	<0.01
21–30	04	68	17	
31–40	03	40	14	
>40	01	39	28	
Total	18	182	64	264
<i>Education</i>				
<10th	10	111	42	0.00
10	07	69	13	
Graduate and above	03	04	05	
Total	18	182	64	264
<i>Experience as food handler</i>				
<1	05	65	06	<0.01
1–5	04	66	10	
6–10	03	15	07	
11–15	02	09	19	
>15	04	27	22	
Total	18	182	64	264
<i>Previous employment</i>				
None/other than food handler	11	157	23	<0.01
Food handler	07	25	41	
Total	18	182	64	264

etc. However, post training, they had a positive attitude toward their role in ensuring safety of food.

Discussion

With the advent of the FSSA 2006 in our country, it is mandatory for all food handlers to undergo compulsory medical examination and training and the responsibility of which rests with the FBO or authorities in case of a Hospital. Meaningful and focused trainings can contribute to improve both the safety and quality of food.

The food chain from farm to fork can be broken into two main parts, that is, farm to kitchen and kitchen to fork. Food handlers are mainly responsible for food safety in the kitchen to fork link. Research on food safety training of food handlers is inconclusive. One of the studies on food handlers in Bangkok concluded that food handlers' training is indispensable for

Table 2 – Comparison of knowledge and practice scores of food handlers about food safety before and after intervention (n = 264).

	Paired differences				t	df	Sig. (2-tailed)
	Mean	Std. deviation	Std. error mean	95% Confidence interval of the difference			
				Lower Upper			
Knowledge score pre and post	–4.455	4.931	.303	–5.052 –3.857	–14.677	263	.000
Practice score pre and post	–6.856	4.982	.307	–7.460 –6.252	–22.362	263	.000

Fig. 2 – Food handlers food safety knowledge and practices (before and after intervention).

safe food handling.⁷ According to Sprenger, training is instrumental in improving food safety practices of food handlers.⁸ In contrast to these studies many studies have documented that training alone does not improve food safety practices of food handlers.⁹⁻¹¹

Most of the food handlers in our set-up were uneducated and were unaware about the casual agents, the mode of transmission of FBI, about barriers for prevention, adequate cooking, use of safe water, etc.¹² The findings of our study relate well to the fact that there is a difference between training and teaching food handlers. Both theory and practical required them.^{13,14}

We trained food handlers in our study through Self Instructional Module (SIM) (in Hindi) which contained illustrations for food safety practices, screening of short films, distribution of posters on Dos and Don'ts and onsite training through personal interactions. SIM covered the theory part of food safety in simple and easy to understand language whereas practical aspects including hand washing and cleaning of shelf were taught through short films.

The knowledge and food safety practices of the food handlers increased significantly after the intervention. A significant number of food handlers started using soap for washing hands. Similar results were seen in a study by Deshpande et al. where both the knowledge and practices of food handlers improved after educational intervention.¹⁵

The median for attitude scores regarding food safety changed in a positive direction among different age groups and education levels post intervention. Attitudes are a reflection of traditional beliefs, which can serve as obstacles to appropriate practices. Positive attitudes can improve practice and vice versa. We found affirmative change in attitude of food handlers toward food safety. Once they understood the value and vitality of their work other than bringing profit to the EE, their attitude changed considerably. They had a very casual approach about food safety when baseline data was collected. However, post intervention, they were very enthusiastic about ensuring of safety for their clients. The practices which were totally in their control improved considerably (hand washing, personal hygiene, reporting during sickness, handling ready to eat foods $p < 0.05$).

Rennie's KAP model is based on the assumption that practices of every individual are based on fact that knowledge about a subject has a direct bearing attitude. This model is based on the foundation that improvement in knowledge will automatically bring a positive change in attitude and hence practice. However, there are flaws in the assumption that mere provision of knowledge will lead to change in behavior. Change in human behavior is a very gradual and complicated process. This has been shown in various studies where the issue of sustainability of safe food practices by food handlers after

Table 3 – Attitude of food handlers to food safety.

Question Statement	Median scores			p
	Pre intervention	Post intervention	Wilcoxon test	
I enjoy my job	1	2	-17.71	<0.01
I have problems in my job	5	4	13.72	<0.01
Food handlers have a definite role in food safety	1	3	12.85	<0.01
Food handlers should receive training on food safety and its regulations	1	3	10.68	<0.01
Training of food handlers will have an impact on food safety	1	3	11.41	<0.01
Food handlers should wear protective clothing	1	3	-12.84	<0.01
Food handlers with disease should not handle food	1	3	11.17	<0.01
Food handlers who don't practice good hygiene should be punished	2	4	12.18	<0.01
Improper storage of foods may be cause of health hazard to consumers	2	1	12.18	<0.01

training has been discussed.^{16,17} Hence, there is a definite link in meaningful training of food handlers and significant reduction in FBI.^{18,19} This is possible because of improvement in microbiological parameters and quality of food.²⁰ We found a positive correlation between knowledge, attitude, and practices similar to the study by Wen-Hwa Ko in Taipei.²¹

Food handlers training is a means but not an end in itself because training does not always lead to improved practices. Hence, just fulfilling the legal requirement of Food Safety and Standards Regulations (FSSR) 2011 may not warranty food safety always. Nevertheless, strict implementation of various aspects of training such as hand washing, personal hygiene by the FBOs, and authorities has important role to play in improving food safety practices.

In our study, the felt need for food safety training was present strongly among food handlers though not expressed. The training content suited their daily needs, time, and place requirements. They could connect themselves with various safe procedures of routine handling and faults in them. However, we cannot undermine the power of humane/personal touch even when imparting High Tech Training. The same was demonstrated in our study. The food handlers emotional quotient was awakened with High Touch Training which has a lot to do with the safety of food served to clients.

In our country food safety training is not an inbuilt part of Eating establishments or institutions. There is indeed requirement of a food safety policy by any organization, for example, a hospital, school, college, etc. Once a policy on subjects exists, there will be a strong allegiance, planned funding mechanism, and transparency, directed actions which are more meaningful, and focused to achieve high standards of food safety.

Conclusion

The intervention package (training; booklet, short films, lectures, posters display) was useful in improving the knowledge, creating a positive attitude and enhancing the food safety practices of food handlers working inside a tertiary care hospital.

Conflicts of interest

The authors have none to declare.

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