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Sero-Prevalence of Peste Des Petitis Ruminants (PPR) of Sheep and Goats in Bench Maji Zone, Southern Ethiopia

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Absrtact: Small stock and mainly sheep and goats are the main farm animals owned by the poor in most developing countries. A Peste des petitis ruminant (PPR) is a wide spread, acute highly contagious, virulent and devastating animal disease of domestic and wild ruminants. It is mainly the disease affects sheep and goats and caused by *Morbillivirus*. With its associated high morbidity and mortality, PPR virus constitutes one of the major obstacles to subsistence farming. The study was conducted from February to April 2016 in Meinit shasha, Surma and Bero district of Bench maji zone in Southern Ethiopia to identify the overall prevalence of PPR in three districts. A total of 392 (77 sheep and 315 goats) was examined for sero-prevalence of PPR. The overall prevalence of both sheep and goat in the three districts was 12 (3.06%) with Meinit shasha 4 (1.76%), Surma 4 (4.93%) and Bero 4 (4.76%) with P >0.05. Prevalence of adult age for both sheep 1 (1.56%) and goats 9 (3.98%) was to be higher than young age 0 (0%) and 2(2.24%) respectively. Species based prevalence revealed ovine 1 (1.29%) and caprine 11 (3.49%) with P-value >0.05. All clinically sick or PPR suspected sheep and goat was not sero-positive for PPR disease. Further prevalence and its associated risk factors study should be carried out to investigate all possible source of the disease.

Key words: PPR · Bench Maji · Prevalence · Sheep and Goats

INTRODUCTION

Ethiopia has one of the largest livestock inventories in Africa providing support for the livelihoods of an estimated 80 percent of the rural poor. The livestock sub-sector contributes some 45% of agricultural GDP, 19-20% of national GDP and 19-20% of total exports. Animal rearing is an integral part of agricultural production and estimated livestock population approximates to 54 million cattle, 25.5 million sheep, 24.06 million goats, 9.01 million equines, 0.92 million camels and 50.4 million poultry. About 85-90% of mixed crop-livestock farmers and 21.6 million agro-pastoralists and pastoralists depend on livestock as a major economic activity for their livelihoods [1].

Pete des petitis ruminants (PPR) is a highly contagious viral disease that mainly affects sheep and goats. Pete des petitis ruminants is a member of the genus *Morbillivirus* in the family Paramyxoviridae. Four genetic lineages (Lineages 1-4) and a number of viral strains have been identified. Lineage 4 viruses have become especially prevalent in recent years. PPRV is closely related to rinderpest virus, which has been eradicated [2]. Domestic animals such as sheep and goat, camel, cattle and pigs can be affected by PPR with a various degree of susceptibility [3].

At one time, peste des petitis ruminants was thought to be restricted to the Middle East and limited areas of Africa and Asia. Recently, its range has expanded in both Africa and Asia [2]. Middle East and Arabian Peninsula; Iraq, Saudi Arabia, United Arab Emirates, Kuwait, Israel, Yemen and Oman are known to have the disease [4]. It was in 1977 that PPR clinically suspected for the first time in Ethiopia in a goat herd in the Afar region, east of the country and later confirmed in 1991 with cDNA probe in lymph nodes and spleen specimens collected from outbreak in a holding near Addis Abeba [5]. Later on the virus was determined to be genetically to be clustered within lineage III [6].

Peste des petitis ruminants (PPR) is transmitted by the aerosol route during close contact between animals mainly through sneezing and coughing [6]. The affected animals are important source of transmission during incubation periods, subclinical cases or before the onset

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of clinical signs [7]. Animals affected by PPR shed the virus in exhaled air, in secretions and excretions from natural orifices approximately 10 days after the onset of fever [8]. Spread through ingestion and conjunctival penetration, by licking of bedding, feed and water troughs are also common. Furthermore, infection may spread to offspring through the milk of an infected dam [9].

The disease is characterized by high fever, ocular and nasal discharge, pneumonia, necrosis and gastrointestinal tract leading to secure diarrhea [10]. Now a day the disease is recognized as responsible for mortality and morbidity across many countries of the world [4]. Heavy loss can be seen, especially in goats, with morbidity and mortality rates sometimes approaching 80-100% [3].

Therefore, the main objectives of this study were:

- To identify the overall prevalence of PPR in three districts
- To recommend control and preventive measures

MATERIALS AND METHOD

Study area

The study was conducted in Meinit shasha, Surma and Bero district of Bench maji zone in Southern Ethiopa. Surma district has agro-ecology of 5% lowland, 80% midland and 15% highland and annual rainfall of 1100 mm. Meinit shasha district has 40% lowland, 55% midland and 5% highland and annual rainfall of 850 mm. Bero district has 35% lowland, 55% midland and 10% highland and annual rainfall of 950 mm [11].

Study Population: The sample size was determined by taking the relative frequency sheep and goats, relative frequency of house hold to get the sheep and goats and house hold proportion. A total of 392 (77 sheep and 315 goats) was examined for PPR sero-prevalence study.

Sample Collection: Blood was collected from jugular vein puncture using venoject needles and vacuintainer tubes. For collection of serum samples 4ml of blood from the jugular vein of sheep and goats were collected using plain vacuintainer and the blood will be put at room temperature for about 24 hours in tilted position. After 24 hours the serum was harvested using cryovials and put in the refrigerator and kept on ice for transportation to the laboratory. In the laboratory, the serum will be centrifuge for 2000 revolution per minute for 5 minutes to remove the remaining red blood cells before being transferred to 2ml cryovials and stored at -20°C.

Data Analysis: Raw data was collected and coded in the MS excel sheet for analysis. Then coded data was analyzed by STATA version 13.1 and chi square ($\div^2$) value has been analyzed to correlate the risk factors.

RESULTS

The overall prevalence of both sheep and goat in the three district was 12 (3.06%) with Meinit shasha 4 (1.76%), Surma 4 (4.93%) and Bero 4 (4.76%) with P >0.05. Highest prevalence value was recorded in Surma district than the rest Meinit shasha and Bero districts (Table 1).

Species based prevalence revealed ovine 1 (1.29%) and caprine 11 (3.49%) with P-value >0.05 (Table 2).

The prevalence in each kebeles was Era 1 (1.35%), Baro 0 (0%), Kudum 1 (3.57%), Bass 2 (6.45%), Jemu 0 (0%), Kurum 4 (7.14%), Bolbokit 0 (0%), Kassi 1 (2.43%), Jeba 0 (0%) and Siyali 3 (10.71%) with P<0.05 (Table 3).

Female sheep 1 (1.61%) was the only affected one in this findings which is adult 1(1.56%) and healthy one 1 (1.61%) (Table 4).

Table 1: Prevalence of sheep and goat PPR in three districts

District	Positive animals	Prevalence (%)	Total examined animals	X^2
Meinit shasha	4	1.76	227	0.215
Surma	4	4.93	81	
Bero	4	4.76	84	
Total prevalence	12	3.06	392	

Table 2: Species based prevalence

Species	Positive animals	Prevalence (%)	Total examined animals	X^2
Ovine/sheep	1	1.29	77	0.317
Caprine/goat	11	3.49	315	
Total	12	3.06	392	

Table 3: Prevalence based on Peasant association (PAs)

Distict	PAs	Positive	Prevalence (%)	Total	X^2
Meinit Shasha	Era	1	1.35%	74	0.093
	Baro	0	0%	57	
	Kudum	1	3.57%	28	
	Bass	2	6.45%	31	
	Jemu	0	0%	37	
Surma	Kurum	4	7.14%	56	
	Bolbokit	0	0%	25	
Beru	Kassi	1	2.43%	41	
	Jeba	0	0%	15	
	Siyali	3	10.71%	28	
Total	12	3.06%	392		

Table 4: Prevalence of sheep PPR based on risk factors

Risk factors		Positive sheep	Prevalence (%)	Total examined sheep	X^2
Sex	Male	0	0	15	1.000
	Female	1	1.61	62	
	Total	1	1.29	77	
Age	Young	0	0	13	1.000
	Adult	1	1.56	64	
	Total	1	1.29	77	
Health status	Health	1	1.61	62	0.093
	Sick	0	0	15	
	Total	1	1.29	77	

Table 5: Prevalence of goat PPR based on of risk factors

Risk factors		Positive goat	Prevalence (%)	Total examined animals	X^2
Sex	Male	3	3.61	83	1.000
	Female	8	3.44	232	
	Total	11	3.49	315	
Age	Young	2	2.24	89	0.453
	Adult	9	3.98	226	
	Total	11	3.49	315	
Health status	Health	11	3.50	314	0.468
	Sick	0	0	1	
	Total	11	3.49	315	

Male goat was higher affected 3 (3.61%) than female goat 8 (3.44%), while young goat was lesser affected 2 (2.24%) than adult one 9 (3.98%). And, all clinically sick goat was not positive to PPR 0 (0%) than clinically healthy one 11 (3.50%) (Table 5).

DISCUSION

The overall prevalence of both sheep and goat in the three districts was 12 (3.06%) with Meinit shasha 4 (1.76%), Surma 4 (4.93%) and Bero 4 (4.76%) with $P > 0.05$. Highest prevalence value was recorded in Surma district than the rest Meinit shasha and Bero districts. However the prevalence revealed in this study was less than prevalence of peste des petites ruminants virus antibodies in cattle, buffaloes, sheep and goats in India with the overall true prevalence of 24.02% with 12.18% in cattle, 17.83% in buffaloes, 50.27% in sheep and 42.43% in goats [12] screening of the 4,884 serum samples showed that the prevalence of PPRV antibody in sheep and goats was 41.01% and 46.11%, respectively, with an overall prevalence of 43.56% [13].

The spread of PPR outbreaks has for a long time been associated with social, cultural and economic activities such as conflicts, livestock trade, cultural festivals and change of husbandry practices, nomadism and seasonal climatic and environmental changes [8, 14]. Its spread has been partly due to inadequate international availability of an effective PPR vaccine until recently and also the fact that small ruminants have perhaps not received adequate attention in disease surveillance and quarantine programs in some regions [15]. Highest sero-prevalence in surma and Bero districts could be due to uncontrollable animal movement between boundary of Kenya and Ethiopia country in and out by different socio economic aspects. While in Meinit shasha the prevalence rate was least than the rest districts and it is due to the chance of movement with Kenya boundary is too low which may lower the rate of disease occurrence. Depending on the character of tans-boundary disease the disease can bypass from country to country through different mechanisms.

Sex has also been reported as a risk factor for susceptibility/resistance to the disease. Since the off-take of males, in a farm, is higher and at an early age compared to females, which end up staying in the herds for longer periods females are more likely to demonstrate higher antibody titers than the males [16]. However, in this result no big prevalence variation has been reported between male and females sex for both sheep and goats.

Species based prevalence revealed ovine 1 (1.29%) and caprine 11 (3.49%). The findings of goats in this research was less than the findings of Berhanu *et al*. [10] sero-prevalence of PPR in goats of southern parts of Tigray region with prevalence of 114 (46.53%). Similar findings were reported showing a higher prevalence of PPR in goats than sheep [17, 18] which is in agreement with the findings of this study. However, Abraham *et al*. [19] and Mehmood *et al*. [20] had reported a higher PPR prevalence in sheep than goats which disagrees with this finding. In this finding, goats were found to have higher prevalence compared with sheep though the difference was not significant ($P > 0.05$). The difference in prevalence could be due to the difference in the proportion of sampled animals. Besides, since goats were used for meat and selling compared with sheep that were less considered for economical purpose, in return pastorals were intense to keep more goats than sheep.

Prevalence of adult age for both sheep 1 (1.56%) and goat 9 (3.98%) was to be higher than young age 0 (0%) and 2(2.24%) respectively. Age appears to be a risk factor for sero-positive status and its linear effect suggests that PPRV is highly immunogenic, naturally infected animals remaining positive for a long time [21]. The young, having been in the herds for a shorter period, are less likely to have been in contact with virus.

All clinically sick or PPR suspected 15 sheep and 1 goat were not positive for sero-prevalence of PPR disease. The clinical sign that has been seen during sample collection were not the clinical signs for the PPR which is confirmed later by laboratory identification. The clinical sign seen during the study was indicating another similar disease other than PPR. So that, care should be taken during surveillance and outbreak investigation to suspect clinically the disease is PPR. Differential diagnosis should be considered in order to suspect the case is PPR or not.

CONCLUSION AND RECOMENDATION

PPR is a fatal disease of sheep particularly goat it is called 'goat plague'. It is widely distributed in sheep and goat rearing areas of all the countries. The impact of PPR on livestock rearing communities is very huge and pushes many of them into poverty. Goats and sheep "Considered as mobile banks", are reared as sources of not only milk and meat for family consumption, but also of income that can easily be mobilized for paying household expenditures and socio cultural roles. In non -infected countries strict quarantine, movement controls, restriction of importation of sheep and goat from affected areas, rapid identification, humane slaughter, disposal of affected animals and burning or burying carcasses and effective cleaning and disinfection of contaminated areas. Regular mass vaccination should be carried out in PPR endemic areas. Further study should be carried out to investigate the possible source of the disease and its associated risk factors. If all countries can embark on comprehensive vaccination, then the disease can be wiped out following the recommendations of OIE/FAO by the year 2030.

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REFERENECES

1. CSA, 2012/13. Central Statistical Agency.
2. CFSPH, 2015. The Center for Food Security and Public Health.
3. Diallo, A., 2006. Contrrol of Peste des Petitis Ruminants and Poverty Alleviation. Journal of Veterinary Medicine, series B, 53(s1): 11-13.
4. Abdi, M., A. Qurban, A.G. Javaid, A.M. Salman and I.S. Syed, 2009. Detection of Peste des Petitis Ruminants (PPR) virus antibodies in sheep and goat population of the North West Frontier province (NWFP) of Pakistan by Competitive ELISA (c-ELISA). Veterinary World, 2(9): 333-336.
5. Roeder, P.L., G. Abraham, G. Kinfe and T. Barrett, 1994. Peste des Petitis Ruminants in Ethiopia goats. Tropical Animal Health and Production, 26(2): 69-73.
6. Banyard, A.C., S. Parida, C. Batten, C. Oura, O. Kwiatek and G. Libeau, 2010. Global Distribution of Peste des Petites Ruminants Diagnosis and Control. Journal of General Virology, 91(12): 2885-2897.
7. Madboli, A. and S. Ali, 2012. Histopathological and Immunohistochemical studies on the female genital system and some visceral organs in sheep and goat naturally infected by Peste des Petitis Ruminants virus. Global Veterinaria, 9(6): 752-760.
8. Libeau, G., O. Kwlatek, R. Lancelot and E. Albina, 2014. Peste des Petitis Ruminants Growing Incidence Worldwide. The OIE and its partners, animal health information department-OIE, pp: 52-510.
9. Munir, M., S. Zohari and M. Berg, 2013. Epidemiology and distribution of Peste des Petitis Ruminants. In Molecular Biology and Pathogenesis of Peste des Petitis Ruminants Virus, Springer Berlin Heidelberg, pp: 69-104.
10. Berhun, A., H. Daniel and A. Kassaw, 2014. Sero-prevalence of Peste Des Petitis Ruminants in Goats of Southern Parts of Tigray Region. Global Veterinaria, 12(4): 512-516.
11. MVDLC, 2016. Mizan Veterinary Diagnostic Laboratory Centre.
12. Balamurugan, V., P. Krishnamoorthy, D.S.N. Raju, K.K. Rajak, V. Bhanuprakash, A.B. Pandey, M.R. Gajendragad, K. Prabhuda and H. Rahman, 2014. Prevalence of Peste-des-petits-ruminant virus antibodies in cattle, buffaloes, sheep and goats in India. Springer, 25(1): 85-90.
13. Balamurugan, V., P. Saravanan, A. Sen, K.K. Rajak, V. Bhanuprakash, P. Krishnamoorthy and R.K. Singh, 2011. Sero-epidemiological study of peste des petits ruminants in sheep and goats in India between 2003 and 2009. Rev. sci. tech. Off. int. Epiz., 30(3): 889-896.
14. FAO, 2009. Transboundary Animal Disease, bulletin, pp: 33.
15. Otte, M.J., R. Nugent and A. McLeod, 2004. FAO Trans-boundary animal disease assessment of socio economic impacts and institutional responses. Livestock policy discussion, pp: 9.

16. Singh, R.P., P. Saravanan, B.P. Sreenivasa, R.K. Singh and S.K. Bandyopadhyay,2004. Prevalence and distribution of peste des petits ruminants virus infection in small ruminants in India. Rev Sci Tech., 23: 807-819.
17. Abubakar, M., S. Ashiq, A.B. Zahoor, M.J. Arshed and A.C. Banyard, 2011. Diagnosis and Control Strategies for Peste des Petitis Ruminants Virus: Global and Pakistan Perspectives. Pakistan Veterinary Journal, 31(4): 267-274.
18. Zahur, A.B., A. Ullah, M. Hussein, H. Irshad, A. Hameed, M. Jahangir and M.S. Farooq, 2011. Sero epidemiology of peste des petits ruminants (PPR) in Pakistan. Pre. Vet. Med., 102: 87-92.
19. Abraham, G., A. Sinatayehu, G. Libeau, E. Albina, F. Roger, Y. Laekemariam, D. Abayneh and K.M. Awoke, 2005. Antibody seroprevalence against Peste des petits ruminants (PPR) virus in camels, cattle, goats and sheep in Ethiopia. Preven. Vet. Med., 70: 51-57.
20. Mehmood, A., A. Qurban, A. J. Gadahi, S.A. Malik and I.S. Syed, 2009. Detection of peste des petits ruminants (PPR) virus antibodies in sheep and goat populations of the North West Frontier Province (NWFP) of Pakistan by competitive ELISA(cELISA). Vet. World, 2: 333-336.
21. Roger, F., D. Chavernac, L. Yigezu, G. Libeau, D. Pfeiffer and J. Guitián, 2008 Peste des Petits Ruminants (PPR) in Ethiopia: Analysis of a national serological survey. BMC Veterinary Research, 4: 34.