

Brucellosis trends in Majmaah city, Riyadh, Saudi Arabia: A trend of 5-year retrospective study (2016-2020)



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ABSTRACT

Brucellosis, also called Malta fever, is a contagious disease caused by *Brucella* species and can affect one or more organs of the body. Globally, the number of brucellosis cases in the past five years (2016-2020) is 500,000 infections per year. However, in Saudi Arabia, infections of brucellosis are extremely low in the same past five years with a range of 4,167 infections per year. Therefore, the goal of conducting this cross-sectional study is to measure the prevalence and incidence rates of brucellosis in the past five years (2016-2020) in Majmaah city in Saudi Arabia and compare these rates with national rates of brucellosis in Saudi Arabia. Data of all patients of brucellosis in King Khaled hospital for the past five years (2016-2020) were collected from the hospital's archives. Statistical analysis system software (SAS version 9.4) was used to clean, edit, and analyze these row data. As a result, incidence rates of brucellosis in Majmaah city in the last five years has been increased and decreased similarly in the line of Saudi Arabia. In 2016, in incidence rate was 78.27 and increased to 90.15 per 100,000 population in 2018. In 2020, that rate has decreased to 62.19 per 100,000 population. This cross-sectional study concluded that brucellosis infection rates among the population of Majmaah city are consistent with brucellosis infection rates in Saudi Arabia.

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1. Introduction

Brucellosis, also known as Malta fever, is a contagious disease that can affect one or more organs of the body including; the central nervous system, reproductive system, liver, and heart (Di Pierdomenico et al., 2011; CDC, 2021). Brucellosis is caused by bacteria called *Brucella*, especially *Brucella melitensis* in humans (Wyatt, 2005; Beeching, 2018). Even if brucellosis has a history of minimal mortality, it causes many serious complications to those affected organs of the body (Pappas et al., 2006; Khan and Zahoor, 2018). These complications include endocarditis, epididymitis, arthritis, the nervous system, liver, and spleen inflammation (Williams, 1973; Gerada and Beeching, 2016). Transmission of brucellosis can be through three ways including; getting undercooked meat or unpasteurized dairy products, inhalation of *Brucella* species, or contamination of skin wounds or mucous

membranes by *Brucella* species (Ramin and MacPherson, 2010; CDC, 2021).

Brucellosis can be diagnosed by signs and symptoms along with other medical exams (Ryan et al., 2019; CDC, 2021). Signs and symptoms of brucellosis include fever, general fatigue, and sweating, pain in joints, headache, malaise, pain in muscles, anorexia, pain in the back. Other medical exams include echocardiography, cerebrospinal fluid culture, magnetic resonance imaging, computerized tomography, and X-rays (Franco et al., 2007; Harrison and Posada, 2018; CDC, 2021). Finally, mortality of brucellosis is very rare, which is less than 2% of brucellosis cases, and treatment may take from weeks to a few months (CDC, 2021; Hayoun et al., 2022). Even if brucellosis does not have a high mortality rank, it is a serious disease that has to be concerned. Globally, the number of brucellosis cases in the past five years is 500,000 infections per year (WHO, 2020; Hayoun et al., 2022). The population of Saudi Arabia is 35,013,414 people (GAS, 2022). According to the Saudi Ministry of Health (MOH), infections of brucellosis are extremely low in the past five years (2016-2020). However, in 2016. The reported cases of brucellosis were 4,062 (MOH, 2022). In 2017, this number increased to 4,692 cases (MOH, 2022). Also, this number kept increasing to 5,455 cases in 2018 (MOH, 2022). However, in 2019,

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the cases of brucellosis decreased to 4,257 cases and 2,372 cases at the end of 2020 (MOH, 2022).

Moreover, it is important to educate the local community about the status of the disease as well as how to prevent that disease. Prevention of brucellosis is basically avoiding the causes of the disease including; undercooked meat and unpasteurized dairy products, avoiding inhalation, and contacting *Brucella* species (Zheng et al., 2018; Glynn and Lynn, 2008). Finally, the goal of conducting this cross-sectional study is to describe the prevalence and incidence trends of brucellosis in the past five years (2016-2020) in Majmaah city, Saudi Arabia, and compare these prevalence and incidence rates with national rates of brucellosis in Saudi Arabia.

2. Materials and methods

Majmaah city is considered one of the largest cities in the Riyadh region located about 180KM from the capital city of Saudi Arabia with a population of 143,089 people (GAS, 2022). This cross-sectional study was conducted in King Khaled hospital, which is the only main hospital in Majmaah city. As a result, from the past five years (2016 to

2020), all medical records for individuals with brucellosis in this research were registered at King Khaled Hospital. This research got the permission from Saudi Ministry of Health, and the author has a bioethics certificate from King Abdulaziz City for Science and Technology. Finally, all patients' information is extremely protected and secured.

All patients of brucellosis data in King Khaled hospital for the past five years (2016-2020) were collected from the hospital's archives as raw data with Excel software. These data include patients having brucellosis, gender, age, and patient gender. Finally, Statistical Analysis System software (SAS version 9.4) was used to clean, edit, and analyze these row data.

3. Results

During the past five years (2016-2020) different cases of brucellosis have been reported at King Khaled Hospital in Majmaah city. In 2016, reported cases of brucellosis were 112 cases, and this number has increased to be the highest reported number during those past years reaching 129 cases in 2018. However, this number has decreased to 71 cases in 2020 for both genders (Fig. 1).

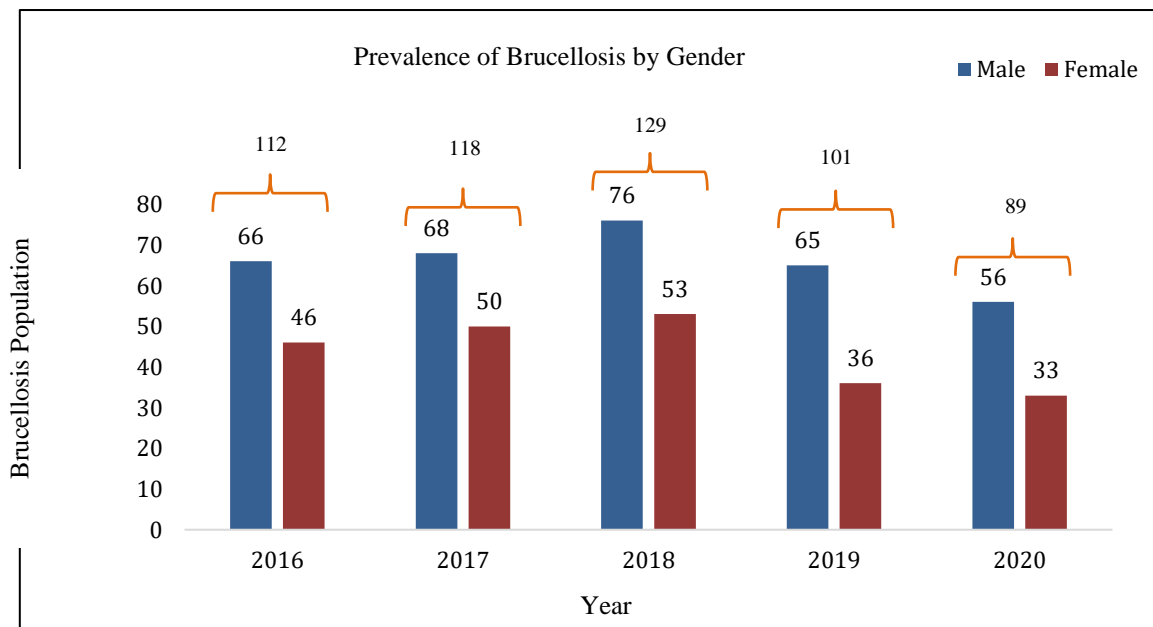


Fig. 1: Prevalence of brucellosis by gender in Majmaah city (2016-2020)

During the past five years (2016-2020) in Majmaah, the increasing and decreasing reported

numbers of brucellosis cases were in both genders as well as different stages of age (Table 1).

Table 1: Cases of brucellosis in Majmaah by age during the past five years (2016-2020)

Year	Cases of brucellosis										Total cases in all 5 years	
	2016		2017		2018		2019		2020		M	F
Gender	M	F	M	F	M	F	M	F	M	F	M	F
Age												
≤ 18	3	3	3	3	4	4	2	3	2	3	14	16
19 - 30	15	10	16	11	18	12	14	9	12	8	75	50
31 - 40	11	7	11	8	13	8	10	5	9	4	54	32
41 - 50	17	13	18	13	19	14	16	10	14	9	84	59
51 - 60	12	7	12	8	13	9	12	5	11	5	60	34
61 - 70	5	3	5	4	5	4	6	2	5	2	26	15
≥ 71	3	3	3	3	4	2	5	2	3	2	18	12
Total of Cases	66	46	68	50	76	53	65	36	56	33	331	218
	112		118		129		101		89		549	

M= Male/F=Female/Mean of age in males=(44)/Mean of age in females=(41)

Also, as a result, the incidence rates for brucellosis increased and decreased in the past five

years (2016-2020) in Majmaah as in the entire of Saudi Arabia (MOH, 2022) (Fig. 2).

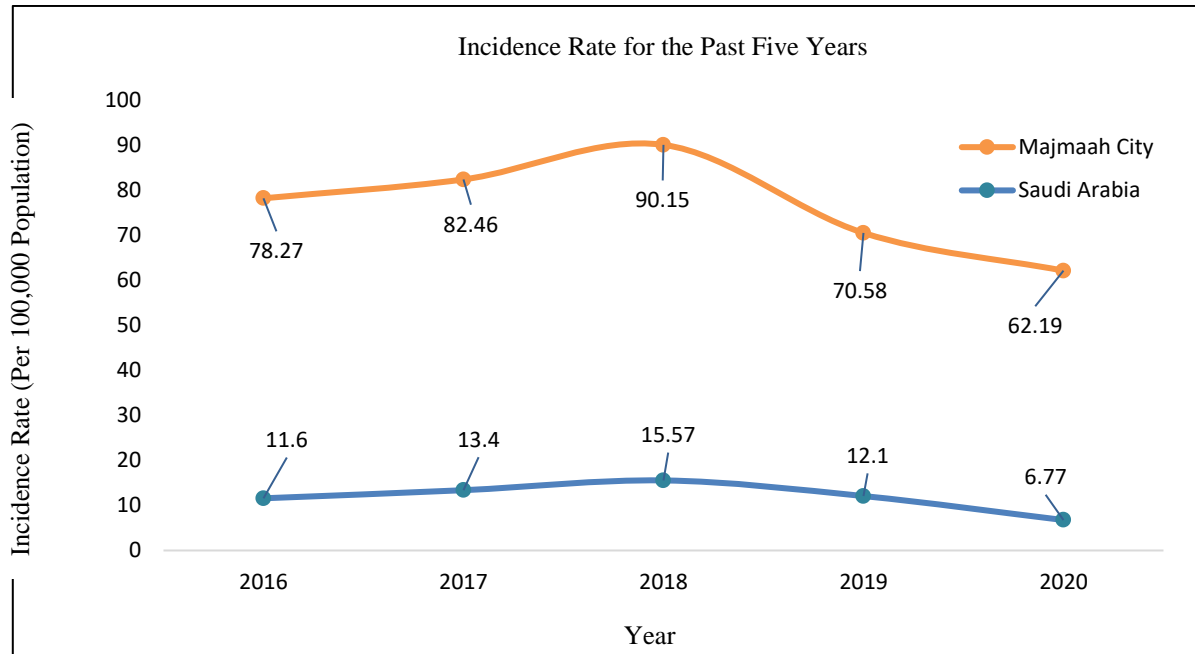


Fig. 2: Incidence rates of brucellosis in Majmaah city and Saudi Arabia (2016-2020)

4. Discussion

Majmaah is one of Saudi Arabia's largest cities, located in the Riyadh area. A disease such as a brucellosis is also regarded as a medical concern to any population. So, for the medical institution in any city with a population of 143,089 people, assessing the prevalence and incidence rates of this condition is critical as well as medically educating the community.

In epidemiology and etiology, prevalence and incidence rates are extremely important measures of any disease in any community (Ward, 2013). The prevalence rate is measuring the spread of an exact disease in a particular population at a certain time while the incidence rate is measuring new cases of that exact disease in that particular population at that time (Ward, 2013).

Therefore, the goal of conducting this cross-sectional study is to measure the prevalence and incidence rates of brucellosis in the past five years (2016-2020) in Majmaah city in Saudi Arabia and compare these rates with national rates of brucellosis in Saudi Arabia.

In general, during that period of time, there was a total of 549 reported cases of brucellosis in Majmaah city. 60.29% of these cases were males and 39.70% were females. The age groups are ≤ 18 years, 19-30 years, 31-40 years, 41-50 years, 51-60 years, 61-70 years, and ≥ 71 years constituted 5.46%, 22.75%, 15.66%, 26.04%, 17.12%, 7.46%, and 5.46% respectively (Table 1).

According to the Ministry of Health in Saudi Arabia (MOH), prevalence rates for brucellosis were increased and decreased in the past five years (2016-2020) in Saudi Arabia. The reported cases in 2016, 2017, 2018, 2019, and 2020 constituted 4,062

cases, 4,692 cases, 5,455 cases, 4,257 cases, and 2,372 cases respectively (MOH, 2022).

Similarly, to the country, Majmaah city is in a line facing increasing and decreasing brucellosis prevalence rates during the past five years. The reported cases in 2016, 2017, 2018, 2019, and 2020 constituted 112, 118, 129, 101, and 89 cases respectively (Table 1).

Also, according to the Ministry of Health in Saudi Arabia (MOH), incidence rates for brucellosis were increased and decreased in the past five years (2016-2020) in Saudi Arabia. Incidence rates per 100,00 population in 2016, 2017, 2018, 2019, and 2020 constituted 11.6, 13.4, 15.57, 12.1, and 6.77 respectively (Fig. 2) (MOH, 2022).

Similarly, to the country, Majmaah city is in a line facing increasing and decreasing brucellosis incidence rates during the past five years. Incidence rates per 100,00 population in 2016, 2017, 2018, 2019, and 2020 constituted 78.27, 82.46, 90.15, 70.58, and 62.19 respectively (Fig. 2).

5. Conclusion

In conclusion, incidence rates of brucellosis in Majmaah city in the last five years has been increased and decreased similarly in line with Saudi Arabia. In 2016, in incidence rate was 78.27 and increased to 90.15 per 100,000 population in 2018. In 2020, that rate has decreased to 62.19 per 100,000 population. Therefore, the trends of brucellosis among the population of Majmaah city are consistent with brucellosis trends in Saudi Arabia. Finally, knowledge of brucellosis including causes, risk factors, transmission, complications, and prevention as well as the medical statistics must be

delivered to the community to avoid and prevent the disease.

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Compliance with ethical standards

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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