ORIGINAL ARTICLE

Food Safety Knowledge, Attitude, and Practices Among Food Handlers in Kirkuk City Hospitals, Iraq

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ABSTRACT

Introduction: Food safety and hygiene remains one of the important public health issues. In hospitals, poor food handling by food handlers during food preparation has been linked to many incidences of foodborne disease or food poisoning. This study assesses food handlers' food safety knowledge, attitudes, and practises at Kirkuk city hospitals in Iraq. **Method:** Fifty food handlers from three hospitals in Kirkuk's city centre were asked to complete a four-part questionnaire. **Results:** Results revealed that most respondents had a fair understanding of food safety, with the highest pass rate of 96% for knowledge of hand washing, 90% for knowledge of foodborne illness symptoms, and 80% for knowledge of cross-contamination. In regard to attitudes, 56% of participants had fair attitudes toward food safety, with highest marks observed for attitudes toward wearing gloves, masks, and head caps (90%), followed by cooking habits (90%). Food safety practises were also observed with 98% participants receiving a fair level of practice in terms of food safety hygiene. Spearman rho coefficient revealed a statistically significant weak positive correlation between knowledge and attitude scores ($r = 0.304$, $P = 0.032$). **Conclusion:** This study highlighted the important need for specific food safety education and training programmes to enhance food safety and practices understanding among hospital food handlers in Iraq.
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INTRODUCTION

Food safety in hospitals is of the utmost significance since patients are susceptible to food-borne infections. Each year, millions of people in the world are hospitalised and some even die due to illnesses resulting from consumption of contaminated food. In fact, the Centre for Disease Control and Prevention (CDC) estimated that almost 48 million people get foodborne illnesses each year, with over 3000 resulting in deaths and over 128,000 requiring hospitalisation (1). Broadly, foodborne illnesses are caused by consuming food contaminated with microorganisms or their toxins, by contamination caused by inadequate preservation methods, cross-contamination from food contact surfaces, as well as unhygienic handling practises. In fact, an estimated 70% of those foodborne illnesses were associated with food mishandling in health institutions (2). In hospitals, poor food handling by food handlers during food preparation has been linked to many incidences of foodborne disease or food poisoning (2, 3).

Food handlers play a major role in ensuring food safety through the production, distribution, storage, and preparation chain. About 10 to 20% of food-disease outbreaks are caused by food handlers themselves (4). Food mishandling and disregard for measures of hygiene cause increased food pathogens. Not only that, socio-demographic characteristics (age, gender, level of education, training) of food handlers may have an effective role in food safety. For example, in a study carried out in Saudi Arabia, it was observed that 46.6% of respondents who have knowledge of food safety were mainly Saudi nationalities who have higher education levels as opposed to the migrants' education levels. In fact, the research stated that the higher the educational level of the food handlers, the greater their knowledge of food safety (5). Additionally, a study in peninsular Malaysia to assess knowledge of food safety and food handling practises among migrant food handlers also noted that there were significant links between poor

levels of knowledge of food safety and the nationality of the respondents. However, another research highlighted that while there was no significant association between gender and knowledge of food safety, the same study did find an association between age and knowledge (6). In Iraq, food safety issues have become a major concern, especially after the ruling regime fell in April 2003, causing Iraq to continuously operate in a state of confusion. As a result, service institutions such as hospitals, as well as the food preparation infrastructure in hospitals have been neglected. Among the essential components of this infrastructure include networks to monitor and control the supply and manufacture of food. Between 2003 and 2004, a needs assessment was conducted in the country to monitoring food preparing factories in vital government institutions, including hospitals, and it was found that there was a lack of systematic food control and coordination by the interim governments that failed to organise the surveillance of diseases transmitted by food as well as monitoring good food handling practises (7).

With that knowledge, along with personal experiences with food handlers of the government hospitals (Kirkuk general hospital, and Azadi teaching hospitals) there is little adherence and knowledge regarding adequate food safety practises and personal hygiene during food preparation. Therefore, the aim of this study was to assess the knowledge, attitudes, and practises of food handlers regarding food safety in hospitals of the Kirkuk City.

MATERTIALS AND METHODS

Data collection

The survey was conducted face-to-face with participants who work as food handlers in government hospitals (Kirkuk General Hospital, Azadi General Teaching Hospital, General Children's Hospital) in Kirkuk City, Iraq. Collectively, there were 60 food handlers in all three hospitals, therefore an inclusive sampling was carried out to collect data from all participants. However, final data was only collected from 50 participants who consented to participate in the survey. Data was collected using a structured paper questionnaire written in two languages (Arabic and English) with an introduction explaining the purpose of this questionnaire and the nature of the participation. A specific number is assigned to each participant to ensure participant's privacy and anonymity.

Instrument

The instrument used in this study was a questionnaire that was adapted from the study of Woh et. al (8) with slight modifications made to suit the cultural context and situation in Iraq. The first part of the questionnaire is to determine the socio-demographic characteristics of food handlers (gender, age, education level, work type, work responsibility, Anti Typhoid injection, and training) as well as the duration of work in the field of food handling, working responsibility (cooker, food distributor), and the number of training courses related to food safety obtained before or during working time.

Second part of the questionnaire gathered information on the knowledge of the food handlers. This section consists of 16 questions, each of which has three possible answers: "Correct", "Incorrect", and "Not Sure". These questions are designed to determine the level of knowledge on food safety, contamination, pathogens, foodborne illness symptoms, temperature control, and hygienic practises.

Third part of the questionnaire is reserved for attitudes of the participants in regards to food safety, with the section containing ten questions that require three possible responses: "Positive answer" "Negative answer" and "Not Sure". Meanwhile, the final section refers to food safety practises. In this section, good health practises for respondents (who deal with food directly) will be evaluated based on the answers regarding personal hygiene and other safe food handling practises. This final part contains ten questions with three possible answers: "Always", "Sometimes" and "Never".

Validity and ethical approval

The content in the questionnaire was reviewed by experts in the field of food safety and communicable diseases. The experts include the Dean of the Faculty of Nursing in Kirkuk University (Community Health Department), the Head of the Food Safety Unit at Azdi general hospital, and a Public Health Officer in Nursing College, in Kirkuk University (Public Health Unit). Additionally, this research has received ethical approval from Research Ethics Committee, Kirkuk University No.21830. Throughout the study, the anonymity and the privacy of the respondents were kept confidential and were used for research purposes only.

Statistical Analysis

Data were analysed using the Social Sciences System (SPSS) version 26. The data on knowledge, attitudes, and practises of the food handlers concerned were analysed with descriptive statistical analysis (frequency, percentage distribution, mean, median, and standard deviation). To answer the objectives in this study, Chi-square test was used to assess the association between total attitude score level. Pearson's correlation test (r) was used to assess correlations between knowledge, attitude, and practice scores. A level of P value less than 0.05 was considered significant.

RESULTS

The distribution of study participants by socio-demographic characteristics is shown in Table I. The highest proportion of study participants was aged < 25 years (56%) with a male to female ratio of 4.55:1. The

Table I: Distribution of study participants by socio-demographic characteristics

Variable	No. (n= 50)	Percentage (%)
Age (Year)		
< 25	28	56.0
25 – 44	15	30.0
≥ 45	7	14.0
Gender		
Male	41	82.0
Female	9	18.0
Educational level		
Illiterate	1	2.0
Primary school	35	70.0
Secondary school	14	28.0
Work type		
Permanent	5	10.0
Part-time	18	36.0
Contract	27	54.0
Responsibility		
Cooking	22	44.0
Casher	12	24.0
Distributer	16	32.0
Received anti-typhoid Vaccine		
Yes	24	48.0
No	8	16.0
Don't know	18	36.0
Received training course		
Yes	36	72.0
No	14	28.0

majority of the participants had finished primary school (70%) and 54% were working by contract. Based on the data reported by the participants, 44% of participants were cooks; 48% had received anti-typhoid vaccine; and 72% had received training courses on food safety.

Food safety knowledge

Table II shows the results of participants' responses to questions regarding food safety and foodborne illness symptoms. The highest percentage of correct responses was for the question 'washing hands before work reduces the risk of food contamination' and for the question 'washing utensils with detergent leaves them free of contamination' (96%), while the highest proportion of incorrect responses was recorded on the question involving knowledge on AIDS transmission (54%). Apart from that, data also showed that 57% of participants didn't know the correct answer when asked regarding the risk of food poisoning among children, healthy adults, pregnant women, and older individuals.

Table II: Participants' response regarding knowledge towards food safety and foodborne illness symptoms

Knowledge Questions	Correct n (%)	Incorrect n (%)	Not Sure n (%)
Washing hands before work reduces the risk of food contamination	48 (96.0)	1 (2.0)	1 (2.0)
Using gloves while handling food reduces the risk of food contamination	46 (92.0)	0 (0)	4 (8.0)
Eating and drinking at the workplace increase the risk of food contamination	28 (56.0)	8 (16.0)	14 (28.0)
Food prepared in advance reduces the risk of food contamination	21 (42.0)	12 (24.0)	17 (34.0)
Reheating cooked foods can contribute on food contamination	21 (42.0)	7 (14.0)	22 (44.0)
Washing utensils with detergent leaves them free of contamination	48 (96.0)	0 (0)	2 (4.0)
Children, healthy adults, pregnant women and older individuals are at equal risk for food poisoning	15 (30.0)	8 (16.0)	27 (54.0)
Typhoid fever can be transmitted by food	16 (32.0)	12 (24.0)	22 (44.0)
AIDS can be transmitted by food	10 (20.0)	27 (54.0)	13 (26.0)
Bloody diarrhea can be transmitted by food	13 (26.0)	13 (26.0)	24 (48.0)
Salmonella is among the food borne pathogens	29 (58.0)	2 (4.0)	19 (38.0)
Hepatitis A virus is among the food-borne pathogens	15 (30.0)	10 (20.0)	25 (50.0)
Cross contamination is when microorganisms from a contaminated food are transferred by the food handler's hands or kitchen utensils to another food	46 (92.0)	0 (0)	4 (8.0)
Stomach pain is a symptom of foodborne illness	45 (90.0)	0 (0)	5 (10.0)
Vomit is a symptom of foodborne illness	40 (80.0)	6 (12.0)	4 (8.0)
Fever is a symptom of foodborne illness	24 (48.0)	10 (20.0)	16 (32.0)
Average of Correct Responses = 29 (58%)			

Food safety attitude

Table III shows the results of participants' response toward attitude questions. Food handlers' attitudes regarding the implementation of food safety plans have a significant impact on the prevalence of food-borne illnesses. On a positive note, data indicated that 98% of participants had a positive attitude toward the questions on wearing masks and gloves as an important practice to reduce the risk of food contamination. However, a negative attitude was noticed in 28% of participants toward the question on storing cleaning products with cans or jars of food, even if they are closed.

Food safety practises

Table IV summarises the reported food handling practises of the food handlers. Based on observations, only 13.3% of the participants wore gloves consistently during the distribution of unpackaged foods, while 25.5% were doing it between time to time, and 12.2% had never worn gloves at all. Additionally, almost 22% of the participants washed his/her hands properly before or after using gloves and 12.24% never did. Additionally,

Table III: Participants' attitude regarding food safety

Attitude Questions	Positive n (%)	Negative n (%)	Not sure n (%)
Well-cooked foods are free of contamination.	45 (90.0)	2 (4.0)	3 (6.0)
Proper hand hygiene can prevent food-borne diseases.	45 (90.0)	4 (8.0)	1 (2.0)
Is it possible to store cleaning products with cans or jars of food, even if they are closed?	25 (50.0)	14 (28.0)	11 (22.0)
Raw and cooked foods should be stored separately to reduce the risk of food contamination.	36 (72.0)	4 (8.0)	10 (20.0)
It is necessary to check the temperature of refrigerators/freezers periodically to reduce the risk of food contamination.	25 (50.0)	2 (4.0)	23 (46.0)
The health status of the workers should be evaluated before employment.	42 (84.0)	2 (4.0)	6 (12.0)
The best way to thaw a chicken is in a bowl of cold water.	14 (28.0)	11 (22.0)	25 (50.0)
Wearing masks is an important practice to reduce the risk of food contamination.	49 (98.0)	0 (0)	1 (2.0)
Wearing gloves is an important practice to reduce the risk of food contamination.	49 (98.0)	1 (2.0)	0 (0)
Wearing caps and adequate clothing is an important practice to reduce the risk of food contamination.	46 (92.0)	3 (6.0)	1 (2.0)

Table IV: Participants' practice about food safety

Practice Questions	Never no. (%)	Sometimes no. (%)	Always no. (%)
Does (he, she) use gloves during the distribution of unpackaged foods	12 (24.0)	25 (50.0)	13 (26.0)
Does (he, she) wash his, her hands properly before or after using gloves	12 (24.0)	17 (34.0)	21 (42.0)
Does (he, she) wear an apron while working	44 (88.0)	2 (4.0)	4 (8.0)
Does (he, she) wear a mask when you distribute unwrapped foods	44 (88.0)	4 (8.0)	2 (4.0)
Does (he, she) wear nail polish when handling food	45 (90.0)	4 (8.0)	1 (2.0)
Does (he, she) properly clean the food storage area before storing new products	1 (2.0)	33 (66.0)	16 (32.0)
Does (he, she) use the sanitizer when washing service utensils (plates, mugs, and spoons)	1 (2.0)	49 (98.0)	0 (0)
Does (he, she) use the sanitizer when washing fruits or vegetables	34 (68.0)	14 (28.0)	2 (4.0)
Does (he, she) check the shelf life of foods at the time of delivery	33 (66.0)	16 (32.0)	1 (2.0)
Does (he, she) prepare a meal in advance (i.e., from one shift to another)	3 (6.0)	40 (80.0)	7 (14.0)

a majority of the participants (44.88%) never wore an apron while working nor a mask when distributing unwrapped foods. Meanwhile, 34.7% of them responded that they never use the sanitizer when washing fruits or vegetables and 33.7% had never checked the shelf life of foods at the time of delivery.

Correlation Between Knowledge, Attitude and Practice Scores

Final results that will be presented in this paper is the correlation between food safety knowledge, attitude and practice. Prior to the analysis, the scores of all three categories were divided into three ranges. The scoring system used to classify the scores is based on a study conducted by Norhaslinda et al. (6). The results (good, fair and poor) are based on the overall scores of the questions; a score of more than 75% will be categorised as good, 51-69% is categorised as fair, and less than or equal to 25% is considered poor.

Based on this range, in regards to the total score of participants about knowledge toward food safety and foodborne illness, 90% of participants obtained a fair score, while the remaining 8% and 2% received good and poor scores, respectively . As for attitude towards food safety, 56% of the participants scored within a fair range, while the remaining 44% had 'good' scores regarding attitude. Finally, most of the participants showed a fair level of practice (98%) regarding food hygiene and food safety practises and 2% scored 'good'. The Spearman Rho test was used to assess the strength and direction of the relationship between the score of respondents' knowledge, attitudes, and practises. As presented in Table V, statistically significant weak positive correlation was detected between knowledge and attitude scores (r= 0. 304, P= 0.032). Meanwhile, no statistically significant correlations ($P \geq 0.05$) between knowledge and practice scores, and attitude and practice scores were observed. The results of this positive relationship between knowledge and attitude are in line with the concept of the study by Al-Shahib et al., (9) which states that food safety knowledge may help to improve food handlers' attitudes. This demonstrates that individuals with a high degree of knowledge have favourable attitudes about food safety, unlike those with a low/weak level of knowledge.

Table V: Correlation between knowledge, attitude, and practice scores

Variable	Knowledge score	Attitude score	Practice score	P - Value
	r	r	r	
Knowledge score	-	0.304	-	**0.032**
	-	-	0.11	0.448
Attitude score	0.304	-	-	**0.032**
	-	-	0.139	0.337
Practice score	0.11	-	-	0.448
	-	0.139	-	0.337

DISCUSSION

Foodborne illnesses are an increasing public health problem in developing countries (10). The goal of this study was to assess food safety knowledge, attitudes, and practises among food handlers at Kirkuk City Hospitals, all of which are critical health institutions in Kirkuk, Iraq. For participants' sociodemographic characteristics, the results of this study showed that the majority of the participants in this study were males, with a majority

of them not more than 25 years. Similarly, most food handlers had only primary school education, with only a few having a tertiary education, implying a lack of proper education for those working in the formal sector in Iraq. This is further supported by the fact that the majority of them lacked knowledge on foodborne illnesses, apart from food safety. This is worrying, especially when taking into account the results of the correlation, which indicates a significant positive correlation (albeit weak) between knowledge and attitude. Additionally, previous research has provided evidence that food handlers' knowledge is significantly associated with the education level of food handlers and food safety training (11). However, while this may indicate that education level should be taken into account when hiring individuals in the food industry, we instead believe that this is a good justification of ongoing food safety training for food handlers. After all, based on the data collected, better knowledge was reported among those who previously attended training courses on food safety which shows that there is some advantage from attending training courses geared towards improving food handlers' knowledge.

Previous research suggests that a lack of food safety knowledge can contribute to poor sanitary practises among food handlers (12). While the analysis fails to show any significant correlation between knowledge and practice of the participants, this research still advocates for continuous preventive measures such as training and observations to help improve the practises related to food handling in hospitals. Hospitals are not only an institution that provides medical care, but also a place of potential source of infections (13, 14). Not only that, hospitals also cater to patients with low immunity, making them more vulnerable to infections and illnesses (15).

Additionally, several studies have pointed out that education of personal hygiene alone was not sufficient to inculcate and enhance the hygienic attitude and practises of food handlers (9). On the contrary, frequent hands-on training programs should be conducted to improve food handlers' attitude. Food handlers' attitudes might be easily improved if they received ongoing and specific-goal oriented training, such as adequate hand-washing, observation of proper personal hygiene, cross contamination prevention, and sufficient sanitation methods. Moreover, handwashing, in particular, has been highlighted as the most common practice that can contribute to food contamination if done incorrectly (16).

CONCLUSION

This study provides significant information on the level of food safety knowledge, attitude and practices among food handlers at Iraqi hospitals in Kirkuk City. It was demonstrated that the overall scores for knowledge, attitude and practices score were fair, indicating the need for continuous training for food handlers to improve their knowledge, generate positive attitudes and improve safe food handling practices, which could contribute to the enforcement of food safety in hospitals. In addition, there is an urgent need to implement and enforce stricter food laws.

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