Knowledge, attitudes and practices of workers on food hygienic practices in meat processing plants in Fars, Iran

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**Abstract**

This cross-sectional study was conducted to evaluate the knowledge, attitudes and practices of food workers in four meat processing plants in the Fars province, southern Iran. A self-administered, structured questionnaire was designed and completed by 97 food workers during November 2006–January 2007. Results indicated that the respondents had acceptable level of knowledge, excellent attitudes and poor practices toward food hygiene measures. Almost all of the food workers (97.9%) were aware of the critical role of general sanitary measures in the work place while there was lack of knowledge about microbial food hazards in the majority (67–78%) of them. A significant negative correlation was observed between knowledge and practices \( r_s = -0.20, P = 0.04 \), and attitudes and practices \( r_s = -0.27, P = 0.009 \), revealing that increased knowledge and even attitudes toward food safety does not always result in positive change in food handling behaviors.

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1. Introduction

Food poisoning and diarrheal illnesses are among the leading causes of morbidity and mortality worldwide (World Health Organization, 1998). Food safety was identified as a high priority area in the 2001–2005 World Organisation for Animal Health (OIE) Strategic Plan. Member countries of the OIE considered that the organisation should be more active in issues of public health and consumer protection and that this should include more involvement in the area of diseases or pathogens transmissible through food (Droppers, 2006). Meat and meat products are of particular importance regarding foodborne illnesses. Foodborne pathogens can be introduced to foods during processing, storage and preparation, from infected humans who handle the food or by cross contamination from some other raw agricultural products (Hedberg, MacDonald, & Osterholm, 1994).

Human handling errors have been responsible for most outbreaks of food poisoning (Clayton, Griffith, Peters, & Price, 2002; Ehiri & Morris, 1996; Greig, Todd, Bartleson, & Michaels, 2007; Howes, McEwen, Griffiths, & Harris, 1996), for example hepatitis A virus can be introduced by unwashed hands of food handlers who are themselves infected. Therefore, good personal hygiene as well as sanitary handling practices at work are essential parts of any prevention programs for food safety.

Food handlers must have the skills and knowledge that they need to handle food safely. Training programs are important for increasing knowledge of food handlers; however, increased knowledge of food safety does not always result in positive change in food handling behaviors. There are several studies about the knowledge and practices of food handlers conducted in various parts of the world (Angelillo, Vigiani, Greco, & Rito, 2001; Baş, Ersun, & Kivanç, 2006; Comes-Neves, Araújo, Ramos, & Cardoso, 2007; Jevšnik, Valentina, & Raspor, 2008; Tokuç, Ekuklu, Berberoğlu, Bilge, & Dedeler, 2008; Walker, Pritchard, & Forsythe, 2003). To the best knowledge of the authors, there is no any formal study concerning the knowledge, attitudes and practices of food workers in meat processing plants in Iran. The objectives of the present study were to determine food workers' knowledge, attitudes and practices about food hygiene in four meat plant industries in Fars province, southern Iran, also to investigate interrelationship between knowledge, attitudes and practices in the study group.

2. Methods

This is a cross-sectional study which was conducted from November 2006 to January 2007 in four meat processing plants in Fars province, southern Iran. Except slaughtering of animals, all other steps for preparation of meat and meat products are undertaken in these plants. The HACCP system has been implemented in these plants since few years ago. Overall, 254 workers are employed in these plants and 180 of them are floor workers.

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The monthly production level of these plants ranges from 90 to 250 tons of meat and various meat products. A self-administered, structured questionnaire was designed and modified by the aid of previous research (Angellillo et al., 2001). Questionnaires were completed by a convenient sample of 97 floor workers out of 180 who directly involved in cutting, processing and packaging of meat and meat products. Each questionnaire was comprised of four distinct parts; demographic characteristics of the participants, food hygiene knowledge, attitudes and practices. Questions about sex, age, education, duration of employment and whether they attended a training course in food safety were included in the first part of the questionnaire.

In the knowledge part, there were 20 close-ended questions emphasizing personal hygiene, cross contamination, microbiological food hazards and specific foodborne diseases. Each question was provided by three possible answers (true, false and do not know). Additional questions about appropriate refrigerator temperature and high-risk groups for food poisoning were also included. The knowledge scores were assigned to respondents according to their answers to questions. The score range was between 0 and 20 and the scores below 10 were considered as poor knowledge.

Subsequent part of the questionnaire was dealing with the attitudes of the respondents about various hygienic measures for food safety. Eleven questions were designed and food handlers were asked to indicate their level of agreement to the statements using a three-point rating scale (agree, uncertain, and disagree). The score ranged between 0 and 22 and the scores below 11 were considered as poor attitudes.

Practices of food workers were assessed by their self-reported hygienic behaviors in the last part of the questionnaire. In this part, 10 questions were provided with five-point rating scale (never, rarely, sometimes, often and always). The score ranged between 0 and 50 and the scores below 25 were considered as poor practices. Two additional questions concerning how often they consume or recommend the products of their working plants were also included in this part.

Statistical analysis was conducted using SPSS software for windows, version 11.5. Descriptive statistics were provided and Spearman's correlation coefficient was used to test the association between knowledge, attitudes and practices scores. P-value less than 0.05 was considered as statistically significant.

3. Results

Of 97 food workers which were participated in this study, 92% were male. The mean age of participants was 29 (SD = 6.5), ranging between 19 and 54 years. About 54% of them had below high-school education, 39% had high-school education and 7% had higher education but not necessarily related to food. The mean and median for duration of employment were five (SD = 4.7) and 2 years, respectively. Fifteen percent had worked for more than 10 years. Ninety four percent had attended food safety training programs which are implemented by Food and Drug safety department, Ministry of Health and Medical Education. Nearly 79.4% had repeated training.

Tables 1–4 summarize the results regarding knowledge, attitudes and practices of respondents. Considering food workers' knowledge, almost all of them were aware of the critical role of general sanitary measures in the work place such as washing hands, using gloves, caps and aprons and proper cleaning of the instruments (97.9% correct answers, Table 1). Most of the respondents (56%) failed to select the correct answer for the question about high-risk groups for food poisoning. Their knowledge regarding specific diseases which are transmitted via food and microbiological food hazards are presented in Table 1. Diarrhea, bloody diarrhea, brucellosis and typhoid were answered with correct options by 86.6%, 77.3%, 64.9% and 51.5% of respondents, respectively. However, correct responses about jaundice and abortion were generally low, ranging between 18.6% and 26.8% (Table 1). The knowledge of the study population about microbiological food hazards was generally lower than their knowledge of diseases. Their correct responses for Salmonella, Hepatitis A virus, Hepatitis B virus, Staphylococcus and Clostridium were 39.2%, 21.6%, 35.1%, 33% and 33%, respectively. Approximately 49.5% of responses about the proper temperature for refrigerator were incorrect. Two questions were about the knowledge of respondents for necessity to take leave during infectious diseases of eye and skin. Their correct responses were 64.9% and 87.6%, respectively (Table 1).

Almost all of the participants in the study (92–99%) agreed with various statements in the attitudes part of the questionnaire. Small percentages were disagree (1–3%) or did not have any idea (1–5%) about some of the statements (Table 2).

Good hygienic practices of food workers were evaluated using 12 questions. The results (Table 3) indicated that 96% of the respondents always wear aprons, while corresponding measures for using gloves and washing hands before it were 69.1% and 76.3%, respectively. Two to three percent reported that they never use gloves or wash their hands. About 56.7% of the respondents reported that they always use masks and 11% stated that they rarely or never use masks during their work. Results showed that only 67% never eat or drink and 10% reported that they always eat or drink in their work place. Considering smoking in the work place, 97% indicated that they never smoke. Approximately 85.6% of respondents reported that they always or often recommend the products of their plants, but only 50.5% reported that they always or often consume their products by own.

According to rating scale, summary statistics for total knowledge, attitudes and practices were calculated and presented in Table 4. Mean score for knowledge was 11.7 (SD = 3.1) ranging between 3 and 18 scores. Approximately 35% of respondents had poor knowledge about food safety measures. Mean score for attitudes was 21.8 (SD = 2.5) and about 98% had their total attitudes score higher than 15. Mean score for practices was 13.5 (SD = 4.3), ranging between 9 and 34 points. Nearly 92% of respondents had poor self-reported hygienic practices.

There was positive correlation between knowledge and attitude ($r_s = 0.35$, $P < 0.001$); however, knowledge and practices ($r_s = -0.20$, $P = 0.04$) as well as attitudes and practices ($r_s = -0.25$, $P = 0.01$) were negatively associated. There was also significant association between knowledge and level of education ($r_s = 0.27$, $P < 0.009$), practices with duration of employment ($r_s = 0.40$, $P < 0.001$), and knowledge of microbiological food hazards with level of education ($r_s = 0.27$, $P < 0.02$).

4. Discussion

It has been shown that most outbreaks of food poisoning result from improper food handling practices (Clayton et al., 2002; Ehriri & Morris, 1996; Howes et al., 1996). Food workers in many settings have been responsible for foodborne disease outbreaks for decades, and there is no indication that this is diminishing (Greig et al., 2007).

The results of the present study showed acceptable knowledge, excellent attitudes and relatively poor practices of food workers in the four meat processing plants in Fars province, south of Iran. Almost all respondents had high level of knowledge concerning the general sanitary measures in the work place such as washing hands, using gloves, caps and aprons, and proper cleaning of the instruments, while majority of them failed in the identification of
specific disease or pathogens which could be transmitted via foods. Similar disappointing results were obtained for awareness of the fact that children, pregnant women and old age groups are at greatest risk for food poisoning and its adverse consequences (Table 1). Lack of acceptable knowledge about foodborne pathogens were reported by TokuÇ et al. (2008) from Turkey and Gomes-Neves et al. (2007) from Portugal.

In the present study, near half or more of the respondents did not know whether Salmonella, Hepatitis A virus, Hepatitis B virus and Staphylococcus are among foodborne pathogens or not (Table 1). This is in spite of this fact that majority of workers attended educational programs in food safety. It seems that more specific courses should be planned for food workers. The training courses need an evaluation to ensure the effectiveness, too.

Awareness of the fact that some groups such as children and pregnant women are at special risk for microbiological hazards in foods was another question with low correct response rate. Similar disappointing results were obtained for the possibility of food poisoning-induced abortions in pregnant women may be induced by foodborne disease. 18 (18.6) 43 (44.3) 36 (37.1)

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Practices (10 questions) 13.5 4.3 13 9 34 50
Attitudes (11 questions) 21.3 2.5 22 0 22 22
Knowledge (20 questions) 11.7 3.1 12 3 18 20

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knowledge, but this does not always result in a change in food han-
ding practices and behaviors.

In conclusion, the results of the present study indicated that de-
spite good knowledge and attitudes of food workers, their practices
toward food hygiene are not acceptable. Although food safety
training programs are essential, behavioral changes will not occur
merely as a result of training. Evaluation of the programs impact is
needed to show the worth of a program and possible area for
change and modification. It is also necessary to evaluate the proper
functioning of the HACCP system and managerial control in the
meat plants in the future researches.

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