

KNOWLEDGE, ATTITUDE AND PRACTICE OF FOOD HANDLERS TOWARDS FOOD SAFETY

By

Al-Wehedy A¹, Faisal S¹, Omar N² and Elsherbeny E¹

¹Department of Industrial Medicine and Occupational Health, ²Department of Medical Microbiology and Immunology, Faculty of Medicine, Mansoura University.

Corresponding Author's: Elsherbeny E: email: Enass75@mans.edu.eg

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Abstract

Introduction: Food handlers play an important role in ensuring food safety throughout the chain of production, processing, storage and preparation of food. Good knowledge, positive attitude and good practice of food handlers are important for prevention of food borne diseases. **Aim of work:** To assess knowledge, attitude and practice (KAP) of food handlers towards food safety at Mansoura University Hospitals and find out personal and work-related factors associated with different KAP levels. **Materials and Methods:** A descriptive observational cross-sectional study was conducted from December 2016 to September 2017. It included all food handlers working at Mansoura University hospitals' kitchens who were on duty and fulfilling legibility criteria. The data were collected using a questionnaire about demographic data, occupational history, food safety knowledge and attitude. Observational checklist was used to assess the workers practice. **Results:** Only one quarter of food handlers had good knowledge towards food safety and hygiene, on contrary, most of them had a good attitude level (61.0%) and a good hygienic practice level (59.0%). High KAP scores were noted among females and university certified workers. The highest KAP scores were noted among veterinarians and cooks. There is a significant strong positive correlation between knowledge and attitude ($r = 0.78$), and moderate positive correlation between knowledge and practice ($r = 0.46$). **Conclusion:** Limited number of food handlers had enough knowledge regarding food safety. Practice had a positive correlation with both knowledge and attitude. KAP scores of food handlers differ significantly regarding gender, educational level and type of work. It should be mandatory for food handlers to undergo a supervised food safety training courses prior to renewal of their license to ensure their efficacy.

Keywords: Attitude, Food handlers, Food hygiene, Knowledge and Practice.

Introduction

Food handler is defined as “any person” employed in the food premises and involved in the preparation, serving, washing or packing of food” (Young et al., 2019). Food handlers constitute an important occupational group in the health care sector because of the vital service they provide for patients and residents (Niles, 2019).

Food handlers play an important role in ensuring food safety. This responsibility is greater in hospitals, as patients are susceptible to nosocomial infections through food contamination by pathogenic organisms (Furst and Francis, 2018). Neglecting food safety measures in hospitals can lead to increased patients’ morbidity and mortality (Askarian et al., 2004). Knowledge, attitude and practice (KAP) studies related to food safety examine and evaluate the participants’ knowledge, opinion and behavior towards food safety issues; taking into consideration important determinants for food borne diseases (FBD) and different sources of food providing services (Hamadan and Almhaifer, 2015). Other studies postulated that positive KAP of the food handlers are key factors in preventing the

occurrence of food borne diseases (FBDs) (Lazou et al., 2012 and Arendt et al., 2013).

All workers involved in handling food should have adequate knowledge about the four critical food safety factors; (FBDs, cross contamination, temperature control and personal health and hygiene) (Thelwell-Reid, 2014). Positive attitude is a necessary factor for translation of knowledge into appropriate practice (Zanin et al., 2017). Inappropriate handling practices can cause food contamination and FBD consequently, impairing the health of the consumer (Ercan and Kiziltan, 2014). Thus, a generally used tool to ensure the hygienic-sanitary quality is the application of KAP model (Baş et al., 2006). The assessment of practices can be performed using questionnaires; called self-reported practice or using work observation called the observed practices (Zanin et al., 2017).

Numerous literatures have identified knowledge, attitude and practice of food handlers towards food hygiene and safety within the community. Up to our knowledge, limited studies were conducted among food handlers at hospitals for referencing in Egypt.

Aim of work

To assess knowledge, attitude and practice (KAP) of food handlers towards food safety at university hospitals and find out personal and work-related factors associated with different KAP levels.

Materials and Methods

Study design: A descriptive observational cross-sectional study.

Place and duration of the study:

This study was conducted from December 2016 to September 2017 at Mansoura university hospitals' kitchens. The study recruited six hospitals; Mansoura University Hospital, Specialized Medical Hospital, Emergency Hospital, Ophthalmic Center, Mansoura University Child Hospital, Oncology Center Mansoura University.

Study sample: All working personnel dealing with food preparation and packing in Mansoura University Hospitals' kitchens were enrolled; 209 out of 227 were on duty at the time of the study and agreed to participate.

Study methods:

A) An interviewer-administrated questionnaire was divided into

three sections. **First section:** was developed to obtain information about demographic characteristics of the participants. **Second section:** consisted of 15 questions to cover the knowledge about food safety and hygiene, based on the previous validated questionnaire by Fadaei (2015). The answers were (Yes/NO) format. A score of 1 was given to the correct answer and 0 to the incorrect one with total score of knowledge ranging between (0–15). The score was then converted to percentage and categorized into (a) Poor knowledge (less than and equal to 50%), (b) Fair knowledge (51 to 69%) and (c) Good knowledge (70% and above) (Isara et al., 2013 and Rohin et al., 2016). **Third section:** included 10 statements evaluating food safety attitude, based on previous researches by (Baş et al., 2006 and Tokuç et al., 2009). The answers were graded on three-point Likert scale (2 = agree, 1 = uncertain and, 0 = disagree) with total score of attitude ranging between (0 – 20). The score was then converted to percentage and categorized into (a) Poor attitude (less than and equal to 50%), (b) Fair attitude (51 to 69%) and (c) Good attitude (70 % and above) (Isara et al., 2013 and Rohin et al., 2016). The questionnaire was pilot tested in 25 respondents to check

clarity of the questionnaire and estimate time needed to complete it, and then minor modifications were made.

B) An observational checklist for food safety practice; was filled for two hours throughout every working day. Observation was done at the pre-preparation, preparation and package stations for approximately 90 hours. No instructions were given to the food handlers to nullify bias. The checklist was based on previous researches (Codex Alimentarius Commission, 2013, FDA, 2013 & Ercan and Kiziltan, 2014) to evaluate hygienic practices of food handlers and consisted of 25 observations referred to main hygienic practices with total score of hygienic practice ranging between (0 – 25). It was then converted to percentage and categorized into poor, fair and good (Rohin et al., 2016).-

Consent

Authors declared that an informed written consent was taken from the studied group, confidentiality was maintained.

Ethical approval

Before conducting the full-scale study, the protocol was approved by Mansoura Faculty of Medicine Institutional Research Board (MFM-IRB); Code: MS/16.07.03. Written administrative permissions have been obtained from concerned authorities.

Data management

Data were coded, computed then analyzed using IBM SPSS version 24 for Windows . Descriptive statistics for qualitative variables were presented as number and percentage. While quantitative variables were presented as mean \pm standard deviation (SD) for normally distributed. Association between normally distributed continuous variables was tested using independent sample t-test and ANOVA. Pearson correlation was used to correlate continuous normally distributed data while Spearman correlation was used to correlate ordinal and non-normally distributed data. The difference was considered significant at ($p \leq 0.05$)

Results

Table 1: Socio-demographic and work-related characters of food handlers (No=209).

Characters	Items	No (%)
Age (years)	(Mean ± SD)	38.9 ±7.4
Sex	➤ Male	134 (64.1%)
	➤ Female	75 (35.9%)
Education	➤ Basic or less	54 (25.8%)
	➤ Secondary	97 (46.4%)
	➤ University	58 (27.8%)
Residence	➤ Rural	164 (78.5%)
	➤ Urban	45 (21.5%)
Contract type	➤ Permanent	171 (81.8%)
	➤ Temporary	38 (18.2%)
Food handling license	198 (94.7%)	
Work shift	➤ Morning	134 (64.1%)
	➤ Evening	8 (3.8%)
	➤ Night	4 (1.9%)
	➤ Rotating	63 (30.1%)
Periodic examination	➤ Every 6 months	124 (59.4%)
	➤ Every 1 year	64 (30.6%)
	➤ Every 2 years	21 (10.0%)
Vaccines	➤ No HAV or TAB###	123 (58.9%)
	➤ HAV#	13 (6.2%)
	➤ HBV##	73 (34.9%)
Food training courses	52 (24.9%)	
Current smoker	55 (26.3%)	

: Hepatitis A vaccine once 12 years ago. ##: All were partially vaccinated (didn't complete 3 doses of Hepatitis B vaccine). ###: Not received hepatitis A or typhoid vaccine.

The study included 209 middle aged food handlers working at six of Mansoura University hospitals' kitchens. More than half were male who received secondary education. Most of the participants had food handling license while all of food handlers had undergone a pre-employment medical examination. While periodic

examination was performed every 6 months for more than half of them and annual examination for about one third of total participants. One third was given the first two doses of HBV vaccine at time of the study.



Figure1: Levels of food handlers' knowledge, attitude and hygienic practice.

According to (KAP) levels, about one third of food handlers have poor knowledge level while 42.0% had a fair level and only 22.0% had a good knowledge level. On contrary, more than half had a good attitude level and a good hygienic practice level.

Table 2: Association between KAP scores and personal parameters of food handlers (No=209)

Items	No	Knowledge score Mean \pm SD	Attitude score Mean \pm SD	Hygienic practice score Mean \pm SD
Age groups				
➤ 18-	59	8.5 \pm 2.7	15.3 \pm 1.8	19.3 \pm 3.5
➤ 35-	103	8.2 \pm 2.8	15.1 \pm 1.9	18.8 \pm 4.2
➤ 45-59 years	47	8.6 \pm 2.6	15.0 \pm 1.8	19.8 \pm 3.7
One-Way ANOVA p value		F= 0.43 (p \leq 0.65)	F= 0.13 (p \leq 0.88)	F= 1.23 (p=0.07)
Gender				
➤ Males	164	8.01 \pm 2.5	14.8 \pm 1.9	19.02 \pm 4.1
➤ Females	45	9.9 \pm 3.04	16.1 \pm 1.6	21.2 \pm 2.9
Student t-test p value		t= 4.3 (p \leq 0.001)***	t= 2.1 (p=0.04)*	t= 3.3 (p=0.001)***
Residence				
➤ Rural	134	8.8 \pm 2.5	15.9 \pm 1.4	19.5 \pm 4.3
➤ Urban	75	7.8 \pm 2.9	13.6 \pm 2.2	19.4 \pm 3.2
Student t-test p value		t= 2.6 (p=0.009)**	t= 4.4 (p \leq 0.001)***	t= 0.1 (p=0.92)
Educational level				
➤ Basic and less	54 97	7.1 \pm 2.8 7.7 \pm 1.9	12.8 \pm 2.9 14.9 \pm 1.1	18.6 \pm 4.3 19.2 \pm 4.01
➤ Secondary University	58	10.9 \pm 2.3	17.5 \pm 1.7	20.9 \pm 3.1
One-Way ANOVA p value		F= 50.6 (p \leq 0.001) ***	F= 27.1 (p \leq 0.001) ***	F= 5.5 (p=0.005) **

* : Significant at (p \leq 0.05).** : Significant at (p \leq 0.01).*** : Significant at (p \leq 0.001).

There was a statistically significant difference when comparing mean KAP scores among participants, with higher scores among females and university certified workers. Rural food handlers were more knowledgeable, had positive attitude towards food safety compared to urban food handlers, with statistically significant difference.

Table 3 : Association between KAP scores and work-related parameters (No=209)

Items		Knowledge score Mean \pm SD	Attitude score Mean \pm SD	Hygienic practice score Mean \pm SD	
1- Type of work					
■	Cooks (No=31)	10.5 \pm 1.2	18.5 \pm 1.3	22.1 \pm 1.5	
■	Bakers (No=9)	7.4 \pm 1.4	14.6 \pm 0.8	13 \pm 2.3	
■	Veterinarians (No=8)	14.4 \pm 0.7	19.8 \pm 0.2	22.6 \pm 0.7	
■	Observers (No=5)	11.0 \pm 2.2	18.4 \pm 0.5	20 \pm 2	
■	Clean workers (No=43)	4.8 \pm 1.2	8.4 \pm 1.6	18.7 \pm 3.5	
■	Store workers (No=18)	8.2 \pm 2.1	17.8 \pm 1.2	16.4 \pm 5.3	
■	Nutrition specialists (No=20)	11.7 \pm 0.8	17.2 \pm 1.1	20.4 \pm 2.5	
■	Preparation Workers (No=71)	8.2 \pm 1.2	15.5 \pm 0.9	19.2 \pm 3.6	
■	Food service managers (No=4)	11.1 \pm 1.4	17.7 \pm 1.3	20.5 \pm 1.3	
One-Way ANOVA		F= 76.2	F= 43.4	F= 14.1	
p value		(p \leq 0.001)***	(p \leq 0.001)***	(p \leq 0.001)***	
2- Training courses					
➤	Present	52	8.8 \pm 2.8	15.3 \pm 3.7	20.5 \pm 3.3
➤	Absent	157	8.3 \pm 2.7	15.04 \pm 3.8	19.1 \pm 4.1
Student t-test		t= 1.07	t= 0.34	t= 2.27	
p value		(p=0.28)	(p=0.43)	(p=0.015)*	

*: Statistically significant at (p \leq 0.05).**: Statistically significant at (p \leq 0.01).***: Statistically significant at (p \leq 0.001).

There was a statistically significant association between KAP scores and type of work of the food handlers with p-value \leq 0.001 in knowledge, attitude and hygienic practice. The highest knowledge score was recorded among veterinarians followed by nutrition specialists and finally food service managers. While the highest attitude score was noted among veterinarians then cooks and observers. Furthermore, the highest hygienic practice score was observed among veterinarians then cooks and food service managers. There was no significant difference in knowledge or attitude scores between food handlers who attended food safety training courses and those

who did not. Contrary to hygienic practice score between food handlers who attended food safety training courses and those who did not, showed significant difference.

Table 4: Correlation between KAP scores and socio-demographic characteristics of food handlers.

Parameters	Knowledge	Attitude	Practice
	r	r	r
Age	0.05	-0.04	-0.06
Educational level	0.53**	0.42**	0.21*
Period of work experience	0.16*	0.025	0.04
Knowledge	1	0.78**	0.46**
Attitude	0.78**	1	0.37**
Practice	0.46**	0.37**	1

Pearson correlation is used for all, except for educational level spearman correlation

*: Statistically significant at ($p \leq 0.05$).

** : Statistically significant at ($p \leq 0.01$).

There was a significant positive moderate correlation between knowledge score and educational levels of food handlers, but the correlation between knowledge score and period of experience is significant positive weak, while no significant difference was found between knowledge score and age. There is a significant positive mild correlation between attitude score and educational level of food handlers, but no significant difference was found regarding age or period of experience. There is a significant strong positive correlation between knowledge and attitude, and moderate positive correlation between knowledge and practice.

Discussion

It is the responsibility of everyone involved in food serving operations to take into consideration the food's safety and hygiene. Moreover, it is crucial to gain full understanding of the correlation between food safety beliefs, knowledge and hygienic practices to reduce food

borne diseases (Zanin et al., 2017). The present study was conducted among all food handlers dealing with food preparation and packing at Mansoura University Hospitals' kitchens during the period from December 2016 to September 2017 to assess their KAP and associated their levels to personal

and work-related factors. That will motivate the management to offer enough knowledge, training for the attitude and hygienic practice; hence providing higher quality of service.

About half of the contemporary study population showed fair knowledge level. Most of them had good attitude and hygienic practice (60.7%, 59.3% respectively) (Figure 1). High KAP scores were associated with personal characters being higher among females and university graduates (Table 2). Moreover, the highest KAP scores were noted among veterinarians and cooks (Table 3).

The knowledge of food hygiene and food safety practices of food service staff plays a major role in the incidence of food-borne diseases, which are a widespread public health problem in both developing and developed countries (Mohammad et. al, 2018). In the current study, only one quarter of food handlers had good knowledge (Figure 1). In agreement with this result; Cuprasitrit et al. (2011) found only 13.0% of food handlers in Thailand had good knowledge, likewise, the percentage was 19.0% in Vietnam (Vo et al., 2015) and 23% in Ghana (Kunadu et al., 2016). On the other hand, many

studies stated that most food handlers had satisfactory knowledge. The percentage of satisfactory knowledge differ in countries, being 90.0% in Egypt (Bassyouni et al., 2012), 84.8% in Jordanian hospitals (Sharif et al., 2013), 83.0% in Malaysian hospitals (Norhaslinda et al., 2016) and 73.0% in Brazil (Rebouças et al., 2017). About one quarter of the participants gained low level of education (Table 1), that may explain their poor knowledge level.

Attitude is a necessary mediator between knowledge and practices (Zanin et al., 2017). More than half of the participants showed a good attitude (Figure 1). Similar results were reported by Isara et al. (2013) in Nigeria, Anuradha and Dandekar (2014) in India, and Rebouças et al. (2017) in Brazil. However, the percentage in the current study (60.7%) was lower than that reported in previous studies which was; 88.9% in Jordan (Sharif et al., 2013), 87.2% in Malaysia (Norhaslinda et al., 2016). On the other hand, it was much higher than the percentage in Thailand (Cuprasitrit et al., 2011) and in Vietnam (Vo et al., 2015) where less than one third of them had good attitude.

In the existing study, the researchers used work observation to capture

non-verbal occurrences of the food handlers' practice. More than half of the participants had good hygienic practices (Figure 1), in parallel to previous studies in which most of the studied food handlers had good hygienic practices with percentage of 63.5% in Saudi Arabia (Hamadan and Almhaifer, 2015). On the other hand, many studies stated that most of food handlers had poor hygienic practices. Cuprasitru et al. (2011) found 15.2% only of food handlers in Thailand had good practice. Also, Vo et al. (2015) in Vietnam and Kunadu et al. (2016) in Ghana found that 22.3% and 19% respectively of food handlers had good practice.

There was a significant positive correlation between practice score and both knowledge and attitude scores in the present study (Table 4). Consistent with Al-Shabib et al. (2016) in Saudi Arabia, Mashuba (2016) in South Africa and Norhaslinda et al. (2016) in Malaysia who reported nearly similar results. These findings contradicted a study in Saudi Arabia which found that good knowledge on food safety didn't necessarily lead to good handling practices (Abdelhafez, 2013). Results of the current study indicated that the food handlers' knowledge level influenced both their attitudes and practices. Safe

practice of food handlers in hospitals was an outcome of their intrinsic knowledge and attitude on food safety (Gruenfeldova et al., 2019).

The educational level of food handlers is generally perceived as one of the factors that affect the food safety knowledge and hygiene. In the present study, mean scores of KAP of the food handlers differed significantly regarding educational level, with higher scores in highly educated participants (Table 2); showing positive correlation between education level and KAP scores (Table 4). This result is similar to previous researches by; Sharif et al. (2013) in Jordan and Vo et al., (2015) in Vietnam, but contradict McIntyre et al. (2013) in Canada who claimed that the education level was inversely associated with good practice.

In the present research, there was a highly significant association between KAP scores and type of work of the food handlers with higher average scores among veterinarians and cooks (Table 3). This discrepancy regarding the type of work agrees with the findings of another study in Jordanian hospitals showing higher averages among cooks (Sharif et al., 2013). Also, Bobhate et al. (2011) in India found significant

association between hygienic practice score and type of work of the food handlers, where the mean score of hygiene among the cooks was higher than that of janitors. It may be attributed to difference in educational level among food handlers.

In the contemporary study, when comparing gender of food handlers (Table 2), higher KAP scores were noted among females more than males. This was consistent with other studies carried out in hospitals in Saudi Arabia (Hamadan and Almhaifer, 2015) and Malaysia (Norhaslinda et al., 2016). However, Kasturwar and Shafee (2011) in India found knowledge among male was higher compared to females. Ercan and Kiziltan (2014) in Turkey didn't find any significant difference regarding gender knowledge.

Training of food handlers in the current study didn't affect neither their knowledge nor attitude (Table 3). This is comparable with the previous reports by; McIntyre et al. (2013) in Canada who found that trained handlers had better scores for practice than those untrained, while Tan et al. (2013) in Malaysia and Mashuba (2016) in South Africa found no significant difference between levels of KAP regarding attendance of training

courses. This is contrary to a study by Sharif et al. (2013) who found that all level of KAP was influenced by training of food handlers in Jordanian Military Hospitals.

Work duration was correlated with higher knowledge level and has no significant impact on the overall attitude and practice among the respondents in the present work (Table 4). Ercan and Kiziltan, (2014) in Turkey also reported a similar observation. In contrast, Lee et al. (2017) in Malaysia found that overall food safety KAP scores rise with increasing working duration.

No associations were detected between KAP scores and age in the current study (Table 4). Hamadan and Almhaifer (2015) in Saudi Arabia and Mashuba, (2016) in South Africa also reported a similar observation.

The strength in the existing study appeared using well-validated methods, such as questionnaires for structured interviews, and assessment of practice using observational checklist. Additionally, recruiting all the working food handlers from six university hospitals increased the sample size. On the other hand, study limitation resulted from self-reporting of the participants on knowledge and attitude which may

underestimate or overestimate data. Hence, future research is suggested to compare KAP pre and post training courses for food safety and hygiene.

Conclusion: Few food handlers were knowledgeable regarding food safety. Practice had a positive correlation with both knowledge and attitude. KAP scores of food handlers differ significantly regarding gender, educational level and type of work. It should be mandatory for food handlers to undergo a supervised food safety training courses prior to renewal of their license to ensure their efficacy.

Conflict of interest

Authors have declared that no conflict of interest exists.

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