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Evaluation of Food Safety knowledge, attitude, and practice (KAP) in Poultry slaughterhouses in Khartoum state

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Abstract

The study was designed to evaluate food safety knowledge, attitude and practice (KAP) in poultry slaughterhouses in Khartoum State (Khartoum, Bahri and Omdurman localities), Sudan. A randomized descriptive cross-sectional study on food safety KAP was conducted among a total of 180 respondents (60 for each locality). Anon-probability multistage clusters sampling method was used. The results revealed that 100.0% of workers said true for using gloves, washing hands, cyclical medical checkup and clearing equipment. Whereas, the respondents in 3 localities (20.0%, 43.3%, and 20.3%) don't aware of chilling degree and have no idea about important of training (0.0%, 3.4% and 0.0%). While highest percentage of the workers aware for risk of contamination of food through eating and drinking during food processing (100.0%, 96.7% and 94.9%). In conclusion, unclear information on knowledge, attitude, and practice (KAP) of workers in poultry meat industry may constitute public health concern. Hence, more attention by local authorities is required particularly on the issue of regulations as well as increasing the awareness of the workers.

Keywords: food safety, poultry, slaughterhouse, Khartoum.

Introduction

Contaminated poultry products are among the most important sources of food-borne outbreaks in humans. Microbial contaminants are reported more often from poultry and poultry products compared with other animal species (Maung, 2004). Unsafe food intake is a common problem in every single part of the world, but such issue is difficult to quantify since the parameter of measurement is not well fined. Food contaminants may cause numerous infectious diseases including fatal cancers (Fukuda, 2015). It has been suggested that foodborne diseases occur commonly in developing countries as a result of poor hygiene and safety practices, inadequate food hygiene laws, poor regulatory mechanisms, poor funding to purchase safer equipment and poor education of meat handlers (Abdullahi, et al. 2016). Study on food poisoning cases results that food handlers are responsible for foodborne disease outbreaks for the past years and there is no indication that this is diminishing (Judy et al., 2007). Food handlers should have excellent hygiene practice to ensure cross contamination is reduced, thus protecting the consumers from food borne diseases (Abdul-Mutalib et al., 2012). Poultry processing plants might be highly contaminated with microorganisms and serve as healthy carriers of these microorganisms. They might be carrying food-borne pathogens or spoilage microorganisms such as *Salmonella* species, *Campylobacter* species, *Clostridium perfringes*, *Listeria monocytogenes*, *Escherichia coli*, *Staphylococcus aureus* and other bacteria (Mead et al., 1994). Sources of contamination during meat processing include the equipment, water, contact surfaces and personnel (Nel et al., 2004;

Govender et al., 2013 ; Nyamakwere et al., 2016). To prevent the spread of such pathogens workers in food processing plants should be educated, trained, monitored as well as motivated to follow standard operating procedures and regulations set by the responsible authorities(**Jianu and Golet, 2014**). The aim of this study was to evaluate food safety knowledge, attitudes and practices in poultry slaughterhouses in Khartoum state.

Materials and methods

Study Site

The study was carried out in poultry slaughterhouses in Khartoum State in different localities namely Khartoum, Bahry and Omdurman.

Target Population

The target population was the workers in poultry slaughterhouses in Khartoum State, Sudan.

Study Design

A cross-sectional study was carried out based on questionnaire survey and interview of the respondents.

Sampling Method and Sample Size

A Non-probability Multi Stage Cluster Sampling Method was employed as described by **Thrusfield** (2007). The selection was done according to willingness of the respondents for interview with different levels. A total of 180 respondents (60 for each locality) were interviewed.

Data Collection Using Questionnaire Survey

The questionnaire was designed to obtain information on Knowledge, Attitude and Practice (KAP) related to the workers in poultry slaughterhouses in Khartoum State. Data regarding KAP were included information such as: washing hands, using gloves, wearing apron, masks and caps, habits of eating and drinking and smoking in work place, storage of raw food, cleaning equipments, transmission of food borne diseases as well as medical checkup of the workers .

Data analysis

Data was analyzed using Statistical Package for Social Sciences (SPSS) version 20. Descriptive statistic such as frequency and percentage were used for all variables. While, analytical statistic such as Chi-square (χ^2) was used for an association between variables and different localities at significant level P-value = 0.05 and 0.01.

Results

All workers in poultry slaughterhouses said true for using gloves in Khartoum (100.0%), Bahry (98.31%) and Omdurman (100.0%). In addition, the majority of the respondents were known the washing of hands reduced the contamination of the food (Table 1). The interviewers recorded positive relationship of pathogens such as *Staphylococcus aureus* and *Clostridium botulinum* in causing food poisoning in Khartoum, Bahry and Omdurman (Table 2). About 90% were aware of increasing risk of food contamination by eating and drinking in work place. There were no statistically significant differences between three localities (P-value >0.05).

Table 1: Assessment of Workers Knowledge on Food Safety in Poultry Slaughterhouses in Khartoum State, Sudan

Parameters	Site									Significance
	Khartoum			Bahry			Omdurman			
	T	F	D	T	F	D	T	F	D	
	Frequency (%)			Frequency (%)			Frequency (%)			
1. Washing hands reduce risk of food contamination.	60 (100%)	0 (0.0%)	0 (0.0%)	59 (98.3%)	1 (1.7%)	0 (0.0%)	60 (100%)	0 (0.0%)	0 (0.0%)	NS
2.Using gloves reduce risk of food contamination.	60 (100%)	0 (0.0%)	0 (0.0%)	60 (100%)	0 (0.0%)	0 (0.0%)	60 (100%)	0 (0.0%)	0 (0.0%)	NS
3.Cleaning equipments reduce risk of food contamination ^a	58 (96.7%)	2 (3.3%)	0 (0.0%)	59 (98.3%)	0 (0.0%)	0 (0.0%)	60 (100%)	0 (0.0%)	0 (0.0%)	No statistic were computed
4.Importance and plan for cleaning of the production area	60 (100%)	0 (0.0%)	0 (0.0%)	59 (98.3%)	0 (0.0%)	1 (1.7%)	60 (100%)	0 (0.0%)	0 (0.0%)	NS
5.Eating and drinking in work place increase risk of food contamination ^a	56 (94.9%)	2 (3.4%)	1 (1.7%)	60 (100%)	0 (0.0%)	0 (0.0%)	60 (100%)	0 (0.0%)	0 (0.0%)	NS
6.Cyclical medical checkup for the workers	60 (100%)	0 (0.0%)	0 (0.0%)	59 (98.3%)	0 (0.0%)	1 (1.7%)	59 (98.3%)	1 (1.7%)	0 (0.0%)	NS

T true; F false; D don't Know. * <0.05 significant; NS >0.05 not significant; a Missing values

Table 2: Frequency of food safety knowledge of workers for transformation of pathogens in poultry slaughterhouses in Khartoum State, Sudan

Parameters	Khartoum			Bahry			Omdurman			Significance
	T	F	D	T	F	D	T	F	D	
	Frequency (%)			Frequency (%)			Frequency (%)			
1. Typhoid transfer via food ^a	60 (100%)	0 (0.0%)	0 (0.0%)	59 (98.3%)	1 (1.7%)	0 (0.0%)	60 (100%)	0 (0.0%)	0 (0.0%)	NS
2. Diarrhea transfer via food ^a	60 (100%)	0 (0.0%)	0 (0.0%)	60 (100%)	0 (0.0%)	0 (0.0%)	60 (100%)	0 (0.0%)	0 (0.0%)	NS
3. Bloody diarrhea transfer via food ^a	58 (96.7%)	2 (3.3%)	0 (0.0%)	59 (98.3%)	0 (0.0%)	0 (0.0%)	60 (100%)	0 (0.0%)	0 (0.0%)	No statistic were computed
4. Hepatitis type A considered as Food Borne Diseases ^a	60 (100%)	0 (0.0%)	0 (0.0%)	59 (98.3%)	0 (0.0%)	1 (1.7%)	60 (100%)	0 (0.0%)	0 (0.0%)	NS
5. Hepatitis type B considered as Food Borne Diseases ^a	56 (94.9%)	2 (3.4%)	1 (1.7%)	60 (100%)	0 (0.0%)	0 (0.0%)	60 (100%)	0 (0.0%)	0 (0.0%)	NS
6. <i>Staphylococcus aureus</i> causes food poisoning ^a	60 (100%)	0 (0.0%)	0 (0.0%)	59 (98.3%)	0 (0.0%)	1 (1.7%)	59 (98.3%)	1 (1.7%)	0 (0.0%)	NS
7. <i>Clostridium botulinum</i> causes food poisoning ^a	60 (100%)	0 (0.0%)	0 (0.0%)	60 (100%)	0 (0.0%)	0 (0.0%)	60 (100%)	0 (0.0%)	0 (0.0%)	

T true; F false; D don't Know. * <0.05 significant; NS >0.05 not significant; a Missing values
As shown in table 3 the attitude of the respondents on food safety in poultry slaughterhouses was 100.0%. They were responsible for washing their hands during the food industry and reduction of contamination by wearing gloves, aprons, caps and masks. Also they were avoiding to touch the food when there were abrasions in their hands and checking of their health status before appointed the questionnaire people attitude had negative effect on public health in food borne diseases.

Table 3: Percentage of Workers Attitude on Food Safety to Hygiene measures in Poultry Slaughterhouses in Khartoum State, Sudan

Parameters	Site									Significance
	Khartoum			Bahri			Omdurman			
	T	F	D	T	F	D	T	F	D	
1. Responsibility of workers for washing hands in food industry^a.	60 (100%)	0 (0.0%)	0 (0.0%)	59 (98.3%)	1 (1.7%)	0 (0.0%)	60 (100%)	0 (0.0%)	0 (0.0%)	NS
2. Using gloves reduce risk of food contamination^a.	60 (100%)	0 (0.0%)	0 (0.0%)	60 (100%)	0 (0.0%)	0 (0.0%)	60 (100%)	0 (0.0%)	0 (0.0%)	NS
3. Wearing apron reduce risk of food contamination^a.	58 (96.7%)	2 (3.3%)	0 (0.0%)	59 (98.3%)	0 (0.0%)	0 (0.0%)	60 (100%)	0 (0.0%)	0 (0.0%)	No statistic were computed
4. Using masks reduce risk of food contamination^a.	59 0 98.3% 0.0%	1 1.7%		56 1 94.9% 1.7%	3 5.1%		59 0 98.3% 0.0%	1 1.7%		NS
5. Wearing caps reduce risk of food contamination^a.	59 0 98.3% 0.0%	1 1.7%		54 0 93.1% 0.0%	4 6.9%		58 0 96.7% 0.0%	2 3.3%		NS
6. Avoidance direct touching of food by workers with hands abrasions^a.	49 8 83.1% 13.6%	2 3.4%		49 5 83.1% 8.5%	5 8.5%		56 3 93.3% 5.0%	1 1.7%		NS
7. Importance of training of the workers on food safety^a.	58 1 98.3% 1.7%	0 0.0%		58 1 98.3% 1.7%	0 0.0%		58 1 96.6% 1.7%	1 1.7%		NS
8. Checkup of health status of workers before appointment^a.	60 100.0% 0.0%	0 0.0%	0	57 96.6% 0.0%	2 3.4%	0	60 100.0% 0.0%	0 0.0%		NS
9. Negative impact of Food Borne Diseases on public health^a.	59 100.0% 0.0%	0 0.0%	0	52 93.2% 3.4%	2 3.4%	2	59 98.3% 1.7%	0 0.0%	1	NS

T true; F false; D don't Know. * <0.05 significant; NS >0.05 not significant; a Missing value Estimation of Hygiene Practices of the workers in Poultry Slaughterhouses in Khartoum State (Khartoum, Bahry and Omdurman) revealed that the majority of the respondents said that always were using gloves (80.0%, 76.3% and 70.75), wearing apron (78.3%, 67.2% and 74.1%) and

washing their hands before touching raw food (76.7%, 81.0% and 59.6%). In contrast, relatively low percentages were observed for answering of respondents on sometimes with respect to wearing masks during the work (6.7%, 6.9% and 63.4%), washing their hands after rest time (20.0%, 20.7% and 10.7%) and cleaning equipments after finishing work (0.0%, 5.1% and 3.5%) in Khartoum, Bahri and Omdurman. However, the majority of the respondents said never smoking in work place (95.0%, 89.7% and 87.7%) in work place and eating and drinking in work place (72.9%, 50.0% and 72.7%) in the three localities (Table 4) .

Table 4: Estimation of Hygiene Practices of the workers in Poultry Slaughterhouses in Khartoum State, Sudan

Parameters	Size															Significance
	Khartoum					Bahry					Omdurman					
	N	R	S	O	A	N	R	S	O	A	N	R	S	O	A	
	Frequency (%)															
1.Using gloves during work ^a.	3	3	4	2	48	3	1	8	2	45	7	2	6	2	41	
	5.0%	5.0%	6.7%	3.3%	80.0%	5.1%	1.7%	2.3%	3.4%	76.3%	12.1%	3.4%	10.3%	3.4%	70.7%	
2. Washing hands before using gloves ^a.	5	0	7	8	40	5	6	4	5	39	8	0	4	6	39	
	8.3%	0.0%	11.7%	13.3%	66.7%	8.5%	10.2%	6.8%	8.5%	66.1%	14.0%	0.0%	7.0%	10.5%	68.4%	
3. Wearing apron during work ^a.	7	1	2	3	47	2	2	7	8	39	12	1	1	1	43	
	11.7%	1.7%	3.3%	5.0%	78.3%	3.4	3.4%	12.1%	13.8%	67.2%	20.7%	1.7%	1.7%	1.7%	74.1%	
4. Wearing mask during work ^a.	2	0	4	5	49	4	0	4	10	40	6	4	2	6	40	
	3.3%	0.0%	6.7%	8.3%	81.7%	6.9%	0.0%	6.9%	17.2%	69.0%	10.3%	6.9%	63.4%	10.3%	69.0%	
5. Wearing cap head during work ^a.	5	1	6	7	41	4	3	6	19	25	9	2	4	6	37	
	8.3%	1.7%	10.0%	11.7%	68.3%	7.0%	5.3%	10.5%	33.3%	43.9%	15.5%	3.4%	6.9%	10.3%	63.8%	
6. Washing hands before touching raw food ^a.	2	0	6	12	40	2	1	2	12	41	6	2	7	8	34	
	3.3%	0.0%	10.0%	20.0%	66.7%	3.4%	1.7%	3.4%	20.0%	70.7%	10.5%	3.5%	12.3%	14.0%	59.6%	
7. Washing hands after touching raw material	2	11	12	13	22	4	14	12	11	17	5	2	2	8	38	
	3.3%	18.3%	20.0	21.7%	36.7%	6.9%	24.1%	20.7%	19.0%	29.3%	9.1%	3.6%	3.6%	14.5%	69.1%	
8. Washing hands after rest time ^a.	3	3	4	2	48	3	3	4	2	48	6	6	6	8	30	
	5.0%	5.0%	6.7%	3.3%	80.0%	5.0%	5.0%	6.7%	3.3%	80.0%	10.7%	10.7%	10.7%	14.3%	53.6%	

9. Eating and drinking in work place ^a .	43	6	4	0	29	11	10	3	5	40	5	5	0
	72.9%	10.2%	6.8%	0.0%	50.0%	19.0%	17.2%	5.2%	8.6%	72.7%	9.1%	9.1%	0.0%
10. Smoking in work place ^a .	57	1	1	0	52	1	1	1	50	2	1	1	
	95.0%	1.7%	1.7%	0.0%	89.7%	1.7%	1.7%	1.7%	87.7%	3.5%	1.8%	1.8%	
11. Cyclical medical checkup of workers ^a .	5	18	20	3	3	25	11	1	2	21	16	2	
	8.3%	30.0%	33.3%	5.0%	5.2%	43.1%	19.0%	1.7%	3.5%	36.8%	28.1%	3.5%	
12. Cleaning equipments after finishing work ^a .	2	1	0	2	2	0	3	0	2	1	2	1	
	3.3%	1.7%	0.0%	3.3%	3.4%	0.0%	5.1%	0.0%	3.5%	1.8%	3.5%	1.8%	

N never; R rarely; S sometimes; O often; A always; * <0.05 significant; NS >0.05 not significant; a Missing values

In the present study all respondents (100.0%) were said true for using gloves during the work can reduce the risk of food contamination.

Discussion

These results were not in agreement with finding of **Chelea et al. 2019**) who stated that carcass handlers their general knowledge on other sanitization procedures such as wearing hand gloves and wearing protective clothing was very low (only 3.9%). In addition, the majority of them gave similar positive responses with respect of washing hands also it confirmative with **Nurul et al. (2017)** whose found that the food handlers are aware of the importance of proper hand washing by percentage 100% in order to reduce the potential of being a vector for the bacteria

On the other hand, the study showed lowest percentage of disagreement were reported by the respondents particularly on importance of training (0.0%, 0.0% and 1.7%). These results are also lowest in the findings of **Sami (2015)** who stated that learning more (92.5%) about food hygiene and participate in any training courses was imperative for them.

The study showed that (100.0%, 96.7% and 94.9%,) were reported for awareness of increasing risk of food contamination by eating and drinking in work place in the three localities, and this is similar to that stated by **Mustafa et al. (2019)** who reported that all of the respondents (100%) were not eating, drinking, in the workplace to avoid or reduce food contamination and **Magda et al., 2014** stated that 76.% of the respondents have knowledge that eating and drinking in the work place increases the risk of food contamination

The study revealed that high percentages regarding their positive responses were recorded for wearing apron (96.7%, 86.4% and 98.3%), using masks (98.3%, 94.9% and 98.3%) and wearing caps (98.3%, 93.1% and 96.7%) in Khartoum, Bahry and Omdurman, respectively. These results are in agreement with **Mustafa et al., (2019)** who proposed that the respondents always use a cap and apron.

This study showed that the attitude of respondents about check of health status before appointment was very low in three localities (0.0%, 3.4% and 0.0%) this findings is disagreed

with **Pet et al. (2019)** which stated that all respondents agreed that the health status of the workers should be evaluated before employment.

This study revealed relatively moderate percentage (Table, 3) and for positive relationship of pathogens such as *Staphylococcus aureus* and *Clostridium botulinum* in causing food poisoning in Khartoum, Bahry and Omdurman. This in line with findings of **Pet et al. (2019)** who said that it comes to knowledge on foodborne disease transmission, 73.1% of the respondents know that *Staphylococcus aureus*, is foodborne pathogens.

This study in assessment of handlers practice in Khartoum state revealed that the majority of the respondents said never for the habits of eating and is disagreed drinking in work place (72.9%, 50.0% and 72.7%) and this findings with result of **Abd Lataf et al. (2018)** who said that 44.8% respondents self-reported that they never eat or drink in the food preparation area.

Some of findings recorded in this study showed the majority of the respondents are smoking in work place (Table, 4) and this results is similar to **Hemati and Fadaei (2020)** who indicated that 61.7% of workers never smoked at work

This study showed that the knowledge of respondents about Washing hands reduce risk of food contamination and this is in line with study of **Toku et al. (2008)** who said that 94.5% of them agreed with washing hands before handling food reduces the risk of contamination. Analysis of practice in this study revealed respondents washing their hands before touching raw food (76.7%, 81.0% and 59.6%), respectively and this in confirmative with **Daru et al. (2017)** who said that washing hands with water and soap before preparing foods (100%). Low percentages were observed in this study for answer and of respondents that respect to washing their hands after rest with percentage (36.7%) and this is not in line with study of **Umami et al. (2018)** who said that 82.4% of respondents washing their hands after a break from work.

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