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Seroprevalence of brucellosis in caprine population of southern agro-climatic regions of Tamil Nadu

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Abstract

Brucellosis in domestic animals is the major source of human infection, and high incidence of human brucellosis is associated with high density of sheep and goats. It is crucial to study the prevalence and epidemiological status of brucellosis in sheep and goats to take effective prevention measures against brucellosis in human or domestic animals. In this context, this study conducted to evaluate the seroprevalence of brucellosis in goats with a history of abortion. Samples were collected from the goat flocks located in southern agroclimatic regions of Tamil Nadu. A total of 52 sera from aborted females as well as 22 sera from males were sampled and analyzed for *Brucella* spp. using Rose Bengal Plate Agglutination test for brucellosis shows positivity of 8.1%. Seropositivity to *C. abortus* was also detected in 0% and 1.35% of male and female respectively. The Knowledge and Practice study related to good management practices in study. High prevalence of infection associated with brucellosis in goat with a history of abortion and poor knowledge about disposal and handling the aborted fetal contents and poor practice followed highlights risks of human zoonotic infections by these pathogens and causes economic loss of diseases. Therefore, special attention is required for further study and implement prevention and control extension program.

Keywords: *Brucella*, RBPT, seroprevalence, southern agro-climatic region

1. Introduction

Brucellosis is an economically important zoonotic disease caused by the gram-negative bacteria of *Brucella* species (Rossetti *et al* 2017 and Alton *et al* 1975) ^[11, 2]. People contract Brucellosis by occupational exposures through handling of aborted fetus or placenta of infected animals [Corbel 2006] ^[4], and inhalation of contaminated aerosol during the processing of the animal products (Dean *et al* 2007) ^[5]. Brucellosis creates significant economic losses to the livestock sector as it results in abortion, infertility, and decreased milk and meat production. The disease has been successfully managed or eradicated from several developed countries, but it is still endemic in livestock and human populations in resource-poor countries (Mcdermott *et al* 2013) ^[9].

2. Materials and Methods

A cross-sectional examination was directed to evaluate the prevalence of *Brucella* organisms in goats. Data were collected based on the previous history of abortion, retention of placenta, infertility and multiple breeding. Extensive rearing system and semi-intensive rearing system are pre-dominant, intensive rearing system is also noticed in the study area. The study was designed to collect samples and information from goat farmers in southern agro-climatic regions of Tamil Nadu. A total of 74 blood samples were collected, comprising D-I (Tirunelveli) ($n = 22$; buck:8, doe:14), D-II (Thenkasi) ($n = 27$; buck:8, doe: 19), D-III (Thuthukudi) ($n = 25$; buck:6, doe: 19) by puncturing the jugular vein of goats using disposable 2 ml plastic syringes gently after wiping with 70% ethyl alcohol, collected blood transferred immediately to clot activator tubes (red vacutainer). After that, the collected blood samples were transported to the laboratory within a cool box containing an ice pack. The sera were separated through centrifugation at 4,500 rpm for 5 min at 15 °C, then decanted the clear serum

into 1.0 ml Eppendorf tubes with labelling. For mentioning the identity of the animal such as sex and breed. Rose bengal plate test (RBPT) is carried out according to the information provided with the Ag kit. Antigen bottle refrigerated at 4°C was removed and left at room temperature for half an hour. Antigen was shaken to ensure homogeneous suspension. With a 100 µl micro pipette, 30 µl of coloured Ag was placed on each square of the plate. one drop 30 µl of serum was placed by the side of the antigen drop. With a spreader the antigen and serum drops were thoroughly mixed and spread to an area of about 2.5 cm diameter. The plate was manually rotated for 4 minutes. With each set of test sera, a known positive and negative control sera were also included. Definite clumping/agglutination to slight agglutination was considered a positive reaction, whereas no clumping/agglutination was regarded as a negative result.



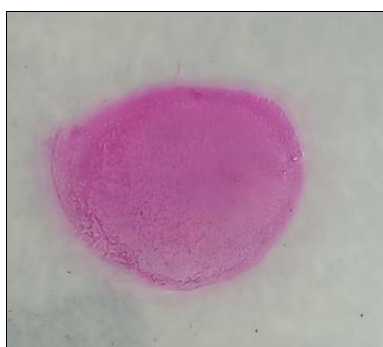
1) Collection of blood samples



2) Separation of serum



3) Adding of Ag and serum



4) Positive result (Agglutination noticed)

3. Results and Discussion

Among the different samples of different regions of Southern agro-climatic regions of Tamil Nadu, the seroprevalence of Brucellosis was higher in District III by 4%, which was followed by 2.7% in D-II and 1.35% in D-I. High prevalence of infection associated with brucellosis in goat with a history of abortion highlights risks of human zoonotic infections by these pathogens. Therefore, special attention is required for further study and control program to counteract these infections in animals and humans. The table presents the distribution of goats by sex (buck and doe) and breed (Local, Kanni, and Kodi) across three districts (D I, D II, and D III), along with the corresponding RBT (Rose Bengal Test) positivity. For each category, the total number of animals examined and the number of RBT-positive cases are shown district-wise.

Bucks showed RBT positivity only in District II and District III (2 positives each), with no positives in District I. Does recorded a lower overall RBT positivity, with one positive case each in District I and District III, and none in District II. Overall, RBT positivity was slightly higher in bucks than does, suggesting a marginally higher exposure or susceptibility among bucks in the studied districts.

Local goats did not show any RBT-positive cases in any of the districts, indicating absence or very low prevalence of infection in this group. Kanni goats showed consistent but low RBT positivity across all three districts (one positive in each district), suggesting widespread but limited exposure. Kodi goats exhibited higher RBT positivity, particularly in District III (two positives), followed by District II (one positive), while no positives were observed in District I. This indicates a relatively higher prevalence among Kodi goats, especially in District III.

District III recorded comparatively more RBT-positive cases across sex and breed categories, followed by District II, while District I showed the least positivity. The results indicate a low but present seroprevalence of brucellosis among goats, with variation across sex, breed, and district. Bucks and Kodi breed goats, particularly in District III, appear to be more affected. The absence of RBT positivity in local goats suggests possible genetic resistance or lower exposure. These findings highlight the need for targeted surveillance and control measures, especially focusing on higher-risk breeds and districts.

Category	Total number (%)			RBT positive (%)		
	D I	D II	D III	D I	D II	D III
Sex						
Buck	8	8	6	-	2	2
Doe	14	19	19	1	-	1
Breeds						
Local	1	2	1	-	-	-
Kanni	11	15	10	1	1	1
Kodi	10	10	14	-	1	2

The data pertaining to abortion incidence and post-parturition management practices among livestock farmers revealed notable gaps in scientific management. Out of 181 respondents, 41.99 per cent (n = 76) reported the occurrence of abortion in their animals, while 58.01 per cent (n = 105) did not experience abortion. The relatively high proportion of abortion cases indicates potential deficiencies in reproductive health management, disease control, and nutritional practices. With respect to the mode of disposal of placenta, only 48.07 per cent (n = 87) of the respondents followed proper disposal methods. A small proportion (2.76 per cent; n = 5) reported

leaving the placenta on grazing land, while 6.08 per cent ($n = 11$) disposed of it improperly. Overall, only 56.91 per cent ($n = 103$) of the respondents practiced any form of disposal, reflecting inadequate awareness regarding hygienic disposal of placental waste. Improper disposal of placenta poses a serious risk for the spread of infectious diseases and environmental contamination.

The findings on cleaning of animal sheds further highlight poor management practices. Merely 8.29 per cent ($n = 15$) of the farmers reported regular cleaning of sheds, whereas an overwhelming 91.71 per cent ($n = 166$) did not practice shed cleaning. Poor shed hygiene can significantly increase the incidence of reproductive disorders, parasitic infestations, and infectious diseases, thereby adversely affecting animal health and productivity.

Overall, the results underscore substantial gaps in reproductive health management and hygienic practices among livestock farmers. Strengthening extension services, enhancing awareness on scientific disposal of animal waste, and promoting regular shed sanitation are essential to improve animal health and reduce reproductive losses.

Abortion	Yes	76	41.99
	No	105	58.01
		181	100.00
Mode of disposal of Placenta	Proper	87	48.07
	Left on grazing land	5	2.76
	Not properly disposed	11	6.08
		103	56.91
Cleaning of shed	Yes	15	8.29
	No	166	91.71
		181	100.00

Like other studies, our study had some limitations. The complement fixation test (CFT) for confirmation of brucellosis in goat populations was not performed. Another limitation is that we could not identify the factors that determine the source of occurrence of diseases in the flock and its transmission. The findings from this work provide better insight that could be utilized to improve management of brucellosis in small ruminants in the study area. Discovering such a substantial burden of brucellosis in small ruminants mandates the creation of awareness among the goat farmers about the zoonotic importance of Brucellosis.

4. Conclusion

Grazing of goats and flock mating may be a risk factor in the goat population for *Brucella* prevalence, and this needs to be studied thoroughly. However, it's suggested that further studies in the southern agro-climatic regions of Tamil Nadu to identify the associated risk factors for disease control.

The present study revealed a low but definite seroprevalence of brucellosis among goats, with clear variations across sex, breed and district. RBT positivity was marginally higher in bucks compared to does, and among breeds, Kodi goats, particularly in District III which showed comparatively higher seropositivity, indicating greater vulnerability or exposure in studied population groups and geographical locations. A substantial proportion of farmers (41.99%) reported the occurrence of abortion in their animals, pointing towards inadequate reproductive health management. The occurrence of abortions among the studied group, when viewed alongside the detection of brucellosis antibodies, raises concerns about the possible role of infectious agents in reproductive losses. Management practices related to placental disposal and shed hygiene were found to be highly inadequate. Less than half of

the respondents practiced proper placental disposal, while a considerable number either disposed of it improperly or left it on grazing land, posing a significant risk for the spread of zoonotic and contagious diseases such as brucellosis. Furthermore, the extremely low adoption of regular shed cleaning underscores poor hygienic practices, which can exacerbate disease transmission, reproductive disorders, and overall productivity losses.

Overall, the findings underscore the urgent need for targeted interventions, including improved disease surveillance, farmer awareness programs on good management practices, and strengthening of reproductive health and biosecurity measures. Special emphasis should be placed on high-risk districts and breeds, along with promotion of proper bio-security measures. Strengthening extension services and veterinary support is essential to mitigate reproductive losses, control zoonotic disease transmission, and enhance the sustainability of goat production systems.

Conflict of Interest

Not available

Financial Support

Not available

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