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Evaluation the levels of knowledge, attitude, and practice (KAP) in an export slaughterhouse in Khartoum state

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Abstract:
A cross sectional design conducted during the period extended from January 2019 to February 2019, among 40 abattoir workers in a selected export slaughterhouse to evaluate the levels of knowledge, attitude, and practice (KAP) regarding hygiene in the slaughterhouse as well as personal hygiene and handling practices. Cross tabulation and Chi-square Test of Association were performed to examine the relationships between the practice and the educational level, working experience and professional training regarding meat safety. The result revealed that the respondents had acceptable level of knowledge, excellent attitudes and good practices toward food hygiene measure. Small proportions 35.0% of workers had received only one session 1-2 years ago, about 67.5% of the participants had a valid health certificate. Chi-square test results revealed that practices of respondents were not significantly different ($P<0.05$) according to educational level, working experience, and professional training. The conclusion of this study showed a significant adherence to basic hygiene practices, some aspects such as routine medical examination, health certificates and professional training of slaughter men should be improved in order to reduce the incidence of diseases.

Keywords: Slaughterhouse, workers, KAP, Khartoum state.

Introduction:

Food borne diseases are a serious and global problem. Food borne illness is a significant source of human disease and defined by the WHO (2007) as “diseases, usually either infectious or toxic in nature, caused by agents that enter the body through the ingestion of food.” Several studies have further indicated that food borne illnesses occur due to poor handling of food (Van Tonder, 2004).Food-borne disease occurs commonly in developing countries particularly in Africa because of the prevailing poor food handling and sanitation practices, (Haileselassie *et al*., 2013).

According to Norrung and Buncic (2008), the process of meat handling increases the possibility of microbial contamination because unhygienic practices during handling may lead to transmission of bacteria to the meat from the surfaces. 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). To ensure that food

handlers have the awareness, knowledge, and practice related to the correct way of handling food, training and education are essential parts of their job (Martins *et al*., 2012).Meat handlers have been reported to lack meat safety knowledge, adequate training and observed to be frequently engaged in poor handling practices, especially during the slaughter process (Nel *et al*., 2004; Haileselassie *et al*., 2013). There is need to assess the meat safety knowledge of meat handlers involved during the slaughter process. This will help to identify any possible modes of contamination along the slaughter process and the responsible authorities can be able to take appropriate steps to improve safety (Abd-Elaleem *et al.,* 2014). Personal hygiene of meat handlers, proper sanitization of contact surfaces, utensils and use of clean water is important in order to prevent cross contamination or recontamination in abattoirs (Haileselassie *et al*., 2013; Buncic *et al*., 2014).

A Knowledge attitude and practice (KAP) survey is a representative study of a specific population to collect information on what is known, believed and done in relation to a particular topic (WHO, 2008). A KAP survey is a quantitative type method by interviewing through the use of a structured, standardized questionnaires and statistical method for collected information. It serves as an educational diagnosis of the community. A KAP survey is widely used to gather information through various types of cross-sectional surveys that planning public health programs (Launiala, 2009).Various KAP surveys related to food safety among food handlers were carried out worldwide (Haileselassie *et al*; 2013; Jianu and Goleţ, 2014).

The research problem is that, there are challenges facing the export of the Sudanese meat, including the external competition in addition to the growing specifications from importers. So establishing a hygienic program for meat is required to supply safe and quality exported meat the objectives of this research were to assess the knowledge, attitudes, and practices of the workers in the selected export slaughterhouse.

Materials and Methods:

Study Area:

This survey was conducted during January 2019 to February 2019 in an export slaughterhouse in Khartoum State.

Target population:

The target population of this study was 40 workers selected randomly in an export slaughterhouse in Khartoum state.

Study Design:

Descriptive study mainly based on quantitative questionnaires to answer questions on knowledge, attitude and practice with regard to hygiene among slaughterhouse workers. Knowledge, attitude, and practice were determined by the using of structured interview and through direct observations of the hygienic status and practices by slaughterhouse workers. Individual verbal consent was obtained from the respondents prior to data collection which its permission was taken from Ministry of Animal Resources and approved by Sudan University of Science and Technology, college of veterinary medicine.

Data Collection:

The questionnaire consisted of four parts; the first part of the collection were information about the socio demographic characteristics of the respondents such as; sex, age, educational level, years of working experience, and occupation. The second part consisted of questions covering the aspects of knowledge that involved; training, frequency of the training and the knowledge about food safety and contamination. The third part covered the aspects of attitude of the respondents toward hygiene .The last part consists of practices which include health certificate, wearing of protective cloth, cleaning of protective cloth, eating, drinking smoking or snuffing during work**.**

The questionnaire was designed in Arabic. About 20 minutes were spent to interview each respondent.

Statistical Analysis:-

Data were analyzed through Statistical Package for Social Sciences (spss) version (23). Descriptive statistics such as means and frequencies were used to present the level of knowledge, attitude, and practice of hygiene among workers. A comparative analytical method is used to demonstrate the differences in food safety knowledge, attitude, and practice among workers in slaughterhouse. Chi-square test is used to study the association between practices of respondents ($P<0.05$) according to educational levels, working experience, and professional training.

Result:

Table 1 showed that all of the slaughter men interviewed were males. The majority of them 60.0% were between the ages of 20 and 30 years. 40% of them were graduates, and 42.5% of the slaughter men had been working 1-5 years .In addition, 65% of the participants were workers.

Table (1): Demographic characteristics of respondents (n=40) in export slaughterhouse in Khartoum state:-

Demographic characteristics		Percentage %
Age	20-30 years	24 (60.0)
	31-40 years	7 (17.5)
	41-50 years	7 (17.5)
	More than 50 years	2 (5.0)
	20-30 years	24 (60.0)
Educational level	Illiterate	2 (5.0)
	Primary school	11 (27.5)
	Secondary school	11 (27.5)
	Graduated	16 (40.0)
Working experience	Less than a year	8 (20.0)
	1-5 years	17 (42.5)
	More than 5 years	15 (37.5)
Occupation	Butcher	9 (22.5)
	Worker	26 (65.0)
	Technician	5 (12.5)

Figure 1 showed that a relatively smaller proportion 35.0% of workers from the slaughterhouse had received professional training on meat safety and hygiene before being employed.

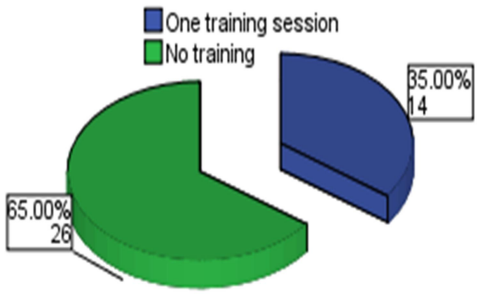

Figure (1) Distribution of participants with respect to number of formal training received (n=40) in export slaughterhouse in Khartoum state:-

Figure2 Showed that the slaughter men who attended the training most had received only one raining session, the last session was more than 1-2 years ago, no refresher or updating courses were offered.

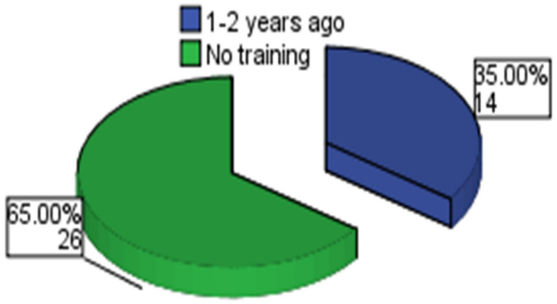

Figure (2): distribution of participants with respect to last formal training received (n=40) in export slaughterhouse in Khartoum state:-

Table (2) revealed that the majority of the respondents had acceptable level of knowledge about their personal hygiene responsibilities to reduce the risk of the contamination by wearing protective clothes 95%, Washing hands regularly 100%, and proper cleaning and handling of instruments 100%.The study showed that 90% of the respondents said that food contaminated by poisoning bacteria can be identified by taste or smell. About 77.50% thought that everyone to be at equal risk of food poisoning. 65% of the participants known that diarrhea is unacceptable health problem in work.

Table (2): Distribution of participants with respect to food safety knowledge (n=40) in export slaughterhouse in Khartoum state:-

Questions regarding food safety knowledge	Answers of participants		
	True	False	I don't know
Wearing protective clothes (a cap, apron, mask, gloves, and boots) is part of your personal hygiene responsibilities.	38 (95%)	1 (2.50%)	1(2.50%)
Wearing protective clothes (a cap, apron, mask, gloves, and boots) reduces the risk of contamination.	38(95. %)	1(2.50%)	1(2.50%)
Washing hands regularly is part of your personal hygiene responsibilities and can reduce the risk of contamination.	40(100 %)	0(0%)	0(0%)
Proper cleaning and handling of instruments reduces the risk of contamination.	40(100%)	0(0%)	0(0%)
Food contaminated by food poisoning bacteria can be identified by taste or smell.	36(90%)	2(5%)	2(5%)
Diarrhea does not affect the job and it is not necessary to take leave from work.	12(30%)	26(65%)	2(5%)
Everyone is at equal risk of food poisoning.	31(77.50%)	7(17.50%)	2(5%)

Table (3): showed that all participants 100.00% were agreed that safe meat handling is an important part of their job responsibility, training for workers was important to reduce contamination, knowledge will benefit their personal life and were agreed that they will change their meat handling behavior when know it is incorrect. The majority of the respondents agreed that good personal hygiene could prevent food borne illness 97.50%,

health status of the workers should be evaluated before employment 97.50% and knives can transfer diseases 92.50%.Most of the respondents 72.50% thought that washing hands and knives with water was clean enough to get rid of the bacteria. About 90.00% of respondents agreed that it is necessary to check the temperature of the refrigerator to reduce risk of contamination, and 95.00% agreed that food borne diseases have harmful effects on both health and economic of the society. Regarding health certificate the study showed that 67.5% of the participants had a valid health certificate, 35% of the participants renewed their health certificate every 6 months, while 32.5% of them renewed it annually.

Table (3): Distribution of participants with respect to food safety attitude (n=40) in export slaughterhouse in Khartoum state:-

Questions regarding food safety attitude	Answers of participants		
	Agree	Disagree	I don't know
Safe meat handling is an important part of my job responsibility.	40(100.00%)	0(0.00%)	0(0.00%)
Food hygiene training for workers is an important issue in reducing the risk of food contamination.	40(100.00%)	0(0.00%)	0(0.00%)
I will change my meat handling behavior when I know it is incorrect.	40(100.00%)	0(0.00%)	0(0.00%)
Food safety knowledge will benefit my personal life and the consumer.	40(100.00%)	0(0.00%)	0(0.00%)
Good personal hygiene can prevent food borne illness.	39(97.50%)	1(2.50%)	0(0.00%)
Health status of the workers should be evaluated before employment.	39(97.50%)	1(2.50%)	0(0.00%)
Knife can transfer diseases.	37(92.50%)	3(7.50%)	0(0.00%)
Washing hands and knives with water is clean enough to get rid of the bacteria.	29(72.50%)	10(25.00%)	1(2.50%)
It is necessary to check the temperature of the refrigerator to reduce risk of contamination.	36(90.00%)	4(10.00%)	0(0.00%)
Food borne diseases have harmful effects on both health and economic of the society.	38(95.00%)	1(2.50%)	1(2.50%)

In table 4 most of the respondents were wearing caps 52.50 %, apron 60.00%, gumboot 77.50% and dress clean clothes 92.5% during the work .Whereas, all of them were not eating, drinking, smoking or snuffing in the workplace.

Table (4): Distribution of participants with respect to food safety practice (n=40) in export slaughterhouse in Khartoum state:-

Questions regarding food safety practice	Answers of participants		
	Always	Sometimes	Never
How often do you use a cap at work?	21(52.50%)	15(37.50%)	4(10.00%)
How often do you use a mask at work?	12(30.00%)	19(47.50%)	9(22.50%)
How often do you use an apron at work?	24(60.00%0	7(17.50%)	9(22.50%)
How often do you use gloves at work?	14(35.00%)	15(37.50%)	11(27.50%)
How often do you use Gumboots at work?	31(77.50%)	8(20.00%)	1(2.50%)
How often do you clean working clothes?	37(92.50%)	0(0.00%)	3(7.50%)

How often do you eat or drink at your workplace?	0(0.00%)	0(0.00%)	40(100.00%)
How often do you smoke or use snuff during work?	0(0.00%)	0(0.00%)	40(100.00%)

Table 5 showed that there were no statistically significant differences between training and practice (P >0.05) and also between educational level, working experience and practice (P >0.05).

Table (5): Distribution of participants with respect to food safety practice according to training (n=40) in export slaughterhouse in Khartoum state:-

		Training				Chi-square test
		Yes		No		
		N	N%	N	N%	P-value
How often do you use a cap at work?	Always	7	50.0%	14	53.8%	0.803
	Sometimes	5	35.7%	10	38.5%	
	Never	2	14.3%	2	7.7%	
How often do you use a mask at work?	Always	5	35.7%	7	26.9%	0.842
	Sometimes	6	42.9%	13	50.0%	
	Never	3	21.4%	6	23.1%	
How often do you use an apron at work?	Always	8	57.1%	16	61.5%	0.891
	Sometimes	3	21.4%	4	15.4%	
	Never	3	21.4%	6	23.1%	
How often do you use gloves at work?	Always	5	35.7%	9	34.6%	0.610
	Sometimes	4	28.6%	11	42.3%	
	Never	5	35.7%	6	23.1%	
How often do you use Gumboots at work?	Always	11	78.6%	20	76.9%	0.754
	Sometimes	3	21.4%	5	19.2%	
	Never	0	.0%	1	3.8%	
How often do you clean working clothes?	Always	13	92.9%	24	92.3%	0.950
	Never	1	7.1%	2	7.7%	
How often do you eat or drink at your workplace?	Never	14	100.0%	26	100.0%	-
How often do you smoke or use snuff during work?	Never	14	100.0%	26	100.0%	-

Discussion:

The results revealed that all of the slaughter men interviewed were males. The majority of them 60.0% were between the ages of 20 to 30 years, 40% of them were graduates, and 42.5% of the slaughter men have been working 1-5 years .In addition, 65% of participants were workers.

Information regarding the training of the interviewed workers is showed that a relatively smaller proportion 35.0% of workers from the slaughterhouse had received professional training on meat safety and hygiene before being employed, those who attended the training most of them had received only one session, the last session was more than 1-2 years ago, no refresher or updating courses were offered. Morrone and Rathbun (2003) indicated that risks along the food chain can be minimized through educate consumers and workers on food safety. Without the knowledge of food safety practices and food handling procedures, food borne illnesses cannot be reduced.

Redmond and Griffith (2003) reported that to ensure this, there should be some form of introductory training with regular updating and refresher courses for food handling. Meat handlers must also understand the risks associated with food contamination by microbiological agents, and should be able to prevent meat contamination (Adams and Moss, 1997).

Educational levels and training of meat handlers regarding basic concepts of meat safety and personal hygiene plays a vital role in ensuring that the consumers are provided with safe and wholesome products (Jianu and Golet, 2014). In addition to this, regular updating and

refresher courses should be carried on more frequently. This will help the meat handlers to have a better understanding of risks associated with contamination of food with microbiological pathogens and sanitation practices (McIntyre *et al*., 2013).In the present study the majority of the respondents (Table 2) had acceptable level of knowledge about their personal hygiene responsibilities to reduce the risk of the contamination However; there is gap of Knowledge concerning poisoning bacteria, diarrhea as unacceptable health conditions and vulnerable groups at risk. The majority of the participants 90% believed that they could determine if food was contaminated with food poisoning bacteria by taste, smell and olfactory checks, they were unaware that food which looked, smelt and tasted normal could cause food poisoning. Similarly, 60% of food handlers assumed the same in studies by Walker *et al.* (2003), 51% by Gnomes-Neves *et al* .(2011) and 50% by Jevsnik *et al.* (2008). Misconceptions, therefore, exist regarding the terms food spoilage and food poisoning. Food spoilage organisms are not necessarily pathogenic, but damage the quality of food, reduce shelf life and in some cases can cause illness. Gram *et al.* (2002) stated that microbial food spoilage manifested itself as visible growth and food textural changes. Spoilage bacteria cause food to rot, deteriorate, perish or decompose and therefore can affect the smell, look and taste of food, rendering it unfit to eat. About 65.00% of the participant known that diarrhea was unacceptable health conditions in the work; diarrhea is the most frequent symptom of food poisoning. Meat handlers are encouraged to report illnesses such as diarrhea, sore throat, fever, cold or open lesions to the supervisor or management so that appropriate measurements are taken. This is reinforced by a study carried out by Bryan (1988) who found that infected food handlers were associated with a majority of food poisoning outbreaks. Knowledge of vulnerable groups was poor as the majority of respondents 77.50% thought that everyone to be at equal risk of food poisoning. Although anyone can be affected by food poisoning; others are more at risk. Apart from the knowledge, attitude is also a crucial factor that may influence food safety behavior and practice, thus decrease the occurrence of food borne diseases (Sani and Siow, 2014).From the survey conducted, All participants 100% reported positive attitudes and agree that safe meat handling is an important part of their job responsibility, food hygiene training for workers is an important issue in reducing the risk of food contamination and they will change their meat handling behaviors when they know it is incorrect, as well as food safety knowledge benefit their personal life and the consumer. The majority of the respondents agreed that good personal hygiene can prevent food borne illness 97.50%, health status of the workers should be evaluated before employment 97.50% and knives can transfer diseases 92.50%.About 72.50% of Participant knowledge of how to keep work surfaces hygienically clean was not good, they believed that washing hands and knives with water is clean enough to get rid of the bacteria; respondents have to know that disinfectant was the best product for killing bacteria on work surfaces. It requires application at a specific concentration for a specific amount of time. This suggests the majority of respondents thoroughly clean work surfaces and dual-use equipment. Hafez (1999) highlighted the importance of cleaning and disinfecting plant equipment to reduce contamination during processing. Detergent is a cleansing substance made from chemical compounds and used for general cleaning. Liquid detergent is more effective than common soaps, as they were dissolved easily in water while absorbing dirt, which is eventually washed off. The soap powder can also be dissolved in water and used. Knives must also be sterilized or boiled in water (FAO, 1985).

The majority of respondents 90.00% agreed that It is necessary to check the temperature of the refrigerator to reduce risk of contamination, and about 95.00% agreed that food borne diseases have harmful effects on both health and economic of the society. Study regarding personal and hygienic practices in the slaughterhouse revealed that 67.5% of the participants

have a valid health certificate, in contradiction to this study, Haileselassie *et al*. (2013) and Abd-Elaleem *et al.* (2014) noted that upon inspection most workers did not have valid health certificates. The study showed that 35% of the participants renewed their health certificates every 6 months, 32.5% of them renewed it annually. Personal hygiene practices investigated in this study include wearing of protective clothing, the cleaning, and disinfection of working clothes, smoking, eating and drinking at the workplace. These practices are considered as mandatory preventative measures which have to be implemented during the slaughter process to reduce chances of cross contamination (Nel *et al.,* 2004).Wearing of protective clothing is one of the major measures implemented in the food industry. It helps to prevent cross contamination. Protective clothing helps to protect both the food product and the meat handler from cross contamination (Muinde and Kuria, 2005).The study showed that the respondents always use a cap and apron (Table 4) these results are in agreement with the results of Van Zyl (1995) who proposed that overalls, hair nets (beard nets, if any), hard hats, rubber boots, and aprons should always be worn by the meat handlers. According to Abd-Elaleem *et al.* (2014) hairnets and beard-nets specifically help to prevent loose hairs and also dandruff from falling into the food since hair is reported to be a source of *Staphylococcus aureus*, on the other hand, handling of foods with bare hands may also result in cross contamination; hence introduce microbes on safe food. In this study, however, most respondents 92.50% always clean their working clothing. All the respondents(100%) claimed that they have never eat , drink, smoke or use snuff at the work Similar findings were also recorded in researches by Nel *et al*. (2004); Jianu and Golet (2014) and Abdul-Mutalib *et al*. (2012), who have indicated that respondents reported that they neither smoke nor eat inside processing areas. Smoking may cause coughing thus, transferring aerosols containing microorganisms to the food (Gordon-Davis, 1998).However, these personal hygiene practices are only claims from the respondents and due to the lack of evidence, there is no guarantee they carry out what they stated in the questionnaires, shortcomings observed in the implementation of personal hygiene practices can be addressed by proper training, educating and monitoring of the workers.

In conclusion, the study revealed that the respondents had acceptable level of knowledge, excellent attitudes and good practices toward food hygiene measure, but there is a need to increase the level of hygiene in the abattoir premises, and there are gaps identified highlighted the necessity of proper professional training and routine medical examinations of workers coupled with health certificates. Therefore, proper training, monitoring and educating slaughterhouse worker will help to ensure that the consumers and the imported countries to be provided with good quality wholesome meat all the times.

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