



SERO-PREVALENCE OF BRUCELLOSIS AND TOXOPLASMOSIS, AMONG BUTCHERS OF DISTRICT KARAK PAKISTAN.

Muhammad Sanab¹, Gull e Rana Khan², Sadaf Nasir³, Asif Ahmad Khan⁴, Zubair Hussain⁵, Abdur Rehman⁶

ABSTRACT

BACKGROUND: The prevalence of brucellosis and toxoplasmosis is elevated in butchers than general population, this may be due to the fact that butchers are more likely to be exposed to animal products, which can be contaminated with these pathogens. Additionally, butchers may not be following proper hygiene practices when handling raw meat, which can increase their chances of getting infection. The objective of this study set out to identify the serological prevalence of *Toxoplasma gondii* and *Brucella melitensis* in butchers. **MATERIAL AND METHOD:** The study was designed to assess the serological prevalence of *Brucella melitensis* and *Toxoplasma gondii* in butchers. In the Karak district, butchers from seven various union councils provided 270 blood samples in total. Based on serum slide agglutination and immune chromatographic assays, the butcher blood samples were analyzed for brucellosis and toxoplasmosis. Data were documented and analyzed through SPSS-22. Results were presented in tables, charts, and graphs. **RESULTS:** Toxoplasmosis and brucellosis were both present in an overall prevalence of 15.6% and 21.9%, respectively. Additionally, butchers were found to have higher rates of brucellosis and toxoplasmosis in the age base groups 15-31 years and weight base group 63-80 kg 7.4% and 10.7%, respectively. **CONCLUSION:** Brucellosis and toxoplasmosis prevention and management should be made a priority in public health education, it is generally agreed. District Karak and the surrounding areas have a serious brucellosis public health issue. With the right precautions, this disease can be avoided, particularly in rural locations.

KEYWORDS: *Toxoplasma Gondi*, *Brucella Melitensis*, Butchers.

1. Department of Medical Laboratory Technology, University of Haripur, Pakistan.
2. Mind Care center and Rehabilitation Unit, Multan, Pakistan.
3. Assistant Professor Microbiology, Department of Pathology, Jinnah Medical College, Peshawar, Pakistan.
4. Institute of Paramedical Sciences, Khyber Medical University, Peshawar, Pakistan.
5. Institute of Paramedical Sciences, Khyber Medical University, Peshawar, Pakistan.
6. Institute of Paramedical Sciences, Khyber Medical University, Peshawar, Pakistan.

Corresponding Author: Abdur Rehman, Lecturer, Department of Medical Laboratory Technology, Institute of Paramedical Sciences, Khyber Medical University, Peshawar, Pakistan. Email: arehman.khattak@gmail.com

How to cite this article: Sanab M¹, Khan G R², Nasir S³, Khan AA⁴, Hussain Z⁵, Rehman A⁶. **SERO-PREVALENCE OF BRUCELLOSIS AND TOXOPLASMOSIS, AMONG BUTCHERS OF DISTRICT KARAK PAKISTAN.** JPUMHS;2023;13:03,82-86. <http://doi.org/10.46536/jpumhs/2023/13.03.452>

Received Aug 10,2023, Accepted On 15 September 2023, Published On 30 September 2023.

INTRODUCTION

The first case of brucellosis was reported in Egypt in 1939, and today it is thought to be endemic in many industrialized nations and affects humans, domestic animals, wild animals, and some marine creatures. People who come into contact with animals or their products run the risk of contracting brucellosis and depend on various factors such as asses of contact, health condition and the tissue of slaughtered animal and use of different conservational protective measure. Individual who are at high risk of developing zoonotic disease are mostly slaughter house worker and butcher^{1,4}. The implication of Brucellosis not only create physical problem; but it is one of the main obstacle to the economy growth of the country whose economic development mainly depend on agriculture and livestock managements. Although brucellosis is prevalent around the world, the significant

numbers of instances are found in the Indian, and South American Mediterranean basin, Middle East peoples.^{1, 2, 5.}

One of Pakistan's most serious illnesses is still brucellosis. Brucellosis is believed to effect 70% of population by direct touching of ill animal or product produced by animals. The most prevalent method of transmission is by usage of unprocessed milk or unpasteurized animal product from infected animal. Human transmission occurs when a human is exposed to the secretions of infected animals for an extended period of time or inhales them aerosolized.^{6,7.}

According to the predilection of their hosts, *Brucella* is divided into six species; three of these are known to cause sickness in humans: *B. abortus* cattle, *B. melitensis* sheep and goat, and *B. suis*

pigs. The primary causative agent of human brucellosis is both *B. abortus* and *B. melitensis*.⁸⁻¹⁰ Malaise, fever, weakness, headache, back pain, and weight loss are brucellosis symptoms in people mostly. Frequently have influence on butchers, slaughterhouse employees, farm laborers, and veterinarians. According to contemporary studies, brucellosis ranks second to rabies as the most serious disease.^{11, 12} For the identification of brucellosis we use clinical symptoms and several other technique which consist of serum agglutination test SAT, Rose Bengal test RBT, standard tube agglutination test STAT, and an enzyme-linked immune sorbent assay ELISA. RBT is a fast, efficient, and affordable diagnostic method with a 99% sensitivity rate. SAT quantitatively show immune response of body and 95.6% sensitive 5,¹³. For the correct diagnosis of brucellosis we use combination of different serological and molecular type testing. Serological test do not precisely diagnose brucellosis because of their low precision and sensitivity¹⁴.

An obligate intercellular protozoan parasite named *Toxoplasma gondii* is an opportunistic pathogen for all warm blood vertebrate including Homosapien and livestock population and cause severe life-threatening disease in the immunocompromised patient¹⁵. Around about 25% of the world population transfer toxoplasmosis, which is the most significant infection distressing the 6 billion world population. Toxoplasmosis is documented to be more common in fuggy and hot areas¹⁶. In Pakistan, the prevalence of toxoplasmosis in Punjab, Azad Kashmir and Khyber Pakhtunkhwa, is 63%, 48% and 38% respectively, illustrating the disparity between ecological regions and age groups¹⁷.

All worm-blooded species, including Homosapien, are significantly more prone to morbidity and mortality as a result of toxoplasma gondii. The spreading of Toxoplasmosis occurs because of contact with infected cat feces, usage of unprocessed milk or contaminated water and uncooked meat and vegetable¹⁸. Homosapien infection is typically asymptomatic, although those with weakened immune systems exhibit encephalitis, myocarditis, and pneumonia. Congenital toxoplasmosis in children show symptom such as mental impairment, blindness and physical inability¹⁹. For absolute diagnosis of toxoplasmosis based on sign and symptom is insufficient it must be evaluated by fusion of serological, molecular, and biological test²⁰.

This study's main goal is to find out how common brucellosis and toxoplasmosis are among the district of Karak butchers in Khyber Pakhtunkhwa.

METHOD AND MATERIALS

It was descriptive cross-sectional studies manage at the institute of paramedical sciences IPMS, Khyber Medical University, and Sina Laboratory Peshawar. It was a sixth-month study carried out from March 2019 to Aug 2020. After approval of the ethical committee of the Institute of paramedical sciences, Khyber Medical University, for study total of 270 blood samples of butchers were collected to screen for Brucellosis and Toxoplasmosis. All females and male children below 15 years and adults having Rheumatic fever / Arthritis were excluded from the study.

After that we split the study subject was divided into 3 categories on the bases of age Category A = 15-31 years, Category B = 32-48 years, Category C = 49-65 years. A current study was conducted in district Karak, Khyber Pakhtunkhwa enclose three tehsils Takhti Nusrati, Karak, Banda Daud Shah and twenty-one union councils Bahadur Khell, Gurgurii, Jata, Narii Panoos, Teeri, Esak chonthraa, Gondi Mirkhun Khel, jandrii, north Karak, south Karak, Latamber, Meta Kheel, Palose Sar, Sabir Abad, Takht Naserati, Wanki Siraj Khal, Chokara, Warana, and Ahmadabad, which surround an area of 3372 sq. km and their population is about 706,298 2017.

Blood from subject veins was drawn up to 2 ml in volume and put into a tube with a yellow lid. For the purpose of collecting serum, the tube was centrifuged for 5–10 minutes at 3000 rpm. For further examination, the serum was kept at 20°C. By applying immune chromatography and the rapid slide agglutination method, all butcher samples were checked for the existence of *Toxoplasma gondii* and *Brucella melitensis*.

The data was organized, tidied up and cross tabulation were made using SPSS, version 22, and Microsoft Excel, 2010.

RESULTS

The survey included 270 butchers from Karak district. The participants' average age was 36.219 12.9956 SD. The study's subjects age extent from 18 to 65. Total of 270 subjects, 42 15.5% tested positive for *Brucella melitensis*, while 228 84.1% tested negative, and 59 21.8% tested positive for *Toxoplasma gondii*, while 211 77.1% tested negative. The frequency of positive cases of *Brucella melitensis* in different age categories shows 207.4% in category A, 176.3% in category B, and 51.9% in category C while 9532.2% in category A, 8531.5% in category B and 4817.8% in category C were negative for *Brucella melitensis*. A consolidated descriptive analysis of *Toxoplasma gondii* is shown the Table 1, while a descriptive analysis of *Brucella melitensis* is shown in Table 2.

Table 1: Descriptive analysis of *Toxoplasma gondii* in Butchers of District Karak, Pakistan.

Descriptive Variables	Frequencies %	
	Negative Cases	Positive Cases
Prevalence	211 77.9	59 21.8
Age groups Years	Category A 15-31	93 34.4
		22 8.1

	Category B 32-48	82 30.4	20 7.4
	Category C 49-65	36 13.3	17 6.3
Wight groups Kg	45-62	85 31.5	24 8.9
	63-80	100 37.0	29 10.7
	81-98	26 9.6	6 2.2
Union Council	North Karak	29 14.0	3 4.8
	South Karak	21 10.1	9 14.3
	Takhte Nasrati	32 15.5	3 4.8
	Chokara	25 12.1	5 7.9
	Shnawa Gudi Khel	33 15.9	10 15.9
	Warana	38 13.4	18 28.6
	Ahmad Abad	29 14.0	15 23.8

Table 2: Descriptive analysis of *Brucella melitensis* in Butchers of District Karak, Pakistan.

Descriptive Variables		Frequencies %	
		Negative Cases	Positive Cases
Prevalence		228 84.1	42 15.5
Age groups Years	Category A 15-31	95 35.2	20 7.4
	Category B 32-48	85 31.5	17 6.3
	Category C 49-65	48 17.8	5 1.9
Wight groups Kg	45-62	90 33.3	19 7.0
	63-80	109 40.4	20 7.4
	81-98	29 10.7	3 1.1
Union Council	North Karak	32 14.0	0 0.0
	South Karak	28 12.2	2 4.9
	Takhte Nasrati	28 12.2	7 17.1
	Chokara	27 11.8	3 7.3
	Shnawa Gudi Khel	33 14.4	10 24.4
	Warana	45 19.7	11 26.8
	Ahmad Abad	36 15.7	8 19.5

DISCUSSION

Pakistan's most prevalent brucellosis risk factors include contact with infected animals, dairy product consumption that isn't pasteurized and contact with contaminated people. The most typical clinical evidence of brucellosis in Pakistan exist fever, joint pain, and fatigue. In order to reduce the burden of brucellosis in Pakistan, it is important to implement preventive measures such as animal's vaccination, pasteurization of dairy products and health education. It is also important to strengthen the surveillance system and improve the diagnosis and treatment of brucellosis.²¹ According to a study by Aqad et al, *Brucella melitensis* is responsible for 94.45% of cases of brucellosis.²² The rate of brucellosis prevalence varies widely across different regions and countries. This is likely due to differences in environmental factors, animal husbandry practices, and the availability of diagnostic tests. In addition, the prevalence of brucellosis may be affected by the population studied, as well as the methods used to detect the disease. For example, In the northeastern Iranian province of Khorasan Razavi, the incidence of brucellosis among butchers was 48%, whereas in the southern Iranian city of Kerman, it was 58.6%. In Saudi Arabia, the prevalence was 35%, while in India,

Pakistan, Tanzania, and Algeria it was 25.5%, 22%, 19.5%, and 37.6%, subsequently while in the current study, it was 15.7%.

The prevalence of brucellosis was found to be lower in certain earlier studies than it is now in Brazil 4.2%, South Korea 0.8%, Iran 4%, and Shiraz, Iran 4%. Blood collectors' category had the highest frequency 99.77%, accompany by animal managing person 68.96% and meat merchant 68.00%, with feather duster having the lowest prevalence 57.14%, according to Kumar et al²⁶. Another investigation of slaughterhouses and butchers revealed commonness of 12% and 7.9% in Kurdistan, Sistan, and Baluchistan. The present results are higher than the previous detection this might be caused by variations in the study population, sample size, and brucellosis diagnosis techniques. Additionally, the ongoing study was run in rural area, it can be the cause of the increased brucellosis prevalence. Furthermore, the current study used a blend of serological and molecular tests for the detection of brucellosis, this might have improved the diagnosis' sensitivity. In the current investigation, participants of age groups 15–31 years had excessive seroprevalence 7.4%, come after by 32–48 years 6.3% and 49–65 years 1.9%. According to a comparable experiment carried out in 2007 in Peshawar by

Ali et al. seropositivity rates were highest among people between the ages of 25 and 35. 27. Ages 21 to 30 had 43% prevalence, according to Kadri et al. ²⁸. In the ongoing investigation, the prevalence of brucellosis in the same subjects was calculated based on weight. The prevalence of brucellosis was 7.0% in the 45–62 kg weight range, followed by 7.4% in the 63–80 kg and 1.1% in the 81–98 kg weight ranges. We are unable to compare our results to those of published research because there is no previous work is done on weight wise prevalence of brucellosis. The incidence of brucellosis in Union Council butchers was identified in the recent investigation. The highest prevalence was reported in Union Council Waraana 26.8%, which is similar to previous studies from Peshawar, Pakistan 27.7% ⁴⁷, followed by Shanawa Gudii Khel 24.4%, supported by India 25.5%, Takhti Naserati 17.1%, similar to Apan et al. 17.8% ²⁹, Chokara 7.3%, correlated to South Iran 7.8% ^{29,30}, South Karak 4.9%, supported by Brazil 4.1%, and zero old and new casus was recorded in North Karak, alike to South Korea 0.8% subsequently. All warm-blooded species, including humans, suffer from significant mortality and morbidity as a result of the widespread parasite *Toxoplasma gondii*. One of the most dangerous zoonotic parasites, it causes infections that are asymptomatic in healthy people but can be quite dangerous in people with impaired immune systems. There have been numerous researches done on the prevalence of toxoplasmosis in Pakistan and other countries around the world. According to Tasawar et al.'s earlier study, Pakistan has a 29.5% prevalence of human toxoplasmosis. ³¹ Ahmad et al. asserted in a different region of Pakistan that the prevalence of toxoplasmosis was 11.33% ³².

In the current study, when it comes to toxoplasmosis, there was reported to be 21.9%, which was comparable to earlier project from Pakistan, where it was 22%, and Mazumder et al., where it was 24% ³³. In comparison to earlier findings from Saudi Arabia 30%, Brazil 47.4%, Egypt 59.6%, and Ethiopia 90%, the toxoplasmosis prevalence in the ongoing study is significantly lower ³⁴. Earlier studies about toxoplasmosis from Vietnam 4.19%, Mexico 11.3%, and Islamabad 17.4% suggested a lower prevalence rate ³⁴. From 1 to 70 years old, *Toxoplasma gondii* was discovered in all age categories. The participants group of 15–31 years in the current project had the greatest seropositivity rate 8.1%, accompany by 32–48 years 7.4% and 49–65 years 6.3%. An earlier study found that toxoplasmosis prevalence rises with age due to a decline in host immunity. ³⁴The prevalence of toxoplasmosis among butchers was assessed in the current study weight-wise. The weight range between 63 to 80 kg was link with the elevated prevalence 7.4%, go behind by that between 45 to 62 kg 7.0%, and 81 to 98 kg 1.1%. In Pakistan, the frequency of infection with *T. gondii* in humans has been reported from 0-50% in different studies 36-38. The prevalence of *T. gondii* infection was

determined in this investigation in humans was found to be 11.3%. This is lower than the prevalence reported in other studies from Pakistan. The discrepancy in prevalence may be brought about by variations in the study population, sample size, and *T. gondii* detection techniques. In the current study, Union Council estimated the prevalence in the study's sample population for the district of Karak. The highest prevalence was found in union council Waranaa 28.6%, followed by Ahmadabad 23.6%, Shanawa Gudii Khel 15.9%, South karak 14.3%, Chokara 7.9%, North karak 4.8%, and Takhti Naserati 4.8%. According to earlier research, *Toxoplasma gondii* is present in humans worldwide and exhibits wide diversity, with rates ranging from 0 to 100% in Europe between 2-92% ³⁵.

LIMITATIONS OF THE STUDY

More sensitive and specific techniques could not be used in the current study. Due to financial problems, our sample size was just 270 which is not enough. The duration of this study was 4 months which is not enough for a current research project. Females and children below 15 years were excluded from the study.

CONCLUSION

In the Karak district and nearby areas, brucellosis is a serious public health concern. Particularly in rural areas, this disease can be averted by prevention. Authorities in charge of public health are in agreement that they should inform the population about the prevention and treatment of toxoplasmosis and brucellosis.

ETHICS APPROVAL: The ERC gave ethical review approval.

CONSENT TO PARTICIPATE: written and verbal consent was taken from subjects and next of kin.

FUNDING: The work was not financially supported by any organization. The entire expense was taken by the authors.

ACKNOWLEDGEMENTS: We are thankful to all who were involved in our study.

AUTHORS' CONTRIBUTIONS: All persons who meet authorship criteria are listed as authors, and all authors certify that they have participated in the work to take public responsibility of this manuscript. All authors read and approved the final manuscript.

CONFLICT OF INTEREST: No competing interest declared.

REFERENCES:

1. Refai MJVm. Incidence and control of brucellosis in the Near East region. 2002;901-4:81-110.
2. Battelli GJVI. Zoonoses as occupational diseases. 2008;444:601-9.
3. Swai ES, Schoonman LJZ, Health P. Human brucellosis: seroprevalence and risk factors related to high-risk occupational groups in Tanga Municipality, Tanzania. 2009;564:183-7.
4. Majd NS, Darian EK, Khaki P, Bidhendi SM, Yahaghi E, Mirnejad RJAPJoTD. Epidemiological patterns of *Leptospira* spp. among slaughterhouse workers in Zanjan–Iran. 2012;2:S550-S2.

5. Dastjerdi MZ, Nobari RF, Ramazanpour JPh. Epidemiological features of human brucellosis in central Iran, 2006–2011. 2012;12612:1058-62.
6. Lapaque N, Forquet F, De Chastellier C, Mishal Z, Jolly G, Moreno E, et al. Characterization of *Brucella abortus* lipopolysaccharide macrodomains as mega rafts. 2006;82:197-206.
7. Sharma V. SERO-PREVALENCE STUDIES OF BRUCELLOSIS AMONG GOATS AND HUMANS USING DIFFERENT SEROLOGICAL TESTS. Division of Veterinary Public Health and Epidemiology, Sher-e-Kashmir ; 2016.
8. Gul S, Khan AJPvj. Epidemiology and epizootology of brucellosis: A review. 2007;273:145.
9. O'Callaghan D, Whatmore AMJBifg. *Brucella* genomics as we enter the multi-genome era. 2011;106:334-41.
10. Gul ST, Khan A, Ahmad M, Hussain IJPJoAS. SEROPREVALENCE OF BRUCELLOSIS AND ASSOCIATED HEMATOBIOCHEMICAL CHANGES IN PAKISTANI HORSES. 2013;504.
11. Yagupsky P, Baron EJJEid. Laboratory exposures to brucellae and implications for bioterrorism. 2005;118:1180.
12. Ahmad M, Sultana S, Fazl-i-Hadi S, Ben Hadda T, Rashid S, Zafar M, et al. An Ethnobotanical study of Medicinal Plants in high mountainous region of Chail valley District Swat-Pakistan. 2014;101:1-18.
13. Erganis O, HADIMLI HH, SOLMAZ H, CORLU MJBVIP. BRUCELLA MELITENSIS AND BRUCELLA SUIS. 2005;49:165-7.
14. Abubakar M, Mansoor M, Arshed MJJPVJ. Bovine Brucellosis: Old and New Concepts with Pakistan Perspective. 2012;322.
15. Hunter C, Remington JJJoID. Immunopathogenesis of toxoplasmic encephalitis. 1994;1705:1057-67.
16. Ahmad Z, Babar S, Abbas F, Awan MA, Attique A, Khan MA, et al. Evaluation of a saponin adjuvanted inactivated *Mycoplasma bovis* a field isolate from cattle lungs in Balochistan, Pakistan vaccine. 2013;156.
17. Bari A, Khan QAJJ. Toxoplasmosis among pregnant women in northern parts of Pakistan. 1990;40:288-9.
18. Jones JL, Dubey JJCid. Foodborne toxoplasmosis. 2012;556:845-51.
19. Scallan E, Hoekstra RM, Angulo FJ, Tauxe RV, Widdowson M-A, Roy SL, et al. Foodborne illness acquired in the United States—major pathogens. 2011;171:7.
20. Pal M, Zenebe N, Rahman MTJM, Health. Growing significance of *Mycobacterium bovis* in human health. 2014;31:29-34.
21. Ali S, Ali Q, Neubauer H, Melzer F, Elschner M, Khan I, et al. Seroprevalence and risk factors associated with brucellosis as a professional hazard in Pakistan. 2013;106:500-5.
22. Aqad H, Near A, Qamor J, Azrot RJAgjosr. Prevalence of brucellosis: a serological study in Tiaret, Western Algeria. 2003;214:244-8.
23. Parizadeh SMJ, Seyednozadi M, Erfanian MR, Nezhad MAJPJoN. A survey on antibody levels among individuals at risk of brucellosis in Khorasan Razavi Province, Iran. 2009;82:139-44.
24. Al-Takhaşşuşī Ma-MF, Sa'ūd Ja-M, Health NIo. Annals of Saudi medicine. 1985.
25. Barbuddhe S, Kumar P, Malika S, Singh D, Gupta LJJoCD. Seropositivity for intracellular bacterial infections among abattoir associated personnels. 2000;324:295-9.
26. Esmaeili S, Naddaf SR, Pourhossein B, Hashemi Shahraki A, Bagheri Amiri F, Gouya MM, et al. Seroprevalence of brucellosis, leptospirosis, and Q fever among butchers and slaughterhouse workers in south-eastern Iran. 2016;111:e0144953
27. Kadri S, Rukhsana A, Laharwal M, Tanvir MJJoTMA. Seroprevalence of brucellosis in Kashmir India among patients with pyrexia of unknown origin. 2000;984:170-1.
28. Apan TZ, Yildirim M, İstanbuluoğlu EJJoV, Sciences A. Seroprevalence of brucellosis in human, sheep, and cattle populations in Kırıkkale Turkey. 2007;311:75-8.
29. Beheshti S, Rezaian G, Azad F, Faghiri Z, Taheri F. Seroprevalence of brucellosis and risk factors related to high risk occupational groups in Kazeroon, South of Iran. 2010.
30. Sadaruddin A, Agha F, Anwar F, Ghafoor AJJPMA. Seroepidemiology of *Toxoplasma gondii* infection in young school children in Islamabad. 1991;416:131-4.
31. Bahia-Oliveira LMG, Jones JL, Azevedo-Silva J, Alves CC, Oréface F, Addiss DGJEid. Highly endemic, waterborne toxoplasmosis in north Rio de Janeiro state, Brazil. 2003;91:55.
32. Shahzad A, Khan MS, Ashraf K, Avais M, Pervez K, Khan JAJTJoPr. Sero-epidemiological and haematological studies on toxoplasmosis in cats, dogs and their owners in Lahore, Pakistan. 2006;163-4:60-73.
33. Hayat S, Tasawar Z, Akhtar TJGJoMS. SEROPREVALENCE OF HUMAN TOXOPLASMOSIS IN KALLARWALI, MUZAFFAR GARH, PAKISTAN. 2014;123.
34. Udonsom R, Lekkla A, Chung PTT, Cam PD, Sukthana YJSAjotm, health p. Seroprevalence of *Toxoplasma gondii* antibody in Vietnamese villagers. 2008;391:14.
35. Tenter AM, Heckerroth AR, Weiss LMJjfp. *Toxoplasma gondii*: from animals to humans. 2000;3012-13:1217-58.