Detection of *Toxoplasma gondii* and *Neospora caninum* antibodies in cattle in Mosul city , Iraq

B. A.AL- Badrani M.I. AL-Farwachi O.K. AL-Hankawai
Coll. of Vet. Med. / Unive. of Mosul

Abstract

The study was conducted on the one hundred sera of local breed cattle in Mosul city , Iraq. All sera were tested for presence of *Neospora caninum* and *Toxoplasma gondii* antibodies by using indirect enzyme linked immunosorbent kits. Results showed that 30% was positive for *Toxoplasma gondii* while *Neospora caninum* showed a positive of 20%. Mixed infections were found in one animal only (1 %). This results indicate that Toxoplasmosis is much more widespread than neosporosis in cattle living in the Mosul city , Iraq.

Introduction

Toxoplasma gondii and *Neospora caninum* are closely related Apicomplexan parasites which are morphologically similar but possess some structural, molecular and antigenic differences (1 , 2). They have similar life-cycles with different final hosts, the felids (3) and canids (4) respectively, and both parasites have similar intermediate hosts including a wide

range of mammals (5 , 6 , 7). Both parasites causing abortion and fetal abnormality in cattle (8 , 9). Previous serological investigations have shown that antibodies to both parasites were present in several species including cattle (10) , sheep (11) , and dogs (12). This work is a comparative seroprevalence of bovine toxoplasmosis and neosporosis in Mosul , Iraq.

Material and methods

A total of 100 sera were collected from local breed cattle (3 – 10 years old) from different regions in the Mosul city , Iraq during the period from July 2011 to April 2012. A commercial ELISA kit (Bio – X *Neospora caninum* , Indriect ELISA kits) for detection of antibodies against *Neospora caninum* in bovine serum was used , the kit has been supplied from Bio – x Diagnostics – Belegique. The test uses 96- well microtitration plates sensitized by a purified *Neospora caninum* protein . The plates odd columns (1 , 3 , 5 , 7 , 9 and 11) contain the purified protein , where as the even columns (2 , 4 , 6 , 8 , 10 , 12) contain a control antigen . we thus have agenuine negative control . Using such a control reduce the number of false positive considerably.All

sera were tested according to the manufacturers instructions , then read the optical densities in the microwells using a micro plate reader at a wavelength of 450 nm.ELISA optical density (OD) reading were transformed to serum / positive percentage (S / P) according to a specific equation cited by manufacturer. The sample considered positive if it gives $S / P \% > 15 \%$, $10 \% < S / P \% < 15 \%$ considered doubtful , but $S / P \% < 10 \%$ considered negative . $S / P = \Delta OD \text{ sample} / \Delta OD \text{ positive} \times 100$ All sera were also tested by a commercial kit (ELISA *T. gondii* serum screening, Institut Pourquier, Montpellier, France). The serum was positive if more than 50% S/P was found.

Results

From a total of 100 cows , 30 (30 %) were positive for *T. gondii* and 20 (20 %) for *N. caninum* . One animal (1 %) had detectable antibodies against both *N. caninum* and *T.gondii*.*T. gondii* was of higher seropositive

in healthy non pregnant cows and more in comparison with aborted and pregnant cows (Table 1). Healthy non pregnant cows had a lower rate of infection than aborted and pregnant cows (Table 2).

Table 1: Percentages of seropositive for *T. gondii* in cattle in Mosul city ,Iraq

Origin of sera	Number of examined	Number of seropositive (%)
From healthy non pregnant cows	30	17 \ 30 (56.7)
From pregnant cows	35	7 \ 35 (20.0)
From aborted cows	35	6 \ 35 (17.1)
Total	100	30 \ 100 (30.0)

Table 2: Percentages of seropositive for *N. caninum* in cattle in Mosul city ,Iraq

Origin of sera	Number of examined	Number of seropositive (%)
From aborted cows	35	11 \ 35 (31.4)
From pregnant cows	35	7 \ 35 (20.0)
From healthy non pregnant cows	30	2 \ 30 (6.7)
Total	100	20 \ 100 (20.0)

Discussion:

In the present study 30 out of 100 sera (30.0 %) of cows were positive for the presence of antibodies to toxoplasmosis infection. This study showed lower seroprevalence than prevalence studied by Moreno et al., 1991 (13) were found in Spain at 41 % , Poland 53% (14) , Serbia 76.3% (15) and Brazil 71% (16). The same prevalence of infection (30%) in buffaloes also reported in Mosul city , Iraq (7) , While lower prevalence of infection in cattle also reported in some countries such as Tanzania (17) , France (18) and Malaysia (19). The difference in seroprevalence in cattle in different countries may reflect different climatic factors. Cats are common pets kept in most families in Iraq and often found in public places. An increase in the number of cats causes increase of toxoplasmosis infection (4). In this study the percentages of seropositive were 6.7 , 20.0 and 31.4 % in the healthy non pregnant animals , pregnant cows and aborted cows respectively. Review of all published data indicate that *Neospora caninum* is a primary abortifacient in cattle (20 , 21) and *Neospora caninum* infection is generally latent and asymptomatic in non pregnant cattle , although bovine neosporosis in pregnant cow is associated with repeated abortion and birth of clinically healthy but persistently infected calves (22) . Several studies demonstrate that chronically infected

seropositive cows have an about two – to three fold increased risk of abortion compared to seronegative dams (23 - 24). Thurmond and Hietala (1997) (25) observed a 7.4-fold higher risk of abortion during the first gestation of congenitally infected heifers. The percentage of seropositive values was significantly higher in the aborted animals than in other animals which reflect the high concentration of antibodies against neosporosis , as also in the previous serological studies showed the aborted dams from herd with endemic bovine abortion have higher antibodies against specific antigens (26). Other researcher has also shown that the high antibody titer are found in post abortion sera and during the second part of pregnancy (26, 27). In conclusion , the results of the present study suggest that is an important factor in the economic losses of the dairy industry in this region of Iraq , and appropriate management and control strategies need to be practiced by dairy farmers in this area. This could be due to the animals owners unawareness to the vaccination programs and also the regions characteristics. The region is illegal animal trade occur from time to time. further epidemiological studies are needed to provide a better understanding of neosporosis and toxoplasmosis under local conditions.

References

1. Dubey, J.P., Barr, B.C., Barta, J.R., Bjerka^os, I., Bjo^orkman, C., Blagburn, B.L., Bowman, D.D., Buxton, D., Ellis, J.T., Gottstein, B., Hemphill, A., Hill, D.E., Howe, D.K., Jenkins, M.C., Kobayashi, Y., Koudela, B., Marsh, A.E., Mattsson, J.G., McAllister, M.M., Modry^o, D., Omata, Y., Sibley, L.D., Speer, C.A., Trees, A.J., Uggla, A., Upton, S.J., Williams, D.J.L., Lindsay, D.S., 2002. Redescription of *Neospora caninum* and its differentiation from related coccidia. *Int. J. Parasitol.* 32, 929–946.
2. Bjerka I ; Mohn SF; Presthus J. Unidentified cyst forming sporozoan causing encephalomyelitis and myositis in dogs .Z Parasitenkd. 1984, 70 : 271 – 274.
3. Dubey, J.P., Hattel, A.L., Lindsay, D.S., Topper, M.J., 1988. Neonatal *Neospora caninum* infection in dogs: isolation of the causative agent and experimental transmission. *J. Am. Vet. Med. Assoc.* 193, 1259–1263.
4. Hill, D., Dubey, J. P. (2002): *Toxoplasma gondii*: transmission, diagnosis and prevention. *Clin Microbiol Infect.* 8: 634–640.
5. Dubey JP, Lappin MR. Toxoplasmosis and neosporosis. In: Greene CE, editor. *Infectious diseases of the dog and cat*. St. Louis (MO): Saunders Elsevier; 2006. p. 754–75.
6. Rodrigues A.A.R., Gennari S.M., Aguiar D.M., Sreekumar C., Hill D.E., Miska K.B., Vianna M.C.B., Dubey J.P.. Shedding of *Neospora caninum* oocysts by dogs fed tissues from naturally infected water buffaloes (*Bubalus bubalis*) from Brazil. *Veterinary Parasitology* ; 2004, 124, 139–150.
7. Al-Farwachi MA , O. K. AL-Hankawe and O. M. Al-Iraqi. Prevalence of antibodies to *Toxoplasma gondii* in females buffaloes in Ninavah province, Iraq. *Iraqi J Vet. Med* ; 2008 , 22(1):19-22.
8. Boger, L.A., Hattel, A.L., 2003. Additional evaluation of undiagnosed bovine abortion cases may reveal fetal neosporosis. *Vet. Parasitol.* 113, 1–6.
9. Radostits OM, Gay CC, Blood DC, Hinchcliff KW. *Veterinary medicine: A textbook of the diseases of cattle, sheep, pig, goats and horses*. 10th ed. Philadelphia: WB Saunders Company 2007: 1317–1322
10. Rahman WA ; Manimegalai V ; Chandrawathani P ; Premaalatha B ; Zaini CM ; Comparative seroprevalences of bovine toxoplasmosis and neosporosis in five states in Malaysia . *Global Veterinaria*. 2011, 6 (6) : 575 – 578.
11. Moreno B, Collantes- Fernandez E, Villa A, Navarro A, Regidor – Cerrillo J, Ortega- Mora LM .Occurrence of *Neospora caninum* and *Toxoplasma gondii* infections in ovine and caprine abortions. *Vet. Parasitol.* 2012 , 161:131-132.
12. Hosseini F, Hosseini F. Seroprevalence of *Neospora caninum* and *Toxoplasma gondii* infection in dogs from west and central parts of Iran using two indirect ELISA tests and assessment of associated risk factors. *Iranian Journal of Veterinary Research, Shiraz University*. 2011, 12 (1) : 46- 50.
13. Moreno T; Martinez- Gomez F; Becerra C . The seroprevalence of bovine toxoplasmosis in Cordoba , Spain . *Annals of Tropical Medicine and Parasitol.* 1991 , 85 : 285- 286.
14. Sroka J. Sero-epidemiology of toxoplasmosis in the Lublin region. *Annals of Agricultural and Environmental Medicine* .2001 , 8: 25-31.

15. Klun I ; Djurkovic – Djakovic O ; Katic-Radivojevic S; Nikolic A. Cross-sectional on *Toxoplasma gondii* infection in cattle , sheep and pigs in Serbia: seroprevalence and risk factors. Vet. Parasitol. 2006 ,135:121-131.
16. Santos TR; Costa AJ; Toniollo MC ;Luvizotta G H ; Benetti A H. seroprevalence of anti-*Toxoplasma gondii* antibodies in dairy cattle ,dogs and human from the Jauuru micro-region , mato Grosso State Brazil . J of Vet. Parasitol. 2009 , 161: 324-326.
17. Luuk B; Schoonman E ; Wilsmore E ; Swai S .Seroepidemiological investigation of bovine toxoplasmosis in traditional and smallholder cattle production systems of Tanga Region, Tanzania . Tropical Anim.Health and Prod. 2009 , 4 : 579- 587.
18. Gilot-Fromont E; Aubert D; Belkilani S ; Hermitte P; Gibout O ; Geers R ;Villena I. Landscape herd management and within – herd seroprevalence of *Toxoplasma gondii* in beef cattle herds from Champagne – Ardenne , France .Vet Parasitol. 2009 , 161 : 36 – 40.
19. Normaznah YK; Saniah N; Fuzina M ; Nseem ; Khatijah .Prevalance of antibodies to *Toxoplasma gondii* among farmers and cattle in Gombak District , Selangor , Malaysia – A preliminary report.Tropical Biomedicine 21:157- 159.
20. Dubey J.P. (2003): Review of *Neospora caninum* and neosporosis in animals. Korean Journal of Parasitology,41, 1–16.
21. Dubey, J.P., Buxton, D., Wouda, W., 2006. Pathogenesis of bovine neosporosis. J. Comp. Pathol. 134, 267–289.
22. Buxton D., McAllister M.M., Dubey J.P. 2002. The comparative pathogenesis of neosporosis. *Trends in Parasitology*, 18,546–552.
23. Pfeiffer, D.U., Williamson, N.B., Reichel, M.P., Wichtel, J.J., Teague,W.R., 2002. A longitudinal study of *Neospora caninum* infection on a dairy farm in New Zealand. Prev. Vet. Med. 54, 11–24.
24. Thurmond, M.C., Hietala, S.K., 1997. Effect of congenitally acquired *Neospora caninum* infection on risk of abortion and subsequent abortions in dairy cattle. Am. J. Vet. Res. 58, 1381–1385.
25. Schares, G., Rauser, M., So'ndgen, P., Rehberg, P., Ba'rwald, A., Dubey,J.P., Edelhofer, R., Conraths, F.J., 2000. Use of purified tachyzoite surface antigen p38 in an ELISA to diagnose bovine neosporosis.Int. J. Parasitol. 30, 1123–1130.
26. Quintanilla-Gozalo, A., Pereira-Bueno, J., Seijas-Carballedo, A.,Costas, E.,Ortega-Mora, L.M., 2000. Observational studies in *Neospora caninum* infected dairy cattle: relationship infection– abortion and gestational antibody fluctuations. Int. J. Parasitol.30, 900–906.

الكشف عن اضرار المقوسات الكوندية والنيوسبورا الكلبية في الابقار في مدينة الموصل , العراق

باسمة عبد الفتاح البدراني مآب ابراهيم الفرو ه جي عمر خزعل الحنكاوي
كلية الطب البيطري/ جامعة الموصل

الخلاصة

اجريت الدراسة على مئة عينة مصل كانت تعود للابقار المحلية في مدينة الموصل , العراق. أذ فحصت جميع العينات للكشف عن تواجد اضرار المقوسات الكوندية والنيوسبورا الكلبية باستخدام عدة الاليزا غير المباشر. اشارت النتائج الى 30% من الامصال كانت موجبة لتواجد اضرار المقوسات الكوندية , بينما كانت 20% من العينات موجبة لتواجد اضرار والنيوسبورا الكلبية, ولوحظ الخمج المختلط في حيوان واحد فقط (1 %). وتشير النتائج الحالية الى داء المقوسات هو الاكثر انتشارا من داء النيوسبورا في الابقار الموجودة في مدينة الموصل , العراق.