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A Study of Prevalence of Brucellosis in Cases of Spontaneous Abortions

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ABSTRACT

Brucellosis remains a major public health problem in developing countries. Endemicity in this region results from the persistence of domestic animals reservoir people in their third to fifth decades of life are most commonly affected. Diagnosis of brucellosis needs high index of suspicion. Early diagnosis and prompt treatment gives complete cure. In a clinically suspected patient, Brucella can be diagnosed conventionally by various laboratory tests, like blood culture, Standard Tube Agglutination Test (STAT) Microscopic Agglutination Test (MAT), Coombs test etc. Prevalence of brucellosis in our study is 9% in patients of spontaneous abortions in this study, as compared to other studies, which is 2-4% even though the study is conducted in a suburban population. This indicates importance of history taking regarding history of animal contacts and usage of raw animal products. This also indicates necessity of brucella antigen test for patients coming with pregnancy losses which is cost effective

Keywords: brucellosis, abortions, STAT.

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INTRODUCTION

Brucellosis is a leading cause of zoonosis worldwide caused by the bacterial genus brucella. It can be transmitted to humans through contact with the infected animals or their products and consumption of the infected dairy products. Transmission can also be airborne and through laboratory contact.

The disease is endemic especially in countries of the Mediterranean basin, the middle East, the Indian subcontinent and part of Mexico and Central and South America. Human brucellosis is found to have significant presence in rural/nomadic communities where people live in close association with animals[1]. Worldwide, reported incidence of human brucellosis in endemic disease areas varies widely, <0.01 to >200 per 100000 population. Brucellosis remains a major public health problem in developing countries. Endemicity in this region results from the persistence of domestic animals as reservoirs. People in their third to fifth decades of life are most commonly affected.

Brucellosis is a systemic disease that can involve any organ or system of the body. In humans, the clinical spectrum of disease can be from asymptomatic to the severe form. Disease is mostly asymptomatic, and is usually diagnosed by serological testing in the endemic areas and among the high-risk groups.

The principle manifestation of brucellosis in animals is spontaneous abortion, presence of erythritol in placenta of these animals plays an important role to localize brucella to effect pathogenesis, this is true only about brucella abortus.

It is believed that brucellosis causes fewer spontaneous abortions in humans than in animals due to absence of erythritol in the human placenta and fetus; presence of anti-brucella activity in the human amniotic fluid also plays a significant role.

Enzyme-linked immunosorbent assay (ELISA), uses cytoplasmic proteins as antigens and measures IgM, IgG, and IgA, for better interpretation. It has been reported as superior to other serological tests due to its higher sensitivity and specificity [2].

Spontaneous abortion is defined as loss of pregnancy without outside intervention before 20 weeks of gestation. Up to 20% of the recognized pregnancies will end in spontaneous abortions [3]. Infection of conceptus is one of causes of abortion. Although brucellosis can result in human abortion it is debated, whether it is more frequent due to brucellosis than due to other bacterial infections.

Being an agricultural country, rural population in India is involved in agriculture and comes in contact with non-immunized farm animals. Various studies have reported a high prevalence of brucellosis in animals even then human brucellosis is not suspected and the diagnosis is missed.

In urban settings, the main sources of infection are slaughterhouses, dairies, laboratories conducting investigations handling live brucella cultures and veterinary institutions[4]. Control by veterinarians of the disease in cattle, dogs, sheep, goats has substantially controlled brucellosis in humans. Infection by brucella abortus and brucella suis are mainly seen in people engaged in some aspects of the live-stock industries, whereas brucella melitensis is primarily food borne and is associated with consumption of unpasteurized milk and milk products.

Diagnosis of brucellosis needs high index of suspicion. Early diagnosis and prompt treatment gives complete cure. In a clinically suspected patient, Brucella can be diagnosed conventionally by various laboratory tests, like blood culture, ELIZA, Standard Tube Agglutination Test (STAT), Microscopic Agglutination Test (MAT), Coombs test etc.

Review of Literature

Until 1969 the US ran a number of experiments with biological weapons. One of the bacteria used in this research was Brucella suis, that is almost identical to Brucella abortus, preferential host of which is pigs instead of cows. The reasons to use Brucella bacteria for developing biological weapon were because of the length of time that it causes disease and the fact that if affects both humans and livestock. Although it does

not kill human hosts, this pathogen can cause a long and lingering chronic illness that will cause a great loss in productivity of a nation's workforce. Another reason this bacterium was targeted to be used as a biological weapon as people consume many animals which may be infected by brucella as food, such as pigs, cows, and goats. The final reason that this posed a great biological threat was that it can be spread through aerosols and therefore is easily dispersed, especially in an urban environment.

Brucellosis also known as Malta fever, first discovered in soldiers staying on the island of Malta by Dr. David Bruce, from whom the pathogen got its name. In order to culture Brucella abortus, a complex medium is required, as the bacterium is fastidious, requiring most essential nutrients to be imported into the cell from the host. Brucella abortus does have major biosynthetic pathways available in it. In its primary host, cattle, the metabolic pathway for the breakdown of erythritol is one that is most desirable, it is even used “preferentially to glucose”. This is a possible factor in the bacteria’s virulence because erythritol is found in bovine placenta.

M. Yousuf Khan, Manuel W. Mah and Ziad A. Memish studied from 1983 to 1985 and concluded that various Brucella species are well-known causes of contagious abortion in cattle, sheep, goats, swine and dogs. Brucella species occasionally cause spontaneous human abortion, but theories regarding whether they do so more frequently than do other infectious pathogens remain controversial [5].

T.J.Ferihough, W.P. Munoz, Mahadeyo, did a perspective study on brucellosis in 125 black patients presenting with inevitable or incomplete spontaneous abortion not obviously due to other cause.[6] There were five cases in which the serological finding was consistent with chronic brucellosis (4%). In all these cases no positive evidence of close animal contact could be found; Furthermore of the 12, 1% of women who actually handled domestic animals, only 1 had a history of previous abortion. A review in 1984 showed that 66% of the black population presenting to their unit had a rural background with possibly a high chance of animal contact, particularly with camel and goats; the likelihood of this population acquiring brucella infection could have been enhanced as a result.

In 1990, Sharif A, Reyes Z, ThomassenP did a screening for brucellosis during a period of 6 months, 537 pregnant women from a rural area in Saudi Arabia were tested serologically for brucellosis.[7] Of the 513 women who were tested routinely, 18 were found to have a positive titre (3.5%). Of 24 patients in whom the test was carried out because of symptoms suggestive of brucellosis, all were positive. Thirty of the 42 positive cases had titres exceeding 1:160. The incidence of abortion among pregnant women with Brucellatitres less than 1:160 was 7.7% contrasting with 17.6% among those with titres above 1:160 (P less than 0.04). This observation called for further study of the incidence of brucellosis in pregnant women in infected areas, and the connection between elevated Brucellatitre and abortion

In 1997, Malone FD, Athanassiou A, Nores LA, Dalton ME studied on poor perinatal outcome associated with maternal Brucella abortus infection and said that perinatal infection with Brucella abortus does not cause poor obstetric outcomes, because of protective mechanisms in the human, not seen in animal species.[8] They reported a case of maternal brucellosis resulting in preterm labor, chorioamnionitis, placental abruption, and delivery of a live-born infant at 25 weeks gestational age.

In 1998, Hackmon R, Bar-David J, Bashiri A, Mazor M. studied for Brucellosis in pregnancy and they said that Brucellosis is rare in pregnancy.[9] Brucellosis is rare in the Middle East and Africa and the most common source of infection is unpasteurized milk products. There was some evidence that there was a higher rate of complication such as abortion, premature rupture of membranes and preterm delivery in infected animals.

MATERIAL AND METHODS

It was a prospective study conducted from July 2012 to September 2014. 100 patients of spontaneous abortion who came to our hospital. All patients admitted and diagnosed as cases of spontaneous abortion were included in the study. Detailed history was taken including the history of animal contact, consumption of unpasteurized milk and milk products, presence of farm animals in close vicinity of residence, slaughter house workers, agriculture workers and patients showing symptoms like fever, joint pain, excessive sweating. Blood samples were collected and sent for the serum analysis for brucella serum agglutination test to detect brucella antibodies and sent to central clinical laboratory of our hospital.

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RESULTS

Comparison of Brucella rate in various categories

Table 1: Distribution of brucellosis cases according to Gravida

		Brucella				Total	%	P value
		Positive	%	Negative	%			
Gravida	Primi	2	5.6%	34	94.4%	36	100.0%	0.482 FE*
	Multi	7	10.9%	57	89.1%	64	100.0%	

*P value calculated by using Pearson chi-square test fisher exact was applied.

Positivity rate of brucellosis was 5.6% in primi while it was 10.9% in multi gravid. Positivity rate was higher in multi gravida; however the difference is not statistically significant.

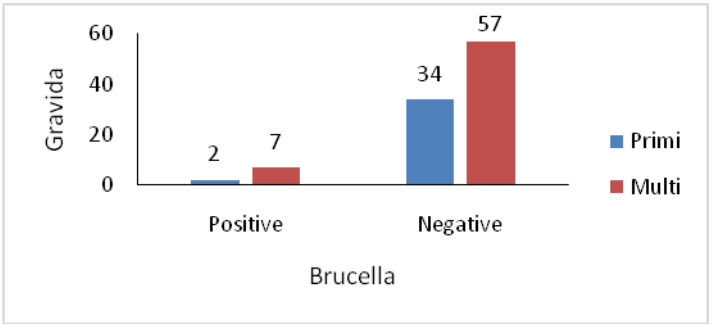

Figure 1: Distribution of brucellosis cases according to Gravida

Table 2: Distribution of brucellosis cases according to Social class

		Brucella				Total	%	P value
		Positive	%	Negative	%			
Socio-economic Status	Lower	8	9.1%	80	90.9%	88	100.0%	0.931
	Middle	1	8.4%	11	91.6%	12		

*P value calculated by using Pearson chi-square test

Positivity rate of brucellosis was 9.1% in lower class while it was 8.4% in middle class, however this difference was not significant.

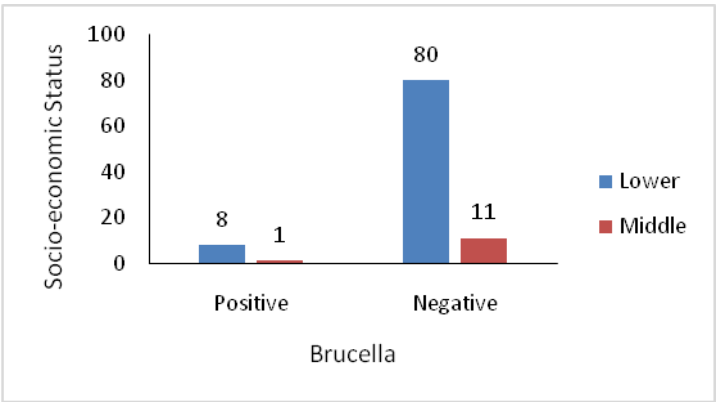

Figure 2: Distribution of brucellosis cases according to Social class

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Table 3: Distribution of brucellosis cases according to Animal contact

		Brucella				Total	%	P value
		Positive	%	Negative	%			
H/O Animal Contact	Yes	5	33.3%	10	66.6%	15	100.0%	0.000
	No	4	4.8%	81	95.2%	85	100.0%	

*P value calculated by using Pearson chi-square test

Positivity rate of brucellosis was 33.3% % in women having history of animal contact while it was 4.8% in women without history of animal contact. The positivity was high in women working in animal exposure and this difference was statistically significant.

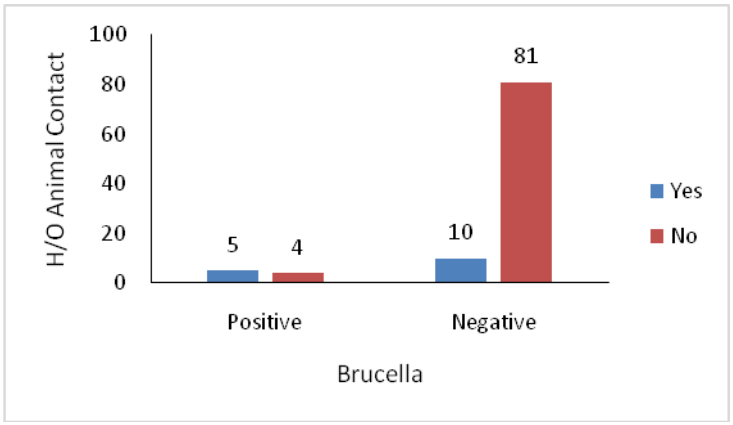

Figure 3: Distribution of brucellosis cases according to Animal contact

Table 4: Distribution of brucellosis cases according to use of animal product

		Brucella				Total	%	P value
		Positive	%	Negative	%			
H/O Animal Products use	Yes	2	100.0%	1	0.0%	3	100.0%	0.000
	No	7	7.2%	90	92.8%	97	100.0%	

*P value calculated by using Pearson chi-square test

Positivity rate of brucellosis was 100% in women having history of use of raw animal product while it was 7.2% in women without history of use of animal contact. The positivity was high in women working in animal exposure and this difference was statistically significant.

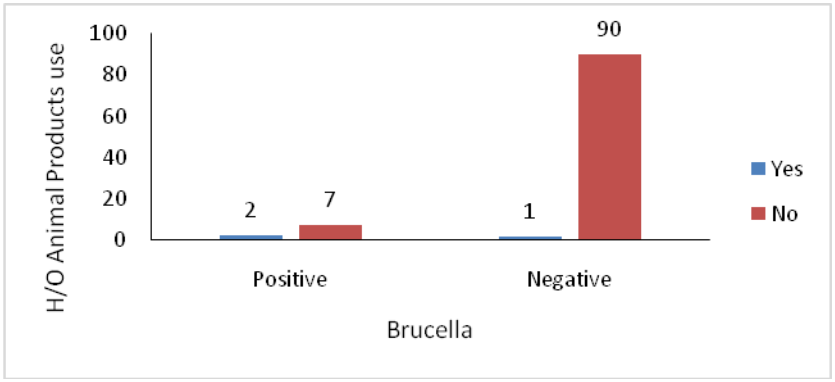

Figure 4: Distribution of brucellosis cases according to use of animal product

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Table 5: Distribution of brucellosis cases according to Lower back pain

		Brucella				Total	%	P value
		Positive	%	Negative	%			
Lower Back Pain	Yes	3	10.3	26	89.7%	29	100%	0.764
	No	6	8.5%	65	91.5%	71	100.0%	

*P value calculated by using Pearson chi-square test

Positivity rate of brucellosis was 10.3% in women having lower back pain while it was 8.5% in women without history of lower back pain..The positivity was high in women having lower back pain however this difference was statistically not significant.

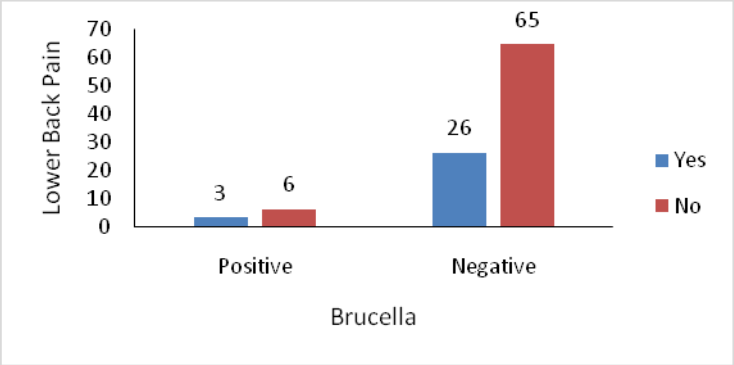

Figure 5: Distribution of brucellosis cases according to Lower back pain

Table 6: Distribution of brucellosis cases according to Joint pain

		Brucella				Total	%	P value
		Positive	%	Negative	%			
Joint Pain	Yes	2	40.0%	3	60.0%	5	100.0%	0.013
	No	7	7.4%	88	92.6%	95	100.0%	

*P value calculated by using Pearson chi-square test

Positivity rate of brucellosis was 40% in women having joint pain while it was 7.4% in women without history of Joint pain..The positivity was high in women having joint pain and this difference was statistically significant.

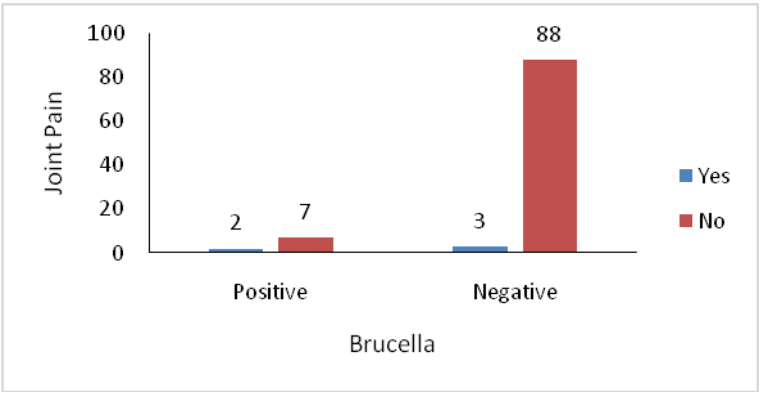

Figure 6: Distribution of brucellosis cases according to Joint pain

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Table 7: Distribution of brucellosis cases according to headache

		Brucella				Total	%	P value
		Positive	%	Negative	%			
Headache	Yes	2	28.6%	5	71.4%	7	100.0%	0.061
	No	7	9.0%	86	91.0%	93	100.0%	

*P value calculated by using Pearson chi-square test

Positivity rate of brucellosis was 10.3% in women having headache while it was 28.6% in women without history of headache. The positivity was high in women having headache however this difference was statistically not significant.

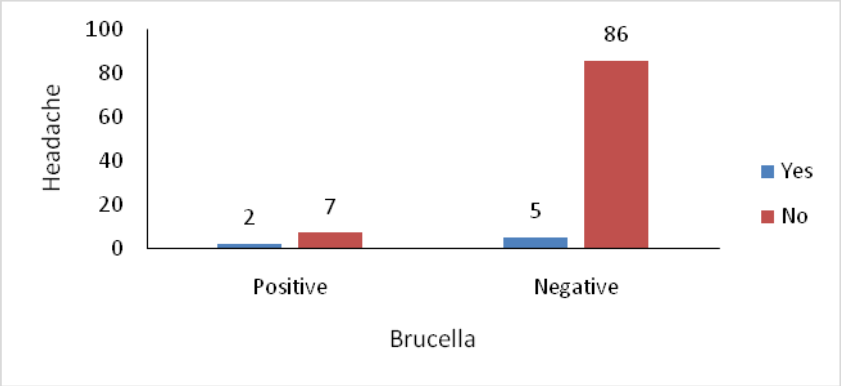

Figure 7: Distribution of brucellosis cases according to headache

Table 8: Distribution of brucellosis cases according to fever with chills

		Brucella				Total	%	P value
		Positive	%	Negative	%			
Fever with chills	Yes	4	50.0%	4	50.0%	8	100.0%	0.000
	No	5	5.4%	87	94.6%	92	100.0%	

*P value calculated by using Pearson chi-square test

Positivity rate of brucellosis was50% in women having fever with chills while it was 5.4% in women without history of fever with chills. The positivity was high in women having fever with chills and this difference was statistically significant.

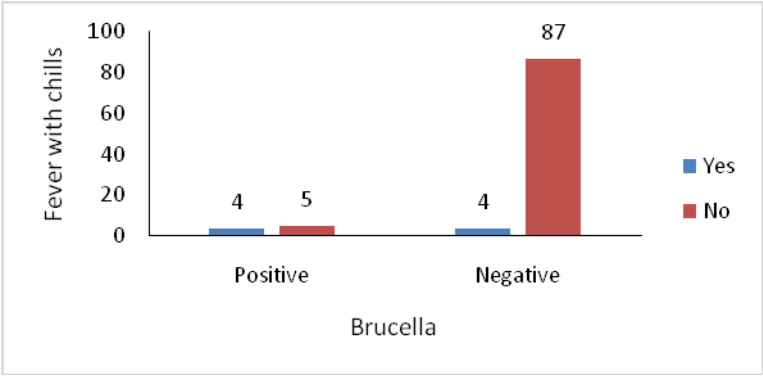

Figure 8: Distribution of brucellosis cases according to fever with chills

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Table 9: Distribution of brucellosis cases according to duration of pregnancy

		Brucella				Total	%	P value
		Positive	%	Negative	%			
PregGrp	Second Trimester	2	18.2%	9	81.8%	11	100.0%	0.257
	First trimester	7	7.9%	82	92.1%	89	100.0%	

*P value calculated by using Pearson chi-square test

Positivity rate of brucellosis was 18.2% in women having second trimester pregnancy while it was 7.9% in women having first trimester pregnancy. The positivity was high in women having second trimester pregnancy however this difference was statistically not significant.

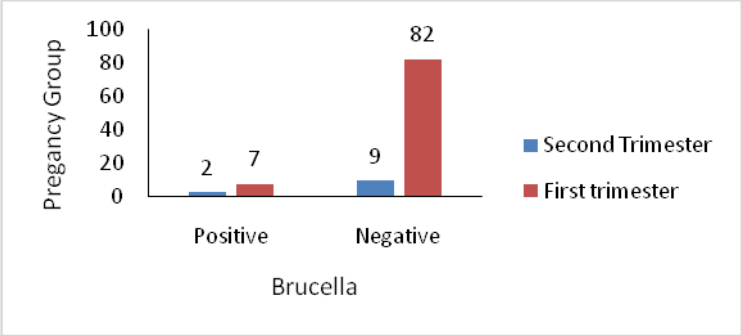

Figure 9: Distribution of brucellosis cases according to duration of pregnancy

CONCLUSION

The present study is done in patients coming with and diagnosed as cases of spontaneous abortions in our hospital.

As our hospital is located in a suburban area and patients come from rural parts, women are coming with spontaneous abortions are more. After doing all investigations to diagnose the cause of spontaneous abortions, many times we could not come to the diagnosis. When we planned this study we noted the records retrospectively. We found that around 70% populations are farmers, many are working in animal husbandry, and many are dairy workers. We also noted that they consume raw milk and milk products. Most of the people staying in farms are in close animal contacts.. This inspired us to evaluate these patients for presence of brucellosis.

100 women admitted in hospital were included in this study.Prevalence of brucellosis in our study is 9% .Out of 100, 15 patients had history of animal contact and among them 5 patients were brucella positive, and this is statistically significant. Out of 100 patient 3 patient, had history of consuming raw milk or pannier, among them 2 patients were brucella positive. This value is statistically significant. Out of 100 patients, 8 patients had fever and 4 patients were brucella positive and this is also statistically significant. Out of 100 patients 5 patients had complains of joint pain among them 2 were brucella positive, this value is statistically significant.

Out of 100 patients 7 patients had headache , 29 patients had lower back ache and 7 patients had headache but the presence of brucellosis in this patients were not statistically significant.

We have treated the positive cases with Tab Rifampicin 600 mg 0nce a day along with Tab Doxycycline 100 mg twice a day for 6 months. These patients were followed up but the results are not reported in this study as this was not included in the aims of the study, further studies are planned for these treated patients for chronicity and further pregnancy outcome.

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