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Abstract

Background: Foodborne diseases are of public health importance worldwide. Most of the factors related to their occurrence are the responsibility of food handlers.

Aims: This study aimed to determine the knowledge, attitudes and self-reported practices of food handlers in Sohag Governorate about food safety and the factors affecting their knowledge, attitudes and practices.

Methods: A cross-sectional study was done from May 2016 to March 2017 with food handlers working in cafeterias, restaurants, food establishments and roadside food stands from four randomly selected districts in Sohag Governorate. A questionnaire was used to collect data on their sociodemographic characteristics – age, sex, residence (urban, rural), education (illiterate, primary, preparatory, secondary, university) and job (cook, assistant) – and food safety knowledge, attitudes and practices.

Results: Of the 994 food handlers included in the study, 39.2% had good knowledge of food safety, 61.2% had positive attitudes and 56.3% reported good food safety practices. In univariate logistic regression, most of the variables were significantly associated with participants' knowledge. Only residence and education were significantly associated with positive attitudes. None of the variables was significantly associated with participants' practices. In multivariable logistic regression analysis, age, male sex, urban residence, higher education and working as a cook were strongly associated with good knowledge. Residence and education significantly influenced positive attitudes.

Conclusion: Food handlers in our sample had poor knowledge of food safety and inadequate compliance with food safety practices. Educational and training programmes should be implemented to improve their knowledge, attitudes and practices.

Keywords: food safety, food handlers, hygiene, foodborne diseases, Egypt

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Introduction

Safe food is defined as not causing harm or illness to the consumer (1). Changing lifestyles and living and working conditions have given rise to a greater number of working women relying on convenience foods (fast foods) and greater negligence of food safety and hygiene. Lack of attention to food safety and hygiene causes an increase in foodborne diseases (2,3), which are important public health problems worldwide (4). These illnesses are generally transmitted by ingestion of viable pathogens or their toxins in amounts that are enough to cause illness (5). Low- and middle-income countries are much more affected by foodborne diseases because of poor food safety training, noncompliance with hygiene practices, inadequate potable water and unhygienic storage (6).

The World Health Organization determined five factors connected to the occurrence of foodborne illnesses including unhygienic practices and insufficient sanitation by food handlers, inadequate cooking procedures, improper storage without considering temperature requirements, cross-contamination, and sourcing food from unsafe places (3). Most of these factors are the responsibility of food handlers who are involved in food production and

preparation. Food handling includes all steps of storing, preparing and preserving food until it reaches final consumption (7).

Studies have found pathogenic microbes on food handlers' hands, and therefore these workers are a source of foodborne diseases (8,9). Furthermore, previous studies have demonstrated an association between inadequate knowledge, attitudes, and practices among food handlers and the occurrence of food poisoning (10–12). In addition, food handlers' attitudes have an important effect on their practices (13).

This study determined the knowledge, attitudes and self-reported practices of food handlers in Sohag Governorate, Egypt, with regard to food safety, and the sociodemographic and work-related factors associated with their knowledge, attitudes and practices.

Methods

Study design

This was a cross-sectional study conducted from May 2016 to March 2017 in Sohag Governorate. The target population was food handlers in cafeterias, restaurants, food establishments and roadside food stands in selected districts of the governorate.

Study setting and sample selection

Sohag Governorate has an estimated population of 4.9 million and 12 districts. Multistage sampling was used to select the sample. Four districts – Sohag, Akhmim, Girga, and Tama – were selected by simple random sampling out of the 12 districts. From each district, four regions were randomly chosen: one urban and three rural regions because of the smaller number of food establishments in rural regions compared with urban regions.

All food handlers (involved in preparing and serving food) in the selected areas who consented to participate after the purpose of the research had been explained to them were included. Food handlers who declined to participate in the study were excluded. There were no other exclusion criteria.

Questionnaire and data collection

An interview questionnaire in Arabic was prepared based on validated questionnaires of previous studies (14,15) to gather data about sociodemographic characteristics, food safety

knowledge (15 items), attitude (15 items) and self-reported practices (19 items) of the participants.

Correct responses were scored 2 while incorrect answers were scored 0. The score range was 0–30. Food safety attitudes and self-reported practices were evaluated with a five-point Likert scale. For items under the attitudes section, positively worded questions were scored as follows: strongly agree (4), agree (3), neutral (2), disagree (1) and strongly disagree (0). In contrast, for negatively worded items, “strongly agree” was scored 0 and “strongly disagree” was scored 4. The scores ranged from 0 to 60. For positively worded self-reported practices, “always” was scored 4 with “never” scoring 0. Again, this was reversed for the negatively worded questions and the score range was 0–76.

Total scores equal to or more than 50% of the maximum scores of knowledge, attitude or practices were categorized as good, while lower scores were considered poor or unsatisfactory.

Data analysis

SPSS, version 22 (16) was used for data entry and analysis. Categorical data are presented as numbers and percentages. The data were tested for normality using the Shapiro–Wilk test. As the data were not normally distributed, nonparametric tests were used to test difference between variables: Mann–Whitney, Kruskal–Wallis and Spearman correlation. The association between good knowledge, attitudes and practices and the studied variables were examined using bivariate and multivariable logistic regression analyses, and odds ratios (ORs) and 95% confidence intervals (95% CI) are presented. The variables were: age, sex, residence (urban/rural), education (illiterate, primary, preparatory, secondary, university) and job, (cook/assistant). A P-value less than 0.05 was considered statistically significant.

Ethical considerations

The study was approved by the Research Ethics Committee of the Faculty of Medicine, Sohag University, Egypt. Informed verbal consent was obtained from all respondents. The questionnaires used in information gathering were anonymous and confidentiality of data was guaranteed.

Results

Our study included 994 food handlers. Those who declined to participate were not counted. The mean age (standard deviation, SD) of the participants was 31.7 (SD 9.9) years (range 16–55 years). Most were males (805, 81.0%) and 531 (53.4%) were rural residents. About one-fifth of

the participants (189, 19.0%) were illiterate, 318 (32.0%) had primary education, 184 (18.5%) had preparatory and 227 (22.8%) had secondary education; only 76 (7.6%) had university education. About one third (346, 34.8%) of the respondents were cooks and 648 (65.2%) were assistants. The mean of years of experience was 9.6 (SD 6.3) years.

Only about one third of the participants correctly answered the knowledge questions about the increased risk of food poisoning from eating raw or semi-cooked meat (325, 32.7%), raw unwashed vegetables (357, 35.9%), and covered leftover food kept for more than 6 hours at room temperature (398, 40.0%). Just over half of the food handlers (56.7%) did not know that insects can transmit food-poisoning pathogens (564, 56.7%) and that harmful bacteria multiply rapidly at room temperature (588, 59.2%) (Table 1).

Regarding the participants' food safety attitudes, 435 (43.8%) considered that safe food handling is an essential part of their job; an approximate proportion (426, 42.9%) thought that food safety training courses are necessary; 43.6% (433) agreed that raw and cooked foods should be separated; and 334 (33.6%) did not agree that wiping vegetables or fruit makes them safe to eat. Nearly one third of the participants did not think that food handlers could be a source of outbreaks of food poisoning (311, 31.3%) and did not agree that thorough washing of vegetables and fruits is mandatory to prevent food poisoning (325, 32.7%). Less than half of the participants (447, 45.0%) agreed that vegetables and raw meat should not be cut on the same chopping board, 448 (45.1%) considered that long nails could be a source of pathogens and (466, 46.9%) agreed that food handlers should have a medical examination twice a year.

Table 2 shows that only 185 (18.6%) of the participants always wore gloves when touching cooked food and 177 (17.8%) always washed their hands before food processing. Only 101 (10.2%) reported that they never worked if they had diarrhoea and similar proportions did not work when they had cuts or wounds on their hands (120, 12.1%) or a common cold (145, 14.6%). Just over one fifth (217, 21.8%) stated that they always separated raw meat from cooked food and 210 (21.1%) stated that they checked the refrigerator temperature regularly.

Overall, 390 (39.2%) of our participants had a good knowledge of food safety and 608 (61.2%) had positive attitudes towards food safety. More than half of the participants (560, 56.3%) reported good food safety practices.

Males had higher knowledge and attitude scores than females (P

Univariate logistic regression analysis indicated that most of the studied variables were significantly associated with good food safety knowledge. Education (OR = 6.9, 95% CI: 5.4–8.8), job (OR = 4.4, 95% CI: 3.4–5.9) and sex (OR = 2.3, 95% CI: 1.6–3.3) were strongly associated with good knowledge scores. With regard to attitudes, only residence (OR = 1.5, 95% CI: 1.2–1.9) and education (OR = 1.1, 95% CI: 1.03–1.3) were significantly associated with participants' positive attitude. However, none of the studied factors significantly influenced food safety practices (Table 3).

A multivariable stepwise logistic regression analysis was done for the variables that were significantly associated with food knowledge and attitude in the univariate analysis. Age, male sex, urban residence, higher education and being a cook were strong indicators of good food safety knowledge, and residence and education were significantly associated with positive food safety attitudes (Table 4).

Discussion

Foodborne diseases cause considerable morbidity and death worldwide (17). Food mishandling and inadequate hygiene in all stages of food processing, preparation and serving increase transmission of foodborne illnesses (18,19).

Our study indicates that only 36.0% of participants correctly identified that healthy food handlers might carry foodborne pathogens, which is lower than the results of a study in Ghana where 71.5% answered correctly (20). In addition, 56.7% of our participants did not know that insects could transmit food-poisoning pathogens, which contrasts with a study in the United Arab Emirates, in which 97% of the sample identified the relation between insects and foodborne illnesses (21).

About 60% of our participants knew that harmful bacteria multiply rapidly at room temperature, which is lower than a study of food handlers in Malaysia, where 77.7% knew that keeping food at room temperature for a prolonged time increased bacterial growth (22). In addition, 98.2% of the Malaysian food handlers considered safe food handling was a vital part of their work compared with only 43.8% in our study. Furthermore, 42.9% of our participants thought that food safety training was essential, which is again lower than other studies (21,23), where 96% and 93.6% respectively believed in the importance of food safety training.

Only 44% of our food handlers agreed that raw and cooked foods should be separated compared with 79.9% of food handlers in a study in Malaysia (15). Furthermore, 45% of our

food handlers agreed that vegetables and raw meat should not be prepared on the same chopping board which is more than the 27.6% reported in a study in Saudi Arabia (24). About 45% of our participants considered long nails could be a source of food-poisoning pathogens compared with 88.1% in the study in the United Arab Emirates (20). Almost half of our participants (46.9%) agreed that food handlers should be medically examined regularly, which is less than a study in food vendors (68.5%) (25) and workers in eating places (71.1%) in Nigeria (26).

As regards practices, 18.6% said that they always wore gloves when touching cooked food and 17.8% always washed their hands before food processing. These figures are much lower than food handlers in Dubai, where 92.2% confirmed that they always used gloves and 90.1% that they always washed their hands before and during food preparation (3). Our results are also lower than the study in Malaysia where 44.4% of the participants said they always wore wear gloves and 86.4% said that they always washed their hands before food preparation (17).

Only 10.2% of our participants stated that they never worked when they had diarrhoea This figure is similar to a study in food handlers in the United States of America (11.9%) (27). Only a small proportion of our food handlers reported that they refrained from work when they had cuts or wounds on their hands or a common cold (12.1% and 14.6% respectively). These proportions are lower than those in the study in Saudi Arabia, where 64.4% said that they did not handle foodstuffs when they had cuts or wounds on their hands and 65.5% said they stopped handling food when they were ill (24).

Only 20.1% of the respondents stated that they always washed their hands with soap and water after using the toilet. This is much lower than the findings of studies in Nigeria (26) and Sri Lanka (28) where 71.7% and 88.5% of food handlers respectively confirmed that they complied with this practice. Moreover, 21.8% of our participants said that they always separated raw meat from cooked food compared with 84.7% in the study in Dubai (3).

In our study, 39.2% of the food handlers had good food safety knowledge, 61.2% had positive attitudes to food safety and 56.3% reported good practices. In a study in Borneo in food vendors, a lower proportion of participants had good knowledge (36.8%), attitudes (19.1%) and practices (10.8%) (29). The study in Nigeria found that 81% had good knowledge, 71% had positive attitudes and 37% had good practices (25).

Age, male sex, urban residence, higher education and being a cook were indicators of good

food safety knowledge in our study. This is consistent with the study in Malaysia which found that age, sex and education significantly influenced food safety knowledge (17). However, another study in Malaysia reported that none of these factors significantly influenced food handlers' knowledge (14). Residence and education were significantly associated with positive attitudes in our study. The study in Malaysia also found that education was significantly associated with the attitude of food handlers (14). However, a study in India found that only age and sex significantly influenced participants' attitudes (30).

None of the studied variables affected participants' practices, which concurs with the findings of other studies (17,30–32) that indicated that age, sex and education had no effect on practices. On the other hand, a study in northern Nigeria reported that age and education had a significant effect on food vendors practices (33). A study in Belgaum City, India, also found that education significantly affected the knowledge and attitudes of food handlers but that it had no effect on their practices (34).

Our participants self-reported their food safety practices which is a limitation of our study as they may have been subject to social desirability bias and reported that they followed correct practices when they may not have. Direct observation of the hygiene practices is needed to draw an accurate conclusion on the compliance of the participants with food safety practices.

Conclusion

Our study highlights the poor knowledge of food handlers in Sohag about food safety and the high level of non-compliance with food safety practices. Such non-compliance could result in outbreaks of foodborne illnesses. Therefore, there is an urgent need to raise interest in food safety. Education and training programmes should be implemented to improve food handlers' attitude, knowledge and practices. In addition, licensing and maintaining supervision should be mandated.

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Competing interests: None declared.

Connaissances et attitudes vis-à-vis de la sécurité sanitaire des aliments et pratiques auto-déclarées des personnes qui manipulent des denrées alimentaires dans le gouvernorat de Sohag (Égypte)

Résumé

Contexte : Les maladies d'origine alimentaire constituent un enjeu de santé publique majeur dans le monde entier. La plupart des facteurs liés à leur survenue sont de la responsabilité des personnes qui manipulent des denrées alimentaires.

Objectifs : La présente étude avait pour objectif de déterminer les connaissances, les attitudes et les pratiques auto-déclarées des personnes qui manipulent des denrées alimentaires dans le gouvernorat de Sohag en matière de sécurité sanitaire des aliments et les facteurs affectant ces éléments.

Méthodes : Une étude transversale a été réalisée entre mai 2016 et mars 2017 auprès des personnes qui manipulent des denrées alimentaires dans des cafétérias, des restaurants, des établissements de restauration et sur des stands alimentaires en bordure de route de quatre districts du gouvernorat de Sohag, sélectionnés de façon aléatoire. Un questionnaire a été utilisé pour recueillir les données portant sur les caractéristiques sociodémograhiques – âge, sexe, lieu de résidence (urbain, rural), niveau d'éducation (analphabète, niveau primaire, collège, lycée, enseignement supérieur et profession (cuisinier, commis) - ainsi que sur les connaissances, les attitudes et les pratiques en matière de sécurité sanitaire des aliments.

Résultats : Sur les 994 personnes qui manipulent des denrées alimentaires ayant participé à l'étude, 39,2 % avaient une bonne connaissance de la sécurité sanitaire des aliments, 61,2 % avaient une attitude positive et 56,3 % faisaient état de pratiques satisfaisantes à cet égard. Dans la régression logistique univariée, la plupart des variables étaient fortement associées aux connaissances des participants. Seuls la résidence et le niveau d'éducation étaient fortement associés à des attitudes positives. Aucune des variables n'était significativement associée aux pratiques des participants. Dans l'analyse de régression logistique multivariée, l'âge, le fait d'appartenir au sexe masculin, la résidence en milieu urbain, un niveau d'éducation supérieur et un emploi de cuisinier étaient fortement associés à une bonne connaissance. Le lieu de résidence et le niveau d'éducation avaient une influence significative sur les attitudes positives.

Conclusions : Dans notre échantillon, les personnes qui manipulent des denrées alimentaires avaient des connaissances limitées en matière de sécurité sanitaire des aliments et ne respectaient pas les bonnes pratiques dans ce domaine. Des programmes d'éducation et de formation devraient être mis en œuvre afin d'améliorer les connaissances, les attitudes et les pratiques.

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