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THE KNOWLEDGE, ATTITUDES, AND PRACTICES OF LIVESTOCK DEALERS IN WASIT PROVINCE, IRAQ REGARDING ZOONOTIC INFECTIONS

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Abstract: This study aims to determine the knowledge, attitudes, and practices about diseases transmitted to humans from animals. The sample of the study is 77 persons working as breeders, fatteners, and sellers of cows and sheep in the countryside of wasit, Iraq. Those people answered some sociodemographic questions in addition to another three kinds of questions (knowledge attitudes and practices), the level score of knowledge was calculated by giving one point to every question. Participants were 72, and their average age was 45 years. The respondents whom had previously been infected were %87.6% of the respondents, however, 58.6% did not know that they infected from a healthy animal. Only 12.6% of the respondents received training on animal husbandry. The participants who had agricultural education were 37.6% of the participants. Those who know un-boiled milk can transmitted diseases were %65 of the and 96% of whom used to consume un-boiled milk. In this study, the lifetime prevalence of contracting diseases from animals was found to be 5.6%. Wearing gloves 36.2% while only % 28 of the participants was wearing masks. Who did not use any personal protective equipment were %13. Using raw milk was common among those who did not know that raw milk would be infected ($p = 0.02$). The participants were well informed about the disease transmitted from animals but they had less knowledge that poultry was also a source of infection ($P < 0.001$). Participants do not demonstrate simple personal protective behaviour. Zoonotic diseases can be effectively addressed through the practice of occupational pathology, regional protection, the necessity of using personal protective equipment, and participation in training, especially in how to use it..

Keywords: infection prevention, cattle breeder, zoonoses.

Introduction

Infections that can be transmitted naturally from animals to humans are known as zoonoses (EFSA, 2023).

Until 1959, diseases transmitted only from animals to humans were referred to as zoonosis, since then, the term zoonosis has been adopted by the FAO/WHO joint committee decision, and it was changed to diseases transmitted from animals to humans and from humans to animals, and began to be used as such (Qiu et al., 2023).

Zoonoses are transmitted directly through the intestinal tract, by biting, through the inhaler route, or skin contact. Indirect transmission of zoonotic gastrointestinal pathogens; may occur in association

with contact with contaminated clothing or shoes, animal bedding, and other environmental surfaces, about 61% of all pathogens that are infectious to humans are zoonotic pathogens (Klous et al., 2016). The distribution of pathogens and zoonotic pathogens that are contagious to humans by species is shown in Table 1..

Table 1: Ratios of zoonotic microorganisms among all microorganisms transmitted to humans (Klous et al., 2016)

Pathogen	General	Zoonotıc
Virus & Prion	217	156 (76%)
Bacteria & Rickettsia	518	259 (50%)
fungi	307	113 (37%)
Protozoa	66	43 (65%)
Helminths	287	278 (97%)
Total	1415	868 (%61)

There are many zoonotic diseases with a diversity of microorganisms and modes of transmission. The most common and reported zoonoses in Europe and the United States is Campylobacter as the main cause of diarrhea and covers 70% of all cases. Other bacterial infections follow Salmonella, yersinia, Escherichia coli, Listeria, Q Fever, tularemia, echinococcus, and brucellosis (Hansson et al., 2018; Rahman et al., 2020).

In Iraq, the common zoonoses are Crimean-Congo hemorrhagic fever disease, anthrax, rabies, and brucellosis. Many zoonotic diseases continue to be an important public health problem, in addition to their negative effects on public health, they also cause economic losses due to productivity losses and deaths in animals (Abdulhameed et al., 2019).

Zoonoses are divided into three groups according to whether the hosts are humans or animals (Keenan et al., 2024):

1. Anthropozoonosis: Those transmitted from animals to humans (Tularemia, Leptospirosis, Rabies, Psittacosis, toxoplasmosis, etc.
2. Zooanthroponosis: Those transmitted from humans to animals (Diphtheria, amebiasis, etc.),
3. Amphixenosis: Those that can be transmitted to both humans and animals. (Staphylococci, streptococci, mycobacteria, etc.

Among the agricultural sectors, animal husbandry has the greatest opportunity to create added value. Apart from the meat, dairy, and other animal products industries, livestock farming contributes greatly to the economy by creating new employment areas through the pharmaceutical, feed, and livestock equipment industries directly based on livestock (Kraham, 2017).

Iraq is in a position where it needs to give special importance to animal husbandry, with its different climatic structures, the existence of various animals of different species and breeds, and the population, the majority of which still lives in rural areas (Al-Ansari et al., 2021).

Zoonoses are an occupational disease in professions that involve contact with animals. People who raise livestock have a significant place among a wide spectrum of professions, from butchery to veterinarians, livestock farmers may be at higher risk for zoonotic disease because they are often in an environment contaminated with animal feces or byproducts (Palomares Velosa et al., 2023).

Additionally, other members working in the farmhouse may be at high risk due to direct and indirect contact with animals, even if they do not work on the farm (Klous et al., 2016). However, only those engaged in animal husbandry were included in this study, those who deal with animal husbandry, they were tried to determine the knowledge about zoonoses transmitted from animals to humans, the infection risks that people are exposed to as a result of some common animal exposures, and determine whether they carry out simple infection prevention activities in farms.

Methods

This study is a cross-sectional type of research. Wasit Governorate has a large and fertile land with many people engaged in agriculture and animal husbandry. Livestock farming is widely practiced in the rural area of wasit Governorate. According to 2022 Iraqi Central Statistical Organization (CSO) data, the population of wasit

and its countryside is 1,378,723 people and the area is 17,150 km², many people are engaged in animal husbandry and agriculture, as well as various business lines (CSO, 2022).

Those who engage in animal husbandry are engaged in dairy farming, livestock farming, and poultry farming. People are vulnerable to zoonotic diseases due to animals, their products, and environmental contamination. It is debatable whether they have sufficient knowledge about zoonoses, modes of transmission, and protection measures and whether they follow these behaviors. Additionally, there is not enough information about whether these behaviors increase in parallel with the level of knowledge and whether people receive sufficient non-formal education (CSO, 2022).

Three different forms of questions: socio-demographic status, knowledge, and attitudes were applied to the participants. In this survey, demographic information such as age, gender, years of animal husbandry, marital status, and number of children were questioned in a questionnaire form also questioning their knowledge levels, attitudes, and behaviors.

The knowledge score was calculated by giving 1 point to each question. Data were collected by face-to-face interview method, comparing knowledge levels according to demographic information and knowledge level of attitude-behavior data were analyzed. The population of the research was 77 people of livestock dealers. Out of a total of 77 people, 5 people were excluded from the study due to inaccessibility and missing data, and 93% of the population was reached. The data were analyzed with the SPSS 26.0 package software. Frequency analysis, chi-square, Fisher's exact test, Student's t-test, and Mann-Whitney were applied. Ethics committee permission was received from the STU University ethics committee.

Results and Discussion

About 44.40% of the participants were women and 55.60% were men. 82% were married and 18% were single. The age average of the participants was 46.14 (SD= 8.89, min=15, max=71); The average age of men was 44.00; The average age of women was 46.05. When men and women were compared in terms of average age; There was no significant difference (p>0.05). The educational status of the participants was as follows: 19.40% were illiterate, 22.20% were literate, 41.70% were primary school graduates, 15.30% were secondary school graduates, and 1.4% were higher education graduates. 95.80% of the participants were engaged in barn and livestock farming, and only 4.20% were engaged in pasture farming. 37.50% of the participants were receiving government support.

About 87.50% of the participants said that diseases would be transmitted from animals to humans, however, 58.71% of them did not have the knowledge that they could catch the disease from a healthy animal (Table 2).

Table 2: Comparison of disease transmission knowledge from animals to humans and transmission knowledge from a healthy animal to humans.

The knowledge that a disease can be transmitted from a healthy animal	Knowledge that diseases can be transmitted from animals to humans		Total n (b%)	P
	Yes n (%a)	No n (%a)		
Yes	26 (%96.2)	1 (%3.8)	27 (37.5)	0.140
No	37 (%82.2)	8 (%17.8)	45 (62.5)	
Total	63 (%87.5)	9 (12.5)	72 (100)	
a: row percentage b: column percentage				

Only 12.50% of the participants had received training on animal husbandry. Only 18.50% of those who received government support and training on animal husbandry (Table 3).

Table 3: Comparison of receiving animal husbandry training and receiving government support related to livestock

Support of government	Status of Receiving Education on Livestock		Total n (%b)	P
	There is n(%a)	None n(%a)		
Yes	5 (%23)	22 (%77.2)	27 (%37.6)	0.281
No	4 (%9)	41 (91)	45 (%62.5)	
Total	9 (%12.5)	63 (87.5)	72 (%100)	
a: row percentage b: column percentage				

About 35.70% of the participants were not aware that diseases could be transmitted from unboiled milk. About 96% of those who did not know that raw milk was a potential source of infection consumed raw milk. Consumption of raw milk was related to the knowledge that raw milk is not a potential source of infection, (p=0.002), (Table 4).

Table 4: Relationship between the use of unboiled milk and disease transmission.

Raw Milk Consumption	Disease Transmission Information from Raw Milk		Total n(%b	P
	There is n (%a)	None n(%a)		
Yes	29 (%55)	24 (%45)	53 (%76)	0.002
No	18 (%95)	1 (%5)	19 (%24)	
Total	47 (%65)	25 (%35)	72 (%100)	
a: row percentage b: column percentage				

While people say that diseases will be transmitted from animals to humans; they view poultry as less dangerous (P<0.001) (Table 5).

Most of the participants (87.50%) had never received any training on animal-borne diseases. Personal protective equipment; glove use was 36.10%; mask use was 27.80%; and the use of different clothes was 75%. About 13% of the participants did not use any personal protection equipment. Almost all of the participants (97.2%) said they washed their hands after handling animals, and 36.1% agreed that the new animal should be vaccinated against brucella (Table 5).

Table 5: Comparison of knowledge about disease transmission from animals to humans and knowledge on disease transmission from poultry.

Information about disease transmission from poultry	Knowledge that diseases can be transmitted from animals to humans		Total n(%b)	P
	Yes n(%a)	No n(%a)		
Yes	47 (98)	1 (%2)	48 (%67)	<0.001
No	16 (%67)	8 (%33)	24 (%33)	
Total	63 (%87.5)	9 (%12.5)	72 (%100)	
a: row percentage b: column percentage				

Between 1993 to 2012, 127 outbreaks (were linked to raw milk) had been reported to the US Centers for Disease Control and Prevention (CDC). Those outbreaks included about 1,909 illnesses and 144 hospitalizations. Most of those outbreaks were caused by: campylobacter, Shiga toxin-producing, *Escherichia coli* or Salmonella and the raw milk outbreaks also affect children (Rhodes *et al*., 2019).

Reported outbreaks are thought to represent the tip of the iceberg. It is thought that the use of raw milk puts livestock workers and those around them at risk of zoonotic diseases. It is known that raw milk is contaminated due to the animal's mammary or other diseases, environmental contamination, animal skin, insects, and dirty personal protective equipment. Milk is contaminated in this way and carries harmful bacteria such as campylobacter, Listeria, Brucella, *Mycobacterium bovis*, Salmonella, or *Escherichia coli* (Ergano *et al*., 2023). Brucella is a disease that remains important throughout the world, especially in developing countries. In Samady *et al*. (2024) study conducted on people living in a semi-urban area, it was determined that 34.8% of the individuals had never heard of brucella before, and 45.6% learned about brucellosis from their relatives or neighbors. Only 29.4% of individuals stated that brucellosis was transmitted to humans, 19.1% stated that animal-to-animal transmission could occur, and 13.3% stated that one of their household members was diagnosed with brucellosis by a doctor. It was determined that 38.5% of the individuals participating in the study bought unpasteurized milk and made dairy products themselves (Samadi *et al*., 2024).

In this study, about 35.70% of the participants answered no to the question " Can diseases be transmitted from raw milk ", and the fact that 53.8% of those who use raw milk were aware that diseases can be transmitted from raw milk reveals that the participants both do not have sufficient knowledge about these diseases and do not understand their importance ($p < 0, 05$).

Iraq is one of the countries where brucellosis is most common. While the number of cases increased between 2010 and 2004, it decreased in the second half of 2014. More than half of the cases (52.8%) were reported from the southern countryside. The decrease in the number of cases does not mean that an effective study is being carried out to control the disease. It is thought that the decrease in the population engaged in agriculture is also effective in this decrease (Alhamada *et al*, 2017).

The most important infection route for Brucella is thought to be the consumption of milk and dairy products such as raw milk and fresh cheese. In a study conducted in Iraq, the presence of brucella abortus, a brucella-type bacterium, was investigated in 202 cow milk samples collected from 14 central villages; Of 202 raw cow milk samples, 35 (17.32%) were identified as suspicious (Salih, 2010).

In this study, people were well informed that diseases could be transmitted from animals to humans (87.5%), but they were less aware that poultry were potential sources of infection (66.7% ($p<0.001$). Although there has been increased interest in recent outbreaks of diseases transmitted from poultry viruses transmitted from poultry and diseases transmitted from poultry such as bird flu are not a problem that has emerged for the first time. Bird flu virus, avian influenza, has always been a bird-borne disease. It emerged in 1918 with the H1N1 type under the name "Spanish Flu", in 1975 with the H2N2 type under the name "Asian Flu", and in 1968 with the H3N2 type under the name "Hong Kong Flu", and it has been shown that the agents of all three major epidemics were initially transmitted from birds. Nearly 40 million people lost their lives in the 1918 epidemic alone (EFSA, 2023).

However, in light of this information, this study revealed that those engaged in animal husbandry still do not have sufficient information about the potential threats to poultry.

It is observed that zoonotic diseases are not adequately evaluated from the perspective of occupational disease in those who work with animals.

In this study, the prevalence of disease transmission from animals was found to be 5.6%. Considering the literature, studies in this direction are limited. Occupational brucellosis cases were detected in 5 people working in a slaughterhouse in Mosul (Dahl, 2020).

There were 36 occupational brucellosis cases in Italy between 1996 and 2006, it has been emphasized that this zoonosis has decreased with the breeding of animals, the practice of occupational medicine, regional protection, the obligation to use personal protective equipment, and especially the mandatory participation in training on how to use them (Enkelmann *et al*., 2020). While 2159 cases of brucellosis were detected in Greece between 2003 and 2015; It was observed that 77.1% of the cases were related to the use of raw milk and livestock, and 87.7% of the cases were farmers and livestock breeders. It corresponds to a prevalence of 7.1 per 100,000 annually. However, other occupations have emerged with similar or higher risk: butchers and slaughterhouse workers (12.7 per 100,000), and laboratory staff (3.1 per 100,000), with the highest risk being veterinarians (53 per 100,000) have been detected (Pereira *et al*., 2020).

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