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Seroprevalence and distribution of brucellosis in major blood groups in suspected females population of Dir Lower Khyber Pakhtunkhwa, Pakistan

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Abstract

Brucellosis is a zoonotic disease caused by Brucella. People working in farm houses, close contact with cattle's and butcher are mostly infected brucellosis. It is common all over the world with variable prevalence and major public health concern. Infectious diseases are also associated with blood groups. The relationships of cholera, malaria and other have been reported earlier. However there is less information regarding prevalence of brucellosis and their relationship with blood groups. The present study was designed to investigate the prevalence, and genetic relationship of brucellosis with blood groups. Tube agglutination test was used to find the positive cases of brucellosis among the suspected population. Tube agglutination test was used to find out blood groups of the participant. A total of 200 suspected brucellosis patients were enrolled in the study. All of them were females and ages range from 15 years to 43 years. Among 200 participants n=60(30%) were seropositive for Brucella. In case of Rh positive n=29 (15.67%) were positive for Brucella Abortus, n=26 (14.05%) for Brucella Melitensis and n=130(70.27%) were negative. Among Rh negative group n=2 (13.33%) were positive for Brucella Abortus, n=3(20.05%) for Brucella Melitensis and n=10(66.66%) were negative. Collectively blood group "B" is more prone to brucellosis while Blood group "O" is least prone to brucellosis. In case of Rh blood groups, Rh positive is more prone to infection as compared to Rh negative.

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Introduction

Brucellosis is a zoonotic disease caused by bacteria of genus Brucella. The disease is found in both domestic and wild animals. Brucellosis is a common infectious disease found all over the word predominantly prevalent in Latin America, Asia and Middle East. It is second major zoonotic disease in North African countries (Aggad & Boukraa, 2006). Brucella are microscopic, non-motile, non-spore forming facultative gram negative intra-cellular coccobacilli (Moreno & Moriyon, 2002). Brucellosis may be symptomatic or asymptomatic and the incubation period varies from one to five week depending upon the infectivity dose and immunity of the host. Symptoms include intermittent fever sweating, anorexia, arthalgia, headache, weight loss, general body pain, edema and spondylitis (Corbel M, 2006). Transmission of Brucella infection is facilitated by, use of unpasteurized milk and dairy products, careless husbandry practices and socio economic position. Humans are infected from contaminated pets and very rarely from humans. Animals are infected by inhaling organisms or through conjunctival transmission. Brucella is present in milk and reproductive tract discharges in high number, while in chronic infected cattle's less number is present thus facilitates vertical transmission (McDermott & Arimi, 2002). Four species of Brucella, i.e. Brucella suis, Brucella abortus, Brucella melitensis and Brucella canis are primary zoonotic pathogens and major concern of Public Health. Brucella melitensis infect sheeps and goats while Brucella abortus infect cattles (Akçakuş, Esel, Çetin, Paç Kisaarslan, & Kurtoğlu, 2005). Being globally common zoonotic disease it is also prevalent in Pakistan and India. Brucellosis of Bovis specie ranges from 3.25% to 4.4% in Pakistan (Ali *et al.*, 2013)(T. Ahmad, Khan, Razzaq, Khan, & Akhtar, 2017).

CDC has declared that for the last three decades brucellosis is an absolutely occupational disease. Meat inspectors, veterinary staff and abattoir workers are mostly infected [10]. Pakistan is an agricultural country and thirty to thirty five millions people are either directly or indirectly concerned with livestock. Butchers, shepherds, veterinary staff and livestock farmers are all at great risks for brucellosis.

The role of blood groups in susceptibility to infectious diseases has been always discussed since a long time ago (Anstee, 2010). Studies have shown that various factors such as blood neutrophil dysfunction, production of cytokines, and blood groups are involved in the occurrence of some diseases (Hennessy, Green, Connor, Darby, & MacDonald, 2003). The relationship between blood groups and some infections such as norovirus, cholera, malaria, and Crimean-Congo fever has been reported (Anstee, 2010)(Güven *et al.*, 2014). Some other studies have proposed that there is some relationship between blood type and severity of diseases (Panda *et al.*, 2011). In addition, the relationship between blood groups and some diseases such as chronic urinary tract infections has been studied (Blackwell *et al.*, 2002), but such a relationship has not been shown in other studies (Halperin *et al.*, 2007). Despite contact with certain viruses, some viral infections do not develop or are asymptomatic, apparently due to ABO blood groups (Halperin *et al.*, 2007). Studies have shown the role of ABO blood groups in susceptibility to various diseases, including influenza, and based on these studies, there have been investigations of the relationship between blood groups and Mycobacterium and Vibrio cholera infections, pneumonia, and viral infections such as mumps and measles (Harris *et al.*, 2005). Despite the importance of brucellosis, the fact that develops into chronic disease in some cases, and the importance of etiologic studies, there is a lack of data on the relationship between blood groups and brucellosis, although there are various reports regarding the role of ABO blood groups in the incidence of other diseases.

Thus the present study was designed to determine the sero-prevalence of brucellosis and association of blood group with frequency of infection in ABO blood groups in female's population of Dir Lower Khyber Pakhtunkhwa.

Materials and methods

Study subjects

Total two hundred female brucellosis suspects were enrolled in the study.

Study area

The study was conducted in district headquarter hospital of Dir Lower Khyber Pakhtunkhwa from March to August 2017.

Study design

Informed written consents and all the relevant information were collected by self-developed questionnaire. All relevant information was collected and used in the study. The study was approved by ethical committee of Khyber medical university and was according to Helsinki protocol. Five ml blood was collected in two separate tubes. Three ml blood was put in EDTA tubes for blood grouping while two ml blood was put in plain tube to extract serum for serological investigation. The serum was extracted after clotting the blood in plain tube by centrifugation at 12000rpm. Serum was stored at -20°C for serological testing while EDTA treated blood was kept at 4°C for blood grouping. Blood grouping was performed by commercially available kit (Blood Grouping Reagent DG Gel 8 ABO/Rh + Kell REF 210383 3034946) according to manufacturer instructions. Brucellosis was tested by using two serological tests, SPAT (Co., Inc. Morganville, N.J. 07751) and STAT (Co., Inc. Morganville, N.J. 07751) according to manufacturer instructions.

Results and discussion

A total of 200 suspected brucellosis patients were enrolled in the study. All of them were females and ages range from 15 years to 43 years. Among 200 participants n=60(30%) were seropositive for Brucella. Among seropositive =31(15.5%) were Brucella Abortus while n=14.5% Brucella Melitensis (Fig. 1). A comparison of positive cases among blood groups was done. Blood group "A" has n=10 (11.49%) Brucella Abortus, n=8 (9.19%) Brucella Melitensis while n=69(79.31%) were negative for brucellosis. Blood group "B" has n=11 (26.19%) Brucella Abortus, n=9 (21.42%) Brucella Melitensis while n=22(52.38%) were negative for brucellosis. Blood group "AB" has n=2 (10.52%) Brucella Abortus, n=4 (21.05%) Brucella Melitensis while n=13(68.42%) were negative for brucellosis. Blood group "O" has n=8 (15.38%) Brucella Abortus, n=8 (15.38%) Brucella Melitensis while n=36(34.5%) were negative for brucellosis. In case of Rh positive n=29 (15.67%) were positive for Brucella Abortus, n=26 (14.05%) for Brucella Melitensis and n=130(70.27%) were negative. Among Rh negative group n=2 (13.33%) were positive for Brucella Abortus, n=3(20.05%) for Brucella Melitensis and n=10(66.66%) were negative (Table 1).

Table 1. Prevalence of brucellosis (*Brucella abortus* and *Brucella melitensis*) in blood groups.

Blood Groups	Brucella Abortus	Brucella Melitensis	Negative for Brucella
A	10 (11.49%)	8 (9.19%)	69(79.31%)
B	11 (26.19%)	9 (21.42%)	22(52.38%)
AB	2 (10.52%)	4 (21.05%)	13(68.42%)
O	8 (15.38%)	8 (15.38%)	36(69.23%)
Total	31(15.5%)	29 (14.5%)	140(70%)
Rh Positive	29 (15.67%)	26 (14.05%)	130(70.27%)
Rh Negative	2 (13.33%)	3 (20.00%)	10(66.66%)

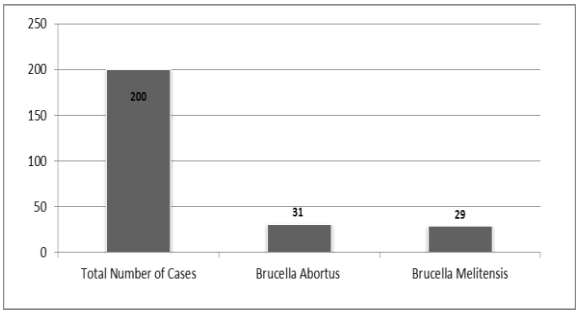

Fig. 1. Total number of cases their respective *Brucella abortus and Brucella melitensis*.

Collectively blood group "B" is more prone to brucellosis while Blood group "O" is least prone to brucellosis. In case of RH blood groups Rh positive is more prone to infection as compared to Rh negative.

Causing agent of brucellosis is bacterial genus Brucella. The symptoms include fever, anorexia, vomiting and headache. Brucellosis is animal disease naturally while humans become accidently by contacting infected animals and animals products (Corbel M, 2006). The current study was conducted to find the prevalence of brucellosis in district Dir of Khyber Pakhtunkhwa and the blood group which harbor infection more than other. A comparison was done to find the prevalence of brucellosis in the different blood groups. Total 30% of the suspected

population was seropositive for Brucella collectively. Among them Brucella Abortus was 15.5 % while 14.5% was *Brucella melitensis*. Similar prevalence (21.05 to 26.1%) has also been reported from other regions of Khyber Pakhtunkhwa and Punjab which is nearly same to our findings. Prevalence in the currents study is a little higher because of the household cattle farming in the studies region (T. Ahmad *et al*., 2017). The incidence of brucellosis in livestock has also been investigated in different region of Pakistan which ranges from 18.53%-35.40% (Nasir, Parveen, Shah, & Rashid, 2004). The prevalence is comparable to the present study however a little higher prevalence reported in the current study is due to lake of awareness and house hold farming in the area of study. A study from swat shows low prevalence of brucellosis which is nearly 2% (H. Ahmad *et al*., 2017). The low prevalence in swat is due the profession adopted by swat population who are shopkeeper and small level business man. The prevalence of brucellosis is different globally however some regions are comparable the finding of the present study (B. Lopes, Nicolino, & P.A. Haddad, 2014). The prevalence reported in Togo (41 %) is nearly similar to our findings (Domingo, 2000). In Libya, 40% prevalence has been reported (Ahmed *et al*., 2010).

Another part of the study was to compare the relative prevalence among blood groups. Blood group "B" was found to harbor more infection as compared to other blood groups which nearly 48% of the blood group tested. While blood group "AB" had very low frequency which is nearly 30%. The relationship between blood groups and infectious disease has been examined in some previous studies. A study conducted by Hustan *et al*., observed that people with "O" blood group had a 11.8 times greater likelihood of being infected with Norwalk virus, while people with "B" blood group has a protective role (Hennessy *et al*., 2003). Another study conducted by Kalayangarooj *et al*., showed a significant relationship between severity of Dengue disease and blood group "AB" in persons with secondary infections (Kalayanarooj *et al*., 2007). A study conducted by Kinane *et al*., reported blood group "B" and "AB" are prone to urinary tract infections (Kinane *et al*., 2009). The study of Kanbay *et al*., Showed that blood group "AB" were less susceptible to Helicobacter- pylori (Kanbay, Gür, Arslan, Yilmaz, & Boyacioĝlu, 2005).

Harris *et al*., Vibrio E1 T infection was more found in people having blood group "O" as compared to other blood groups (Harris *et al*., 2005). Association of blood groups and brucellosis has also been established and the risk of brucellosis is also calculated in Kurdish population. Blood group "AB" shows a greater risk of infection having odds ratio of 2.744 (Mohsenpour, Hajibagheri, Afrasiabian, Ghaderi, & Ghasembegloo, 2015). The result of the study is different to the finding of our study; we found that blood group "B" is more prone to infection and blood group AB is least prone to infection.

Conclusion

Brucellosis is prevalent (30%) in the suspected population of Dir Lower Khyber Pakhtunkhwa. Relationship of blood groups with infection showed that blood group "B" is more prone to brucellosis while Blood group "O" is least prone to brucellosis. In case of Rh blood groups, Rh positive is more prone to infection as compared to Rh negative.

Conflict of interest

The authors declared that they have no conflict of interest

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