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BRUCELLOSIS;

BRUCELLOSIS AMONG CLINICALLY SUSPECTED PATIENTS ATTENDING A GENERAL HOSPITAL IN MAJMAAH SAUDI ARABIA

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ABSTRACT... Background: Human brucellosis is a zoonotic infectious disease transmitted from domesticated animals to humans. It remains a major public health problem in Saudi Arabia where 7% of the population still maintains a nomadic life style with domestication of animals. **Objectives:** This study aims to discover the prevalence of brucellosis and *Brucella* among patients attending a district government hospital in Majmaah, kingdom of Saudi Arabia. **Period:** 2 years (from 1st February 2016 to 31st January 2018). **Design:** Cross sectional descriptive. **Settings:** King Khalid Hospital, Al Majmaah, Saudi Arabia. **Materials (Patients) & Methods:** Total 1098 serum samples from the patients with clinical suspicion of brucellosis were screened with rapid slide agglutination test (crescent diagnostics Jeddah) for *Brucella* antibodies and later confirmed by Serum Tube Agglutination Test. **Main Outcome Measures:** The result of our study showed that the prevalence of brucellosis among patients attending our study is 9.1%. **Results:** 100 individuals were found to be seropositive with titers $\geq 1:160$. The result of our study showed that the prevalence of brucellosis among patients attending our study is 9.1%. The Majority of the patients presented to the medical OPD and orthopedic unit of the hospital. The prevalence of disease in males was found to be higher as compared to females in the current studied group. The age group 21- 40 years, was found to be far more susceptible to this infection. Majority presented with fever and musculoskeletal complaints. The total seroprevalence rate calculated for the patients attending our hospital is 26.50%. **Conclusion:** Frequent serological surveillance should be carried out in areas that are endemic. Screening of risk groups, imported animals and household members of active brucellosis must be undertaken. This is a crucial epidemiological move allowing for timely diagnosis and control of disease. **Limitations:** Our prevalence rate represents a specific segment of the population (i.e., those attending the hospital) and not the general population.

Key words: Human Brucellosis, Seroprevalence.

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INTRODUCTION

Human Brucellosis is a microbial infection caused by gram negative bacteria belonging to the genus *Brucella*.¹ It is among the most common zoonotic infections. Shepherds, veterinarian, farmers, abattoir workers in endemic areas are exposed to this disease because of their occupational contact with infected animals.² The genus *Brucella* is divided into several nomen species based on preferred natural hosts and biological characters. *Brucella* species causing disease in humans are *Brucella melitensis* (goats and sheep and camel as reservoirs), *B. abortus* (animal reservoirs in cattle), and *Brucella suis* (animal reservoirs in swine).³

The disease is transmitted from infected animals to humans via direct contact through cuts or abrasions in the skin, by inhalation of infectious aerosols, or by ingestion of raw meat and dairy products.⁴

Although the occurrence of brucellosis is worldwide, it is a significant health problem and economic burden in Mediterranean countries hence called Mediterranean fever.⁵

In Middle Eastern countries, any individual with long standing fever and having difficulty walking into the physician's office would be regarded as

having brucellosis until proved otherwise⁶

The diagnosis of brucellosis is usually clinical and serological. The diagnostic criteria set by CDC north Atlanta is illness associated with fever and clinical suspicion of brucellosis (symptoms of weakness, muscle /joint pains, fatigue, anorexia, chills, sweats, weight loss, etc.) and Brucella antibodies titer by tube agglutination test $\geq 1:160$. A positive blood culture makes a definitive diagnosis.⁷ Serological diagnosis is by detecting agglutinating antibodies (IgA classes, IgG, and IgM).⁸ The most often used serological tests are usually Rose Bengal test, rapid slide agglutination test and the tube agglutination test, complement fixation test, and ELISA.⁹

Brucellosis although controlled in many of the developed and industrialized countries, is a significant economic burden, public health problem and a notifiable disease in Saudi Arabia. About 7 % of the Saudi population maintains a nomadic lifestyle. Meat and dairy products from domesticated animals is a primary staple food of the country.¹⁰ According to World Health Organization report on Brucellosis in 1998, Saudi Arabia had the highest incidence of human brucellosis in the eastern Mediterranean region.¹¹ The disease has an annual incidence of 8-50 cases/ 10^5 population.⁴

The study had its focus on Majmaah city which is a governorate in Riyadh province with a small population of 45,000. The city is the largest in the Sudair region, and King Khalid hospital is the main hospital in Majmaah providing specialized and primary services to the population of Majmaah and its surrounding towns and villages.

MATERIALS AND METHODS

This study was conducted at King Khalid hospital Majmaah, Saudi Arabia. The study period is 2 years (from 1st February 2016 to 31st January 2018).

Cases were diagnosed based on clinical presentation. Name, age, sex, and hospital numbers were recorded. Blood Specimens were collected by experienced staff from patients and

sent to the microbiology laboratory.

Each blood sample was centrifuged, and serum separated for analysis.

Febrile antigen tests were used in the detection of antibodies produced. Febrile Antigens are killed S-phase bacteria, which are stained to help read an agglutination reaction.

The patient's serum is tested for anti Brucella antibodies by reacting with these stained suspensions in both slide and tube agglutination methods. The rapid slide test is a qualitative test and used as a screening tool especially when large numbers of specimens have to be examined. The tube test is a quantitative test and used to confirm positive results, by the slide test.

In Rapid Slide screening method one drop each of patient serum to be tested ($50 \mu\text{l}$) was placed on reaction circle of the card. One drop ($50 \mu\text{l}$) of the appropriate febrile antigen suspension provided by the crescent diagnostic Jeddah was added using the reagent dropper. Contents were mixed uniformly rocked gently, back and forth, to observe for agglutination macroscopically at one minute.

In tube agglutination method serial dilutions of patient's serum (1/20,1/40, 1/80,1/160, 1/320,1/640 ,1/1280,1/2560 and 1/5120) were made in separate test tubes using normal saline. To all the tubes 1 drop of appropriate febrile antigen suspension was added, and tubes were incubated at 37 °C overnight. Agglutination was observed macroscopically in each tube of the dilution series. The titer of the patient serum using febrile antigen suspensions is the highest dilution of the serum sample that gives a visible agglutination. Titers $\geq 1:160$ were indicative of infection according to the manufacturer's instruction.

RESULTS

Total 1098 serum samples were sent to the microbiology department of King Khalid hospital Majmaah during the study period. 291 patients (26.50%) were found positive with a rapid slide

agglutination test. They were subjected to the tube agglutination titer. Anti-Brucella antibodies titer $\geq 1:160$ was observed in 100 (9.1 %) cases.

Age and gender distribution of these patients are given in Table-I.

Males outnumbered the females. Majority of the samples (i.e., 68) were sent from the medical unit (both outpatient and inpatient), 15 samples were sent from the orthopedic unit, 5 from urology department, 4 from surgical unit, 4 from the pediatric ward, 2 from obstetrics and gynecology unit and 2 from the emergency department.

Distribution of the tube agglutination titers in the patient's positive for Brucella antibodies is shown in Table-II.

90 patients had a titer of 1:20, 94 patients had a titer of 1:40. Thus giving an overall seroprevalence of 26.50% among the patients.

The presenting complaints for majority of the patients was fever (n=29), arthralgias (n=21), backache (n=19), body aches (n=17), myalgias (n=15) and abdominal pain (n=14). Few patients had symptoms related to genitourinary tract including testicular mass and pain (n=9) (because of orchitis, epididymitis), infertility (n=4), dysuria (n= 4). Other symptoms and signs recorded were fatigue, sweating, chills, and rigors, headache, depression, weight loss, cough, vomiting, diarrhea, and lymphadenopathy.

Characteristic		N	%
Gender	Male	69	69%
	Females	31	31%
Age group(years)	1-10	6	6%
	11-20	9	9%
	21-30	23	23%
	31-40	23	23%
	41-50	19	19%
	51-60	7	7%
	61-70	5	5%
	Nonspecified	8	8%
	Total	100	100%

Table-I. Age and gender distribution of patients

Tube Agglutination Titer	Number of Patients	Percentage
1:5120	3	3%
1:2560	1	1%
1:1280	25	25%
1:640	27	27%
1:320	23	23%
1:160	22	22%
1:80	42	42%
Total	100	100%

Table-I. Age and gender distribution of patients

DISCUSSION

Brucellosis is an endemic and major zoonosis in the middle eastern and Mediterranean regions.⁵ Saudi Arabia being part of the region gets share burden of the disease. Brucellosis is a significant public health problem and a notifiable disease in the country. Factors implicated in the prevalence of the disease include the nomadic lifestyle of the sizeable portion of the country's population and its dietary habits.¹⁰ The prevalence also correlates with the ritual sacrifice of livestock at annual hajj and al Adha festival. The sacrificial animals which are imported are poorly screened for the infection.¹²

Brucella is difficult to culture and a laboratory hazard. Despite advancements in the diagnostic techniques of brucellosis including PCR and automated blood culture methods, the serological diagnosis remains the mainstay of diagnosis in most of the world.¹³

The problem of defining a serological cut off titer indicative of active infection has yet to be solved. With each individual producing a different antibody response. Some individuals develop high values, while others develop low titers even with active disease. Many authors consider a titer of 160 (200 IU) or more along with clinical suspicion to be diagnostic of the disease.¹⁴

The overall prevalence of human brucellosis in the present study was 9.1%; these patients fulfilled the diagnostic label of brucellosis which is clinical suspicion and titer of 160 or more. This correlates with an earlier hospital-based study undertaken at the Armed Forces Hospital, Riyadh, KSA. In

this study, a total of 1733 samples were tested, and 153 (8.8%) were positive.¹²

The total seroprevalence rate calculated for the patients attending our hospital is 26.50%. In an earlier large-scale study, conducted in 1999 by Al-Sekait MA, the seroprevalence rate among the general population of Saudi Arabia was 15%.¹⁰ Our seroprevalence rate is higher because it is among a specific segment of the population (i.e., those attending the hospital) and not the general population. Large population-based studies are recommended to calculate recent seroprevalence in the Saudi population.

Data from other middle eastern countries shows a seroprevalence rate of 29.3% in Iraq, 12% in Kuwait, 4.1 % in Jordan, 1.2 % in Oman, 5.4 % in Turkey and 0.03 % in Egypt among the general population¹⁵.

In our study males outnumbered the females (2: 1). This gender distribution in the occurrence of *Brucella* infection may be because of occupational exposure of men to infected animals. Men are more involved in out door activities such as handling and slaughtering of livestock. This finding is observed in other regional studies as well.^{13, 16} However, study conducted by Al Mofleh et al, observed a higher infection rate among females associated with the risk factor of females milking the animals in the study areas.¹⁷

The age group observed most commonly in our study was between 21-50 years. This is also expected because of more extended occupational exposure of this age group to the infected animals and agrees with earlier studies.¹² There were fewer cases in children (6%) in our study which is in contrast, to study by *Fallatah et al.* in northern Saudi Arabia where 20% of the cases were children.¹⁶

Fever and musculoskeletal signs and symptoms were the predominant presenting complaints in our study. This finding is similar to other studies done in endemic regions.^{10,12,13,16,17}

Our study adds to the available information about

the prevalence and population characteristics of brucellosis with reference to the Sudair region of Saudi Arabia in particular.

CONCLUSION

Frequent serological surveillance should be carried out in areas that are endemic. Screening of risk groups, imported animals and household members of active brucellosis must be undertaken. This is a crucial epidemiological move allowing for timely diagnosis and control of disease

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Most of our problems are because we act without thinking or we keep thinking without acting.

– Unknown –

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AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
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2	Syed Yousaf Kazmi	Acquisition of data, analysis and itnepretation of data.	
3	Muhammad Asad Farhan	Approval of version of the manuscript to be publish,	
4	Usama Bin Ghaffar	revising the manuscript.	
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