

## ***Toxoplasma gondii* Infection among a Caprine Farm Workers**

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**Abstract:** Anti-*Toxoplasma* antibodies were detected in 3 aborted goats' sera which were reared in a caprine farm. ELISA test applied on 18 serum samples obtained from the farm workers, revealed a presence of IgG and IgM in 11 serum samples (61%) with titers of = 128. Retesting for positive sera (IgG and/or IgM) showed rising of titers within 6 weeks. This results reflect an active recent infection among the farm workers due to unadequate protection measures. Out of 118 caprine sera examined by latex agglutination tests 88 (74.5%) were positive for *Toxoplasma* antibodies; 23 (73.6%) pregnant females and 65 (55.9%) males. IgM was detected in all latex positive caprine sera with titers of 1:512-1:1024. *Toxoplasma gondii* cysts were demonstrated histologically in brains of caprine fetuses and mice that inoculated with caprine fetuses tissues.

**Key words:** Anti-*Toxoplasma*, goat, caprine farm worker, ELISA

### **INTRODUCTION**

Toxoplasmosis is a widely distributed zoonosis, the man being an accidental participant of its epidemiological chain. The disease in human caused by *Toxoplasma gondii* was first recognized by Janku (1923). In 1939 Sabin proved that, *Toxoplasma* isolates from humans and those previously obtained from animals belonged to the same species. Since then, it has been estimated that up to one third of the world human population has been exposed to the parasite (Jackson and Hutchison, 1989; Ashbun, 1992; Gross, 1996; Dubey, 1998). Toxoplasmosis affects many groups of workers who keep direct or indirect contact with animals, mainly without adequate using protection measures.

*Toxoplasma gondii* is one of the principal causes of abortion, foetal death and still birth in goats (Dubey and Baettie, 1988). In Sudan an early report of *Toxoplasma* in goats was reported by Zain Eldin *et al.* (1985) who reported a percentage of 63% using an indirect haemagglutination micromethod.

The aim of this study is to recognize the risk of transplacental toxoplasmosis in goats from economic and public health points of view.

**History:** During a study on sporozoan-induced abortion in goats, three aborted goats sera were obtained from a caprine farm for diagnosis. Anti-*Toxoplasma* antibodies (titers of  $\geq 512$ ) were detected in three sera by

latex agglutination test, using toxo-latex kit (Linear Chemicals, S.L., Spain), which suggested an epizootic on the farm and may led to further epidemiologic investigations.

### **MATERIALS AND METHODS**

Eighteen serum samples were obtained from the farm workers in vacutainer bottles. ELISA test was applied to detect anti-*Toxoplasma* antibodies using *Toxoplasma* IgM and IgG Enzyme Immunoassay test kits (Linear Chemicals, S.L. Spain). Positive samples for IgG and/or IgM were retested twice with six weeks intervals so as to detect antibodies titer rises.

One hundred and eighteen blood samples were obtained from goats; 86 males and 32 pregnant females. Sera were separated by centrifugation at 2000 xg for 10 min. Latex agglutination test was applied to detect anti-*Toxoplasma* antibodies using Toxo-latex kit (Linear chemicals, S.L. Spain). Positive sera were retested by *Toxoplasma* IgM and IgG Enzyme immunoassay test kits.

Portions of placenta, brain, heart, lung, liver, thigh muscle and mesenteric lymph nodes from 3 aborted fetuses were homogenized in five volumes of 0.9% NaCl solution. After, 3 mL of tissue suspension was mixed with 3 mL of antibiotic (200.000 units of Penicillin and 200  $\mu$ g of streptomycin) and added to a saline solution as described by Duby (1981). One mL of the mixture was inoculated IP into 6 albino mice so as to examine the

products of conception for *Toxoplasma*. Survivor mice were exsanguinated 35 days after inoculation for detection of *Toxoplasma* tachyzoites and cysts.

### RESULTS AND DISCUSSION

Anti-*Toxoplasma* antibodies IgM and IgG were detected in 11 out of 18 (61%) serum samples from the farm workers with titers of  $\geq 128$ . Retesting for positive sera (IgG and/or IgM) showed increasing of titers within 6 weeks (Table 1).

Out of 118 caprine sera, 88 (74.5%) were positive for *Toxoplasma* antibodies, 23 (73.6%) pregnant females and 65 (55.9%) males. IgM was detected in all latex positive caprine sera with titers of 1:512-1:1024.

Out of 23 infected does 3 does aborted, 12 delivered infected kids, 6 delivered healthy not infected kids and 2 delivered dead full-termed fetuses (Fig 1).

Mice inoculated with tissues of fetuses, survived at least 35 days after inoculation. Histosections revealed presence of *Toxoplasma* cysts in mice and fetuses brains (Fig. 2).

Toxoplasmosis is being one of the parasitic infections of great interest to public health. In farm workers, the handling of infected animals and their products represent risk of infection by *Toxoplasma*.

In this study, the percentage of 61% of infection among workers in the caprine farm indicates a high infection due to unadequate protections measures. The antibody titers for *Toxoplasma* of  $\geq 128$  and detection of IgM in sera reflected a recent infection. A high and increasing titers of *Toxoplasma* antibodies suggested an active infection Mackie *et al.* (1971).

In this study the cause of abortions in goats were attributed to natural infection with *Toxoplasma gondii* and not as a result of GT-1 strain, because *Toxoplasma* isolates from the does and their fetuses were not lethal to mice and the does were clinically normal during pregnancy. The variety of infection degree within the pregnant does may be due to the stage of pregnancy and the virulence of *Toxoplasma strain*.

Recognition of transplacental toxoplasmosis in goats is important from economic and public health points of view. Cats may eat infected placentae when kidding takes place, an infected cat can excrete millions of oocysts in its feces. The type of management and production of livestock also may be a factor that has an impact on the epidemiology of *Toxoplasma gondii* infections, so using intensive farm management with adequate measures of hygiene, confinement and prevention may significantly reduce the risk of *Toxoplasma* infection.

Table 1: *Toxoplasma* index of anti-*Toxoplasma* antibodies IgM and IgG for caprine farm workers

No.	IgM	IgM	IgG	IgG
	1.08	19	1.08	1.1
	1.9	19	1.6	1.7
	1.3	1.5	1.04	1.2
	1.02	1.15	1.4	1.7
	2.3	232	2.5	2.5
	2.2	28	0.7	1.02
	1.1	1.7	1.1	1.9
	1.3	1.4	1.7	1.9
	1.02	1.8	1.5	1.8
	1.4	1.9	1.3	1.7
	1.9	1.9	1.7	1.8
Control +ve	1.9	23	2.8	2.5
Control -ve	0.2	0.07	0.6	0.1
Cut off	1	1.0	1	1



Fig. 1: A dead full-termed caprine fetus

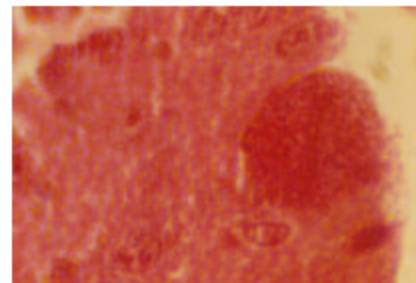


Fig. 2: *Toxoplasma* cyst in a brain of (caprine fetus  $\times 1600$  (H and E))

### REFERENCES

- Ashburn, D., 1992. History and general epidemiology. In: Ho-Yen Do and A.W.L. Joss (Eds). Human Toxoplasmosis. Oxford: Oxford University Press, pp: 1-25.
- Dubey, J.P., 1981. *Toxoplasma*-induced abortion in dairy goats. JAVMA., 178: 671-674.
- Dubey, J.P. and C.P. Beattie, 1988. Toxoplasmosis of animals and man, CRC press, Boca Raton. Fl, pp: 220.
- Dubey, J.P., 1998. *Toxoplasma gondii* oocysts survival under defined temperatures. J. Parasitol., 84: 862-865.

- Gross, U., 1996. *Toxoplasma gondii*. Berlin: Springer-Verlag.
- Jackson, M.H. and W.M. Hutchison, 1989. The prevalence and source of *Toxoplasma* infection in the environment. *Adv. Parasitol.*, 28: 55-105.
- Janku, J., 1923. Pathogenesa a pathologicka anatomie tak nazvaného verozeného kolobomu \_lute skvrny v oku normální velikém a mikrophthalmickém snálezem parazitu v sitnici. *Ěas lék Ěesk*, pp: 39-43: 1021-1027, 1054-1059, 1081-1085, 11-15, 1138-1144.
- Mackie, M.J., G.F. Alvin and P. Pallister, 1971. A study to determine the causal relationship of toxoplasmosis to mental retardation. *Am. J. Epidemiol.*, 94: 215-244.
- Sabin, A.B., 1939. Biological and immunological identity of *Toxoplasma* of animal and human origin. *Proc. Soc. Exp. Biol.*, 41: 75-80.
- Zain Eldin, E.A., S.E. Elkhawad and H.S. Kheir, 1985. *Rev. Elev. Med. Vet. Pays Trop.*, 38: 247-249.