ORIGINAL ARTICLE

Knowledge, Attitude and Practice (KAP) among Foreigner Food Handlers at Restaurants with Long Operating Hours in Lembah Klang, Malaysia

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ABSTRACT

Introduction: Poor food handling practices in restaurants with long operating hours which is dominated by foreign food handlers that increase the risk of foodborne diseases. This study aims to measure the level of knowledge, attitudes and practices (KAP) and to compare practice face to face interview with observed food safety practices of foreign food handlers in long-operating hours restaurants in Lembah Klang. **Methods:** This study was a cross-sectional study used face to face interviewer-assisted questionnaires with 117 foreign food handlers. A checklist guided observation was used to identify the actual practice status of 14 respondents. **Results:** There were no significant differences ($p > 0.05$) between sociodemographic characteristics and knowledge, attitudes and practices of food handlers. The mean score of knowledge, attitude and practice were 66.00 ± 13.67, 79.56 ± 16.67 and 66.02 ± 16.05 respectively. A weak and significant correlation ($p < 0.01$) between mean score of knowledge and attitude; knowledge and practice; and attitude and practice among foreigner food handlers ($r = 0.287$, $r = 0.264$, $r = 0.285$). The findings showed a significant difference ($p < 0.001$) between mean scores of practice face to face interview compared to observed practice ($t = 5.467$). **Conclusion:** Thus, this study demonstrated the food handlers had a good attitude toward food safety despite the moderate level of knowledge and practice that could be further improved. Meanwhile, actual practices that much affected by culture could be further improved with effective enforcement.
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Keywords: Food safety, long-operating hours restaurant, foreigner food handlers, knowledge-attitude-practice (KAP), observation

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INTRODUCTION

Food safety is defined as the assurance that food will not cause harm to the customer when it is prepared and/or eaten according to its intended use (1). The World Health Organization has introduced five key features for safe food. Among them are "Keep clean"; "Separate raw and cooked materials"; "Cook thoroughly"; "Keep food at safe temperature"; and "Use safe water and raw materials" (2). All of these elements are the responsibility of the food handlers who are the main players in the food premises. Therefore, food handlers play an important role in ensuring that food safety principles are adhered to in all food chain processes especially at the stage of food preparation and storage (3, 4). According to the Malaysia Food Hygiene Regulations (PPKM) 2009, a food handler is defined as any person directly involved in the preparation of food; touching food or surfaces that in contact with food; and handling packaged or unpacked food or equipment in any food premises Every food handler is required to obtain anti-typhoid injections, attend food handler training courses, wear proper food handler clothing, and always practice personal hygiene while handling food. Moreover, they need to maintain the optimal level of cleanliness of the premises (5). In addition, according to Jeine et al., (6), food handlers need to wash their hands properly, practice good personal hygiene, wear clean clothes and practice safe food handling to ensure food safety.

According to Wambui et al., (7), good hygiene practices among food handlers is important in preventing and controlling the risk of food-borne diseases in consumers and community in view of food handlers that can act as carriers of pathogenic microorganisms such as *Salmonella, Staphylococci*, and *Escherichia coli* (8). They have the probability of carrying pathogens without showing symptoms and eventually contaminating food (9, 10). The failure of food handlers in handling

food safely is one of the causes of foodborne diseases especially food poisoning outbreaks. The study by Woh et al., (11) had reported a low level of 31.1% of knowledge among foreigner food handlers in Selangor, Ipoh and Kuala Terengganu, Malaysia. This was related to the training programs that was not fully assimilated due to lack of comprehension due to language barriers and low education levels. The past study found that the person's knowledge did not reflect their practices, person with good knowledge had poor handling practices (12). Aside from that other findings showed low hygiene practices among food handlers were due to their low knowledge (13, 14, 15). However, a study in Kuala Lumpur, Malaysia showed that practices were depended on knowledge and attitude. Low scores in food safety knowledge indicated to also have a low awareness in food safety implementation (15). In fact, there was a study conducted in Malaysia in 2016, showed that food handlers who did not attend the food handler course, found to be lack of knowledge about pathogens that cause disease (6).

Foreign food handlers are dominating the restaurants with long operating hours which often associated with limitations in frequency and quality of cleaning due to long hours operation. In fact, the majority of foreign food handlers are often entangled with the issue of poor food handling, as most of them came from developing country of India or some from underdeveloped countries such as Bangladesh and Myanmar. The most concerning part is that the growth of the premises into franchise has attracted gourmand at all ages, exposing them to the risk of food contamination and even foodborne disease with their unsanitary status of food premises, yet to be highlighted specifically under long hours operation instead of current practice that generalize all restaurants under the same cleanliness assessment. Generally, increase in the prevalence of foodborne diseases associated with restaurants has been widely reported in the food service industry (16, 17, 18).

Further research should be done to assess the process of monitoring the status of food handler practices. This is because the Hamed and Mohammed, (19) found that self-reported on food safety practices by food handlers is likely to be inaccurate with the actual practices. Therefore, direct observation should be carried out to ensure compliance with actual food safety practices by food handlers. This is supported by Bou-Mitri et al., (20), which proposes further studies to obtain more accurate information about the knowledge, attitudes and practices of food handlers related to food safety by conducting an audit to their practices. Therefore, this study was conducted to determine knowledge, attitude and practice (KAP) among foreign food handler and to compare the finding of practice face to face interview with the observed practice of the food handlers. The findings of this study were also important as the baseline data to further improve the level of food hygiene and safety in long-hours operating restaurants in Lembah Klang, Malaysia.

MATERIALS AND METHODS

Study Design

A cross-sectional study was conducted from May 2022 to January 2023. This study involved all restaurants with long operating hours in selected district located in Lembah Klang comprised of 33 premises (n=33). Long-hours operating restaurant refers to the register list of 24-hour food premises by local authority which include restaurant that operate for more than 18 hours but excluding fast food restaurant. The study population involved foreign food handlers who are immigrant or working with Malaysia permit. The sampling method was mixed mode involved quantitative and qualitative. The type of quantitative study sampling was stratified sampling. This sampling ensures that the number of samples obtained was representative of different number of food handler in 33 restaurants based on ratio or percentage determined. The respondents were randomly selected based on inclusion and exclusion criteria of samples. The inclusion included 18 years old and above, valid travel document and work permit, permanent or part time basis and licensed food premise by local authority. Meanwhile, exclusion involved difficulty in understanding local language and refused to be the respondent.

The sample size was calculated based on Naing et al., (21) and total number of 117 out of 127 food handlers included, 10 food handlers were excluded based on exclusion criteria. For qualitative methods, the type of sampling used was random sampling. Sample size was 10% (14) from the total number of respondents in quantitative method. Then the number of respondents were grouped according to cleanliness level of food premises, whether A, B or C.

Data Collection

The study protocol was reviewed, and ethical approval was attained from Secretariat Committee of Medical Research and Innovation of Hospital Canselor Tuanku Mukhriz, National University of Malaysia Medical Centre (Project Reference UKM/PPI/111/8/JEP-2019-737) and National Medical Research Register, Ministry of Health Malaysia (Research ID-22-00393-8MF). Formal permission had been granted by local authority involved in the studies location. Data was collected from interview questionnaires and practices observation. The questionnaire on food safety in this study was adapted from the study by Rosnani et al., (22) with modification to suit the foreigner food handlers who working in long hours operation restaurant. The pre-prepared questions for interview questionnaire was reviewed by seven experts of food safety, comprising academicians from public universities and practitioners of Environmental Health Officer/ Assistant Officer from Ministry of Health,

Ministry of Local Government Development and local authorities.

Face to face interviewer-assisted questionnaire

The interview was conducted face-to-face using questionnaire that evaluated knowledge, attitude and practice (KAP) of food handler. The questionnaire consists of 36 questions and four parts: part A for respondent sociodemographic information; part B for knowledge; part C for attitude; and part D for food safety practices. The questionnaire was set in local language and attached with pictorial show card. The first part of knowledge had 13 questions to assess knowledge of the food handler through "True/False/Not Sure" answers. The second part of attitude included 11 questions which were answered through "Agree/Disagree/ Uncertain". While the third part for practice included 12 questions that were answered "Frequent/Rare/Never". For questionnaire analysis purpose, the raw scores of knowledge, attitude and practice were given score 1 for correct answers while score 0 was given to incorrect or "Not Sure", or "Uncertain". We reported "Rare" answers as inconsistent practice answers and score 0 was given. Finally, the scores were next converted to a percentage. The score that less than 50% were categorized as having a low level of knowledge, attitude and practice, 50% to 75% as moderate, while more than 75% were good (23). Consent were obtained and goals of study were explained briefly. For illiterate respondents, the questions were asked by an interviewer with visual aid cards and the questions were completed based on the answers.

Foreigner food handler observation

The purpose of the observation carried out was to confirm that whether practices stated in the feedback of the questionnaire similar to the actual situation in the field or vice versa. Observation was conducted using a checklist containing five selected items from Practice Questionnaire; "I use a clean cutting board when cutting food", "I use food clip/ladle/glove to pick up food", "I make sure that the food served is always covered", "I cut my nails so that they are always short and clean", and "I wear a shoe when working at food premise". Selected items were prior on important factors that could affect the food safety, routine practices, individual based and observable. The observers were two professional food inspectors and were given the same checklist. The observation was carried out within three months after the face to face interview. As for the analysis scores, 1 mark was given to respondents who performed similar practice as mentioned in practice face to face interview, and 0 mark was given for the opposite.

Data Analysis

Statistical analysis was conducted using Microsoft Office Excel 2010 and IBM SPSS statistical software version 20 (Armonk, New York: IBM Corp). The independent T-test and One-way ANOVA analysis were used to determine significance different between two or more sub-group of respondent demography. Whereas Pearson correlation was applied to identify significant relationship between the knowledge, attitude and practice among food handlers. As for comparison between practice face to face interview and observation, a paired T-test was chosen and p-value of < 0.05 was considered to be statistically significant. Meanwhile, the descriptive results were presented as mean, standard deviation, percentages, and tables.

RESULTS

Sociodemographic characteristics

Table I displays the sociodemographic characteristics of study respondents. A total of 117 food handlers participated in this cross-section study, with more male participating (n = 106) than females (n = 11). The majority of the respondents were from India (70.9%), followed by Indonesia (10.3%), Bangladesh (8.5%), Myanmar (7.7%) and others (2.6%). Regarding vaccination status, 82 respondents (70.1%) were vaccinated with typhoid shots and 77 (65.8%) attended the food handler training. The results of independent T-test and one-way ANOVA shows that there were no significant differences ($p > 0.05$) between sociodemographic characteristics and knowledge, attitudes and practices of food handlers.

Food safety knowledge, attitude and practice

Table II shows mean scores for knowledge, attitude and practice of the respondents were 66.00 ± 13.67, 79.56 ± 16.67, and 66.02 ± 16.05 respectively. KAP level revealed that most of the respondents achieved good level for attitude (64.1%), while scored moderate level for knowledge (55.6%) and practice (70.1%). In the knowledge section (Table III), the highest of 97.4% respondents answered question (Washing hands after going to the toilet can avoid food contamination/dirty) correctly. Whereas the lowest of 15.4% respondents answered correctly to question (Typhoid vaccination is taken to prevent workers from fever). Table IV shows that the best level of attitude related to the question (When I wash the raw materials, the cooked food will be clean/ safe) with value of 97.4% and the least level belonged to question (I don't have to cover freshly cooked food) with 45.3% correct answers. Table V displays the analysis of responses to practice questions about food safety. The highest level of practice questions was question (I use food clip/ladle/glove to pick up food) with 98.3% respondents correctly answered. Meanwhile the practice of "I reheat cooked food" for question was the lowest with value 17.1%.

The relationship between respondent's knowledge, attitude and practice

Table VI shows that there was a weak and significant correlation between mean score of knowledge and attitude; knowledge and practice; and attitude and practice among foreigner food handlers ($r = 0.287$, $r =$

Table I: Sociodemoghraphic characteristics of study respondents (n=117)

Variables	Category	n (%)	Knowledge Score		Attitude Score		Practice Score	
			Mean (SD)	*p* value	Mean (SD)	*p* value	Mean (SD)	*p* value
Gender	Male	106 (90.6)	66.54 (13.92)	0.198	80.01 (16.85)	0.364	65.88 (16.36)	0.763
	Female	11 (9.4)	60.83 (13.95)		75.20 (14.70)		67.42 (13.15)	
Age group	≤ 20 years old	1 (0.9)	53.84 (0.00)	0.632	90.90 (0.00)	0.297	75.00 (0.00)	0.797
	21 - 30 years old	44 (37.6)	64.16 (13.16)		75.82 (17.96)		64.77 (17.78)	
	31 - 40 years old	35 (29.9)	66.37 (15.17)		83.11 (13.79)		68.09 (12.70)	
	41 - 50 years old	25 (21.4)	69.23 (12.95)		77.81 (18.57)		63.66 (18.62)	
	51 - 60 years old	10 (8.5)	64.61 (17.09)		85.45 (14.34)		67.5 (14.41)	
	> 60 years old	2 (1.7)	73.07 (5.44)		86.36 (6.43)		75 (0.00)	
Country of origin	India	83 (70.9)	67.84 (12.72)	0.213	78.97 (17.79)	0.351	65.06 (16.99)	0.224
	Indonesia	12 (10.3)	61.53 (13.52)		75 (14.04)		68.05 (12.73)	
	Bangladesh	10 (8.5)	59.23 (21.77)		86.36 (13.72)		71.66 (8.05)	
	Myanmar	9 (7.7)	64.95 (15.44)		85.85 (11.24)		71.29 (13.25)	
	Others	3 (2.6)	58.97 (4.44)		72.72 (9.09)		50 (22.05)	
Education status	No formal education	6 (5.1)	61.53 (20.06)	0.549	71.21 (15.66)	0.430	66.66 (12.91)	0.926
	Primary education	50 (42.7)	65.07 (14.76)		81.27 (15.19)		66.83 (16.37)	
	Secondary education	52 (44.4)	67.89 (12.63)		79.72 (18.59)		64.90 (16.53)	
	College/University	9 (7.7)	63.24 (13.20)		74.74 (12.68)		67.59 (15.28)	
Experienced	<1 year	17 (14.5)	65.15 (18.47)	0.528	84.49 (10.55)	0.593	71.56 (14.75)	0.208
	1-5 years	47 (40.2)	66.93 (13.79)		79.11 (18.76)		66.66 (15.54)	
	6-10 years	33 (28.2)	63.40 (11.22)		79.06 (14.99)		1.65 (17.52)	
	>10 years	20 (17.1)	68.84 (14.44)		77.27 (18.54)		60.41 (15.02)	
Typhoid vaccinated	Yes	82 (70.1)	67.07 (13.85)	0.209	78.93 (18.12)	0.534	64.83 (16.36)	0.222
	No	35 (29.9)	63.51 (14.13)		81.03 (12.74)		68.80 (15.17)	
Attended training	Yes	77 (65.8)	66.13 (13.57)	0.894	79.22 (17.38)	0.758	64.93 (16.58)	0.310
	No	40 (34.2)	65.76 (14.88)		80.22 (15.39)		68.12 (14.97)	

*Significant at $p < 0.05$.
*Independent T test (for variable with two groups) or One-way ANOVA analysis of variance (for variable with more than subgroup).

Table II: Mean scores of respondent's levels of knowledge, attitude and practice

Parameter	Mean	SD	Min	Max	KAP Level (%)		
			(%)	(%)	Low [a]	Moderate [a]	Good[a]
Knowledge score	66.00	13.97	23.08	92.31	12.8	55.6	31.6
Attitude score	79.56	16.67	27.27	100	6.0	29.9	64.1
Practice score	66.02	16.05	16.67	100	12.0	70.1	17.9

[a] is level of KAP, which low (< 50%), moderate (50-75%), good (> 75%)

0.264, r = 0.285, p < 0.01). Positive r values indicate that the correlation between all variables were directly proportional.

Practice observation

The result of the paired T-test analysis found that there was a significant difference with t value at 5.467, p < 0.001 between mean scores of practice face to face interview compared to observed practice (Table VII).

DISCUSSION

The mean score of food handlers' knowledge was moderate at 66.00 ± 13.67 and majority respondents had moderate level of knowledge (55.6%) in food safety. This finding was in line with previous studies conducted in restaurants at Kuala Lumpur (61.7 ± 8.1)(24) , Kuwait (53.59 ± 16.683)(25), South Africa (66.8%)(26) and Thailand (69.54%)(27) that the level of knowledge of

Table III: Respondents responses to knowledge questions on food safety (n=117)

Item	Correct	Incorrect
	n (%)	n (%)
By wearing shoes while working, it can reduce the incidence of contamination/dirty food. (**true**/ false/ not sure)	94 (80.3)	23 (19.7)
Foods that have been taken out from the refrigerator and defrost, can be stored back in the refrigerator. (true/ **false**/ not sure)	49 (41.9)	68 (58.1)
Long nails can contaminate/ stain food. (**true**/ false/ not sure)	105 (89.7)	12 (10.3)
Only raw materials (such as vegetables) that look dirty need to be washed before cooking. (true/ **false**/ not sure)	59 (50.4)	58 (49.6)
Wearing a clean apron can prevent food contamination/dirty. (**true**/ false/ not sure)	105 (89.7)	12 (10.3)
Washing hands after going to the toilet can avoid food contamination/dirty. (**true**/ false/ not sure)	114 (97.4)	3 (2.6)
Usage of polystyrene containers for food packing are not allowed. (**true**/ false/ not sure)	68 (58.1)	49 (41.9)
Wearing plastic gloves to pick up cooked food can prevent food from being contaminated/dirty. (**true**/ false/ not sure)	104 (88.9)	13 (11.1)
Cooked food that left open can be contaminated/dirty. (**true**/ false/ not sure)	80 (68.4)	37 (31.6)
The safe temperature for cooked food is over 63^{0}C or less 5^{0}C. (**true**/ false/ not sure)	32 (27.4)	85 (72.6)
Coughing towards food does not contaminate/ stain food. (true/ **false**/ not sure)	74 (63.2)	43 (36.8)
Raw materials that contaminated cooked food are the main cause of stomach pain/diarrhea. (**true**/ false/ not sure)	102 (87.2)	15 (12.8)
Typhoid vaccination is taken to prevent workers from fever. (true/ **false**/ not sure)	18 (15.4)	99 (84.6)

Note: Correct answers in bold

Table IV: Respondents responses to attitude questions on food safety (n=117)

Item	Correct	Incorrect
	n (%)	n (%)
If my hand is wound, I can't touch the cooked food. (**agree**/ disagree/ uncertain)	97 (82.9)	20 (17.1)
I don't have to cover freshly cooked food. (agree/ **disagree**/ uncertain)	53 (45.3)	64 (54.7)
I can wear slippers while washing dishes in the kitchen. (agree/ **disagree**/ uncertain)	76 (65.0)	41 (35.0)
I can't use an apron to dry my hands. (**agree**/ disagree/ uncertain)	90 (76.9)	27 (23.1)
I can't prepare food with dirty hands. (**agree**/ disagree/ uncertain)	104 (88.9)	13 (11.1)
I can't store food in a fridge that's not functioning. (**agree**/ disagree/ uncertain)	100 (85.5)	17 (14.5)
I must separate the place to store raw materials (such as vegetables) with cooked foods (such as fried chicken). (**agree**/ disagree/ uncertain)	104 (88.9)	13 (11.1)
I can't scratch any part from my body when preparing food. (**agree**/ disagree/ uncertain)	107 (91.5)	10 (8.5)
When I wash the raw materials, the cooked food will be clean/ safe. (**agree**/ disagree/ uncertain)	114 (97.4)	3 (2.6)
I can use the same cutting board to cut raw materials and cooked food. (agree/ **disagree**/ uncertain)	98 (83.8)	19 (16.2)
I don't use hot water to defrost raw materials (such as frozen fish). (**agree**/ disagree/ uncertain)	81 (69.2)	36 (30.8)

Note: Correct answers in bold

respondents were also at moderate level, with range of marks between 50-75%. Even there was also another study involving food premises in three states in Malaysia resulted in low level of knowledge (11). This trend of results is closely related to several factors such as not attending food handler training, lack of food handler training module in their better-known language and low educational background as most of them ended their education at primary or secondary level.

This study recorded 97.4% of respondents correctly answered to the question (Washing hands after going to the toilet can avoid contaminated/ dirty food). This showed that majority of the respondents had a good

Table V: Respondents responses to practice questions on food safety (n=117)

Item	Correct	Incorrect
	n (%)	n (%)
I use a clean cutting board when cutting food. (**frequent**/ rare/ never)	104 (88.9)	13 (11.1)
I use food clip/ladle/glove to pick up food. (**frequent**/ rare/ never)	115 (98.3)	2 (1.7)
I make sure that the food served is always covered. (**frequent**/ rare/ never)	34 (29.1)	83 (70.9)
I cut my nails so that they are always short and clean. (**frequent**/ rare/ never)	105 (89.7)	12 (10.3)
I keep raw materials and cooked food in the same space. (frequent/ rare/ **never**)	71 (60.7)	46 (39.3)
I reheated cooked food. (frequent/ rare/ **never**)	20 (17.1)	97 (82.9)
I wear a shoe when working at food premise. (**frequent**/ rare/ never)	69 (59.0)	48 (41.0)
I do not re-freeze the raw materials (such as frozen fish) that have been defrost. (**frequent**/ rare/ never)	26 (22.2)	91 (77.8)
I blew (blow the wind) to open the plastic packaging to pack the food. (frequent/ rare/ **never**)	103 (88.0)	14 (12.0)
I use a tissue to cover my mouth when coughing or sneezing. (**frequent**/ rare/ never)	98 (83.8)	19 (16.2)
I cleaned the premise as scheduled. (**frequent**/ rare/ never)	97 (82.9)	20 (17.1)
I store perishable foods (such as milk) in the refrigerator. (**frequent**/ rare/ never)	82 (70.1)	35 (29.9)

Note: Correct answers in bold

Table VI: Correlation between respondent's knowledge, attitudes and practices

Parameter	*r value*	*p value*
Knowledge and attitude	0.287	0.002**
Knowledge and practice	0.264	0.004**
Attitude and practice	0.285	0.002**

**Significant at $p < 0.01$

Table VII: Mean score practice face to face interview compared to practice observed

Scores	Mean	SD	*t* value	*p* value
Practice face to face interview	3.43	0.645	5.467	0.000**
Practice observed	2.07	0.730		

**Significant at $p < 0.001$

understanding of the importance of keeping hygiene after using toilet in preventing the occurrence of cross-contamination from contaminated hands to food or equipment used. Referring to CAC, (28), one of the main causes of food contamination was bad hand hygiene practice. Increase in knowledge might due to high level of awareness after practicing preventive measures during and after the COVID-19 pandemic that had plagued the country since January 2020. This finding is in line with a study by Al-Shabib et al., (29) which showed that the majority (98.9%) of respondents answered the question about washing hands after using toilet correctly. This is because food handlers must always wash their hands properly at all stages of food production, before and after touching food, after touching contaminated food and after using the toilet. According to Burton et al., (30), the practice of washing hands using soap and water can reduce the presence of bacteria to a rate of 8%.

Meanwhile, the lowest at 15.4% of respondents answered correctly to the question (Typhoid vaccination

is taken to prevent workers from fever). This was likely due non-attendance of 34.2% food handlers in food handler training set by the authorities. Therefore, they had no idea of the purpose and importance of taking the vaccination. Referring to the Malaysia Food Hygiene Regulations 2009 under sub-regulation 30(1), food handlers must undergo food handler training and obtain a Food Handler Training Certificate from the Ministry of Health. Besides, under Regulation 11 it is the duty of the owner of food premises to employ only food handlers who have undergone a food handler training and been medically examined and vaccinated. Under the same regulation, if the food premises owner or food handler fails to comply with the prescribed provisions, they can be compounded or fined not more than ten thousand ringgit or imprisoned for a term not exceeding two years (5). Majority of 70.9% food handlers came from India had low awareness in vaccination and this is supported by (31) that revealed low vaccination coverage in Chennai, India with 67% food handlers were not vaccinated. Low awareness may due to 47.8% of respondents lack of knowledge regarding Salmonella infection (typhoid) and the importance of typhoid vaccination.

Analysis showed mean score for the respondents' attitude was high at 79.56 ± 16.67 and 64.1% of food handlers showed a good level of attitude regarding food safety (see Table II). This is in line with studies that revealed good level of attitude of food handlers in food safety were 94% and 85.2% (26, 32). According to (34), attitude is an important factor in food handling because attitude that is connecting the knowledge and practice. Knowledgeable person with positive attitude has high tendency in translating their knowledge into practice. This was supported by several other researchers stated that attitude of food handlers was a key factor capable of influencing their practice in handling food safely (29, 34, 35).

Total of 97.4% respondents had good attitude towards the need to wash raw materials so that cooked food would be clean and safe. This showed that majority of respondents have a positive attitude and a high level of awareness in food hygiene and prevention of cross-contamination. It is customary for the operators in the beginning of the daily task with washing raw materials. Recent studies in Saudi Arabia and Kerman, Iran showed similar results when 90.8% (29) and 82.6% (36) had the good attitude of washing vegetables and fruits with clean water before eating.

The lowest percentage recorded for attitude was 45.3% for question (I don't have to cover freshly cooked food). The attitude of not requiring freshly cooked food to be covered was due to lack of knowledge on the importance and responsibility to protect cooked food and to please customers' convenience in choosing food. The attitude was in line with the study in India restaurants which recorded 64% of vendor's restaurant did not cover displayed food during sales (37). Based on the Malaysia Food Hygiene Regulations 2009, provisions under regulation 37(1) Protection of food, states that food handlers shall not store, exposure or display for sale any food ready for consumption by humans in any food premises unless the food is adequately protected from contamination by any person in contact with the food; or other sources of contamination, in an effective way and using cabinets, exhibition cupboards, containers, covers or protective equipment, systems or other devices that are easy to clean (5).

Mean score of respondents' practices was moderate at 66.02 ± 16.05 and 70.1% of respondents have shown to have moderate level of practice in food safety. This is in line with several researchers such as Hashanuzzaman et al., (38), Woh et al., (11), Hamed and Mohammed, (19), and Lee et al., (24) who showed the similar results. Even Woh et al., (11), who conducted a study of foreign food handlers, recorded a practice level of 69.8%. However, some other studies have shown poor results regarding the level of food handlers' practices on food safety. This is evidenced by Norrakiah et al., (14), Jeinie et al., (39), and Salhadi et al., (13) stemming from low operator knowledge. Practice is determined by one's knowledge and attitude.

Food handler with low scores in food safety practices indicated low awareness in implementation of food safety (15). Next, the analysis showed the practice of using food clip/ladle/glove in handling food recorded a high number of respondents of 98.3%. This is in line with the Al-Kandari et al., (25) study which recorded 96.8% of respondents using glove when handling food. While Nkhebenyane and Lues, (26) recorded a moderate level of respondents at 62%. But not for Hamed and Mohammed, (20) study, where there was just 18.6% of respondents used glove. This was due to public awareness and local cleanliness practice that the food handler afraid of, if they do not practice it might affect the sales. In addition, the practice has become the routine since first they came and worked.

The practice of not reheating cooked food, only 17.1% of respondents answered "often" to the questions. This showed majority of food handlers (82.9%) reheat cooked food. This happened due to the presence of lunch menu leftovers such as chicken curry and mutton that were then reheated to serve for dinner menu. Based on the information obtained from food handlers, the frequency of reheating food ranges from 1 to 3 times in a day. Reheated food expose to risk of food poisoning if the heating is done not within safe temperature ranges which is at or above 70°C every 4 to 6 hours before the formation of the toxin (40). Several current studies found that questions related to food reheating emphasized the aspect of effective temperature to kill microorganism with 45.8%, 57.4% and 65.5% of respondents reheated food until it was steaming or piping

hot before serving (25, 36, 38). Most of the reheated food observed at study premises were high-risk foods and were exposed to contamination as they were not covered and left for more than 4 - 6 hours after cooked. Food warmers were observed to be used as a method in controlling safe temperature but unfortunately most of the warmers were not well function or were set not to the optimum temperature which is above 70°C. This will further increase the risk of cross-contamination and subsequently the occurrence of foodborne diseases. This finding concurred with the study by Bryan et al., (40) that stated holding foods at temperatures above which pathogens can multiply prevent foodborne illness.

In general, the findings showed that there was a weak and significant correlation between knowledge, attitudes and practices among foreign food handlers on food safety. Finding relates to previous research whereby knowledge and attitude, knowledge and practice, and attitude and practice were all significantly correlated with each other (26, 38, 32). This positive correlation suggests that moderate level of practice in handling clean and safe food conducted by foreign food handlers were translated from high level of attitude and moderate level of knowledge. According to Cheng et al., (41), KAP model consist of knowledge, attitudes and practices elements that showed positive attitudes emerge from good knowledge and it allowed individuals to develop positive food safety practices. Despite that attitude is a complex construct that involves cognitive and behavioral affected by various factors such as regulation, education, tradition and culture. Therefore, good food handling practice is important to act as buffer zone in reducing the risk of foodborne diseases in Malaysia.

As for comparison between practices face to face interview and observation, there was a significant difference in mean score. This indicated that three practices; "I use a clean cutting board when cutting food" (100%), "I cut my nails so that they are always short and clean" (78.58%), and "I wear a shoe when working at food premise" (78.58%) were not fully implemented by food handler compared to the result of practices face to face interview. As reported in current study, only 50% of respondents practicing hand washing before handling food compared to 95% during the interview (42). Based on Ncube et al., (32) study, there was difference between self-reported practices and observations of 5 out of 20 practices. There are the practices of "Cleaning food preparation", Rinsing and cleaning food preparation area", "Not consumed the expired food", "Keep hand nails clean and short" and Used protective gear properly". Based on data collected, this situation occurred as results of lack in monitoring by supervisors at the restaurant as well as low perception of risk with regards to cutting board among food handlers. Referring to Cunha et al., (43), among the factors influencing the failure of food handlers to perform good practices was due to low perception of risk with regards to hand hygiene, inappropriate infrastructure of units and work overload. In view of these factors, food handlers tend to prioritize others activities involved food preparation or entertained customers. The study of Zanin et al., (33) states that among the factors that cause inconsistent between self-reported practices and observation was that the training knowledge received while attending the course was not fully assimilated thus not translated to the attitude or practices. In addition, social desirability bias and culture also contributes to the divergence of the two factors.

CONCLUSION

Present study showed that foreigner food handlers working in long operating hours restaurants had high level of attitudes but moderate level of knowledge and practices in food safety. Those three elements were significant with weak correlation to each other. Meanwhile, most of practice face to face interview were not eventually practiced by respondents. Significantly, the results of this study can assist authorities in developing and improving existing legislation or public policy provisions. For example, to review and improve the training course module for food handler considering multilingual modules, competency assessment for all participants and revision of certificate validity period. This is important to improve food handlers' level of knowledge in cleanliness and safety food handling. In addition, enforcement activities should be carried out regularly and holistically to ensure the cleanliness of food premises and food safety are always guaranteed.

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