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ASSESSMENT OF KNOWLEDGE, ATTITUDES AND PRACTICES (KAP) ON MICROBIOLOGICAL SAFETY AMONG CATTLE ABATTOIR WORKERS IN MALAYSIA

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ABSTRACT;

Occupational safety and proper meat handling may serve as strategies that can be used to reduce economic loses in the meat industry. Public health can also be improved if the strategies are carefully adhered to. A self-administered questionnaire was distributed to cattle abattoir workers for microbiological safety assessment. The results showed that all the workers have received various forms of training mostly in occupational safety (90%) while only fifty percent (50%) were trained on how to store carcass at the appropriate temperature and how to improve on personal hygiene. Seventy five percent (75%) of workers wear hairnets and ninety percent (90%) cut their finger nails regularly. Respondents within the age of 41-50 scored the highest (60%) compared to 21-30(56%) age groups. Statistical analysis performed using Statistical Package for Social Sciences (SPSS) showed that the mean KAP score was 16.9±2.4 among the workers. The KAP determined by this study highlighted the need for an improvement of workers knowledge on microbiological standards in their working place

Keywords: Microbiological safety, Occupational safety, Hygiene, Food safety

Introduction

The increasing incidence of food borne diseases has been related to many different factors, including population growth, changes in food preparation habits, a rise in the number of food service establishments, increased consumption of food outside the home and a lack of food safety training and education among consumers and food handlers (Motarjemi & Käferstein, 1999). Worker mishandling of food is one of the major causes of food borne disease outbreaks (WHO, 2000). Because outbreaks often lead to severe economic losses, food handler training is an important business strategy for managing food safety risks. Moreover, food handler training is seen as one strategy by which food safety can be increased, offering long-term benefits for the food industry (Smith, 1994). In addition, the European Parliament has adopted in April 2004 the Regulation (EU) No. 852/2004, underlining the need for all the food businesses to identify the steps of the production process in order to

ensure food safety and this has been applied to all EU food businesses since the 1st January 2006.

The main change relates to food safety management systems, i.e. risk-based methodologies to ensure food safety. The law's implementation recognizes education of food handlers as a crucial line of defense in the prevention of food borne illnesses (Legnani *et al*, 2004; Martínez-Tomé *et al.*, 2000; Sun & Ockerman, 2005; Worsfold, 2001). Food business operators shall ensure that all stages of production, processing and distribution of food under their control satisfy the relevant hygiene requirements laid down in the Regulation (EU) No. 852/2004 (Jev-snik *et al*., 2008). A successful implementation of the procedures based on the HACCP (Hazard Analysis and Critical Control Points) principles will require the full cooperation and commitment of food business employees and to this end they should undergo training. Under the personal program of HACCP, employees must be trained in such areas as food safety, manufacturing controls and personnel hygiene. Once HACCP plans have been established, employees must be trained to manage any critical control points (CCPs). The necessity of application of the HACCP principles introduced by the Codex Alimentarius 30 years ago became law in Portugal in 1998 (Diário daRepública, 1998), and the Portuguese law has recently established the requisites for a "handler card" (Diário da República, 2006) for meat handlers (MH)working in meat retail businesses, to apply from 1st August 2008. In a survey conducted in Portugal by Eduarda *et al*., 2010 to assess workers knowledge on good practice in food industry and work safety and hygiene revealed that meat handlers with professional training in Good Practice in Food Industry (GPFI) and in both areas (BT) have had the highest proportions of correct answers in knowledge and practice questions. Increasing demand for meat and meat product by human population has made human contact with animals unprecedented, coupled with movement of animals across international frontiers to supplement the local supply and increasing the risk of zoonotic diseases especially from endemic zones (Bala and Yazah, 2011). Zoonoses are described as those diseases and infections which are naturally transmitted from animals to humans. They represent about 70% of the number of emerging infectious diseases in recent time (Cutler *et al*., 2010). There are over 300 zoonotic diseases of diverse etiologies which cause high morbidity and mortality (Pal, 2007). Zoonotic diseases occur in both sexes, in all age groups, in all seasons, in all climatic zones and in rural and urban settings (Acha and Szypres, 2003 and Pal, 2007). Transmission of zoonotic infections occurs through various routes (Hugh-Jones *et al*., 2000). However, direct contact seems to be the most common mode of entry of infectious agent in the employees working in slaughter houses (Gracey *et al*, 1999). The employees of meat industry are at particular risks of acquiring many

zoonotic infections, due to the close contact that exists between them and animals/tissue of animals during slaughtering or processing (Acha and Szypres, 2003 and Pal, 2007, Haasgma *et al*., 2011). Many occupational zoonotic diseases of multiple etiologies are encountered in abattoir workers who deal with the slaughter of different species of food animals for human consumption. As a result abattoir workers constitute a major group at risk of occupational zoonosis, due to the close contact that exists between them and animals/tissue of animals during slaughtering or processing (Mehendra *et al*., 2013). An assessment is required to determine the whether the workers have adequate knowledge on occupational microbiological hazards so that risks of exposures can be reduced to the barest minimum through an intervention program.

Methodology

Type of Study

A cross-sectional study was conducted to evaluate the current practice of cattle abattoir workers with regard to knowledge, attitude and practice of cattle abattoir workers on microbiological and occupational safety. A total number of 50 workers were targeted for the assessment study.

Study Locations

Tampin, Shah Alam, Senawang, Kuala Pilah, Kuantan, Kemaman, Jasin, Ipoh, and Teluk Intan were selected for the study

Population

Butchers form government owned cattle abattoir.

Sampling Frame;

All butchers working in government owned cattle abattoir.

Exclusion

Workers not involved in handling meat and those that disagree to participate in the intervention program.

Inclusion

Workers involved in handling meat that agree to participate in the intervention program.

Approval for the Study;

Approval for the intervention program was obtained from the Faculty of Medicine Ethics committee and the Division for Veterinary Services of the Ministry of Agriculture, Malaysia

Informed Consent Form

After the approval, consent forms were distributed to the abattoir workers for their willingness to participate in the intervention program. All the government Halal abattoir workers agreed to participate.

Questionnaire Development

A questionnaire developed by Soares *et al*., 2012 and Nel *et al*., 2004 was adopted with modifications and reviewed through a series of meetings with a group of experts to test

Knowledge, Attitude and Practice of abattoir workers. The questionnaire was tested for Validity and reliability by distributing it to some respondents outside the study frame.

Questionnaire Distribution

A self-administered questionnaire was distributed to the Halal abattoir workers to answer some questions with regard to Knowledge, Attitude and Practice (KAP). Scores were recorded for analysis.

Outcome Measures

Assessment of Knowledge, Attitude and Practice was measured as 1 for correct and 0 for incorrect answers respectively. The participants were asked to answer a total of 37 questions out of which 25 questions were on KAP while the remaining covered provisions of training and protective materials. Knowledge, Attitude and Practice were categorized as Good if the participant scored marks ≥70% and insufficient if <70% (Soares *et al*., 2012).

Table 2 shows that all the workers have received one form of training or the other but mostly in occupational safety (90%). However, only fifty percent (50%) of the workers have been trained on how to store carcass at the appropriate temperature and how to improve on personal hygiene. This may likely affect the safety of meat as improper storage and lack of good personal hygiene affect its quality. Most of the abattoir workers received training annually but the trainings were centered on occupational safety. Ninety percent (90%) were provided with safety equipment and seventy percent (70%) agreed that it was adequate. Inadequate safety equipment may increase the possibility of exposure of the workers to microorganisms and also cross contaminations. Report of illness by the workers to the management/hospital was found to be thirty seven percent (35%) while associated symptoms include; Diarrhea (29%), Vomiting (14%) and Fever (57%) which may likely be from exposure or other sources.

Observations by the researchers in some of the abattoirs indicated that some of the abattoir workers do not want to use the protective materials provided for unknown reasons. Assessment of the workers knowledge on safety and hygiene revealed that ninety percent (90%) of them do not know that they are expected to wash their hands after break. Transmission of microorganism can be prevented by hand washing but twenty five percent (25%) of the workers did not know. Knowledge on washing of protective clothes in the laundry provided by the management was found to be ninety percent (90%) among the workers. Only thirty percent (35%) answered correctly that a healthy looking worker can contaminate carcass. When the workers were ask to select the type of people that should not work in the abattoir only ten percent (10%) got the right answers as shown in Table 3.

The questionnaire was used to determine the beliefs of the workers with regard to their attitudes at the working place.

Table 1: Assessment of Employees Training and Sufficiency of Safety Equipments

Statement	Response (%)	
	Yes	**No**
1. Have you received any form of training on how to work in Abattoir?	90	10
2. Which form of training have you received?		
(a) Meat cutting	*55*	*45*
(b) Meat storage	*50*	*50*
(c) Personal hygiene	*50*	*50*
(d) Occupational safety	*75*	*25*
3. When was the last time that you received training?		
(a) Last month	*10*	*90*
(b) Last six month	*10*	*90*
(c) Last year	*75*	*25*
4. Do you agree that it was informative?	*100*	*0*
5. Have you been provided with protective equipments?	*90*	*10*
6. Do you agree that the protective equipments are adequate enough?	*70*	*30*
7. Which of the protective materials are you provided with?		
(a) Apron	*90*	*10*
(b) Hairnet	*80*	*20*
(c) Gumboots	*85*	*15*
(d) Mask	*70*	*30*
(e) Gloves	*85*	*15*

Table 2: Employees Illness Reports

Statement	**Response (%)**	
	Yes	**No**
1. Have you reported any form of illness to the management/Hospital within the last six months?	35	65
2. Which of the following symptoms were associated with the illness?		
(a) Diarrhea	29	71
(b) Vomiting	14	86
(c) Fever	57	43
(d) Abdominal Pain	-	-

Table 3: Assessment of Knowledge on Abattoir on Safety and Hygiene

Statement	Response (%) Correct	Wrong
1. When do you Wash hands during work day?	10	90
2. What do you use for hand washing?	100	0
3. Do you agree that hand washing can prevent disease transmission?	75	25
4. Where do you think is appropriate for washing protective clothing?	90	10
5. Do you agree that healthy looking worker can contaminate meat?	35	65
6. What do you think will happen to bacteria at 37^0C?	55	45
7. Is increased temperature the most effective way of destroying microorganism?	50	50
8. What is the correct temperature for the sterilization of knives?		
9. Which of the following group of people are not allowed to work in the abattoir?	10	*90*

Table 4: Assessment of Attitudes of the employees

Statement	Response (%) Correct	Wrong
1. Do you know that clean and proper meat handling is your responsibility?	*100*	*0*
2. Do you believe that long finger nails can contaminate meat?	*100*	*0*
3. Do you agree that learning about meat safety through training is important?	*90*	*10*
4. Do you exchange knives without sterilization with your Co-workers during meat processing?	*70*	*30*
5. Do you use same knife for cutting organs and meat?	*60*	*40*

Table 5: Assessment of Good Practices by the Employees

	Statement	Response (%)	
		Correct	**Wrong**
1.	*What do you think should be used to wash instruments and surfaces after disinfection?*	*70*	*30*
2.	*Do you agree that there is a need to change working instruments and clothes when changing place?*	*15*	*85*
3.	*Do you work when you have diarrhea?*	*95*	*5*
4.	*Do you wear cap while working in the abattoir?*	*75*	*25*
5.	*Do you allow your finger to grow?*	*90*	*10*
6.	*Do you wash you hand after going to toilet?*	*100*	*0*
7.	*Do you dry your hand with towel after washing?*	*90*	*10*

Table 6: KAP Score by the workers

S/N	CATEGORY	SCORE	Percentage (%)
1	Knowledge	7.35	57
2	Attitude	4.10	82
3	Practice	5.45	78

Mean score for KAP=67.6%, Percentage of workers with sufficient KAP score= 37.5%, Percentage of workers with insufficient KAP score= 62.5%

Table 7: KAP Scores Based on Age Groups

AGE	AVERAGE KNOWLEDGE SCORE (%)	AVERAGE ATTITUDE SCORE (%)	AVERAGE PRACTICE SCORE (%)	KAP AVERAGE SCORE (%)
21-30	56	75	71	64
31-40	58	86	80	70
41-50	60	84	86	72
51-60	54	80	79	66

Table 8: Average KAP Scores Attributed to Education Background

AGE	AVERAGE KNOWLEDGE SCORE (%)	AVERAGE ATTITUDE SCORE (**%**)	AVERAGE PRACTICE SCORE (**%**)	KAP AVERAGE SCORE (**%**)
Primary School	54%	80%	71%	64%
Secondary School	58%	80%	80%	69%

All the workers believed that their responsibilities include proper handling of meat to ensure safety. The results of our study showed that thirty percent (30%) of the worker believed that they can exchange unsterile knives with co-workers during work and forty percent (40%) believed that the same knife can be used for cutting organs and meat. Knives exchange and use of same knife help in transmission of microorganisms from one part of the animal to another. Intestinal contents harbor a large number of microbes both commensal and pathogenic and therefore serve as a potential source of meat contamination (Table 4). Good practices by the workers were also determined through the questionnaire and the results have shown that the workers answered to wear hairnets (75%) and most cut their finger nails regularly (90%) as shown in Table 5.

Individual results for Knowledge, Attitude and Practice for the revealed that the Knowledge score was below the requirement as shown in Table 6 in the pre-intervention phase. Workers aged 45 to 50 scored higher KAP marks (72%) compared to others as shown in Table 7. Perhaps those within that age must have been trained several times. For education background those with secondary school score higher marks (69%) compared to those with Primary School Certificate which indicated that qualification of a worker may play a role in the KAP performance of an abattoir worker as shown in Table 8.

Discussion

Twenty five percent (25%) of the workers did not know that hand washing can prevent disease transmission. These results corroborate with recent work of Ansari-Lari et al. (2010). Combining the use of gloves with proper hand washing can reduce the risk of cross contamination (Montville, Chen, & Schaffner, 2001) based on some reports. Workers aged 45 to 50 scored average KAP marks (72%) during the study. However, some observational studies found that although the food handlers have good knowledge towards food safety but they do not always put the knowledge into practice (Oteri & Ekanem 1989). Manning and Snider (1993) reported that 81% of their respondents are aware of the importance of hand washing, but only 2% observe washing their hands thoroughly. Another study by Clayton et al. (2002), food handlers might be aware of the food safety attitudes they should have, but 63.0% of their respondents admitted that they seldom practice such positive attitudes. This proved that although most of the food handlers in this survey gave positive answers but they might not practice it when handling foods. Workers responded (100%) that it is their responsibility to properly handle meat. Lower positive responds (76.9) was reported by Siow and Sani (2011). Results from Statistical Package for Social Sciences (SPSS) have shown that the mean KAP score was 16.9±2.4 among the workers. In addition, the percentage of workers with sufficient KAP score was 37.5% which indicates a

potential public health concern regarding the microbiological safety of the slaughtered animals.

Conclusion

The results of this study point to the need to improve more in terms of training, particularly in Good Practice in the abattoir industry, thus enabling butchers to achieve more correct answers in Knowledge and Practice. The training of managers is a necessary precursor to the implementation of realistic food safety practices within the workplace

Limitation and Recommendation

The major limitation of the study lies in the small, non-random sample which restricts possibilities to generalize findings from the present data. Another clear weakness is the cross-sectional study design which prohibits drawing causal conclusions. The results of this study point to the need to improve training, particularly in good practice in the abattoir industry, thus enabling butchers to achieve more correct answers in knowledge and practice. The development of evaluation criteria for the effectiveness of professional training is crucial to protect Public Health.

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