

## Assessment of Knowledge and Attitude of Population towards Brucellosis in the Riyadh Region, Saudi Arabia (2018-2019)

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### ABSTRACT

*Introduction:* Brucellosis is a zoonotic bacterial infection, caused by ingestion of unpasteurized milk or undercooked meat from infected livestock, or close contact with their secretions. Knowledge and awareness regarding brucellosis is essential for the implementation of control measures and consequently prevention of brucellosis. The study was designed to estimate knowledge and awareness regarding this disease among the high risk population.

*Objectives:* The study aims to identify the level of knowledge regarding brucellosis, to assess the attitudes of targeted population towards brucellosis and to determine misconceptions and malpractice associated with brucellosis in the Riyadh province of Saudi Arabia.

*Methodology:* This cross-sectional study was carried out to assess knowledge, attitudes practices, and misconceptions of the population towards Brucellosis in the Riyadh region. The data was collected by well-defined pretested questionnaire; SPSS was used for data analysis.

*Results:* The sample size calculated was 138. Participants demonstrated good knowledge regarding brucellosis and were near equal in their understanding of the causative agent (*Brucella* species) and its means of transmission from animals to humans. The majority (86.2%) of the participants would take actions to ensure the animal is healthy when they buy a new animal, and demonstrated good practices while handling the domesticated animals and their secretions.

*Conclusion:* Our study demonstrated good knowledge, attitude, and practice towards brucellosis among the population of the Riyadh region of Saudi Arabia.

**Key words:** Brucellosis, Knowledge Attitude and Practices (KAP), Riyadh region

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### INTRODUCTION

Brucellosis is caused by gram-negative bacteria "*coccobacilli*," from the genus *Brucella*, including different genetically similar types/strains, e.g. (*Brucella abortus*, *Brucella melitensis*, *Brucella suis*, and others), with varying reservoir hosts

[1]. Certain occupations show high risk for Brucellosis including dairy farmers, shepherds, Slaughterhouse workers, Veterinarians, Microbiologists, and others. Brucellosis is transmitted to people through direct contact and consumption of infected and contaminated animal and animal products, e.g. (unpasteurized infected milk, milk products, unlocked meat, urine, and genital organs, laboratory inhalation, accidental skin penetration, etc...) The commonly described reservoirs include sheep, camels, cattle and buffalo, and others.

Brucellosis is a multisystem disorder, usually presenting with a wide variety of signs and symptoms. The most common presentation is the fever of unknown origin. Followed by musculoskeletal system manifestations including arthritis and osteomyelitis and backache [2]. Chronic brucellosis may cause many complications, including endocarditis, epididymo-orchitis, meningitis, encephalitis, and others [3]. Brucellosis should be considered in every child living in an endemic area, showing symptoms of fever and having a history of ingestion of raw milk and dairy product and/or animal contact. Prevention should rely on the health education of the public about different issues of the disease, including boiling raw milk [4].

One of the most devastating effects of the disease is the economic burden on society, and it costs billions of dollars in treatment and eradication. Purifying milk is a viable way to eradicate Brucellosis. This precautionary measure isn't routinely practiced even in well-developed countries as a result of social norms and malpractices, and unawareness of the risks of not understanding these malpractices [5]. For a control and prevention program to be effective, it is essential to raise awareness and knowledge about the acquisition, transmission, clinical manifestations and complications of the disease and identifying misinformation and malpractices associated with it [6]. In developing nations, misguided information about *Brucella's* actual incidence and prevalence emerge from underreporting and deficient surveillance programs. All add to brucellosis becoming a national health problem. The incidence of Brucellosis is estimated to be 500,000 human cases worldwide each year [7]. World health organization (WHO) and Food and Agriculture Organization (FAO) documented the highest incidence of Brucellosis in KSA in comparison to other countries in the region [2,8]. The prevalence of brucellosis in the patients studied by serological tests in Sudair and Riyadh region is 8.8% and 9%. [9,10]. However, despite the efforts to control it, the level of awareness, existing knowledge, and practice among the target population is insufficient, especially in the target region (Riyadh & Sudair region), which is an area that is rich in pastures and livestock and many people come in close contact with these

animals. In response to this problem, our study proposes several parameters for assessment of the current situation of brucellosis to draw attention and raise awareness about brucellosis as a way to prevent and control it.

## METHODOLOGY

### Study design

The proposed design for this project was an observational, cross-sectional study to determine the knowledge and attitude of the population towards brucellosis in the Riyadh region, Saudi Arabia.

### Study area

This study has been conducted in the Riyadh region, Saudi Arabia. Riyadh region called Al-Wosta, located in the center of Saudi Arabia. It has an area of 404,240 km<sup>2</sup>. It is the second-largest province in terms of both area and population.

### Study population

The study population included Herders, Butchers, slaughter-house workers, and Meat processing workers in Riyadh region, Saudi Arabia.

### Sampling

#### Sample type

Stratified random sampling has been considered in this study in the selection of certain risks related to occupations.

#### Sample size

The sample size of this study has been calculated by the following formula

$$n = Z^2 pq / d^2 = Z^2 P(1 - P) / d^2$$

(Where, n=Sample size, Z=Standard deviate, P=Prevalence, Q=1-p, d=Error accepted)

The prevalence (P) was calculated as 10%.

With reference to the above-mentioned formula and other studies done previously, we decided that the size of the study sample should be around 138.

### Duration of the study

The total scheduled duration for this study lasted for around six months, including the data collection and processing.

### Data collection

A pretested and well-designed preformed questionnaire has been used to collect data for assessing knowledge, attitudes practices,

and misconception of the population towards Brucellosis in the Riyadh region.

#### Data analysis

All the data have been entered and analyzed by computer using the SPSS software version 25, and statistical analysis has been applied.

#### Ethical concern

The ethical approval has been obtained from Majmaah University ethical committee. Informed consent has been obtained from the participating individuals with the assurance of confidentiality of all given information.

### RESULTS

Table 1 summarizes the demographic profile of the participants.

Participants were near equal in their knowledge about the bacteria *Brucella*. 51% (n=71) they heard about the bacteria *Brucella*, and 48.6% (n=67) said no. Also, 64.5% (n=89) of them heard of the disease Brucellosis, and 35.5% (n=49) said no. However, the majority of participants, 97.1% (n=134), believe that humans can be infected with Brucellosis, and the rest of them said no. Also, most of the participants, 74.6% (n=103), know how the brucellosis transmits from animal to human, and the other 25.4% (n=35) didn't

know-how. Many of the participants, 64.5% (n=89) they denied their knowledge about any national program concerning Brucellosis. And 35.5% (n=49) they know about program almost half of the participants, 48% (n=67), know about the treatment of brucellosis, and another half 51.4% (n=71) don't know. Near equal of participants, 52.2% (n=72) know about the existent of vaccination for Brucellosis in livestock, and the other 47.8% (n=66) didn't know. Most of the participants 62.3% (n=86) have been not told by the veterinarian that some of their sheep, goats, or cows have had Brucellosis, and the rest of the 37.7% (n=52) have been told. Most of the 63.0% (n=87) didn't vaccinate them against Brucellosis, and the other 37.0% (n=51) they vaccinated cattle (Table 2).

The majority of participants [n= 119 (86.2%)] persons would take actions to assure the animal is healthy when they want to buy a new animal, while 19 (13.8%) participants don't take any steps to ensure the animal is healthy. Table 3 shows that 88 (63.8%) of the participants would like to receive more information about brucellosis, while 55 (36.2%) of all participants show no interest in receiving more information about brucellosis.

The majority of participants wash their hands after milking livestock about 80.4%, while 19.6%

Table 1: Demographic distribution.

Demographic	Frequency	Percent
<b>Name of city or village</b>		
Al Majmaah	91	65.90%
Zulfi	5	3.60%
Al Artawyh	16	11.60%
Tumair	4	2.90%
Riyadh	19	13.80%
Other	3	2.20%
<b>Sex</b>		
Male	138	100.00%
Female	0	0.00%
<b>Nature of handling</b>		
Owner	76	55.10%
Butcher	13	9.40%
Herders	44	31.90%
Slaughter-house worker	5	3.60%
<b>Nationality</b>		
Saudi	88	63.80%
Non-Saudi	50	36.20%
<b>Type of livestock</b>		
Cows	7	5.10%
Camels	41	29.70%
Sheep	44	31.90%
Goats	3	2.20%
Mix	43	31.20%

**Table 2: Knowledge regarding brucellosis.**

Statement	Frequency	Frequency	Percent	Percent
	Yes	No	Yes	No
Have you ever heard about the bacteria <i>Brucella</i> ?	71	67	51.4	48.6
Have you heard of the disease Brucellosis?	89	49	64.5	35.5
Can a human being infected with Brucellosis?	134	4	97.1	2.9
Do you know how brucellosis is transmitted from animal to human?	103	35	74.6	25.4
Do you know if there is any national program concerning Brucellosis?	49	89	35.5	64.5
Do you know if there is any treatment for Brucellosis in cows/sheep/goats?	67	71	48.6	51.4
Do you know if there exists any vaccination for Brucellosis in livestock?	72	66	52.2	47.8
Have you been told by the veterinarian that some of your sheep/goats or cows have had Brucellosis?	52	86	37.7	62.3
Are your cattle vaccinated against brucellosis?	51	87	37	63

**Table 3: Attitude regarding brucellosis.**

Statement	Frequency yes	Frequency no	Percent (Yes)	Percent (No)
If you buy a new animal, do you take any actions to ensure the animal is healthy?	119	19	86.2	13.8
Would you like to receive more information on brucellosis?	88	50	63.8	36.2

**Table 4: Practice regarding brucellosis.**

Statement	Frequency yes	Frequency no	Percent yes	Percent no
Do you wash your hands after milking livestock?	111	27	80.4	19.6
Do you sell fresh milk or dairy products on a regular basis?	22	116	15.9	84.1
Do you drink raw milk? "Without boiling/pasteurizing."	68	70	49.3	50.7
Does the nutritional value change after boiling milk?	41	97	29.7	70.3
Do you boil the milk before selling it or consuming it?	87	51	63	37
Have you had any abortions or stillbirth among your cattle during the last year?	63	75	45.7	54.3
Do you cock meat or consume raw?	126	12	91.3	8.7

do not wash their hands after milking animals. Most of the participants do not sell their products on a regular basis, about 84.1% whereas 15.9% sell their products. 49.3% of participants drink fresh milk without pasteurizing, while 50.7 participants drink fresh milk with pasteurization. The majority of participants believe the boiling of milk does not change their nutritional value about 70.3%, while 29.7% believe boiling of milk changes their nutritional value. Most of the participants boil the milk before selling it or consume it about 63%, while 37% do not boil the milk before selling it or consuming it. More than half of participants have not had any abortions or stillbirth among their cattle during the last year, about 54.3%, while 45.7% have had abortions or stillbirth among their cattle in the previous year. The majority of participant cock meat 91.3%, while 8.7% does not cock meat (Table 4).

## DISCUSSION

Educating occupation-related risk groups about brucellosis is integral to effective control of this disease [11]. Accordingly, assessing the knowledge regarding this disease among the high-risk population is a starting point for the implementation of efficient control programs

[12]. This current study is concerned with the knowledge and information regarding brucellosis among workers and dealers who are associated with livestock businesses that necessitate direct contact with animals in Saudi Arabia's Riyadh region. The level of knowledge about an etiological agent by its self was about 51% of all participants, while 64.5% of the participant was aware of the disease brucellosis. Almost half of the participant was not knowledgeable about the treatment, (48.6%) or animal vaccination (52.2%) This half figure regarding knowledge about brucellosis is similar to a meta-analysis conducted by Zhan et al. This author did a first-ever global systematic review to explore knowledge related to brucellosis. This meta-analysis assessed seventy-nine original articles from across the globe. Generally, close to half of the risk groups knew about the etiological agent and the disease, indicating insufficient knowledge. Participants might have heard of the disease but do not have a clear understanding of it. This elucidates that the participants in this study and people across the world have inadequate knowledge regarding brucellosis, which entails an obstacle for its elimination and control. This low level of knowledge implicated in this study is thus of significant public health

importance. 64.5% were not aware of any national programs about brucellosis reflecting reduced health care attention and efforts as well as communication gap and ineffective transfer of knowledge [13].

This study also revealed that most of the participants (63.8%) displayed a high level of interest and a positive attitude towards protecting themselves against brucellosis and are willing to receive more information about the disease. The majority of participants (86.2%) would take actions to ensure the animal is healthy when they buy a new animal

Generally, the study implicates that increasing the level of knowledge among livestock handlers must be an essential goal, as well as fulfilling the responsibilities of health care organizations toward people who are willing to receive the appropriate information about brucellosis. A positive attitude of avoiding certain high-risk practices associated with *brucella* transmission was seen among the participant in this study. The majority wash their hands after milking livestock (80.4%). 50.7% drink milk only after pasteurization and a majority cook meat before consumption (91.3%).

Identification of high-risk practices associated with brucellosis is crucial to implement efficient control and prevention strategies [14]. Unluckily, the lack of a clear cut policy to identify risk factors is the most critical reason for disease persistence in many countries [15]. The increased consumption of unpasteurized dairy products is still responsible for the high prevalence of brucellosis in many communities. Besides, close contact with domesticated animals and contact with their secretions is another important risk factor [16]. Consumption of Unpasteurized dairy products and illegal sale of contaminated dairy products have been responsible for brucellosis outbreaks in Morocco and Spain [17-19]. It has been proven that implementing policies to control the unlawful purchase of raw and contaminated milk could effectively reduce the spread of human brucellosis [20]. Another study highlighted the importance of reduction of brucellosis in animals by controlling abortion rates and avoiding mixing small livestock and cattle [15]. Slaughtering an infected animal is another high-risk practice [21]. Educating

people at risk about handling slaughtered meat and disposing of sick animals, placenta, and aborted fetuses are required to decrease the transmission of the disease. The positive attitude shown towards the use of gloves for protection should be noted by the relevant authorities, and cattle keepers should take responsibility for using gloves as a measure of protection.

The willingness of participants to help improve, and keep the environment of livestock handling and consumption better and safe was the most crucial factor that helped in this study. A small portion of participants provided information that was misleading or contradicting. Riyadh region is an excellent specimen for such a survey due to the increased level of relying on livestock for consumption, or businesses [22].

In conclusion, people who are associated with livestock handling or consumption are mostly aware of the disease brucellosis. However, they do not have as much knowledge as what is required to help control it. Health care organizations must take action to increase the level of awareness and understanding by providing programs or any other method that can be helpful.

#### CONCLUSION

Our study demonstrated good knowledge, attitude, and practice towards brucellosis among the population of Saudi Arabia.

#### LIMITATIONS

The limitations we faced were time constraints. The other restrictions were language difficulties and small sample size.

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