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SOME EPIDEMIOLOGICAL AND ZOONOTIC ASPECTS OF BRUCELLOSIS AND TOXOPLASMOSIS IN SHEEP, GOATS AND HUMANS

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SUMMARY

An epidemiological survey to screen the occurrence of brucellosis and toxoplasmosis in sheep, goats and humans was carried out. Six hundreds and twenty-five animals serum samples were collected from 375 sheep (155 aborted and 220 apparently healthy) and 250 goats (105 aborted and 145 apparently healthy). Beside 9 aborted foeti (5 from sheep and 4 from goats) were subjected for bacteriological examination. In addition, 125 human serum samples were taken from patients with fever (25), previously aborted women (25), shepherds (35) and hospitalized patients (40). The serum samples were serologically examined for the presence of specific *Brucella* antibodies by Rose bengal plate test (RBPT), Buffered acidified plate antigen test (BAPAT) and tube agglutination test (TAT) and for the detection of *Toxoplasma* antibodies by latex agglutination test (LAT) and indirect haemagglutination test (IHAT). The results showed that the percentages of seropositive for brucellosis in sheep by RBPT, BAPAT and TAT were 10.1, 8.5 and 8% respectively, while their respective percentages in goat sera were 8, 6.8 and 6%. The overall percentages of *Brucella* seropositive in aborted sheep and goat sera as estimated by RBPT, BAPAT and TAT (13.5, 11.9 and 11.2%) were higher than in apparently healthy animals (6.3, 4.9 and 4.4%). On the other hand, the seroprevalence of human brucellosis was 4.8, 4 and 3.2% as estimated by RBPT, BAPAT and TAT, respectively. Patients with fever showed 8%, while shepherds showed 5.7% *Brucella* seropositive by TAT. Three isolates of *Brucella melitensis* biovar 3 were isolated from aborted foeti of sheep (two) and goats (one).

Concerning the occurrence of *Toxoplasma* antibodies, the percentages of seropositive detected by LAT and IHAT were 24 & 22.1% in sheep and 21.2 & 19.2% in goats, respectively, while, the

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percentages in aborted sheep and goats (30.8 and 28.5%) were higher than in apparently healthy (17.3 & 15.6%).

Regarding human, the percentages of *Toxoplasma* seropositive by LAT and IHAT were 18.4 and 16%, respectively. Moreover, the high percentage was detected in previously aborted women (36 and 32% by LAT and IHAT, respectively).

It is concluded that brucellosis and toxoplasmosis are zoonotic disease wide-spread among the examined sheep and goat herds. This indicates that the potential role of these animals for dissemination and spread of such zoonoses in the examined areas. The zoonotic importance and the preventive measures necessary for combating brucellosis and toxoplasmosis in sheep, goats and humans were discussed.

INTRODUCTION

Brucellosis is one of the most widespread zoonotic disease which exert a great economical impact. The disease is known to be widely distributed allover the world especially in the mediterranean and Middle East countries of long time ago (Kolar, 1987).

Intensive and semintensive breeding of sheep and goats led to a rapid increase in the prevalence of *Brucella melitensis*, leading to epidemic of human brucellosis (Alton et al., 1988). In the Middle East, B. melitensis account for most human cases (Al-Balla, 1995). *B. melitensis* infection is endemic in Egypt and is the most prevalent in humans and a wide range of animals (El-Taweel, 1988; Salem and Hossein, 1990). Brucellosis is considered to be the most important economic reproductive disease of food animals, causing abortion, stillbirth, infertility, premature birth in sheep and goats. Beside the public health significance of brucellosis from stand point of its zoonotic importance, the disease in man varies from undulant fever to chronic deblitating infection (Benkirane, 1997). Infection caused by *B. melitensis* are known to cause more sever clinical and pathological effects and to be responsible for most worldwide morbidity particulary in developing countries (Nicoletti 1989). The infection in sheep and goats mainly caused by *B. melitensis* and less frequently due to *B. abortus* or *B. suis* (Acha and Szyfer 1991).

Absence of characteristic clinical symptoms, the chronic nature of infection and difficulty in isolation of brucellae make the diagnosis of the disease more difficult. Therefore, serological tests are the most useful and widely used for diagnosis of brucellosis. The combination of serological tests is desirable to overcome their variation in sensitivity and specificity (Thakur et al 2002).

Toxoplasmosis is a wide spread zoonosis caused by an obligatary intracellular coccidian protozoan, *Toxoplasma gondii*. It infects human beings and

many warm-blooded animals, inducing abortion, still birth, neonatal and perinatal mortality in sheep, goats and man (Robert and Frankel, 1990). It causes mental retardation and loss of vision in congenitally infected children and death in immunosuppressed patients (Dubey, 1996).

Toxoplasmosis has long been recognized as one of the main causes of ovine abortion (Dubey and Welcome, 1988). On the other point of view, most acquired toxoplasmosis in sheep and goats is asymptomatic even when tissues are severely infected by *T. gondii*. Moreover, latent infected sheep and goats constitute potential source of human toxoplasmosis who acquire infection through ingesting of tissue cysts in undercooked meat (Dubey and Beattie, 1988). In Egypt, latex agglutination test (LAT) and indirect haemagglutination test (IHAT) were previously used for detection of Toxoplasma antibodies in the sera of sheep, goats and humans by many scientists (Ghoneim et al. 1984; Abdel Rahman et al., 1996; Reda et al, 1996; Mohamed, 1999; Haggag, 2000 and Abou Zeid, 2002).

On account of zoonotic and economic importances of brucellosis and toxoplasmosis, this study was undertaken to survey serologically sheep, goats and human for brucellosis and toxoplasmosis. Also the possible role of sheep and goats in the propagation of infection to other animals and man was assessed.

MATERIAL AND METHODS

Animals: A total of six hundreds and twenty five (260 aborted and 365 apparently healthy) non vaccinated sheep and goats were used in this study (Table 1). The examined animals were raised in different managemental systems in Dakahlyia and Sharkia Provinces.

Table (1): Number of animals and human serum samples collected from Dakahlyia and Sharkia Provinces

Source of sample			Number
Animals	Sheep	Aborted	155
		Apparently healthy	220
		Sub - total	375
	Goats	Aborted	105
		Apparently healthy	145
		Sub – total	250
	Total		625
Human	Patients with fever		25
	Previously aborted women		25
	Shepherds		35
	Hospitalized patients		40
	Total		125

Hospitalized patients without fever.

Humans: A total of one hundred and twenty five human serum samples were collected from Dakahlyia and Sharkia Provinces (Table 1). These included 35 shepherds of examined sheep and goats herds; 25 patient with fever; 25 women suffering from abortion and 40 hospitalized patients. The patients were attending Mansoura General hospital and Zagazig University hospitals. Serum samples of aborted women were obtained from some Clinic Medical laboratories at Mansoura city.

Samples: Blood samples were collected from sheep, goats and humans in sterile capped tubes. The clear serum was obtained and poured in bondwarf tubes and kept at - 20°C until tested for brucellosis and toxoplasmosis.

Swabs from 9 (5 sheep and 4 goats) aborted foeti were taken under aseptic condition for culture of Brucella organisms.

Serological examination for brucellosis:

All animal and human serum samples were subjected to Rose Bengal plate test (RBPT), Buffered acidified plate antigen test (BAPAT) and Tube agglutination test (TAT) according to Alton et al (1988). In TAT, the end titre of 1:40, i.e 50% agglutination (80 I.U.) or above indicate positive reactions. An end titre of 1:20 (40 I.U) was regarded as suspicious reactions. Antigens for RBPT and RAPAT were supplied by the Veterinary Serum and Vaccine Research Institute, Abbasia, Cairo, Egypt. Antigen for TAT obtained from SA Scientific, Inc, 4919 Golden Quail, San Antonio, Texas 78240, USA.

Bacteriological examination: Swabs from stomach contents of nine aborted foeti were examined for Brucella organisms using direct culture on Brucella agar medium containing Brucella selective antibiotics (Oxoid, England). The plates were incubated at 37°C in an atmosphere of 10% Co_2 for 6-10 days, then examined for Brucella colonies. The suspected colonies were identified. Typing of Brucella isolates was carried out on the base of Co_2 requirement, H_2S production, growth in the presence of dyes and agglutination with Brucella specific antisera (Central Vet. Lab. Weybridgl, England). All these procedures were done according to Alton et al (1988).

Serological examination for toxoplasmosis:

Serum samples from sheep, goats and human were firstly tested by LAT according to Jacobs (1973). Latex reagent (suspension of poystyrene particles sensitized with T. gondii) and positive & negative controls (SAS TOXO Rapid Latex test) were obtained from SAScientific, Inc.,4919 Golden Quail, San Antonio, Texas 78240, USA.

All serum samples from sheep, goats and human were retested by IHAT according to **Camargo and Leser (1976)** and manfacturers instructions

of TOXO-IHA. Kits of TOXO-IHA-Fast (which contain sensitized red blood cells (R1), non- sensitized RBCs (R2), sample diluent (R3), positive control serum (R4), negative control serum (R5), absorbent (R6) and microtiter plate) were supplied by ABC Diagnostics, 23 July St., Industrial Zone, P.O. Box (14) New Damietta, Egypt. The interpretation of the test was carried out according to the instruction of the kit producer, where the titre equal to 1:160 or above are considered significant reaction. Titre less than 1:160 is non-evaluative infection and may be correspond to old (chronic) or an already treated infection.

RESULTS

Results of serological tests for brucellosis in animals:-

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Table (2): Results of RBPT of sheep and goat sera.

Source of samples	Aborted			Apparently healthy			Total		
	No. of examined	No. of positive	%	No. of examined	No. of positive	%	No. of examined	No. of positive	%
Sheep	155	23	14.8	220	15	6.8	375	38	10.1
Goats	105	12	11.4	145	8	5.5	250	20	8
Total	260	35	13.5	365	23	6.3	625	58	9.3

Table (3): Results of BAPAT of sheep and goat sera.

Source of samples	Aborted			Apparently healthy			Total		
	No. of examined	No. of positive	%	No. of examined	No. of positive	%	No. of examined	No. of positive	%
Sheep	155	21	13.5	220	11	5	375	32	8.5
Goats	105	10	9.5	145	7	4.8	250	17	6.8
Total	260	31	11.9	365	18	4.9	625	49	7.8

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Table (4): Results of TAT of sheep and goat sera.

Source of samples	Aborted							Apparently healthy							Total			
	1/80	1/160	1/320	1/640	No. of examined	Total no. of positive	%	1/80	1/160	1/320	1/640	No. of examined	Total no. of positive	%	No. of examined	Total no. of positive	%
Sheep	3	4	7	6	155	20	12.9	2	3	3	2	220	10	4.5	375	30	8
Goats	2	3	3	1	105	9	8.6	1	1	2	2	145	6	4.1	250	15	6
Total	5	7	10	7	260	29	11.2	3	4	5	4	365	16	4.4	625	45	7.2

Table (5): Summarized results of serological tests used for detection of brucellosis in sheep and goat serum samples.

Source of samples		No. of examined	RBPT		BAPAT		TAT	
			No. of positive	%	No. of positive	%	No. of positive	%
Sheep	Aborted	155	23	14.8	21	13.5	20	12.9
	Apparently healthy	220	15	6.8	11	5	10	4.5
	Total	375	38	10.1	32	8.5	30	8
Goats	Aborted	105	12	11.4	10	9.5	9	8.6
	Apparently healthy	145	8	5.5	7	4.8	6	4.1
	Total	250	20	8	17	6.8	15	6
Total		625	58	9.3	49	7.8	45	7.2

Results of serological tests for brucellosis in humans:-

Table (6): Results of RPAT of human serum samples.

Source of human samples	No. of examined	No. of positive	%
Patients with fever	25	3	12
Previously aborted women	25	0	0
Shepherds	35	2	5.7
Hospitalized patients	40	1	2.5
Total	125	6	4.8

Table (7): Results of BAPAT of human serum samples.

Source of human samples	No. of examined	No. of positive	%
Patients with fever	25	2	8
Previously aborted women	25	0	0
Shepherds	35	2	5.7
Hospitalized patients	40	1	2.5
Total	125	5	4

Table (8): Results of TAT of human serum samples.

Source of samples	No. of examined	1/80	1/160	1/320	Total	
		No.	No.	No.	No. of+ve.	%
Patients with fever	25	1	0	1	2	8
Previously aborted women	25	0	0	0	0	0
Shepherds	35	1	1	0	2	5.7
Hospitalized patients	40	0	0	0	0	0
Total	125	2	1	1	4	3.2

Table (9): Summarized results of serological test for detection of brucellosis in human serum samples.

Source of samples	No. of examined	RBPT		BAPAT		TAT	
		No. + ve	%	No. + ve	%	No. + ve	%
Patients with fever	25	3	12	2	8	2	8
Previously aborted women	25	0	0	0	0	0	0
Shepherds	35	2	5.7	2	5.7	2	5.7
Hospitalized patients	40	1	2.5	1	2.5	0	0
Total	125	6	4.8	5	4	4	3.2

Results of bacteriological examination :-

Bacteriological examination of 9 aborted foeti (5 sheep & 4 goats) yield 3 *Brucella isolates* (2 from sheep & 1 from goats). The isolates were identifed and typed *Brucella melitensis* biovar 3.

Results of serological tests for toxoplasmosis in animals :-

Table (10): Detection of *Taxoplasma* antibodies in sheep and goat sera by latex agglutination test.

Saurce of samples	Aborted			Apparently healthy			Total		
	No. of examined	No. of positive	%	No. of examined	No. of positive	%	No. of examined	No. of positive	%
Sheep	155	50	32.3	220	40	18.2	375	90	24
Goats	105	30	28.6	145	23	15.9	250	53	21.2
Total	260	80	30.8	365	63	17.3	625	143	22.9

Table (11): Detection of *Taxoplasma* antibodies in sheep and goat sera by IHA test.

Source of sample		No. of examined	No. of +Ve	%	No. of seropositive				
					1/160	1/320	1/640	1/1280	1/2560
Aborted	Sheep	155	47	30.3	13	14	12	5	3
	Goats	105	27	25.7	10	7	5	3	2
	Total	260	74	28.5	23	21	17	8	5
Apparently healthy	Sheep	220	36	16.4	17	10	6	3	0
	Goats	145	21	14.5	12	5	2	2	0
	Total	365	57	15.6	29	15	8	5	0
Total		625	131	21	52	36	25	13	5

Mixed infection of brucellosis and toxoplasmasis was observed in 11 cases (7 sheep and 4 goats).

Table (12): Comparison between latex agglutination and IHA test for detection of *Toxoplasma* antibodies in sheep and goat sera.

Source of samples		No. of examined	Latex agglutination		IHA test	
			No. of positive	%	No. of positive	%
Sheep	Aborted	155	50	32.3	47	30.3
	App. healthy	220	40	18.2	36	16.4
	Total	375	90	24	83	22.1
Goats	Aborted	105	30	28.6	27	25.7
	App. healthy	145	23	15.9	21	14.5
	Total	250	53	21.2	48	19.2
Total		625	143	22.9	131	21

App. = Apparently

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Results of serological tests for toxoplasmosis in humans :-

Table (13): Occurrence of *Toxoplasma* antibodies among human sera as estimated by latex agglutination test.

Source of samples	No. of examined	No. of positive	%
Patients with fever	25	2	8
Previously aborted women	25	9	36
Shepherds	35	6	17.1
Hospitalized patients	40	6	15
Total	125	23	18.4

Table (14): Occurrence and level of *Toxoplasma* antibodies in the human serum samples detected by IHA test.

Source of samples	No. of examined	Positive cases		Antibodies titer				
		No.	%	1/160	1/320	1/640	1/1280	1/2560
Patients with fever	25	2	8	1	1	0	0	0
Previously aborted women	25	8	32	2	1	3	1	1
Shepherds	35	5	14.3	2	1	1	1	0
Hospitalized patients	40	5	12.5	3	2	0	0	0
Total	125	20	16	8	5	4	2	1

Table (15): Comparison between latex agglutination and IHAT for detection of *Toxoplasma* antibodies in human sera.

Source of samples	No. of examined	Latex agglutinetion		IHAT	
		No of positive	%	No of positive	%
Patients with fever	25	2	8	2	8
Previously aborted women	25	9	36	8	32
Shepherds	35	6	17.1	5	14.3
Hospitalized patients	40	6	15	5	12.5
Total	125	23	18.4	20	16

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DISCUSSION

In this work, some epidemiological and zoonotic aspects of brucellosis and toxoplasmosis in sheep, goats and humans were studied. These were carried out by seroprevalence survey of brucellosis in animals and man by RBPT, BAPAT and TAT, and determination of *Toxoplasma* specific antibodies in animals and man by LAT and IHAT. Also, the potential role of *Brucella* and *Toxoplasma* in abortion, and the possible role of sheep and goats in the transmission of infection to other animals and man were discussed.

Most surveys performed to reveal the incidence of brucellosis in animals and man have been depend upon the agglutination test because it is easy and economic performance. However, a combination of RBPT, BAPAT and TAT were used in the present work to reveal naturally infected cases. RBPT is a rapid test for demonstration of antibodies in the early stages with onset of the brucellosis in both man and animals. The results of RBPT of sheep and goat sera are shown in Table (2). The percentage of infection in sheep was 10.1% (14.8% in aborted sheep and 6.8% in apparently healthy). While, the percentage of brucellosis in goats by RBPT was 8% (11.4% in aborted goats and 5.5% in apparently healthy). These results are nearly similar to the results of previous works reported by Fadda and Sanna, (1982); El-Gohary et al. (2003); Shalaby et al. (2003) and El-Gamal (2004). On the other hand, lower results were previously reported by Bassiony and Ibrahim (1997); Seddek (1999) and Ammar, (2000). Higher figures were also previously cited by Shalaby (1986); El-Bauomy (1989) and Montasser et al. (2002) respectively .

The percentages of brucellosis as detected by BAPAT were 8.5% in sheep and 6.8% in goats. Lower results of brucellosis in sheep and goats as estimated by BAPAT were recorded by Seddek (1999), Ammar (2000) and Montasser (2002). On the other hand, higher figures (19.9% in sheep and 19.5% in goats) were previously reported by El-Bauomy (1989). As shown in Table (4), TAT detected brucellosis in a significant titres in 8% of sheep and 6% of goats. Nearly similar results were previously cited by El-Gamal (2004).

It is evident from summarized results of the three serological tests used for detection of brucellosis in sheep and goats that the percentages of brucellosis in sheep as detected by RBPT, BAPAT and TAT were 10.1, 8.5 and 8 respectively. Their respective percentages in goats were 8, 6.8 and 6%. From the a fore-mentioned results, it is clear that RBPT detected higher number of reactors than other tests, this may be due to RBPT is sensitive to detect low titre as in cases of chronic brucellosis. On the other hand, RBPT detects mainly immunoglobulion M (IgM) and immunoglobulin type G1 (Ig G1). However, TAT can detect IgM.

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IgG2 and IgA. It may be worthy to note that, on infection IgM appear earlier than other immunoglobulin, so, RBPT indicates positive reaction sooner than TAT. Moreover, the acidic of RBPT (3.6) and BAPAT (4.02) may inhibit the non-specific antibodies leaving the specific agglutinins. Also TAT has a certain limitation specially in the early and chronic stages of the disease (Alton et al., 1988).

Trials for isolation of Brucella organisms from 9 aborted foeti revealed 3 *B. melitenisis* biovar 3 (2 from sheep, one from goats). *B. melitensis* was previously isolated from sheep in El-Behra and Kafr El-Shiekh, Egypt by Salem and Hossein, (1990) and Mantasser et al. (2002). Leyda et al., (2003) detected *B. melitensis* in 39 (31%) of 126 aborted foeti. *B. melitensis* is a specific pathogen for sheep and goats, causes more necrosis of the endometrium leading to a high proportion rate of abortion, and also the early localization within the mammary gland leading to acute mastitis (Carlton and Charles, 1998).

From the results achieved in Tables (2-5), one could conclude that percentages of positive reactors to RBPT, BAPAT and TAT in aborted sheep (14.8, 13.5 and 12.9%) were higher than in apparently healthy sheep (6.8, 5 and 4.5%). Also in aborted goats (11.4, 9.5 and 8.6%) were higher than in apparently healthy goats (5.5, 4.8 and 4.1%). These results indicate the potential role of Brucella in abortion in sheep and goats. This confirm the reports of Carlton and Charles (1998); Ammar (2000) and Al-Talafhah et al (2003). On the other hand, the infection rate is higher in examined sheep than in goats. Similar result was recorded by El-Gamal (2004). Moreover, the higher incidences of ovine and caprine brucellosis detected in this study, may be reflect the potential role of sheep and goats as an important reservoir for transmission of brucellosis to cattle or buffaloes, or even to other sheep or goats flocks. Beside the public health hazard to shepherds, farmers, abattoir workers and other persons who directly or indirecllly contact with infected sheep and goats.

Concerning brucellosis in man, RPAT detect brucellosis in the sera of 6 (4.8%) out of 125 examined human samples. Three (12%) out of 25 patient with fever and 2 (5.7%) of shepherds were seropositive, while only one patient (2.5%) of 40 hospitalized patients was reactor to RBPT. However, BAPAT revealed that 5 (4%) of human sera were seropositive. Moreover, TAT detected brucellosis in 4 (3.2%) out of 125 examined humans. Two patients of 25 patients with fever were seropositive, while two shepherds were reacted with TAT. Al-Shamahy et al. (2000) found that the incidence of brucellosis in shepherds was 7.8%. However, Mudaliar et al. (2003) reported that the prevalence of brucellosis in animal handlers was 33%.

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Baba et al. (2001) found that 5.2% of patients with pyrexia of unknown origin were had B. abortus antibodies. The prevalence among sheep and goats rearers was 9%. In Egypt, Amer (1989) and Soliman (1998) reported that seroprevalence of human brucellosis were 18.75% and 10.6% respectively , while El-Gohary et al. (2003) recorded that the overall of positive cases of human brucellosis in Gharbia Province was 10.7% in RBPT and 9.3% in serum tube agglutination test. Abou-Eisha (2001) found that the prevalence of Brucella antibodies in human was 5.1% in RBPT and 4.2% in TAT. He found statistical difference in Brucella positive reactors between personal groups who were in close contact with animals (6.8%) and city dwellers (1.6%). However, there was no significant difference in positive reactors between farmers and their families. El-Gamal (2004) showed that the occurrence rate of Brucella infection in farmers was 6.6% with use RBPT and 5.3% with use TAT.

It is evident from the results summarized in Table (9) that the seropositive of human brucellosis were 4.8%, 4 and 3.2% as detected by RBPT, BAPAT and TAT, respectively. These results are in agreement with the previous works of Abou-Eisha (2001) and El-Gohary et al. (2003) as they reported that RBPT detected higher number of reactors than other tests. From the results achieved in Tables (6-9) the prevalence of brucellosis was higher in patient with fever, so, patients with pyrexia of unknown origin must be screening for brucellosis, especially who were rearing of animals or consuming raw milk or milk products. On the other hand, the seropositive cases of brucellosis among shepherds, may be reflect the role of sheep and goats in transmission of infection to shepherds, however, the other routes of infection with brucellosis can not ignored. Necessary precautions and periodic screening of shepherds and animal rearers must be done.

In sheep and goats industry a great economic losses were reported due to *T. gondii* infection. Clinical symptoms of toxoplasmosis in sheep, goats and man are not specific specially in the early stage of infection. Therefore, the detection of specific Toxoplasma antibodies appear to be the perfect tool for diagnosis of toxoplasmosis.`

The results of occurrence of *toxoplasma* antibodies in sheep and goat sera are shown in Tables (10-12). LAT revealed that the percentage of toxoplasmasis in sheep was 24% (32.3 in aborted and 18.2% in apparently healthy). Nearly similar results by using LAT were previously reported by Hashami-Fesharki, (1996); Esmat, (1997) and Abou Zeid, (2002). While, the percentage of toxoplasmasis in goats was 21.2% (28.6% in aborted and 15.9% in apparently healthy).

The percentages of toxoplasmosis as detected by IHAT in sheep and goats were 22.1 and 19.2% re-

spectively. These results were nearly similar to previous works of (Ruppanner et al., (1987); Abou-Eisha, (1992) and Esmat, (1997). However, higher levels were previously reported by Moussa, (1986); Malik et al (1990) and Mohamed (1999).

From the results achieved in tables (10-12), one can be easily conclude that, the percentages of seropositive for toxoplasmosis in aborted sheep and goats were higher than apparently healthy animals. These difference may be due to multiplication of *T. gondii* in placenta and release of antigen into maternal circulation. So, the occurrence of high level of *T. gondii* antibodies in aborted animals detected in this study reflect the importance of *T. gondii* as a causitive agent of abortion among sheep and goats. Such fact is in agreement with previous results of Dubey and Welcome (1988), Abou Zeid (2002) and Masala et al. (2003) who found that *T. gondii* antibodies titres were higher in aborting ewes than in those with normal birth. With regard to species susceptablility, the seropositivity was little higher in sheep (24%) than in goats (21.2%). The approximate similarity of the seroprevalence for Toxoplasma gondii detected in this study between sheep and goats may be due to the fact that the examined animals were taken from same area and sometimes from mixed herd breed which made them submitted to the same condition and habit of grazing. On the other hand, the higher prevalence of toxoplasmosis in examined sheep and goats may be represent a source of infection for slaughter house workers who handle infected meats and for humans who consumed inadaquately cooked mutton containing tissue cysts (Pseudocysts, Bradyzoites).

The seroprevalence of *Toxoplosma* antibodies in human sera was 18.4 (36% in previously aborted women, 17.1% in shepherds; 15% in hospitalized patients and 8% in patients with fever) as detected by LAT. However the percentage of seropositive as detected by IHAT was 16% (32% in previously aborted women; 14.3% shepherds, 12.5% in hospitalized patients and 8% in patients with fever). Nearly similar results were recoded by El-Rifale et al. (1984); Ghoneim et al. (1984); Aboul-Magd et al. (1987); El-Ridi et al. (1991); Abou Zeid (2002) and Fan et al. (2003). Higher prevalence of Toxoplasma antibodies in women had a history of abortion or genital disorders was previously recorded by Reda et al. (1996); Mohamed (1999); Haggag (2000) and Logar et al. (2002).

The results in Table (12,15) declare the comparison between LAT and IHAT in animals and human. It was found that IHAT gave less seropositive number than LAT. Similar finding obtained by Esmat (1997). However, Dubey and Beattie (1988) and Abou-Zeid (2002) reported that LAT is a sensitive, reliable, simple and rapid test and it could be used as a screening test in seroepidemio-

logical studies.

It could be concluded that brucellosis and toxoplasmosis are zoonotic diseases spreading among sheep and goats in the examined areas. Higher seropositives of brucellosis and toxoplasmosis were found in the aborted sheep and goats. These results explain the significant role of both diseases in abortion in such animals. The detection of *Brucella* seropositive among shepherds, reflecting the possible role of sheep and goats in transmitting such zoonosis. So, it is advisable to monitor the seroprevalence of brucellosis in sheep and goats and their shepherds. Also, brucellosis must be suspected in patients with fever especially who occupationally contact with animals or consumed raw milk or milk products. Special attention of authorities must be directed against brucellosis in sheep and goats. RBPT and LAT could be used as a screening tests in seroepidemiological studies on brucellosis and toxoplasmosis respectively, and their results must be confirmed by other serological tests. *B. melitensis* biover 3 is the predominant biovar exists among the examined herds.

Higher prevalence of *Toxoplasma* antibodies in the examined sheep, goats and man especially women with recurrent or sporadic abortion, indicates the wide distribution of the disease. So, the recommended hygienic measures against the disease are destraction and eradication of the stray cats; mutton and other meat must be thoroughly cooked; pregnant women should be advised to avoid cats unless it is strictly isolated and prohibited from eating any raw meat or a prey.

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