Effect of Health Educational Intervention for Brucellosis among Slaughterhouse Workers at Gharbia Governorate

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Abstract

Background: Brucellosis is a pervasive problem throughout the world, especially in developing countries. It has a great impact on human health and animals, these all affect on social income. **Aim of the study:** To evaluate the effect of health educational intervention for brucellosis among slaughterhouse workers at Gharbia Governorate. **Subjects and Methods: Research design: A**quasi- experimental design was in this study used to collect data. **Setting:** This study was conducted at four slaughterhouses in Tanta, Kfer El-Zayat, Bassioun and El-Mahala El-Koubra in Gharbia Governorate .**Subjects:** Eighty five workers' was selected randomized as a study sample. **Tools of data collection:** Data were collected using three tools. Tool I: A structured interview questionnaire to collect data about slaughterhouse workers. Tool II: An observation checklist, to assess workers practices throughout work process. Tool III: Blood analysis to slaughterhouse workers for brucellosis disease. Results: **Results:** revealed that the mostly of workers were males, and married, nearly half of them reside rural areas, and more than half of workers reside in urban areas. About three quarter of workers was drinking non boiled milk, and one quarter of them was infected by brucellosis. Slightly more than of workers were veterinaries also more than one quarter from manual workers, less than one fifth from butchers and skinners. **Conclusion:** One quarter of slaughterhouse workers were exposed to brucellosis infection during work. The training program was effective and increased the level of workers' knowledge and practices about brucellosis disease. **Recommendations:** A booklet containing information about brucellosis should be available at all slaughterhouses in Gharbia Governorate.

Keywords: Health Education, Brucellosis, Slaughter House, Workers.

Introduction:

Brucellosis is one of the important neglected bacterial zoonotic diseases that have affected animals and humans for decades. The disease is caused by bacterial agent of genus Brucella. Human brucellosis is caused mainly by Brucellaabortus, B. melitensis and B. Suis, also the main causes of brucellosis in cattle, goats/sheep and pigs respectively. Wild life animals are also equally affected and these may act as reservoirs to both domestic animals and human. Human infection is through contact with infected animals and ingestion of contaminated animal products such as milk, meat, or carcasses [1].

Brucellosis is a zoonotic disease that can be encountered during pregnancy, especially in endemic areas such as; Latin America, Africa, Asia and Mediterranean countries. It is one of the most common bacterial zoonoses in the world, with 500.000 new cases reported annually and incidence in some countries of more than 10/100.000. Several endemic areas (France, and Latin America) achieved control of the disease in the past yet the disease remains to be endemic in many developing countries [2].

An Egyptian study incorporating an active acute febrile illness surveillance system was carried out to identify and confirm suspected cases, brucellosis incidence in the study area was 70 cases per 100,000 persons year. Only 5.7% of these cases were identified

through hospital-based surveillance, from which the incidence rate would be calculated as 3.8 cases per 100,000 person-years using a case definition based on laboratory confirmation or 6 cases per 100,000 persons year using a clinical definition. Reliance on routine hospital-based incidence data would have, therefore, underestimated incidence by 12–18 times. Official data from the Ministry of Health provided an incidence rate of only 0.3 cases per 100,000 persons year[3].

Human brucellosis is usually not transmitted from human to human; people become infected by contact with fluids from infected animals (sheep, cattle, or pigs) or derived food products, such as unpasteurized milk and cheese. Brucellosis is also considered an occupational disease because of a higher incidence in people working with animals (slaughterhouse cases). People may also be infected by inhalation of contaminated dust or aerosols. Human and animal brucellosis share the persistence of the bacteria in tissues of the mononuclear phagocyte system, including the spleen, liver, lymph nodes, and bone marrow[4].

Human brucellosis has a wide clinical spectrum, presenting various diagnostic difficulties because it mimics many other diseases for example malaria, typhoid, rheumatic fever, joint diseases and other conditions causing pyrexia. The disease manifests with continued, intermittent or irregular fever (hence the name undulant fever), headache, weakness, profuse sweating, chills, arthralgia, depression, weight loss, hepatomegaly, and splenomegaly and generalized aching. Cases of arthritis, spondylitis, osteomyelitis, epididymitis, orchitis, and in severe cases neurobrucellosis, liver abscesses, and endocarditis have also been reported in humans [5].

Significance of the Study:

The true global incidence of human brucellosis is difficult to determine, but the incidence of the disease worldwide is estimated at more than 500,000 infections per year. The reported incidence of human brucellosis in endemic areas varies widely from < 0.01 to > 200 per 100,000 populations. Brucellosis is an important health problem in Egypt and a confirmed cause of 3% of cases of acute febrile illness. It is endemic among humans and domestic ruminants (6).

In Egypt, the close contact between farmers and their animals due to the predominance of small scale farms occupational exposure of farmers, veterinarians and butchers to infected animals and consumption of unpasteurized milk and some dairy products are considered to be the major risk factors for human infection with Brucella species suggests that measures aimed at reducing the occurrence of brucellosis in animals are the most effective means of reducing human brucellosis [6].

Aim of the Study:

The present study aimed to evaluate the effect of health educational intervention for brucellosis among slaughterhouse workers at Ghabia Governorate

Research Hypothesis

Health educational intervention about brucella infection will improve slaughterhouse workers' knowledge and practices about disease prevention.

Subjects and Methods:

Research design:

A quasi experimental design was used in this study

Study setting:

This study was conducted at four slaughterhouses at Tanta, KferElzayat, Bassioun and El-Mahala El-Koubra, atGharbia Governorate

Study subjects:

Gharbia Governorate is composed of eight slaughterhouses. Four slaughterhouses were randomly selected. Tanta 23, Kfer El-Zayat 26, Bassioun 16 and El-Mahala El-Koubra 20Gharbia Governorate.A purposive sample of 85 who met the following inclusion criteria:

- The worker age over 20 year.
- The duration of his/her work not less than one year.
- All workers should be permanent to ascertain gaining cooperation of the subjects till the end of study.
- Accept to participate in the study.

Tools of data collection:

Three tools were used in this study:

Tool I: A structured interviewing questionnaire to collect data about general characteristics of slaughterhouse workers, namely; socio-demographic data, worker's medical history, and his/her knowledge about brucellosis.

Scoring system: A correct response was scored two, incomplete correct answer scored one and the incorrect answer scored zero. Knowledge total score equal 36 points. The total score was divided by maximum total score to get the percentage of score out of 100% for each worker. A total score percentage of < 60% was considered as poor, while 60 – 75 as fair, and >75 as good.

Tool II: An observation checklist composed of two parts:

Part A: Slaughterhouse environment. The checklist included items about the location (10 items), the ground (9 items), and water and energy supply (5 items).

Part B: This part was concerned with slaughterhouse workers' practices. It is composed of 20 items about work condition of worker's practices through working process including hand washing, clothing practices, ergonomics and equipment.

Tool III: Blood analysis to slaughterhouse workers for brucellosis disease.

Scoring system: A correct performed item was scored one, and the incorrectly done item was scored zero. The total practices score equals 46 points divided by maximum total score to get the percentage of score out of 100% for practices. A total score percentage < 60% was considered as poor, while 60 – 75 as fair, and >75 as good.

Content validity and Reliability:

The validity of the tools contents for the slaughterhouse workers' knowledge and observational checklist was examined by 5 experts from Faculties of Nursing and Veterinary Medicine at Zagazig University. Experts reviewed the content for clarity, relevance, applicability, comprehensiveness, understanding, and ease for implementation. Minor modifications were done. Cronbach's Alpha test was 0.853 for tool (I) and 0.953 for tool (II).

Field work:

Data collection was carried out from the beginning of June 2015 to the end of April 2016. An official request to conduct the study was directed the Faculty of Nursing, Zagazig University to the managers of slaughterhouses at Gharbia Governorate. The researchers conducted the educational program twice/week (Sundays, & Wednesdays), from 8.00 a.m. to 10.00 a.m. The workers were interviewed individually by the researcher to fill in the sheets.

Pilot study:

A pilot study was carried out on 10 % (8 workers) of slaughterhouses, to check tools clarity and to estimate the needed time for filling in the questionnaire and observation checklist. The necessary modifications were done according to the answers and comments of participants. Those who shared in the pilot study were excluded from the main study sample.

Administrative and Ethical considerations:

A simple explanation about the aim of the study was presented to workers. A written consent was signed by workers before data collection. The researcher emphasized in the consent that participation was voluntary, and that any participant can withdraw at any time without any need to justify his/her decision. Any raised questions were answered, and the collected data were treated confidentially and used only in the study purposes.

Statistical analysis:

The collected data were organized, tabulated and statistically analyzed using the Statistical Package for the Social Sciences (SPSS), version 16, (SPSS Inc. Chicago, IL, USA). For quantitative data, the range, mean and standard deviation were calculated.

For comparison between means of two groups of parametric data of independent samples, student t-test was used. For comparison between means of two groups of non-parametric data of independent samples, Z value of Mann-Whitney test was used.

For comparison between means of two related groups (pre/post intervention) of parametric data, Paired t-test was used and Z value of Wilcoxon Signed Ranks Test was used for comparison between means of two related groups of non-parametric data.

For comparison between more than two means of non-parametric data, Kruskal-Wallis was calculated. The correlation between two variables was tested using Pearson's correlation coefficient (r).Significance was adopted at $p<0.05$ for interpretation of results of tests.

Results:

Table (1): Presents the general characteristics of the studied subjects. It revealed that, the mean age of the slaughterhouse workers was $39.56+10.71$ years, the most of them (91.8%) were males, more than one half of them (55.3%) were from urban areas and the most of them (94.1%) were married. On other hand, 25.9% were veterinary physicians, 27.% were manual workers. and the remaining workers were, butchers, skinner and auxiliary workers (16.5%, 15.3%, 15.3% respectively). Also, the same table shows that an equal percentage of 25.9% had either primary education or university education, while 24.7% had secondary education. More than half of the studied subjects (54.1%) reported that their monthly income was insufficient. However; only 9.4% attended previous training concerning brucellosis.

Table (2): presents distribution of studied slaughterhouse workers by their medical history. According to the table 23.5% suffered from hypertension, 8.2% from bilharzias and an equal percentage of only 2.4% of them had diabetes and renal diseases. The same table revealed that 35.3% of them take regular medication to treat their chronic diseases.

Table (3): Shows the prevalence of brucellosis among studied workers. The results revealed that the highest prevalence29.4% of brucellosis was among Bassioun slaughterhouse

workers, followed by Kfer El-Zyiat workers (28%) then Tanta and Elmhalla El Koubra (17.4%, &15.0% respectively). The total prevalence of human brucellosis in Gharbia Governorate was 22.4%.

Table (4): displays slaughterhouse workers' knowledge about brucellosis pre-post intervention. The table revealed that there were statistically significant differences between workers' knowledge pre and post intervention in most knowledge items including; definition of disease, mode of transmission, causative agent, methods of spread of infection, and manifestations of disease and complication of brucellosis.

Table (5): presents worker's self-reported behaviors pre-post intervention. The table showed statistically significant differences detected in the items of drinking non-boiled milk, eating roasted meat, wearing protective clothes during calf birth assistance, and putting knife in mouth during work pre-post intervention(p=0.001).

Table (6): indicates pre-post intervention practices before starting work. The results revealed the presence of statistically significant differences in all items of workers' practices pre-post intervention, except clothes type are easily cleaned, hand washing before slaughtering, and tools, gloves and boots are clean (p= 0.001).

Discussion:

Brucellosis is endemic in Egypt among humans and domestic ruminants. There is a lack of information on the frequency of human brucellosis at the national level in Egypt, In the Nile delta region, the incidence was estimated at 18 cases/100,000 populations in Jennings et al.[7].

Human infection is through contact with infected animal and ingestions of contaminated animal product such as milk, and meat. The slaughterhouse workers are generally more susceptible to contact brucellosis by virtue of their direct exposure to viscera, gravid uterus and fetal membranes of infected animal.

The aim of this study was to evaluate the effect of health educational intervention for brucellosis among slaughterhouse workers at Gharbia Governorate.

The present study results revealed that some factors affected on workers' knowledge as in demographic factor, educational level and monthly income, occupational factor work environment in slaughterhouse. The study revealed that more than half of workers among the study sample belonged to low income i.e. insufficient. This result in agreement with that of a study carried out in Egypt, by Jennings et al. [8], who suggested that demographic, occupational, and socioeconomic factors may play a role. Aggregated data at national or regional levels cannot capture these complexities of disease dynamics and, consequently, at-risk populations where areas may be neglected.

According to socio-demographic characteristics of the slaughterhouse workers as educational level the current study results revealed that less than one tenth were illiterate, slightly more than one quarter had primary education, and near one quarter from workers were secondary education. Only, more than one quarter from slaughter workers had university education. As for residence, more than half of workers resided in urban areas. This result is agreement with that of a study conducted in Lahore by Mukhtar [9], who reported that the distribute in of participants by educational status was as follows: illiterate, 59%; primary level of education and 25.6% of

graduate. More than three fifth (62.8%) of the seropositive resided in urban localities as compared to those living in rural areas (37.2%).

Regarding to educational level the present study findings showed that approximately one quarter of slaughterhouse workers had university education and many of them were illiterate or had primary education. These study findings present studies revealed that educational level affected on knowledge and practices of the slaughter workers significantly. This result is in agreement with that of a study conducted in Uzbekistan by Earhart et al.[10],who reported that the high literacy rate and low educational standard, together with a positive attitude towards learning more, build a good foundation for importance of information campaigns for brucellosis among risky occupations.

The current study result revealed that most of slaughterhouse workers were males and brucellosis is more likely to occur in males rather than females. This is congruent with that of a study done in rural northern Tanzania by John et al.[11], who reported that all brucellosis cases were adult males. Worldwide, brucellosis is more likely to occur in males rather than females the cause of this disparity is occupational exposure differences, most of worker in slaughterhouse are males.

Considering age of slaughterhouse workers under the majority of workers were males and their ranged between 20 to 60 with a mean of 39.56+10.71.This result is in agreement that of a study conducted in Nigeria byGusi et al.[12],who reported that the majority of participants were male, and their ages ranged from 18 to 67 years. The mean age of study participants was 30years with a standard deviation (SD) of nine years.

The current study findings showed that those workers with lower level of education were less likely to have heard of brucellosis compared to those with a higher level of education but there was no statistically significant difference in knowledge between men and women. The farmers with a lower level of education are thus likely at higher risk of contracting brucellosis. This is also supported by a study conducted in Yemen byAl-Shamahy et al.[13].Which showed that humans diagnosed with brucellosis were more likely to have a lower educational level compared to the controls.

The present study result showed that more than half of slaughterhouse workers were low income. A lower disease incidence is seen in developed countries when compared to low and middle had insufficient income countries. However, brucellosis is still targeted to specific sub-groups of these populations, such as Turkish immigrants in Germany. In same line with the present study findings, Dahouk, et al.[14], reported that Hispanic communities of low socioeconomic status in the USA have higher brucellosis incidence. This result might be indicating that low social income is an important factor of disease endemic in developing countries.

Concerning the knowledge of the studied workers' about brucellosis the current study revealed that more than half of workers did not know definition of the disease or had never heard about the disease. This result is similar to that shown in a study conducted in Kenya by Kang et al.[15]. On the other hand, in contrast to this finding, a study in Uganda byKansiime et al.[16], showed a high awareness of brucellosis among the community participants also similar results have been shown in Egypt, where the majority of the farmers were aware of brucellosis. This might be attributed to

the endemic situation of brucellosis in the study area.

The present study revealed that more than half of slaughter house workers lack of knowledge about manifestations and disease complications of complications. This result might be due to underestimation of the disease due to lack of workers knowledge about disease, so only a few of slaughterhouse workers described fever as a sign of the disease. This result is similar that of a study conducted in Kyrgyzstan byKozukeev et al.[17], who reported that despite their knowledge of human brucellosis; only a few shepherds described fever as a sign of the disease. A lack of awareness about the signs of the disease may cause the seriousness of the disease to be underestimated. This underestimation of disease severity may also play a role in the shepherd's ignorance regarding high-risk practices such as assisting parturition or handling of aborted material from ewes without gloves or masks.

According to brucellosis manifestations, the present study showed that the brucellosis disease had no specific symptoms such as fever, night sweats, anorexia, myalgia, weight loss, and arthralgia. Brucellosis is a multisystem disease with a propensity for chronicity. Majority of the infected individuals may develop skeletal and gastrointestinal problems. This result is accordance with that of a study was conducted in Indian Smits et al.[18], who found a high prevalence among the slaughterhouse workers with nonspecific symptoms such as; fever, night sweats, anorexia, myalgia, weight loss, and arthralgia. Brucellosis is a multisystem disease with a propensity for chronicity.

According to knowledge and practices of slaughterhouse workers about brucellosis, this study result revealed that a majority of the

participants in this study had ever heard about brucellosis (commonly known as 'brucella). The main source of information about the disease was from friends. Contrary to this finding, a study in central Asia, Tajikistan, byGrahn[19], revealed that 31% of the respondents had heard about brucellosis from human doctors. The different sources of information highlight a need for multiple communication channels to transmit and improve public knowledge about brucellosis through the media, social gatherings and schools as well as ensuring that knowledge being transmitted is standardized through frequent follow-up with health education talks on biomedical knowledge of the disease from health team and veterinary doctors. However, post intervention workers' knowledge improved.

Regarding to slaughterhouse workers practice pre-post intervention the present study findings showed that pre-program about one fifth of the workers don't follow safe disposal of placentas of aborted fetus as they get rid of them by throwing into the river canal stream, this results was congruent with study done in the kafrEsheikh by Hegazy et al.[20], who reported the heavily polluted water. Post intervention the workers' self-reported behaviors practice significantly improved in nearly all items of practices.

Concerning the protective measures used before starting work and throughout the workers, Job, nearly a quarter used them, This might be attributed to the unavailability of protection measures, while the workers' knowledge about the correct measures taken while dealing with meat throughout slaughterhouse processes improved.

Conclusion:

According to the results of the present study, it can be concluded that: One quarter of slaughterhouse workers exposed to brucellosis infection during work. The training program was effective in increasing the level of workers' knowledge and practices of brucellosis disease.

Recommendations:

Based on the results of the present study, it is highly recommended that:

1- Health education should be provided to slaughterhouse workers about brucellosis disease source, causes, transmission, prevention and treatment.

2- Educate workers about the importance of wearing protective clothes when dealing with animals, and wearing rubber gloves while handling animals, meat, blood and viscera suspected to be infected with Brucellosis.

3- Pasteurize milk and other dairy products, especially cheese, which for less than 3 months may still be contaminated. Unpasteurized dairy products should not be eaten while traveling to endemic areas.

4- An illustrated booklet containing information about brucellosis, causes, management and measures of prevention should be available in all slaughterhouses.

Table (1): Distribution of the Studied Subjects by their General Characteristics (n=85)

Characteristics	No	%
Age in years:		
20-	21	24.7
30-	21	24.7
40-	23	27.1
50-60	20	23.5
Mean+SD	39.56+10.71	
Gender:		
Males	78	91.8
Females	7	8.2
Residence:		
Urban	47	55.3
Rural	38	44.7
Marital status:		
Single	4	4.7
Married	80	94.1
Divorced	1	1.2
Job:		
Veterinary	22	25.9
Bucher	14	16.5
Skinner	13	15.3
Manual worker	23	27.0
Auxiliary workers	13	15.3
Educational level		
Illiterate	7	8.2
Primary	22	25.9
Secondary	21	24.7
High institutes	13	15.3
University	22	25.9
Monthly income:		

Sufficient and saving	6	7.1
Sufficient	33	38.8
Insufficient	46	54.1
Attended previous training concerning brucellosis	8	9.4

Table (2): Distribution of Study Subjects by Their Medical History(n=85).

Medical history	No	%
History of chronic illness		
None	53	62.4
Hypertension	20	23.5
Diabetes	2	2.4
Renal diseases	2	2.4
Bilharziais	7	8.2
Others	8	9.4
On regular treatment for chronic diseases	30	35.3

Table (3): Prevalence of Brucellosis Among Studied Workers

Slaughterhouse	Total workers	Positive for brucellosis	%
Kafr El-Zayat	25	7	28.0
Bassioun	17	5	29.4
Tanta	23	4	17.4
El-Mahalla El-Koubra	20	3	15.0
Total	85	19	22.4

Table (4): Distribution of Studied Workers by their Knowledge about Brucellosis Pre and Post Health Education Intervention

Items of knowledge	Before		After		Z	p
	No	%	No	%		
Knowing definition of the disease						
Incorrect answer	45	52.9	15	17.6		
Incomplete correct answer	21	24.7	49	57.6	5.788	0.001*
Complete and correct answer	19	22.4	21	24.7		
Mode of transmissions :						
Can be transmitted from animals to man	66	77.6	80	94.1	3.300	0.001*
Can be transmitted from man to animals	63	74.1	56	65.9	1.400	0.162
Brucellosis is an infectious disease	59	69.4	70	82.4	2.041	0.041*
Causative agent for brucellosis:					3.468	0.001*
Don't know	28	32.9	8	9.4		
Virus	22	25.9	24	28.2		
Bacteria	31	36.5	51	60.0		
Parasite	4	4.7	2	2.4		
Methods of spread of infection :					5.214	0.001*
Incorrect or wrong answer	47	55.3	28	32.9		
Incomplete correct answer	20	23.5	31	36.5		
Complete and correct answer	16	21.2	26	30.6		
Manifestations of brucellosis						
Incorrect answer	48	56.5	29	34.1		
Incomplete correct answer	9	10.6	19	22.4	4.009	0.001*
Complete and correct answer	26	32.9	37	43.5		
Complications of brucellosis:						
Incorrect answer	51	60.0	45	52.9	1.672	0.094
Incomplete correct answer	13	15.3	15	17.6		

Complete and correct answer	21	24.7	25	29.4

Table (5): Distribution of Studied Workers by Their Self-Reported Behaviors Pre-Post intervention (n=85)

Risky behaviors	Before		After		Z	P
	N	%	n	%		
Drinking none boiled milk	64	75.3	52	61.2	2.268	0.023*
Eating well cooked meat	71	83.5	77	90.6	1.500	0.134
Eating roasted meat	27	31.8	45	52.9	3.182	0.001*
Washing hands before eating	63	74.1	63	74.1	0.000	1.000
Washing hands after eating	73	85.9	73	85.9	0.000	1.000
Washing hands after defecation or urination	78	91.8	80	94.1	0.707	0.480
Washing hands after dealing with animals	68	80.0	73	85.9	1.147	0.251
Wearing protective cloths during animal slaughter	22	25.9	25	29.4	0.894	0.371
Wearing protective cloths during calf birth assistance	21	24.7	38	44.7	3.157	0.002*
Wearing head cover	8	9.4	9	10.6	0.302	0.763
Put knife in mouth during work	54	63.5	44	51.8	2.041	0.041*
Touch animal parts with hand cuts present	33	38.8	26	30.6	1.347	0.178
Safe disposal of animal placenta	18	21.2	21	24.8	0.728	0.467

Table (6): Distribution of Study Worker their Practice Starting Work Pre-Post Intervention (n=85)

Practices	Before intervention		After intervention		Z	P
	No	%	No	%		
Clothes are always clean	10	11.8	35	41.2	4.642	0.001*
Clothes type are easily cleaned	45	52.9	46	54.1	0.218	0.827
Clothes color are dark	62	72.9	76	89.4	2.646	0.008*
Apron always used to protect cloths	0	0.0	59	69.4	7.681	0.001*
Watches and rings removed	15	17.6	30	35.3	2.611	0.009*
Hand washing before slaughtering	31	36.5	37	43.5	1.414	0.157
Head cover used	5	5.9	35	41.2	5.145	0.001*
Hand and arm wash after touching skin	26	30.6	50	58.8	3.703	0.001*
Tools made of stainless steel	61	71.8	85	100	4.899	0.001*
Tools, gloves and boots are clean	71	83.5	75	88.2	1.000	0.317
Disinfectant are accessible	51	60.0	70	82.4	3.413	0.001*
Tools always disinfected	27	31.8	59	69.4	4.718	0.001*

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