Veterinary Serum and Vaccine Research Institute,
Abbasia, Cairo, Egypt.

SERO-PREVALENCE OF *TOXOPLASMA GONDII* IN SMALL RUMINANTS

(With One Table)

By

R.M. AL-KHATIB*

* Central Veterinary Diagnostic Lab., Ministry of Agriculture Riyadh, KSA.

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المسح المصلي للتوكسوبلازما جوندى في المجترات الصغيرة

رجب محمد الخطيب

هدفت هذه الدراسة إلى إجراء مسح مصلى لبيان مدى الإصابة (الأجسام المضادة) بعدوى التكسوبلازما جوندى من أربع مدن في المملكة العربية السعودية وهى الرياض ، المزاحمية المجمعة وعسير .تم جمع 449 عينة مصل من أغنام وماعزتعانى من الإجهاض المتأخر وتتراوح أعمارها بين 3 - 6 سنوات في الفترة من أكتوبر 2008 إلى أبريل 2010. تم إختبار هذه العينات باستخدام اختبار تفاعل الإنزيم المناعي المرتبط الغير المباشرة (الإيليزا). عدد ثلاثمائة وأربعين عينة كانت إيجابية لوجود الأجسام المناعية المضادة للتوكسوبلازما وبنسبة (76.84 ٪) لمجمل العينات. تم تسجيل أعلى نسب تواجد للأجسام المناعية: 110 (33.56%) فى مدينة الرياض و130(49.51%) في مدينة عسير، بينما أقل نسبة تواجد كانت 45 (5.91%) في مدينة المزاحميه و60 (10.95%) في مدينة المجمعة على التوالي . تعد هذه الدراسة الأولى لتسجيل تواجد طفيل توكسوبلازما جوندى بين قطعان المجترات الصغيرة التى تعاني الإجهاض المتأخر بالمملكة العربية السعودية الأمر الذى يتطلب مزيدا من الدراسة عن مدى انتشار طفيل توكسوبلازما جوندى في فصائل الحيوان الأخرى وكذلك أولى وسائل تشخيص المرض.

SUMMARY

The current study aimed to determine the sero-prevalence of infection from four cities in kingdom of Saudi Arabia; Al Riyadh, Al Muzahmiah, Al Magmah and Asir. Samples were collected from October 2008 to April 2010. A total of 449 serum samples were collected from 3-6 years old sheep and goat suffered from late abortion. The obtained samples tested using an indirect enzyme linked immmunosorbant assay (ELISA). Three hundred forty five (76.84%) of the all investigated samples were found to be positive, of which the heights ratios were 110 in Al Riyadh (33.56%) and Asir 130 (49.51%), while the lowest ratio was 45 (5.91%),

60 (10.95%) in Al Muzahmiah and Al Magmah, respectively. To the author knowledge, this is the first report indicated the existence of *Toxoplasma gondii* among small ruminants herds suffered from late abortion in KSA; so further investigations among other species to explore the potential for spread and diagnosis of *Toxoplasma gondii* are recommended.

***Key words**: ELISA, Small ruminants, Sero-prevalence, Toxoplasma gondii.*

INTRODUCTION

Toxoplasmosis is a true zoonotic disease caused by infection with an obligate intracellular protozoan parasite; *Toxoplasma gondii* (Dubey and Beattie, 1988 and Buxton, 1990) which has a world wide distribution (Buxton, 1991; Akca and Neriman, 2010). While; a wide range of warm-blooded animals including human being act as intermediate hosts for the parasite; the only known final hosts are cats and other felids. Cats excrete environmentally- resistant oocysts in their feces, while the organism can infect a wide range of animal species (Dubey and Beattie, 1988; Dubey, 1994). Toxoplasmosis is a world problem which indicated that T.gondi oocysts contaminate the environment due to the presence of large number of infected stray cats (Dubey and Beattie, 1988; Buxton, 1990). Oocysts shed continuously in the cat's faeces from 4 until 14 days after infection , with an expected peak output of tens millions of 6-8 days, thus; fifty grams of infected cat faeces may contain as many as million of oocysts (Dubey and Frenkel, 1972), which can remain sporulate so for over a year (Dubey, 1977).

Toxoplasmosis is a common infection of sheep and goat (Dubey and Jones, 2008), bovine (Bekele and Kasali, 1989; Akca and Neriman, 2010), equine (Riemann *et al.,* 1975) and Camiledae (Elamina *et al.,* 1992 and Sadrebazzaz *et al.,* 1998) world wid. Toxoplasmosis is a principal cause of abortion and neonatal death (Dubey and Jones, 2008). Hosts become infected by ingestion of food or milk contaminated with oocysts (Meireles *et al.,* 2003 and Skinner *et al.,* 1990) or by ingesting under cooked meat from infected animals with *Toxoplasma gondii* (Dubey *et al.,* 2005).

The presence of antibodies against *T.gondii* in the serum of the hostes with either recent or past *Toxoplasma* infection has been demonstrated by different techniques (Handman *et al.,* 1980; Kasper *et al.,* 1983 and Sharma *et al.,* 1983).

The sero-prevalence of Toxoplasmosis in goat and sheep varies among different countries and regions within a country, and up to 77%

prevalence has been reported (Tenter *et al.*, 2000). Sheep and goats are very economic food animals; act as an important source of both meat and milk for humans in many countries (Dubey, 1990 and Huong *et al.*, 1998). Infection with *Toxoplasma gondii* in sheep and goat not only resulted in significant reproduction disorders as abortion or neonatal mortalities; but also has implication for public health since consumption of infected sheep and goat meat or milk can facilitate zoonotic transmission (Waldeland and Loken, 1991; Tenter and Johnson, 1997).

The purpose of this study was to investigate the sero-prevalence of *T. gondii* among sheep and goat herds from different regions in KSA.

MATERIALS and METHODS

1. Serum samples:

Blood samples were obtained from 449 sheep and goats showed late abortion, from 4 cities of KSA (Al Riyadh- Al Muzahmiah – Al Magmah – and Asir). Blood samples were collected by jugular vein puncture. Serum was removed from the clotted blood samples by centrifugation at 3000 rpm for 10 minutes then aspirate and stored at -20ºC until tested.

2. Enzyme linked Immunosorbant assay (ELISA):

The ELISA kits were supplied by Institute of Pourquier, France and the test was carried out according to the manufacture's instructions. Each sample; individually tested in single well. The results were expressed as the percentage of the mean absorbance value of the samples (S) to the mean absorbance value of the positive (P) control sample provided with the diagnostic kit. The resultant S/P ratio was expressed as a percentage (S/P%) according to manufacture's recommendation where; sera with S/P% less than 40% were regarded as negative, between 40% - 50% as suspicious, and more than 50% as positive.

RESULTS

Out of 449 tested small ruminant sera, 345 (76.84%) were found to be positive to anti-toxoplasma IgG antibodies. The total positives sero-prevalence were 345out of 449 representative 76.84%, of which 110 (33.56%), 45 (5.91%), 60 (10.95%) and 130 (49.51%) in Al Riyadh, Al Muzahmiah, Al Magmah, and Asir respectively (Table, 1).

Table 1: The sero-prevalence (antibodies) of *Toxoplasma gondii* infection from four cities in Saudi Arabia.

Examined animal City	No. of animals	species		+ve		-ve		Total positive	positive percentage
		sheep	goat	Sheep	goat	sheep	goat		
Al Riyadh	137	41	96	30	80	11	16	110	33.56
Al Muzahmiah	59	20	39	13	32	7	7	45	5.91
Al Magmah	82	28	54	20	40	8	14	60	10.95
Asir	171	51	120	35	95	16	25	130	49.51
Total	449	140	309	98	247	42	62	345	76.84

DISCUSSION

Toxoplasma gondii is an obligate intracellular zoonotic protozoan with a worldwide distribution. It infects humans as well as a broad spectrum of vertebrate hosts (Kim *et al.,* 2008).

Goat is one of the most important animals for meat and milk production (Pita Gondim *et al.,* 1999) which could be turned into potential sources of human Toxoplasmosis.

Toxoplasmosis in small ruminante have been widely studied due to its importance to public health, since the dissemination of the parasite for man can occur through the direct contact with domestic animal. The high prevalence of *T. gondii* infection indicated continues exposure of goats to infection due to heavy environmental contamination with oocysts shed from the observed stray cats in the farms. Similar observation was also reported in Italy (Masala *et al.,* 2003).

A plethora of commercially available products has been released in the past few years which use enzyme immunoassay (EIA) technology for detection of proteins and parasitic antigens. ELISA is a more effective screening test for *T. gondii* infection (Kim *et al.,* 2008). Most of the early methods were qualitative assessments of the presence or absence of anti-bodies by a color change of liquid in a microtiter plates. ELISA methods were developed to meet the demands for more rapid test results. The techniques were reported to be simple enough to be performed by nontechnical employees or sophisticated setting (Facklam, 1987).

The world sero-prevalence of Toxoplasmosis in small ruminants has been shown to have great variability, Tenter *et al.* (2000) indicated value from 0% to 77% in Ethiopia, and 81.6% in Nigeria for goats (Chantal

et al., 1994 and Arene, 1984), this agreed with the results in the present study, the sero-prevalence was (76.8 %) this indicated that Toxoplasmosis is one of the most important caustic agent of abortion and infertility in sheep and goat in Saudi Arabia.

In our present study, the high sero-prevalence of *Toxoplasma gondii* antibodies in sheep and goat may be due to the fact that; cats were extensively distributed throughout the investigated regions. Previous reports on the prevalence of *T. gondii* in Korea, 37.0% (17/46) of cats raised on Jeju island were sero-positive by ELISA (Kim and kim, 1989), 13.1% (26/198) of stray cats in a rural area near Chinju-si were positive (Sohn and Nam, 1999), in addition; a high prevalence of Toxoplasmosis within hot and humid environments is attributed to longer viability of *T.gondii* oocysts of cat under humid conditions (Fleck, 1972 and Fayer, 1981).

To the author knowledge, this is the first report indicated the existence of *Toxoplasma gondii* among small ruminant herds suffered from late abortion in KSA. Although; our focus here is on goat and sheep; further investigations are recommended among other species taking in consider that the prevalence of *toxoplasma* antibodies and infection were recorded world widely in bovine, equide in addition; it is urgently needed to control urban stray cat population and to reduce the risk of zoonotic transmission of toxoplasmosis to other animal hosts and humans. Therefore; high ratio of *T. gondii* antibodies represents an essential advance for the development of new reagents for the diagnosis of this parasitic disease.

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