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SHORT COMMUNICATION

Epidemiological Aspects of Foot and Mouth Disease Outbreak in a Sheep Herd

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ABSTRACT

Present study is a detailed investigation on the occurrence and mortality caused by Foot and Mouth Disease (FMD) and its possible association with carrier status in a sheep herd in Islamabad capital territory (ICT) area of Pakistan. A total of 95 animals (50 adult and 45 young) were present in the herd at the start of the outbreak and about 22 out of 45 young ones (Age=15-30 days) were died in a period of 2 weeks. Only 10 out of 50 adult sheep showed the clinical signs of the disease but the interesting feature of outbreak was that the kids from the clinically healthy sheep also develop the disease and expired. This experience is indicative of the possible excretion of virus in the milk of dam before the onset or without the clinical signs which is pointing towards the FMD carrier status in sheep. On postmortem of the dead animals, yellow streaks were found on the heart which is indicative of FMD virus infection. Later the sampling was performed from the infected dam showing the non-structural antibodies (NSP) for FMDV. The tissue samples for the morbid animals were tested for the presence of FMD antigen by Indirect Sandwich ELISA (Is ELISA) as well as RT-PCR. The samples from the heart tissue and blood were found positive for FMD antigen with serotype Asia-1. There was a high mortality rate in young ones (22/45) but the history revealed that the disease was present in the area during previous years but the clinical ailment was not severe. So it might be the emergence of serotype "Asia-1" in the sheep population which was linked to disease severity. It is worth-mentioning that no FMD vaccination is being carried out in small ruminants especially in animals with the nomads.

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INTRODUCTION

Livestock is an important sector of Pakistan's economy. Cattle mainly provide farm power, buffaloes are kept for milk for home consumption and sale and sheep and goats are for meat and are easily convertible assets. Foot and mouth disease can be controlled but there are few difficulties like the existence of multiple serotypes of the causative virus, extreme contagiousness and multiple host species including small ruminants and wildlife (Abubakar et al., 2012). The role of small ruminants in the epidemiology of FMD was started early. The clinical sign of the disease in sheep and goat were hardly visible. The disease can easily be overlooked until and unless individual animals are carefully examined for disease lesion. With these peculiarities, sheep and goat may function as repository of the virus.

The role of small ruminants in the spread and distribution of FMD in Asian and African countries is well documented where the small ruminants contaminates river water, ponds, pastures, the shrubs and other environment. The source of infection to the other livestock occurs because the movement of ruminants in these countries is unrestricted and is of free-range nature (Uppal, 2009).

Animals are defined as FMDV carriers if they still have FMD virus detectable more than 28 days after infection. However, such animals do not necessarily fit the normal epidemiological definition of a carrier as an individual not showing symptoms of disease but able to disseminate infection, since they are not necessarily contagious (Sutmoller et al., 2003).

If FMD control campaign is considered as a national/international public good, one of the issues that need to

be addressed is to have strategies for the control of FMD in small ruminants.

MATERIALS AND METHODS

Outbreak description

The outbreak of FMD in a sheep herd (local breed) near Islamabad capital territory (ICT) areas was investigated. The herd type was nomadic but settled in the area for last three years and animals were kept on grazing. The outbreak started with emergence of clinical signs of FMD in five adult animals. Later in a week time, the mortality started in young ones of age 15 to 30 days. The kids from clinically infected as well as healthy dams started to die. The animals expired without showing any clinical lesions in a phase of few hours.

Clinico-pathological examination

At the postmortem the characteristic feature observed was having yellow streaks on the heart (Fig. 1). The other body tissues were not having any pathological findings.

Sample collection and laboratory confirmation

Various body tissues (Liver, spleen, lungs, lymph nodes and blood) were taken as diagnostic samples and were processed by ELISA and reverse transcriptase polymerase chain reaction (RT-PCR) techniques for the confirmation of FMD virus. ELISA for FMDV antigen detection was a kit by BDSL, UK) which is an indirect sandwich test (Hamblin et al., 1986). A color reaction on the addition of enzyme substrate indicated a positive reaction and the results were read spectrophotometrically (Immunoskan, BDSL, Finland) at recommended wavelength (492 nm). In this case, an absorbance reading greater than 0.1 above background indicates a positive reaction; thus the confirmation of FMD antigen and serotype was identified. Further sample confirmation was done on reverse transcriptase PCR (Reid et al., 2003). The serum samples from the dam were tested on NSP-FMD ELISA on the kits from IZSLER, Brescia, Italy.

RESULTS

A total of 95 animals were present in the herd at the start of the outbreak and about 22 out of 45 young ones (Age=15-30 days) were expired in a period of 2 weeks (Table 1). Only 10 out of 50 adult sheep showed the clinical signs of the disease but the interesting feature of outbreak was that the kids from the clinically healthy sheep also develop the disease and expired.

Postmortem of the dead animals was conducted and found yellow streaks on the heart indicative of FMD virus infection. Later the sampling was performed from the infected dam showing the non-structural antibodies. The tissue samples for the morbid animals were tested for the presence of FMD antigen by Indirect Sandwich

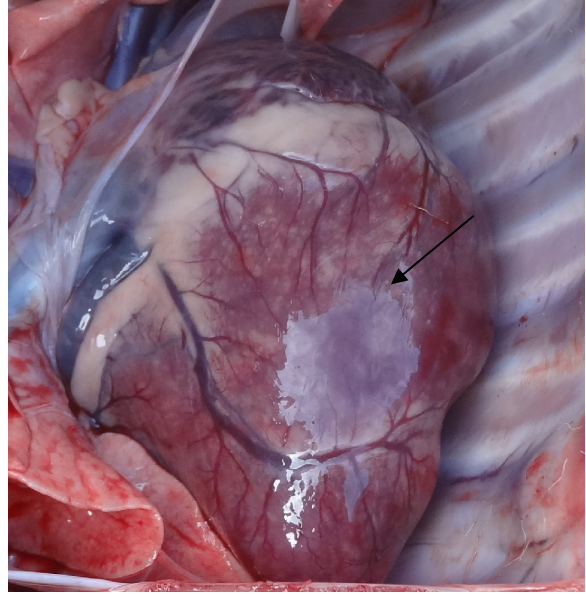


Fig. 1: Characteristic lesions of FMD on sheep heart

ELISA (Is ELISA) as well as RT-PCR. The samples from the heart tissue and blood were found positive for FMD antigen with serotype Asia-1.

DISCUSSION

FMD investigations are mostly focused on the cattle and buffalo with less emphasis on small ruminants and wild so the above report is an effort towards understanding the possible occurrence of carrier status of FMD in sheep. In another recent study by Abubakar et al. (2012), the overall prevalence of FMDV in cattle and buffaloes in Pakistan was 33.2 %, while in cattle alone, it was 37.1 %, higher than in buffalo (28.7 %) which is indicative of virus being endemic in the country. Based on experimental direct contact and intranasal inoculation studies, the incubation period of FMD in sheep and goats is typically between 2 and 8 days, but may be as short as 24 h (Kitching and Hughes, 2002) but in our experience the adult animals might carrying the virus without showing any clinical disease.

Another interesting finding was a high mortality rate in young ones (22/45) but the history explained that the disease do come in the area previous years but the clinical ailment was not severe. So this was another possibility that the emergence of serotype “Asia-1” in the sheep population can be linked towards disease severity. In 2000, Greece experienced FMD in sheep and goats with Asia I (Leforban and Gerbier, 2003). In Turkish Thrace 1996, there has been outbreak of serotype O FMD amongst cattle as well as in Evros prefecture of Greece. This perhaps happened because of illegal importation of live sheep by a farmer with close family connection in Turkey (Kitching, 1998).

Table 1: Summary of FMD outbreak in sheep herd

Area	Animal Species	Total animal kept	Diseased in adult	Mortality rate in Adult	Mortality Rate in Young	FMD Serotype Confirmed
ICT (Islamabad Capital Territory)	Sheep	95	10/55	--	22/45	Asia-1

In February 2001, FMD outbreak in United Kingdom lasted for about 32 weeks, where the role of sheep in the spread of FMD was realized. Calves that had been in contact with sheep imported into France from the UK spread the virus to the Netherlands. The clinical signs were very mild in the vast majority of outbreaks involving sheep. The average number of sheep displaying lesions within a single flock was less than 5%. The lesions occurred mainly in the mouths of sheep. A small minority of sheep exhibited foot lesions or lameness. The virus caused severe clinical disease in cattle and pigs (Donaldson and Alexandersen, 2003). These all findings are in congruent with our report. So the above findings give an indication that FMD control in an endemic country is possible with some strategy to deal this disease in small ruminants.

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REFERENCES

- Abubakar M, S Kanwal and A Saeed, 2012. Persistence, Emergence and Distribution of Foot and Mouth Disease Virus (FMDV); Global and Pakistan Perspectives. *Pakistan Journal of Life and Social Sciences*, 10: 84-90.
- Abubakar M, MJ Arshed, Q Ali and M Hussain, 2012. Spatial trend of Foot and Mouth Disease virus (FMDV) serotypes in cattle and buffaloes, Pakistan. *Virologica Sinica*, 27: 320-323.
- Donaldson AI and S Alexandersen, 2003. The virological determinants of the epidemiology of foot-and-mouth disease: by B. Dodet & M. Vicari, eds. *Foot and Mouth Disease: Control Strategies*. Paris: Elsevier, pp: 174-188
- Hamblin C, IT Barnett and RS Hedger, 1986. A new enzyme-linked immunosorbent assay (ELISA) for the detection of antibodies against foot-and-mouth disease virus. I. Development and method of ELISA. *Journal of Immunological Methods*, 93: 115-121.
- Kitching RP, 1998. A recent history of Foot-and-Mouth Disease. *Journal of Comparative Pathology*, 118: 89-108.
- Kitching RP and GJ Hughes, 2002. Clinical variation in foot and mouth disease: sheep and goats. *Review in Scientific Technical*, 21: 505-512.
- Leforban Y and G Gerbier, 2003. Recent history and epidemiology of foot-and-mouth disease in Europe. By B. Dodet and M. Vicari, eds. *Foot and Mouth Disease: Control Strategies*, Paris: Elsevier, pp: 153-171.
- Reid SM, SS Grierson, NP Ferris, GH Hutchings and S Alexandersen, 2003. Evaluation of automated RT-PCR to accelerate the laboratory diagnosis of foot-and-mouth disease virus. *Journal of Virological Methods*, 107: 129-139.
- Sutmoller P, SS Barteling, RC Olascoaga and KJ Simpson, 2003. Control and eradication of foot-and-mouth disease. *Virus Res.*, 91: 101-144.
- Uppal PK, 2009. Foot-and-Mouth Disease in Small Ruminants-An Issue of Concern. *Appen*, 29. www.fao.org/ag/aga/infocommissionsdocs/greece04/Appendix29.pdf