Zoonotic Diseases Prevention Program for Veterinary Workers in Rural Health Units at Benha City

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ABSTRACT

Context: Zoonotic diseases are infectious diseases that are naturally transmitted from animals to humans.
Aims: The study aimed to evaluate the effectiveness of the Zoonotic Diseases prevention program for Veterinary workers in Rural Health Units at Benha City.
Methods: A quasi-experimental design. The study was carried out in Veterinary Health Units at Benha City. A convenience sample was used, which includes (85) Veterinary workers. Two tools used for collecting data: 1) A structured interviewing questionnaire to assess: a) demographic characteristics, b) medical history of previous exposure to Zoonotic diseases, and c) knowledge of Veterinary workers regarding zoonotic diseases. 2) An observational checklist sheet was used to assess: a) practices of veterinary workers regarding the prevention of zoonotic diseases, b) veterinary health unit environmental condition.
Results: More than three-quarters (76.5%) of veterinary workers were male, less than half (45.9%) aged ranged from 30 < 40 years with mean±SD (32.3±6.62), and about one-third (31.8%) of them were secondary education. The majority (89.4%) of veterinary workers had a poor total knowledge score regarding zoonotic diseases preprogram intervention compared to more than half (55.3%) of them had good total knowledge score post-program intervention. On the other hand, about two-thirds (62.4%) of veterinary workers had unsatisfactory total practices score regarding zoonotic diseases preprogram intervention compared to more than three quarters (78.8%) had satisfactory total practices score post-program.
Conclusion: Post-program score was higher than the preprogram score both in knowledge and practices of veterinary workers regarding zoonotic diseases, and there is a positive correlation between total knowledge and total practice pre and post-program (P=0.000). The study recommends an illustrated booklets and brochures in each Veterinary Health Unit focus on using protective methods during contact with animals and adherence to adequate sanitary standards.

Keywords: Zoonotic diseases, veterinary workers, rural health units, Benha City

1. Introduction

Zoonoses are very common, with more than six out of every ten infectious diseases known to humans in animals, and three out of every four news or infectious diseases originating in humans spread from animals *(Schoonman, 2015; Rajala, 2016).*

Animal-borne diseases are diseases that can be transmitted from animals to humans. Zoonotic diseases can cause germs, including viruses, bacteria, parasites, and fungi. Zoonoses from animals transmitted to humans in different ways, through direct contact (saliva, blood, urine, nasal discharge, stool, or other body fluids of the infected animal) or indirect contact (contact with areas where animals, organisms, or surfaces contaminated with germs live) or vectors (from mosquitoes, ticks, fleas or any other vector) and food (from eating or drinking something unsafe) *(Tesfaye et al., 2013).*

Zoonotic diseases are diseases and infections that are transmitted naturally between vertebrates and humans. Brucellosis, rabies, trypanosomiasis, bovine tuberculosis, cystic disease, emphysema, and anthrax included in the zoonoses list. In developing countries, zoonotic diseases pose a critical threat to human health, especially for communities that breed and breed animals for food and clothing *(Hundal et al., 2016).*

Many people interact with animals in their daily lives; either at home or away from home, but some people may be at greater risk than others for some zoonotic diseases, such as children under the age of 5, pregnant women, and adults over the age of 65 years, and any person with HIV or a cancer patient undergoing chemotherapy *(Tabibi, 2015)*. Zoonotic diseases can be prevented by following the basic hygiene guidelines and following routine veterinary care guidelines for pets, washing hands, avoiding direct contact with animals, and not eating raw meat *(Molldrem, 2017).*

Community Health Nurse (CHN) has various roles and responsibilities in efforts to control zoonotic diseases. These roles generally fall into the categories of monitoring, education, immunization, early detection, referral, and treatment. CHN also provides supportive care for veterinary personnel, and supportive care may include educating workers about reducing or preventing infection *(Mohamed, 2011).*

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2. Significance of the study

Nearly two-thirds of human infectious diseases are caused by pathogens common to wild or domestic animals. Endemic zoonoses cause about 1 billion people to suffer from disease and millions of deaths each year. Emerging zoonotic diseases pose a threat to global health, causing economic damage to hundreds of billions of dollars over the past 20 years. Zoonotic diseases account for more than 60% of all infectious diseases that cause disease in humans and 75% of newly emerging infectious diseases *(Karesh et al., 2012).* So, veterinary workers' zoonotic disease prevention program will increase their knowledge and practices related to zoonotic diseases.

3. Aim of the study

The study aimed to evaluate the effect of the Zoonotic Diseases prevention program for Veterinary Workers in Rural Health Units at Benha City through:

- Assessing the Veterinary Worker's knowledge and practices regarding Zoonotic Diseases prevention,
- Designing and implementing Zoonotic Diseases prevention program for Veterinary Workers,
- Evaluating the effect of the Zoonotic Diseases prevention program.

3.1. Research Hypothesis

The program will be improved the veterinary worker's knowledge and practices regarding Zoonotic Diseases prevention

4. Subjects and Methods

4.1. Research design

A quasi-experimental design was used to conduct this study.

4.2. Research setting

The study conducted at 50% of Veterinary Health Units (8 units), selected randomly from the total number of all units, is (16 units) in Benha City. These selected units are named (Manshaet Benha, Sandanhor, Sheblanga, Elshomot, Met Elhofeen, Met Rady, Kafer Saad, and Benha Veterinary Unit).

4.3. Subjects

A convenience sample was used, which includes all workers who worked in previously selected Veterinary Health Units. The total number 85 workers as follows (Manshaet Benha Veterinary Health Unit (13), Sandanhor (9), Sheblanga (10), Elshomot (10), Met Elhofeen (9), Met Rady (10), Kafer Saad (12), and Benha Veterinary Unit (12).

4.4. Tools of data collection

Two tools were used in this study.

4.4.1. A Structured Interviewing Questionnaire

The researchers designed a questionnaire based on a literature review, approved by supervisors, and guided by *Mohamed et al. (2017)*. It is written in simple, clear Arabic language. It consisted of the following three parts:

Part I: concerned with the personal characteristics of studied Veterinary workers, which included age, gender, education, level, residence, experience years, income, and previous training.

Part II: covered the medical history of previous exposure to Zoonotic diseases for studied Veterinary Health Unit's workers as type disease, type of treatment, types of animals and birds that treated at Veterinary Health Units which included 18 items divided into (5 items about types of treated animals, four items about types of treated birds, and nine items about the source of information on zoonotic diseases).

Part III: constructed to assess worker's knowledge regarding zoonotic diseases. It included 41 items divided into (two items about the meaning of zoonotic diseases, four items about the causative agent, four items about bacterial diseases, four items about viral diseases, four items about parasitic diseases, two items about fungal diseases. It also included five items about the most vulnerable group for zoonotic diseases, four items about professionals who are most susceptible to zoonotic diseases, four items about the mode of transmission of zoonotic diseases to humans, and eight items about methods of prevention of zoonotic diseases).

Scoring system for knowledge items

The worker's knowledge was calculated for each item as follows: Complete and correct answer scored (2), Incomplete correct answer was scored (1), while do not know or the wrong answer was scored (0).

The total score knowledge was (82) points. These scores were converted into percent scores. Knowledge was considered good if the score of the total knowledge >65% (>55), considered average if it equals 50-65% (41-54), and considered poor if it is less than 50% (<41).

4.4.2. Observational checklist sheet

It was developed to assess Veterinary workers' practices regarding prevention of zoonotic diseases. It consisted of the following two parts: Part I: concerned with personal hygiene which included 25 items divided into (eleven items about hand washing, nine items about wearing protective clothes when contact with the animal, five items about dealing with animals inside the Veterinary Health Unit). Part II: observe veterinary health unit environmental condition that included 14 items divided into (one item about water supply, three items about type of water supply source, three items about ventilation, two items about lightning, one item about sanitary sewage disposal, and four items about the type of sewage disposal).

Scoring system for practices items

Practices score for each item was given as follows: Done = (1), Not done = (0). The total practice score was

considered satisfactory if the score of the total practices ≥ 65% (≥ 17 scores) and considered unsatisfactory if it is less than 65% (< 17 scores).

4.5. Procedures

Content validity and reliability of the tool: Validity of all tools of the current study reviewed by three experts in community health nursing from the Faculty of Nursing, Zagazig, and Benha University to ensure its clarity applicability. The tools were modified according to the experts' opinion on the simplicity of the sentences and suitability of the content. Reliability coefficients are calculated for questionnaire items. The coefficient alpha was 0.87.

Fieldwork started by data collection that took a period of three months, from January to March 2019. The researchers initiate the data collection three days per week during the three months. The accomplishment of the study is done through four phases: assessment, planning, implementation, and evaluation.

The assessment phase included the pre-intervention data collection for baseline assessment. The researchers first introduced themselves and explained the purpose of the research to the Manager of the Veterinary Health Unit and the workers. All the workers working in the Veterinary Health Unit met. The pre-test knowledge and practices questionnaires were distributed, and then the same questionnaires were used after the program implementation (one month later) as post-test for comparison. The time consumed for answering questionnaires ranged from 20-25 minutes for each. The data were primarily tested to provide the basis for designing the intervention program.

The planning phase was the second phase. Based on a review of the literature, sample features, and the results obtained from the assessment phase, the researchers designed the intervention program content. The researchers prepared an illustrated booklet, and after its content validation, it was dole out to Veterinary workers to use as a guide for self-learning.

The general objective of the Veterinary workers' program was to improve their knowledge and practices toward Zoonotic Diseases prevention. Specific objectives formulated. By the end of the intervention program, the Veterinary workers should be able to:

- Define the meaning and causative agents of zoonotic diseases.
- Enumerate the Bacterial, Viral, Parasitic, and Fungal zoonotic diseases.
- Discuss the methods of infection transmission to humans.
- Identify the most susceptible individuals to zoonotic diseases and professionals who are most susceptible to zoonotic diseases.
- Explain the methods of prevention of zoonotic diseases.
- Identify the component of the Veterinary Unit Health environment.
- Discuss the practice of handwashing.
- Explain the practice of wearing protective clothes.
- Discuss the practices of dealing with animals inside the Veterinary Health Unit.

The intervention was implemented (implementation phase) in the Veterinary Health Unit, waiting room. The educational training methods were lectures and group discussions. The sessions were aided by using pictures and posters through a laptop and data show to facilitate teaching. The intervention was implemented in five sessions (3 theoretical and two practical); the time of each session was 60 minutes. The objectives of the sessions were as follows:

In the first session (60 minutes): The main objective was to help Veterinary workers gain knowledge about the meaning and causative agents of zoonotic diseases, followed by the Bacterial, Viral, Parasitic, and Fungal zoonotic diseases. Lecture and group discussions are used as teaching methods with data show through the laptop to facilitate the teaching.

The second session (60 minutes): The main objective was to help veterinary workers gain knowledge about the transmission methods to humans and the most susceptible individuals and professionals to zoonotic diseases. Group discussions and lectures are used as teaching methods with a brochure.

In the third session (60 minutes): The main objective was to help Veterinary workers identify the methods of prevention of zoonotic diseases and identify the component of the Veterinary Unit Health environment. Sessions supported by data show, booklet, brochure, posters, images, group discussions, and lecture used as a teaching method.

In the fourth and fifth sessions (120 minutes): Practical session about hand washing, the main objective was to help Veterinary workers gain satisfactory handwashing practices (time and methods), wearing the protective cloths, and dealing with animals inside the Veterinary Health Unit. Sessions supported by data show, booklet, brochure, posters, images, demonstration, re-demonstration, and group discussions used as teaching methods.

Evaluation (evaluation phase) of the Veterinary workers' intervention was done one month later after applying for the program; through the same tools.

A pilot study was carried out on eight Veterinary workers, representing 10% of the study sample, in Veterinary Health Units to assess the feasibility and the applicability of the tools. As well, the time needed to fill in the data collection tools was estimated. Veterinary workers who participated in the pilot study excluded from the study sample.

Administrative and ethical considerations: Approval to conduct the study was obtained from the Dean of the Faculty of Nursing, Benha University, directed to the Manager of the selected Veterinary Health Units for conducting the present study. As well, informed consent took from each of the workers who agreed to participate in the study. They also assured the confidentiality of the information given to carry out the study used only for the study.

4.6. Data analysis

The data was organized, categorized, tabulated, and analyzed by using appropriate statistical methods. Computerized data entry and statistical analysis were fulfilling scores using Statistical Package for Social Science (SPSS) version 18. Using frequency, percentage, chi-square test, mean±, SD, and Spearman Correlation test. Statistical significance was considered at a p-value <0.05.

5. Results

Table 1 shows that 45.9% of the studied sample aged ranged from 30-<40 with a mean±SD of 32.3±6.62. At the same time, 76.5% of them were male and came from rural areas. On the other side, 51.8% of workers married, and 31.8% were secondary education. Furthermore, 38.8% of workers had experienced seven years, and more and 51.8% had no previous training.

Figure 1 shows that 34.1% of the studied sample had exposure to infectious animal diseases, while 65.9% did not get exposure.

Table 2 shows that 35.3% of animals that the studied veterinary workers rear were goats. On the other hand, 34.1% and 31.8% of birds reared were chicken and duck, respectively.

Figure 2 shows that the studied sample source of information about zoonotic diseases was a veterinary physician for 88.2%, while were media (radio-TV) for 52.9% of them.

As revealed in table 3, 81.2% of the studied sample had complete, correct knowledge about methods of prevention of zoonotic disease. Moreover, 63.5% of them had complete, correct knowledge about most susceptible individuals to zoonotic diseases post-program. It is evident in this table; there were highly statistically significant improvements in the studied sample knowledge regarding zoonotic diseases post-program compared with preprogramming.

Figure 3 shows that 89.4% of the studied sample had poor knowledge scores regarding zoonotic diseases at preprogram, while 55.3% had good knowledge scores post-program.

Table 4 indicates that 21.2% of the studied sample washing their hands frequently at preprogram, while 71.8% of them wash hands frequently post-program, and 56.5% of them do not wash hands after dealing with animals at preprogram, while 75.3% of them wash hands after dealing with animals post-program. Furthermore, 27.1% do not wash hands with soap and water at preprogram, while 71.8% wash their hands with soap and water post-program. The same table indicates highly statistically significant improvements in using disinfectants and wet hands with water post-program about zoonotic diseases.

Table 5 shows that 12.9% of the studied sample wears a protective mask at preprogram, while 72.9% of them post-program wears a protective mask, and 76.5% do not use protective clothing before dealing with the animal at preprogram, while 51.8% of them using protective clothing before dealing with the animal post-program. The same table indicates that there were highly statistically significant improvements in all items post-program about zoonotic diseases.

Figure 5 shows that 37.3% of the studied sample had satisfactory total practices score regarding zoonotic diseases pre the program, while 78.8% had satisfactory total practices score regarding zoonotic diseases post-program.

Table 6 shows a positive relationship between total knowledge and total practice pre and post-program.

Table 7 reveals that 100.0% of the studied sample reported health units' environmental conditions had a water supply. The piped system was the source of water supply for 100.0% of them. Moreover, 50.0% of them had proper ventilation, and 75.0% had sufficient lighting, as regard 100.0% had sanitary sewage disposal, where municipal one was the type of sewage disposal for 37.5% of them.

Table (1): Frequency and percentage distribution of the studied veterinary workers regarding their demographic characteristics (No=85).

Demographic characteristics	No.	%
Age/ Year		
20-<30 years	33	38.8
30-<40	39	45.9
40 years and more	13	15.3
Mean±SD	32.3±6.62	
Sex		
Male	65	76.5
Female	20	23.5
Residence		
Rural	65	76.5
Urban	20	23.5
Marital status		
Single	10	11.8
Married	44	51.8
Divorced	20	23.5
Widowed	11	12.9
Level of education		
Read and write	23	27.1
Basic education	22	25.9
Secondary	27	31.8
University	13	15.3
Experience		
1-<4years	21	24.7
4-<7years	31	36.5
7+	33	38.8
Previous training		
Yes	41	48.2
No	44	51.8

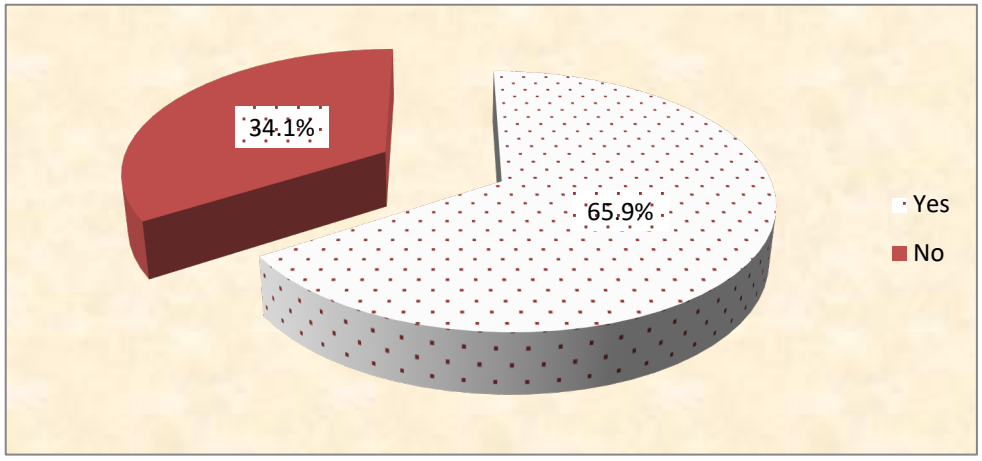

Figure (1): Percentage distribution of the studied veterinary workers regarding history for exposure to infectious animal diseases, (No=85).

Table (2): Frequency distribution of the studied veterinary workers' knowledge regarding types of animals and birds reared (no=85).

Variables	No.	%
Types of animals		
Goat	30	35.3
Sheep	12	14.1
Cows	15	17.6
Buffalo	14	16.5
Camels	14	16.5
Types of birds		
Chicken	29	34.1
Duck	27	31.8
Geese	16	18.8
Pigeons	13	15.3

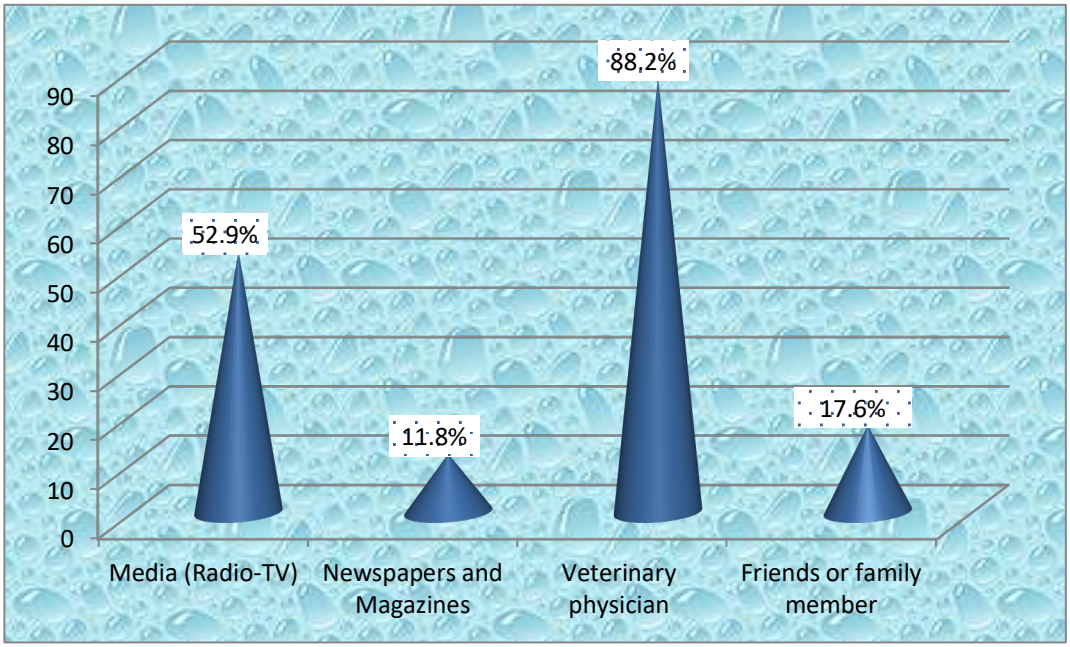

Figure (2): Percentage distribution of the studied veterinary workers regarding the source of information about zoonotic diseases (no=85).

Table (3): Frequency distribution of the studied veterinary workers' knowledge score about zoonotic diseases pre and post-program (no=85).

Knowledge items	Pre-program						Post-program						χ^2	p-value
	Complete correct		Incomplete correct		Do not know		Complete correct		Incomplete correct		Do not know			
	No	%	No	%	No	%	No	%	No	%	No	%		
Meaning of zoonotic diseases	11	12.9	21	24.7	53	62.4	39	45.9	32	37.6	14	16.5	40.6	0.000
Causative agents of zoonotic diseases	15	17.6	22	25.9	48	56.5	40	47.1	32	37.6	13	15.3	33.2	0.000
Bacterial zoonotic diseases	14	16.5	33	38.8	38	44.7	42	49.4	32	37.6	11	12.9	28.8	0.000
Viral zoonotic diseases	11	12.9	34	40.0	40	47.1	43	50.6	38	44.7	4	4.7	48.6	0.000
Fungal zoonotic diseases	13	15.3	31	36.5	41	48.2	49	57.6	29	34.1	7	8.2	45.0	0.000
Parasitic zoonotic diseases	12	14.1	41	48.2	32	37.6	33	38.8	41	48.2	11	12.9	20.0	0.000
Most susceptible individuals to zoonotic diseases	15	17.6	11	12.9	59	69.4	54	63.5	25	29.4	6	7.1	70.7	0.000
Professionals who are most susceptible to zoonotic diseases	12	14.1	15	17.6	58	68.2	30	35.3	51	60.0	4	4.7	74.3	0.000
Methods of infection transmission to humans	21	24.7	28	32.9	36	42.4	36	42.4	49	57.6	0	0.0	45.6	0.000
Methods of prevention of zoonotic diseases	10	11.8	56	65.9	19	22.4	69	81.2	16	18.8	0	0.0	85.2	0.000

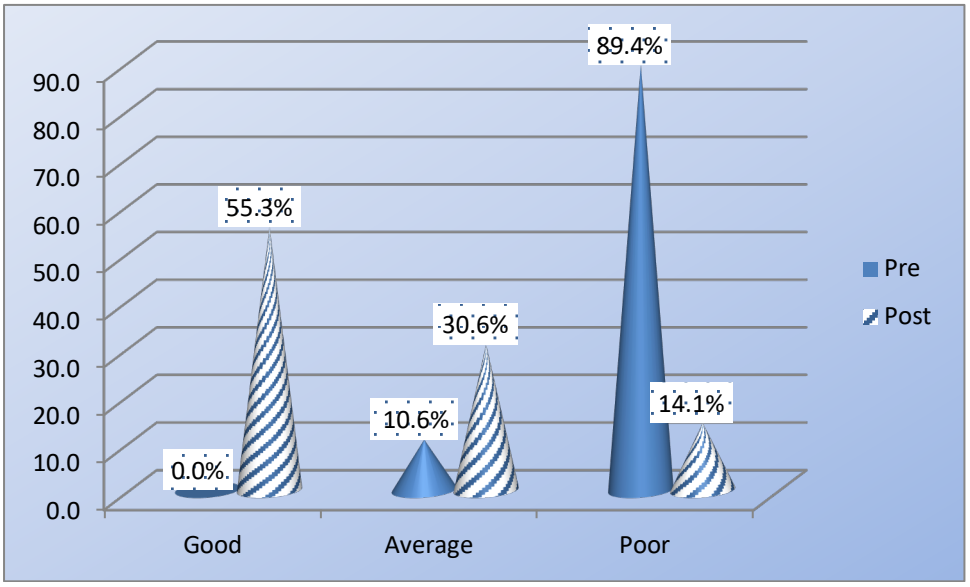

Figure (3): Percentage distribution of studied workers regarding total knowledge score before and after the program.

Table (4): Frequency distribution of the studied veterinary worker practices score regarding handwashing pre and post the program (no=85).

Practices (Handwashing)	Pre-test				Post-test				χ^2	p-value
	Done		Not Done		Done		Not Done			
	No.	%	No.	%	No.	%	No.	%		
Handwashing frequently	18	21.2	67	78.8	61	71.8	24	28.2	43.7	0.000
Time of hand washing										
Before dealing with animal	49	57.6	36	42.4	56	65.9	29	34.1	1.22	0.26
After dealing with animal	37	43.5	48	56.5	64	75.3	21	24.7	17.7	0.000
Before and after dealing with animal	53	62.4	32	37.6	70	82.4	15	17.6	8.49	0.004
Wash hands by										
Only water	36	42.4	49	57.6	56	65.9	29	34.1	9.47	0.002
With soap and water	62	72.9	23	27.1	61	71.8	24	28.2	0.02	0.86
Using disinfectants	15	17.6	70	82.4	68	80.0	17	20.0	66.1	0.000
Methods of hand washing										
Wet hands with water	20	23.5	65	76.5	58	68.2	27	31.8	34.2	0.000
Put soap on hands	34	40.0	51	60.0	69	81.2	16	18.8	30.1	0.000
Rub the hands, soles of the hands, seemingly, between the fingers	36	42.4	49	57.6	51	60.0	34	40.0	5.29	0.02
Rinse hands thoroughly with clean running water	48	56.5	37	43.5	41	48.2	44	51.8	1.15	0.28
Drying hands with a clean towel	36	42.4	49	57.6	31	36.5	54	63.5	0.61	0.43

Table 5: Frequency distribution of the studied veterinary workers' practices score regarding wearing protective cloths pre and post-program (no=85).

Protective clothes	Pre-test				Post-test				χ^2	p-value
	Done		Not Done		Done		Not Done			
	No.	%	No.	%	No.	%	No.	%		
Wear protective clothes										
Uniform	15	17.6	70	82.4	75	88.2	10	11.8	85.0	0.000
Gloves	20	23.5	65	76.5	72	84.7	13	15.3	64.0	0.000
Special shoes	43	50.6	42	49.4	58	68.2	27	31.8	5.48	0.019
Protective Mask	11	12.9	74	87.1	62	72.9	23	27.1	62.4	0.000
Headcover	14	16.5	71	83.5	58	68.2	27	31.8	46.6	0.000
Eyeglasses	28	32.9	57	67.1	55	64.7	30	35.3	17.1	0.000
Time of wearing protective clothes										
Before dealing with the animal	20	23.5	65	76.5	44	51.8	41	48.2	14.4	0.000
Before cleaning the place of animal	15	17.6	70	82.4	62	72.9	23	27.1	52.4	0.000
During waste disposal	25	29.4	60	70.6	61	71.8	24	28.2	30.4	0.000

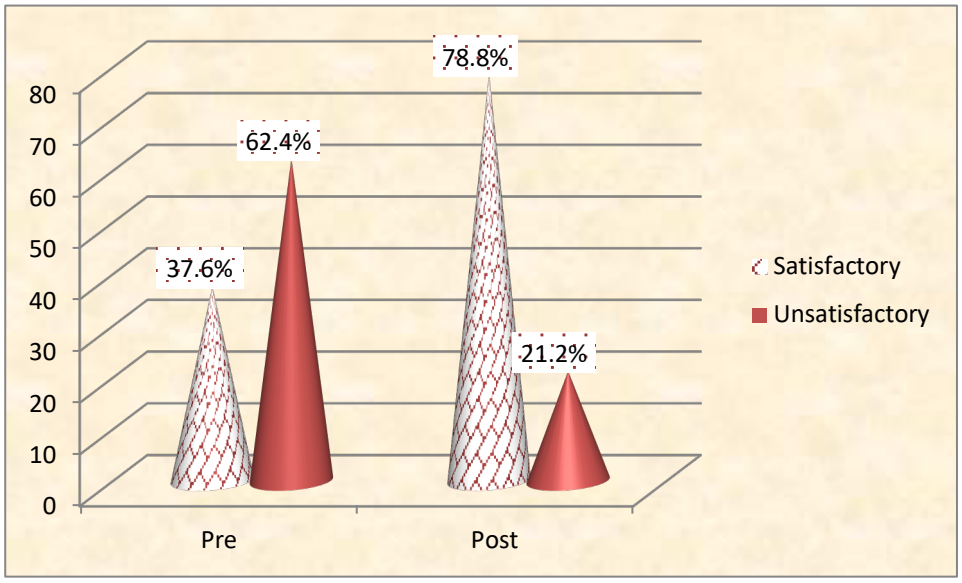

Figure (5): Frequency distribution of studied sample regarding total practices score before and after the zoonotic diseases prevention program.

Table (6): Correlation between total knowledge and total practices pre and post zoonotic diseases prevention program.

Total practices	Total knowledge									
	Pre				Post					
	Poor (n=76)		Average (n=9)		Poor (n=12)		Average (n=37)		Good (n=36)	
Unsatisfactory	46	60.5	7	77.8	9	75.0	9	24.3	0	0.0
Satisfactory	30	39.5	2	22.2	3	25.0	28	75.6	36	100.0
	X^2=1.02		p-value = 0.31		X^2=30.7		p-value = 0.000			

Table (7): Frequency distribution of the veterinary health units environmental condition (no=8).

Veterinary Unites Environmental conditions	No.	%
Water supply (yes)	8	100.0
Source of sanitary water supply		
Piped system	8	100.0
Deep wells	0	0.0
Shallow wells	0	0.0
Ventilation source		
Good	4	50.0
Average	2	25.0
Poor	2	25.0
Lighting		
Enough	6	75.0
Not enough	2	25.0
Sanitary sewage disposal (yes)	8	100.0
Type of refuse disposal		
Municipal one	3	37.5
Self-building one	2	25.0
Cesspit	2	25.0
Canal drainage	1	12.5

6. Discussion

Zoonoses are infectious diseases that are transmitted naturally from vertebrates to humans and vice versa. It is caused by all kinds of pathogens, including bacteria, parasites, fungi, viruses, and brines *(Wang & Crameri, 2014)*. This study aimed to evaluate the effect of the Zoonotic Diseases prevention program for Veterinary Workers in Rural Health Units at Benha City.

The demographic characteristics of the studied sample revealed that less than half of veterinary Workers aged ranged from 30-<40, with a mean±SD of 32.3±6.62, and more than three-quarters of them were male and came from rural areas. These results in agreement with a study by *Mahmoud and Sabry (2019)*, who conducted a study on a safety training program for clinical laboratory workers regarding the prevention of occupational hazards and found more than half of the workers aged from 30 to less than 40 years old and more than two-thirds of them were male. However, disagreed with *Abd El-Hameed et al. (2012)*, who conducted a study on awareness of personnel in direct contact with animals regarding brucellosis, reported that most farmers in direct contact with animals aged 40 years and over were mostly female and married. This finding may be because most of the veterinary health unit workers were males, and this period of the age is appropriate for this profession.

Regarding the educational levels of workers in the current study, about one-third of workers were secondary education, and more than one-quarter were read and write. In contrast, one-quarter of workers were primary education, and the minority were university education. This result in line with a study by *Mohammed et al. (2017)* on awareness regarding the prevention of zoonotic diseases transmission among livestock farmers in rural areas who reported that; just under a third of the sample was illiterate, one fifth had a university education, and a minority had graduate studies. According to *Joshi (2013)*, who conducted a study on the knowledge and practices of livestock farmers regarding brucellosis in the Kailali district, zoonoses, and food hygiene news, and indicated that one-third of the farmers were illiterate, and slightly more than a tenth were university educated. However, this result was not consistent with *Diez and Coelho (2013)*, who evaluated cattle farmers' knowledge of bovine brucellosis in northeast Portugal and indicated that three-quarters of the sample had primary education and a minority had secondary education. The high level of reading and writing among workers reflects a weak educated society that puts them at risk of contracting zoonoses.

Regarding history for exposure to infectious animal diseases, the present study indicates that one-third of veterinary workers have been exposed to infectious animal diseases and that two-thirds of them are not exposed to them. This result agrees with *NASPHV (2015)*, who indicated that zoonotic diseases are recognized as occupational hazards faced by veterinarians daily. It is known that (61%) known human pathogens and (75%) are emerging diseases that affect humans from Zoonotic

diseases. Additionally, this result is in agreement with a study by *Dowd et al. (2013)*. The study performed on Zoonotic disease risk perceptions and infection control practices of Australian veterinarians: Call for change in work culture who found that under half of the respondents (44.9%) reported having contracted a zoonotic infection during their veterinary work, with 25.2% reporting a confirmed incidence and 19.7% reporting a suspected incidence.

Moreover, this results in line with other studies by *Helmy et al. (2013*); and *Wang et al. (2014)*, who indicated that for people who do not work in a profession with livestock, exposure to animal micro-organisms is much lower than those employed in the livestock sector. While this result disagrees with a study by *Klous et al. (2016),* who indicated that close contact with livestock animals was unnecessary for transmission events, living close to cattle can be sufficient to cause adverse health effects among the population.

As regard species of animals and birds reared. The present study showed that more than a third of the veterinary workers reared goats, most of whom raised chickens and ducks. This result agrees with a study by *Mohammed et al. (2017),* who indicated that more than a third of the livestock farmers in rural areas reared goats, and most of them reared chicken and duck. This finding may be due to the needs of veterinary workers owners of chickens and ducks to eat.

The results of this study showed that the majority of workers who mentioned the veterinarian were the primary source of information on zoonotic diseases, while more than half mentioned the media (radio and television). This finding is not consistent with *Ahmed (2014),* who conducted a study of farmers' perception regarding brucellosis at Kalyobia Governorate and reported that about one-third of the studied sample received information from friends or relatives. Also, according to the results of *Grahn (2013),* who conducted a study of brucellosis in small ruminants at Dushanbe, Tajikistan, Uppsala, this was reported; about a third of the studied sample received information about the disease from human physicians. The difference in these results may be due to the positive role of the veterinarian in these veterinary health units.

The score of knowledge of veterinary workers on zoonotic diseases before and after the program in the current study showed that the majority of veterinary workers have complete, correct knowledge of the methods of prevention of zoonotic disease and about two-thirds of them have complete, correct knowledge of most susceptible individuals to zoonotic diseases post-program. Furthermore, there were statistically significant improvements in the studied sample knowledge regarding zoonotic diseases post-program compared with preprogramming. In agreement with *Hezekiah et al. (2013), this finding,* carrying out a study of knowledge and practices related to the transmission of bovine brucellosis among livestock workers in Yewa, Southwestern Nigeria, indicated that two-thirds of the sample had poor knowledge of zoonotic diseases. However, this finding differs from *Holt et al. (2014),* who conducted a study of Brucella infection in large ruminants in an endemic area of Egypt and reported that most of the sample had good knowledge of zoonotic diseases. According to *Tebug et al. (2014),* who conducted a study on the risk, knowledge, and preventive measures of smallholder dairy farmers in northern Malawi concerning zoonotic Brucellosis and bovine tuberculosis found that the knowledge of Zoonotic diseases among dairy farmers was high. This finding may be due to the positive role of Veterinary Units in recognizing livestock farmers. From the researchers, point of view, the improving the score of knowledge among Veterinary workers due to the zoonotic disease intervention program.

The present study's main objective was the assessment of veterinary workers' knowledge and practices regarding zoonotic diseases. The overall knowledge and practices score in preprogram among veterinary workers related to zoonotic diseases prevention were very poor knowledge and unsatisfactory practices. This study results highlighted the pressing need for implementing zoonotic diseases prevention program, where knowledge and practices often come from program intervention. Less than half of the workers under study have received previous training regarding zoonotic diseases, adding to that more than one-quarter of the study sample was read and write. This finding may be a reason for workers to possess poor knowledge and unsatisfactory practices on zoonotic diseases.

This result was in line with *Joshi (2013),* who reported that most of the farmers had poor knowledge regarding zoonotic diseases and more than half of them had poor hygienic practices regarding brucellosis and agreed with *Ahmed (2014),* who found that slightly more than half of the studied sample had unsatisfactory practice regarding brucellosis. Additionally, these results agree with a study by *Swai et al. (2010)* on knowledge and attitude towards zoonoses among animal health workers and livestock keepers in Arusha and Tanga, Tanzania. The study found that veterinary field staff and staff in health facilities have a low awareness and poor knowledge of zoonoses.

After implementing the program regarding zoonotic disease prevention, the objectives and hypothesis were highly achieved. The findings pointed to more than half of veterinary workers' good knowledge, and more than three-quarters of them had satisfactory practice scores regarding zoonotic diseases post-program intervention. These improvements might be due to the effect of the program intervention, which is provided to workers. Also, they were enthusiastic about participating in the program and willing to attend future health education programs, as they reported.

These results agree with a study by *Tebug et al. (2014)* on Risk, knowledge, and preventive measures of smallholder dairy farmers in northern Malawi about zoonotic Brucellosis and bovine tuberculosis**,** who found that the knowledge of zoonoses amongst dairy farmers was high. Furthermore, these results in line with a study by *Mahmoud & Sabry (2019),* who conducted a study on a safety training program for clinical laboratory workers regarding prevention of occupational hazards who found

that before the program implementation, 23% of the laboratory workers had good total knowledge scores regarding laboratory safety, while after the program implementation total knowledge scores increased to 62 %.

Additionally, these results agree with the study result by *Narjis et al. (2015),* who revealed a significant increase in the knowledge mean scores of the intervention group after the training program (p=0.001). The result of the present study revealed that there was a positive correlation between total knowledge and total practice pre and post-program implementation. This finding in line with a study by *Osbjer et al. (2015),* who found that the positive effect of zoonosis knowledge was associated with the practice of handwashing before cooking and after handling live animals.

Regarding the practices score of handwashing among veterinary workers pre and post the Program. Less than one-quarter of veterinary workers wash their hands frequently at preprogram, while about three-quarters of them wash hands frequently post-program, and more than half of them do not wash hands after dealing with animals preprogram, while three-quarters of them wash hands after dealing with animals post-program. Furthermore, more than one-quarter of veterinary workers do not wash hands with soap and water at preprogram, while nearly three-quarters of them wash their hands with soap and water post-program, there were highly statistically significant improvements in using disinfectants and wet hands with water post-program about zoonotic diseases.

This result has disagreed with a study by *Addo et al. (2011)* in Ghana under the title of knowledge, attitudes, and practices of herd men in Ghana concerning milk-borne zoonotic diseases and the safe handling of milk, who reported that most of the studied sample practiced hand washing before dealing with livestock. Also, *Ashbaugh (2010)* performed a study of a descriptive survey of dairy farmers in Vietnam. The study agreed with this result and reported that slightly more than three-quarters of the studied sample washed their hands with soap after dealing with livestock. Also, these results agreed with *Samad (2011),* who mentioned that the zoonotic disease might have serious consequences for a poor person who will probably have poor access to healthcare and can ill afford to have the ability to work impaired by sickness.

As regards, veterinary workers' practices score regarding wearing protective cloths pre and post the program. The present study results showed that; few percentages of veterinary workers wear a protective mask at preprogram implementation compared to about three-quarters of them wear a protective mask post-program intervention. More than three-quarters of veterinary workers do not use protective clothing before dealing with the animal at preprogram compared to more than half using protective clothing before dealing with animal post-program. This result agreed with *Holt et al. (2014), Lindahl et al. (2015),* who found that most of the studied sample did not use protective equipment when dealing with animals. This finding might be due to poor veterinary workers' knowledge regarding the importance of wearing protective clothing to prevent the transmission of zoonotic diseases when dealing with animals before program intervention.

Concerning health units' environmental condition, the current study reveals that most of the veterinary workers reported health units' environmental condition had a water supply, the piped system was the source of water supply them, half of them had good ventilation, three-quarters of them had sufficient lighting, and most of them had a sewage system where more than one-third of them had municipal sewage. These results agreed with *Sofian et al. (2013),* who conducted a study of screening family members of patients with acute brucellosis in an endemic area of Iran. The study reported that most of the studied samples had a water supply, good lighting, and adequate ventilation in their home. This finding may be because of improved government resources and in line with a study by *Mohammed et al. (2017)* on awareness regarding the prevention of zoonotic disease transmission among livestock farmers in rural areas. The study found that most of the studied sample had a water supply in their home, which was piped system, most of them had proper ventilation, most of them had sufficient lighting, and most of them had sewage system where half of them had municipal sewage.

7. Conclusion

In light of the results of this study, it can conclude that the zoonotic diseases prevention program has been effective in increasing the level of knowledge of veterinary workers and their zoonotic practices. The result showed that the score of knowledge after the program was higher than the preprogram score in both knowledge and practices of veterinary workers.

8. Recommendations

Based on the current study findings, the following recommendations are proposed: health education programs and research should be given and conducted for veterinary workers on measures to prevent zoonotic diseases in Veterinary Health Units. Also, they should provide illustrated booklets and brochures in each Veterinary Health Unit to maintain knowledge of zoonotic disease and focus on the use of preventive methods during contact with animals and adherence to appropriate health standards and use as a reference. Finally, the prevention and control of zoonotic diseases must be an integral part of Veterinary health that unites safety measures.

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