Advances in Animal and Veterinary Sciences. 1 (6): 188 – 190
http://www.nexusacademicpublishers.com/journal/4

Short Communication

Co–Infection of *Mycobacterium avium* Subspecies *paratuberculosis* and *Brucella melitensis* in a Sirohi Breed of Goats in India

Shoor Vir Singh*, Kundan Kumar Chaubey, Saurabh Gupta, Vivek Kumar Gupta, Narottam Das Agrawal, Naveen Kumar

Microbiology Laboratory, Animal Health Division, Central Institute for Research on Goats, Makhdoom, PO –Farah, Dist. – Mathura, 281 122, Uttar Pradesh, India
*Corresponding author: shoorvir.singh@gmail.com; shoorvir_singh@rediffmail.com

ARTICLE HISTORY

Received: 2013–09–27
Revised: 2013–10–14
Accepted: 2013–10–16

Key Words: *Brucella melitensis*, Johne's disease, Brucellosis

ABSTRACT

Screening of goats (n=34) was performed using indigenously developed ELISA and SAT assays. Results revealed a total of 79.4% and 14.7% infection of caprine Johne's disease and caprine Brucellosis, respectively in a newly established goat herd at Popa Burj village in Mathura district of Uttar Pradesh, India. History indicated that the Sirohi breed of goats was recently purchased from the native tract in Sirohi district of Rajasthan. All of the five *Brucella* positive goats were found to be co–infected with Johne's disease. Study revealed the presence of two major infectious diseases in the herd of Sirohi goats, which demand immediate attention and need for developing control programmes for twin infections.

ARTICLE CITATION: Singh SV, Chaubey KK, Gupta S, Gupta VK, Agrawal ND and Kumar N (2013). Co–infection of *Mycobacterium avium* subspecies *paratuberculosis* and *Brucella melitensis* in a sirohi breed of goats in India. *Adv. Anim. Vet. Sci.* 1 (6): 188 – 190.

Caprine Johne's diseases (CJD) and Caprine Brucellosis (CB) are not only economically important diseases of animals leading to production losses but are also zoonotic in nature and have public health significance. *Mycobacterium avium* subspecies *paratuberculosis* (MAP), the cause of CJD has wide host range and infects animals like cattle, buffaloes, goats, sheep, pigs, deer, rabbit, primates and human beings. Diarrhoea, weakness and low productivity are the main symptoms of CJD. MAP has been reported from all parts of the world (Barad et al., 2013, Braun et al., 1990, Robbi et al., 2002, Yadav et al., 2008, Mercier et al., 2010, Singh et al., 2013, Shroff et al., 2013). Brucellosis is predominantly caused by *Brucella melitensis* in goats and sheep and is major human infection (zoonosis) caused by consumption of raw milk and handling of meat and meat products of these animals (Xavier et al., 2010, Gupta, 2013). Indigenous ELISA kit (i–ELISA) and serum agglutination test (SAT) were used for the screening of CJD and CB, respectively. Farm located at Popa Burz (Raipura Jat) of Mathura district was recently established by purchasing Sirohi breed of goats from the native tract (Sirohi district) in Rajasthan. CB is an important disease of ruminants and about 18–40% of large ruminants reach abattoir due to infertility (Sharma et al., 1993). Beside its zoonotic implications, it is one of the major causes of abortions in goats and sheep. The study aimed to investigate presence of twin infections (CJD and CB) in a herd of Sirohi goats.

Thirty four (3 males and 31 females) goats of Sirohi breed were screened to estimate prevalence of CJD and CB in goat farm of Popa Burz (Raipura Jat) in Mathura district. The farm was recently established by purchasing Sirohi breed of goats from the native tract (Sirohi district) in Rajasthan. Animals were weak and suffering from diarrhoea. Serum samples were collected from all goats and screened for CJD and CB using i–ELISA and SAT, respectively.

Indigenous ELISA kit (i–ELISA) we have earlier developed for the screening of animals against JD (Singh et al., 2006) was used for screening. Protoplasmic Antigen (PPA) was harvested (Singh et al., 2008) from 'bison type' genotype of MAP isolated from a terminal case of JD in a Jamunapari goat (Singh et al., 2006). Whole cell sonicate was centrifuged and standardized at 0.1 ug per well of microtiter plate. Serum samples were used in 1:50 dilution and anti–goat horseradish peroxidase conjugate (Sigma Aldrich, USA) in 1:5000 dilution. Culture positive and negative samples of goats were used as positive and negative controls, respectively. Optical densities (OD) were transformed to S/P ratios and goats were negative (0.00–0.09), suspect (0.10–0.24), low positive (0.25–0.39), positive (0.40–0.99) and strong positive (1.0–10.00) for the status of CJD (Collins, 2002). Goats in strong positive and positive category were considered positive for CJD. Goats were screened by Standard Agglutination Test (SAT) following the procedure of Alton and colleagues (1988) with some modifications using *Brucella melitensis* plain antigen (Annonymous, 1971). The agglutination titres of ›1:40 were considered positive for brucellosis and those titers ‹1:20 were taken as doubtful (suspected) and subjected to re–testing at monthly interval (Annonymous, 1971). Chi–Square test (X^2) applied to measure the significant association between the two tests (Siegel and Castellan, 1989).

Screening of 34 recently procured farm goats showed that, 27 (79.4%) were positive for CJD by i–ELISA and 5 (14.7%) for CB by SAT. Of 27 CJD positive samples, 4 (11.7%) were strong positive or super shedders. All 5 goats positive for CB were also positive for CJD (co–infected) (Table 1). Screening of 34 goats showed that, 5 (14.7), 7 (20.5), 22 (64.7%) and 0 (0.0%) were positive for co–infection of CJD and CB, negative for CJD and CB, positive for CJD and negative for CB and negative for CJD and positive for CB, respectively (Table 2). Results first time exhibited co–infection of MAP and *Brucella melitensis* in goats.

ISSN: 2307–8316 (Online); ISSN: 2309–3331 (Print)

Table 1: Detection of MAP and *Brucella* infection in farm goats of Sirohi breed using Indigenous ELISA kit and SAT

MAP infection / Johne's disease					*Brucella* infection
S/P ratio	Disease Status		*n* – Status in ELISA		*n* – Status in SAT
00.0–0.09	Negative	Negative	1 (2.9)	7 (20.5)	29 (85.2)
0.1–0.24	Suspected		3 (8.8)		
0.25–0.39	Low positive		3 (8.8)		
0.4–0.9	Positive	Positive	23 (67.6)	27 (79.4)	5 (14.7)
1.0–10.0	Strong positive		4 (11.7)		
Total			34		34

*figures in parenthesis are percentage, n = number

Test	Combinations (*n*)			
	1	2	3	4
Indigenous ELISA	+	–	+	–
SAT	+	–	–	+
Total = 34	5 (14.7)	7 (20.5)	22 (64.7)	0 (0)

*figures in parenthesis are percentage, *n*= number

Table 2: Comparative status of co–infection of MAP and *Brucella* in Sirohi breed of goats at Popa Burz, Mathura using Indigenous ELISA and SAT

There is significant association between two tests with respect to Positive/Negative detection of cases (P<0.05). Recently, commercial goat farming is growing at fast pace in India and Sirohi is very popular breed amongst goat farmers, therefore it is very important to know the incidence of chronic and incurable diseases like JD and brucellosis, in the native tract of this breed. Both these diseases may get distributed through the movement of the infected animals from the breeding tract to different parts of the country, as these herds form the foundation stock of many up–coming commercial goat farms. JD has been reported in goats worldwide with prevalence of 7.9, 76.9, 74.3 and 62.9% in Republic of Cyprus, USA, Chile and France, respectively (Liapi et al., 2011, Manning et al., 2002, Salgado et al., 2007, Mercier et al., 2010). In India, prevalence of CJD has been estimated were 78.0, 91.6 and 58.6% in Bhopal, Bareilly, and Mathura, respectively (Rajukumar et al., 2006, Tripathi et al., 2006, Kumar et al., 2007).

There are number of reports on the incidence of brucellosis in animal farms world–wide and incidence of brucellosis has been recorded as 4.4, 4.9, 0.03–0.1, 1.3, 4.9, 5.2–38.5, 32.8% from Iraq, India, France, C. Ethiopia, Egypt, Iran and Pakistan, respectively (Karim et al., 1979, Singh et al., 1998, Toma, 1990, Bekele and Kasali, 1990, Abdel Ghani et al., 1983, Zowghi and Ebadi, 1985 and Akhtar, 1992). Singh et al. (1998) also reported incidence of brucellosis in different breeds of goats in 7 district of UP and Punjab and was 4.0%. In another study, Singh et al. (2000) reported 2.7% incidence in goats through dot–ELISA (Singh et al., 2000).

Results showed high and moderate prevalence of CJD and CB in Sirohi breed of goats located in a farm herd at Mathura district. However, above prevalence indicate twin infections in native tract of Sirohi breed of goat, which is very popular in new commercial goat farms, therefore needs immediate attention for control.

ACKNOWLEDGEMENTS

We are thankful to the CSIR and Director, CIRG, Makhdoom for providing the necessary research facilities and continuous support.

REFERENCES

Abd-el-Ghani M, Osman K and Nada SM (1983). Evaluation of serodiagnostic methods: Brucellosis among sheep and goats in Egypt. Int. J. Zoonoses 10: 132–137.

Akhtar, S (1992). Epidemiological status of brucellosis and the current strategies for it's control in Pakistan. In: Proc. Strategies in Diagnosis and Control of Brucellosis in Asia, Beijing, China. 1–40.

Alton GG, Jones LM, Angus RD and Verger JM (1988). Technique for the Brucellosis Laboratory, (INRA, Paris).

Annonymous (1971). Joint FAO/WHO Expert Committee on Brucellosis, 5th report, WHO Technical Report Series No. 464.

Barad DB, Chandel BS, Dadawala AI, Chauhan HC, Kher HN, Shroff S, Bhagat AG, Singh SV, Singh PK, Singh AV, Sohal JS, Gupta S and Chaubey KK (2013). Comparative potential of traditional versus modern diagnostic tests in estimating incidence of caprine Johne's disease. Adv. Anim. Vet. Sci. 1 (1): 35–40.

Bekele T and Kasali OB (1990). Brucellosis in sheep and goat in Central Ethiopia. Bull. Anim. Health. Prod. Africa. 38, 23–25.

Braun RK, Buergelt CD, Littell RC, Linda SB and Simpson JR (1990). Use of an enzyme–linked immunosorbent assay to estimate prevalence of paratuberculosis in cattle of Florida. J. Am. Vet. Med. Assoc. 196(8): 1251–1254.

Collins MT (2002). Interpretation of a commercial bovine paratuberculosis enzyme–linked immunosorbent assay by using likelihood ratios. Clin. Diagn. Lab. Immunol. 9: 1367–1371.

Gupta VK (2013). Brucellosis: A perennial scourge. Indian J. Small. Rumin. 19(2): 121-136.

Karim MA, Penjouian EK and Dessouky FI (1979). The prevalence of brucellosis among sheep and goats in northern Iraq. Trop. Anim. Health Prod. 11, 186–188.

Kumar P, Singh SV, Bhatiya AK, Sevilla I, Singh AV, Whittington RJ, Juste RA, Gupta VK, Singh PK, Sohal JS and Vihan VS (2007). Juvenile Capri–paratuberculosis (JCP) in India: Incidence and characterization by six diagnostic tests. Small Rumin. Res. 73: 45–53.

Liapi M, Leontides L, Kostoulas P, Botsaris G, Iacovou Y, Rees C, Georgiou K, Smith GC and Naseby DC (2011). Bayesian estimation of the true prevalence of *Mycobacterium avium* subsp. *paratuberculosis* infection in Cypriot dairy sheep and goat flocks. Small Rumin. Res. 95(2–3): 174–178.

Manning JBE, Steinberg H, Krebs V and Collins MT (2002). Diagnostic testing patterns of natural *Mycobacterium paratuberculosis* infection in pygmy goats. Can. J. Vet. Res. 67: 213–218.

Mercier P, Baudry C, Beaudeau F, Seegers H and Malher X (2010). Estimated prevalence of *Mycobacterium avium* subspecies *paratuberculosis* infection in herds of dairy goats in France. Vet. Rec. 167(11): 412–416.

Rajukumar K, Tripathi BN, Kurade NP and Parihar NS (2006). A dot–enzyme immunoassay for large scale screening of sera for antibodies to *Mycobacterium avium* subsp. *paratuberculosis* in goats. J. Appl. Anim Res. 29: 49–52.

Robbi C, Rossi I, Nardelli S, Marangon S, Vincenzi G and Vicenzoni G (2002). Prevalence of paratuberculosis (Johne's disease) in dairy farms in North–Eastern Italy. Proceedings of the Seventh International Colloquium on Paratuberculosis.

ISSN: 2307–8316 (Online); ISSN: 2309–3331 (Print)

Salgado M, Kruze J and Collins MT (2007). Diagnosis of paratuberculosis by fecal culture and ELISA on milk and serum samples in two types of Chilean dairy goat herds. J. Vet. Diagn. Invest. 19: 99–102.

Sharma VK, Gupta RC, Mishra SK, Khurana NK and Khar SK (1993). An abattoir study of lesions in buffalo genitalia. Indian Vet. J. 70: 1165-1167.

Shroff S, Chandel BS, Dadawala AI, Singh SV, Bhagat AG, Chauhan HC, Gupta S (2013). Evaluation of Indigenous vaccine in Patanwadi sheep naturally infected with clinical Johne's disease. Res. Opin. Anim. Vet. Sci. 3(9): 322-329.

Siegel S and Castellan NJ Jr (1989). Non Parametric Statistics for the Behavioral Sciences. Second Edition, McGram–Hill International Editions– Statistics Series.

Singh SV, Gupta VK and Singh N (2000). Comparative Evaluation of a Field–based Dot–ELISA Kit with Three Other Serological Tests for the Detection of Brucella Antibodies in Goats. Trop. Anim. Health Prod. 32: 155–163.

Singh SV, Singh N, Gupta VK, Shankar H, Vihan VS, Gupta VK and Tiwari HA (1998). Seroprevalence of brucellosis in a few important Indian goat breeds. Small Rumin. Res. 30: 93–98.

Singh SV, Singh AV, Singh PK, Gupta VK, Kumar S and Vohra J (2006). Sero–prevalence of paratuberculosis in young kids using 'Bison type', *Mycobacterium avium* subsp. *paratuberculosis* antigen in plate ELISA. Small Rumin. Res. 70: 89–92.

Singh SV, Singh AV, Singh R, Sharma S, Shukla N, Misra S, Singh PK, Sohal JS, Kumar H, Patil PK, Misra P and Sandhu KS (2008). Sero–prevalence of Johne's disease in buffaloes and cattle population of North India using indigenous ELISA kit based on native *Mycobacterium avium* subspecies *paratuberculosis* 'Bison type' genotype of goat origin. Comp. Immunol. Microbiol. Infect. Dis. 31: 419–433.

Singh SV, Singh PK, Singh AV, Gupta S, Chaubey KK, Singh B, Kumar A, Srivastav A, Sohal JS (2013). Bio-burden and bio-type profiles of *mycobacterium avium* subspecies *paratuberculosis* infection in suspected population of domestic livestock in India. International Journal of Current Research 5(7): 1897-1901.

Toma B (1990). Brucellosis in cattle, sheep and goat in France in 1989. Epidemiologie et Sante Animale 18, 87–96.

Tripathi BN, Periasamy S, Paliwal OP and Singh N (2006). Comparison of IS900 tissue PCR, bacterial culture, johnin and serological tests for diagnosis of naturally occurring paratuberculosis in goats. Vet. Microbiol. 116(1–3): 129–37.

Xavier MN, Paixao TA, Hartigh ABden, Tsolis RM and Santos RL (2010). Pathogenesis of *Brucella* spp. The Open Veterinary Science Journal. 4: 109–118.

Yadav D, Singh SV, Singh AV, Sevilla I, Juste RA, Singh PK and Sohal JS (2008). Pathogenic 'Bison–type' *Mycobacterium avium* subspecies *paratuberculosis* genotype characterized from riverrine buffalo (*Bubalus bubalis*) in North India. Comp. Immunol. Microbiol. Infect. Dis. 31: 373–387.

Zowghi E and Ebadi A (1985). Serological investigations on brucellosis in cattle, sheep and goats in Iran. Rev. Sci. Tech. Off. Int. Epiz. 4(2): 319-323.

ISSN: 2307–8316 (Online); ISSN: 2309–3331 (Print)