CASE REPORT

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The Problem of Diagnosis in Occupational Brucellosis

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ABSTRACT Occupational brucellosis is caused by contact with infected animal tissues during work. Workers who are working in veterinary services, occupations with products derived from animals and close contact to waste of animals, processing or keeping or trading animal products and laboratories are under the risk of occupational brucellosis. In this study, 9 cases of occupational brucellosis who were diagnosed between 1 January 2012 -31 December 2017 in the occupational disease hospital were evaluated. Two thirds of the cases (n=6) worked for the same company that works in dairy cattle farming and raw milk production. When all cases were evaluated, it was seen that the necessary occupational health and safety measures were not taken in the workplaces, proper personal protective equipment (PPE) was not used, and there were problems in diagnosis, notification and return to work. It should be keep in mind that these cases are just the tip of the iceberg.

Keywords: Brucellosis; delayed diagnosis; occupational diseases

In the Social Insurance and General Health Insurance Law, occupational disease refer to the temporary or permanent disease, physical or mental handicapped status, caused by a reason reiterated due to the quality of the work made or worked by the insurance holder or by the working conditions.[1] Although it is possible to protect employees from occupational diseases, they are still an important cause of morbidity and mortality today.[2] In cases where protection from occupational diseases is unsuccessful, early detection of the disease is required. The aim of the determination of occupational diseases is to diagnose and treat the sick employee early, to minimize sequelae, to provide the necessary rehabilitation, to prevent other employees from affecting the disease and to ensure that employees benefit from legal rights.[3]

The frequency of occupational disease is closely related to the industrialization of countries and the implementation of basic occupational safety measures. Although it varies across countries, the International Labor Organization (ILO) reports that the expected number of occupational diseases is 0.4-1.2%. As a result of that, the expected number of annual occupational diseases may be considered to be 64-192 thousand in Turkey. However, the number of cases diagnosed with occupational disease in the statistics of the Social Security Institution of 2017 is only 691.[4] The small number of diagnoses of occupational disease is due to the problems with the diagnostic system, the inability to prove that the diseases are occupational and not reflected in the records due to inadequate job inspections.[5]

Occupational diseases in Turkey are classified into five groups according to the "Regulation on Determination of Working Power and Profession Gain Loss Rate". Occupational brucellosis is in Group D.[6]

Brucella species are Gram-negative rod-shaped bacteria that can cause life-long lasting chronic disease in humans. Occupational brucellosis occupies an

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important place among occupational infectious diseases. Occupational risk areas are research institutes, laboratories, meat processing, horse meat animal food production, horticulture, veterinary services, animal care, hunting and artificial insemination.[7] In the study of Liang et al. 245 occupational brucellosis cases were examined and it was found that the incidence was higher in the agriculture and animal husbandry sector and that the veterinarians were the most at risk occupational group.[8]

In a research conducted in 2011, 84 (11%) of 712 veterinarians and veterinary technicians in Turkey were shown to have occupational brucellosis.[9] However, when the statistics of the Social Security Institution of 2011 and current year 2017 are analyzed, it is seen that the number of occupational diseases in the veterinary services sector is zero in both years, and the cases identified in this study are not diagnosed as occupational diseases.[4]

With this case series, the characteristics of cases diagnosed with occupational brucellosis between January 1, 2012 and December 31, 2017 in a hospital authorized to diagnose occupational disease were investigated and the process of diagnosis, notification and return to work were aimed to be discussed.

Informed consent was obtained from all cases. Ethical requirements were fulfilled.

CASE REPORTS

A total of 9 cases with occupational brucellosis were diagnosed by infectious diseases specialists in clinical and serological examinations (Rose Bengal Test, Brucella Agglutination Test, Brucella Tube Agglutination Test) in different health institutions. After the diagnosis of brucellosis, the patients applied to a center authorized to diagnose occupational diseases in order to establish a causal link to the occupational diseases. None of them had consumed suspicious food.

The mean age at the time of diagnosis was 33.5 (min: 23, max: 43) years, the mean age at which they were diagnosed with occupational brucellosis was 37 (min: 25, max: 49) years, and the mean working time was 10 (min: 4, max: 35) years. While two of them had a high school graduate degree, others had primary or secondary and only two of them had an occupational training (Table 1). First six cases were employers of at the same company.

While the first six cases were employees of the same farm producing dairy cattle and raw milk, one was an animal breeder (Case 7), one was a butcher (Case 8) and one was a deli worker (Case 9). Only one case is an animal breeder and self-employed woman (Case 7).

CASE 1

A 23-year-old male patient with brucellosis was admitted to the hospital with the diagnosis of occupational disease after a disease relapse at the age of 27. He worked for 6 years in dairy cattle breeding and raw milk production. He worked in the delivery room for the first 3.5 years and after than milking with the machine. During the execution of the work, he described contact with the body fluids of animals, blood, milk and placenta of abortion animals. He

TABLE 1: Distribution of cases according to demographic characteristics and working life characteristics.

Case	Age (years) of diagnosis	Age (years) of occupational diseases diagnosis	Exposure duration (years)	Degree of graduate	Occupational training	PPE
1	23	27	6	Secondary School	No	Available but Inadequate
2	27	37	1	-	-	-
3	25	25	4	Secondary School	No	Available but Inadequate
4	43	44	4	Primary School	Yes	Available but Inadequate
5	43	45	5	Primary School	No	Available but Inadequate
6	34	34	6	High School	No	Available but Inadequate
7	43	49	35	Primary School	No	Available but Inadequate
8	39	39	4	High School	Yes	Available but Inadequate
9	25	33	5	Secondary School	No	Available but Inadequate

stated that when he worked in the delivery room, he used all arm-and-birth gloves, and in other studies he used latex gloves and a mask (Table 1). He had chronic fever, sweating, fatigue, joint pain and increased sleep need during his illness. The patient recovered without any sequelae and was fired after the relapse.

CASE 2

A 27-year-old male with brucellosis, 10 years later he applied to the hospital authorized to diagnose occupational disease. He worked in delivery room and milking departments and took part at the autopsy of the dead animals. During the execution of the work, he described contact with the body fluids of animals, blood, milk and placenta of abortion animals. The patient had pain in the left elbows and knees before the diagnosis and recovered without any sequelae after treatment.

CASE 3

A 25-year-old male patient, the year he was diagnosed with brucellosis, was admitted to the hospital authorized to diagnose occupational disease. He stated that he was taking the blood sample of animals, milking with the machine and cleaning the barn. During the execution of the work he described contact with the body fluids of animals, blood, milk and feces. He used latex gloves and a mask for PPE (Table 1). In addition, he had non-occupational allergic asthma as comorbidity. The patient who had sweating and joint pain before the diagnosis recovered without sequelae with treatment. The patient was fired after diagnosis with occupational diseases.

CASE 4

A 43-year-old male patient with brucellosis, was admitted to the hospital authorized to diagnose occupational disease 1 year later. He worked in the same company with the first three cases for 5 years. He carried out the birth of animals in the delivery room, milking by machine, pasteurizing the milk and cleaning the barn. During the execution of the work, he described contact with the body fluids of animals, blood, milk, feces and placenta of abortion animals. He stated that he used long arm veterinary examination gloves while carried out birth and used latex gloves in his other works (Table 1). He had fatigue, low back and joint pain before diagnosis. In addition, he had intervertebral discs' injury as occupational comorbidity. The patient recovered without sequelae with treatment and continued milking with the machine in the same company.

CASE 5

A 43-year-old man was admitted to the hospital authorized to diagnose occupational disease 2 years after the diagnosis of brucellosis. He worked in the same company for 6 years with the first four cases. He carried out the birth of animals in the delivery room, milking by machine, pasteurizing the milk and cleaning the barn, transporting of calves and feeding of sick animals. During the execution of the work, he described contact with the body fluids of animals, blood, milk, feces and placenta of abortion animals. He stated that he used long arm veterinary examination gloves while carried out birth and used latex gloves in his other works (Table 1). Before diagnosis, he had fatigue, fever, low back pain and joint pain. The patient recovered without sequelae with treatment and is still supervising the animals in the same workplace.

CASE 6

A 34-year-old male patient was admitted to the hospital authorized to diagnose occupational disease after he was diagnosed with brucellosis. He carried out the birth of animals in the delivery room, milking by machine, pasteurizing the milk and cleaning the barn, transporting of calves and feeding of sick animals. During the execution of the work, he described contact with the body fluids of animals, blood, milk, feces and placenta of abortion animals. He stated that he used long arm veterinary examination gloves while carried out birth and used latex gloves in his other works (Table 1). He had chills, low back and joint pain before diagnosis. The patient recovered without sequelae with treatment and continued to work in the same workplace.

CASE 7

A 43-year-old female patient was diagnosed with brucellosis at age of 46 and then relapsed at the age of 49. When diagnosed for the first time, the patient

had joint pain. She was reevaluated with complaints of humming ears, balance disorder and gait disturbance after streptomycin use. The diagnosis of neurobrucellosis was ruled out and these complaints were evaluated as sequelae due to streptomycin. The patient was diagnosed with occupational brucellosis in a health institution authorized to diagnose occupational disease after the relapse. She worked in a livestock farming for 35 years in her own business. She carried out the birth of animals, milking by hand and machine, cleaning the barn. During the execution of the work she described contact with the body fluids of animals, blood, milk, feces and placenta of abortion animals. She used latex gloves for PPE (Table 1). The patient recovered with sequelae after the treatment and stopped livestock after diagnosis.

CASE 8

A 39-year-old male patient graduated from high school had received occupational training at start to work (Table 1). He worked as butcher for 17 years for cattle slaughtering, deboning and shredding of meats. During the execution of the work, he described contact with the body fluids of animals' blood. He used latex gloves for PPE (Table 1). Before the diagnosis, he was diagnosed with arthritis due to left knee pain and treated. He was consulted an infectious diseases specialist due to ongoing complaints and diagnosed with brucellosis. The patient who was referred to the hospital authorized to diagnose occupational diseases by infectious diseases specialist, recovered without sequelae after treatment. The patient had continued to work in the same job.

CASE 9

A 25-year-old male patient with a diagnosis of neurobrucellosis admitted to the hospital authorized to diagnose occupational disease 8 years later. He had been doing the chopping and packaging of cheeses in a deli for 9 years. He stated that he had cuts in his hand when he opened the cheese cans, he had contact with fresh cheese and he used latex gloves for PPE, although not regularly (Table 1). The patient had complaints of fatigue, headache and dizziness before the diagnosis and paraparesia sequelae remained. The patient was fired after diagnosis with occupational diseases.

DISCUSSION

Occupational brucellosis is an infectious, notification of a compulsory disease that threatens both animal and human health requires long-term treatment and may result in disability.[10]

In Turkey, one of the few hospitals authorized to diagnose occupational disease, only 9 people were diagnosed with occupational brucellosis in eight years. While according to the statistics of the Social Security Institution of 2017, the number of occupational infectious diseases was zero. In a study conducted in Turkey in 2011, 84 cases were found to have occupational brucellosis and this number was not reflected in the occupational infectious diseases statistics of the same year.[4,9] This situation indicating that there are problems in the diagnosis and notification of brucellosis cases and the actual number of cases is not reflected in the official records. Similarly, while about 300 cases reported with brucellosis per year in Republic of Macedonia, only 12 cases of occupational brucellosis were detected in 2008-2009, despite the increased occupational risk. This situation suggested that there is a deficiency in the diagnosis and reporting of the occupational brucellosis.[11] In the study conducted in India, while an overall prevalence of brucellosis was recorded 7.04% in 1050 samples in veterinarians, para- veterinarians, veterinary students, artificial inseminators and animal handlers; the highest prevalence was seen in para-veterinarians (16.32%) and animal handlers (16.12%).[12]

2159 human brucellosis was diagnosed in Greece between 2003-2015 and the mean incidence rate was 1.62 per 100 000 population per year. When the occupation groups incidence rates are examined; in farmer and livestock breeders 7.1 per 100000, in butchers and abattoir workers 12.7 per 100000,in laboratory personnel 3.1 per 100000 and the highest risk was in veterinarians 53.2 per 100000.[13] In a study in Macedonia, 418 brucellosis cases were detected in 7 years follow-up period, of which 251 had occupational exposures. This study showed that approximately 60% of the cases had occupational risks. In cases with positive occupational exposure, male gender, positive family history, and arthralgia was more common.[14]

Although our patient number is not sufficient for generalization; the most common symptoms were low back and joint pain, fatigue.Two patients said they had a fever. In another study, in patients tested positive for brucellosis, the intermittent fever was recorded as the most predominant symptom (71.62%), followed by joint pain (52.70%) and body aches (44.59%).[12]

However, other eight patients admitted with personal requests, only one was referred to the hospital authorized to diagnose occupational diseases by an infectious diseases specialist. This may be due to the fact that physicians do not consider brucellosis cases as occupational diseases.

In this study, the presence of 6 cases worked from the same company and diagnosed brucellosis suggests that the necessary occupational health and safety measures have not been taken and that the necessary interventions have not been performed in this workplace about zoonosis. It could be considered that there are much more cases of brucellosis in the company, but they did not apply to the competent centers for fear of dismissal.

Occupational training programs involving disease prevention measures are very important for workers who work with high risks of brucellosis. Only two cases had an occupational training while others who are working in dairy cattle breeding and raw milk production, veterinary services such as taking blood from animals and/or giving birth had not the training required by the job. It should be taken into consideration that this situation poses a risk for both worker and animal health. In the study examining the cases in the pharmaceutical company; manual operation in process line and repeated using of protective suits were identified as risk factors for occupational brucellosis.

In the same study, following the improvement of preventive measures and the dissemination of health education, no new cases of occupational brucellosis were observed in the following about 1 year.[15]

All cases using latex gloves stated that the gloves were easily torn during the work and were not durable. It is seen that body fluids and food contact with the skin, which can be prevented by the use of appropriate gloves, is a risk factor for brucellosis in all cases. Improper PPE use, such as latex gloves, and untrained employees can be effective in both transmission and spreading. In a study on cases diagnosed with occupational brucellosis, 20% to 27% of the respondents stated that when placenta retention developed during delivery to animals, it was done to remove the placenta with bare hands and that it touched the lips of the milked milk even though the lips were cracked.[16] In this case series, none of the patients used protective glasses as PPE. The study among workers in the slaughterhouse showed that the risk of brucellosis infection was significantly reduced among those wearing protective glasses.[17]

The big problem faced by cases after diagnosis with occupational disease was unemployment. While three of the cases were fired, only one case was provided with a less risky work environment in the same workplace.

In order to prevent occupational brucellosis, the magnitude of the problem should be determined and the problems arising from the occupational diagnosis and notification system should be eliminated. It is very important that infectious diseases specialists and occupational physicians keep in mind that brucellosis cases may be due to occupational exposure and they should be referred relevant centers. Occupational health and safety practices required for brucellosis are as follows: Employees should be employed in jobs appropriate to their training and qualifications, and they should be supported with occupational training. It should also be a priority to make and implement the necessary legal regulations in order to ensure that employees diagnosed with occupational diseases do not become unemployed and can be placed in appropriate jobs.

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Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members

of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

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