

Epidemiology and Economic Aspects of Foot and Mouth Disease in District Sahiwal, Punjab, Pakistan

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Received: 18.07.2011

Accepted: 16.09.2011

SUMMARY

The present investigation was conducted in randomly selected 12 villages situated in Tehsil Chichawatni, District Sahiwal, Province Punjab of Pakistan with history of infection/ outbreaks and other 12 control villages which were free from the outbreak/ disease. In total population of 2571 cattle, morbidity, mortality and case fatality rates were 53.20%, 15.25% and 28.65%, respectively. In young cattle, out of 834, morbidity, mortality and case fatality rates were 56.47%, 22.90% and 40.55% while in adult population of 1737, these were 51.64%, 11.57% and 22.40%, respectively. Out of total population of 5926 buffaloes, morbidity, mortality and case fatality rates were 61.69%, 20.80% and 33.72%, respectively. In young buffalo calves 283 morbidity, mortality and case fatality rates were 65.82%, 30.77% and 46.75%, respectively. In adult population of 3843 buffaloes, morbidity, mortality and case fatality rates were 59.46%, 15.40% and 25.9%, respectively. Young animals of both species were most susceptible than adults. The different auction markets of livestock fairs, slaughter houses, middleman, private veterinary practitioner and farmers were consulted in and around Tehsil Chichawatni about the prices of livestock breeds at various ages and of different sexes. The economic losses due to FMD were observed Rs. 27448000/- (\$ 322918) during the study period (Six months) in the infected/ outbreak villages. Data presented here provides some indication about the prevalence of FMD infection at village level.

Key Words

Epidemiology, FMD, Economics, Cattle, Buffaloes

Pakistan, Pencap, Sahiwal Bölgesindeki Sap hastalığının Epidemiyolojik ve Ekonomik Yönleri

ÖZET

Bu araştırma Pakistan'ın Pencap eyaleti Sahiwal bölgesi, Tehsil Chichawatni'daki enfeksiyon/salgın hikayesi olan 12 köy ile enfeksiyon/salgın hikayesi olmayan rastgele seçilen 12 köyde yapıldı. 2571 inekten oluşan bir popülasyonda morbidite, mortalite ve vaka ölümleri oranı sırasıyla %53.20, %15.25 ve %28.65 olarak bulundu. 834 genç inekte, morbidite, mortalite ve vaka ölüm oranları sırasıyla %56.47, %22.90 ve %40.55 iken 1737 yetişkin içeren popülasyonda bu oranlar sırasıyla %51.64, %11.57 ve %22.40 olarak tespit edilmiştir. 5926 bufalo bulunduran popülasyonda morbidite, mortalite ve vaka ölüm oranları sırasıyla %61.69, %20.80 ve %33.72; 283 bufalo buzağısında %65.82, %30.77 ve %46.75 ve 3843 yetişkin bufaloda ise bu oranların sırasıyla %59.46, %15.40 ve %25.9 olduğu gözlenmiştir. Her iki türdeki genç hayvanlar hastalığa yetişkinlerden daha duyarlı bulunmuştur. Tehsil Chichawatni civarında farklı cinsiyet ve yaşlardaki evcil süt hayvanlarının fiyatları konusunda canlı hayvan pazarlarına, mezbahanelere, tüccarlara, özel veteriner hekimlere ve çiftçilere danışılmıştır. Sap hastalığından dolayı oluşan ekonomik kayıplar 6 aylık çalışma periyodunda enfekte/salgın olan köylerde 322918 dolar (Rs. 27448000) olarak gözlenmiştir. Sunulan bu bilgiler koy seviyesinde sap hastalığının prevalansı hakkında bir göstergedir.

Anahtar Kelimeler

Epidemiyoloji, Şap, Ekonomi, İnek, Buffalo.

INTRODUCTION

Foot-and-mouth disease (FMD), a highly contagious viral disease affecting primarily cloven-hoofed animals, continues to be a major concern for the world livestock industry. At one time or another, this menace has occurred in most parts of the world including Pakistan. It is characterized by fever and vesicular eruption in the mouth and on the feet. The causal agent is a small, naked RNA virus. It can affect all the animals in a herd. There are seven distinct types of virus viz- A, O, C, Sat-1, Sat-2, Sat-3

and Asia-1. The virus is found in blood, milk and saliva soon after infection. Animals of wild origin may act as carrier or reservoir e.g. dogs, cats, deer, wild boars and even humans, birds and flies (Radostits et al., 2000).

If we see the Global situation of FMD, in a review by Kesy (2002), FMD is now present widely. In 2000, fifty nine countries officially reported outbreaks of FMD. The disease occurred in Europe (Greece), Asia but there is very little data is available from Pakistan. In Pakistan, Anjum et al., (2006) recorded Foot and mouth disease (FMD) prevalence and importance percentages in Pakistan using

various procedures of Participatory Disease Surveillance (PDS), during a period of 3 years (June 2002 - June 2005). They also said that most out-breaks were reported by the farmers in Punjab province followed by Sindh, NWFP Balochistan, AJK and Northern Areas. This also corresponded with the livestock population in these provinces and areas.

A recent study conducted in Landhi cattle colony, Karachi, Pakistan, Klein et al., (2008) sequenced the partial or full 1D coding region of FMDV from 58 out of the 106 positive swab-samples in real-time RT-PCR from apparently healthy and affected animals. In addition, they sequenced the full 1D coding region of 17 epithelium samples from animals with clinical signs of FMD. This was related to molecular epidemiology but we conducted a more basic epidemiology in randomly selected 12 villages situated in Tehsil Chichawatni, District Sahiwal with infection/outbreak and other 12 control villages which were free from the outbreak/ disease.

The information was recorded on a questionnaire performa. The vital statistics i.e. morbidity, mortality and case fatality were also recorded for the better understanding of disease at present and its control for the future endeavors.

MATERIALS and METHODS

Active Surveillance

For an active surveillance a sample size of 10% that is 12 villages with infection/ outbreak were randomly selected from Tehsil Chichawatni, District Sahiwal in Punjab province of Pakistan. Names of villages with infected/outbreak were 31/11-L, 176/9-L, 109/12-L, 43/12-L, 20/11-L, 15/11-L, 173/9-L, 37/12-L, 169/9-L, 23/11-L, 45/12-L and 17/11-L.

The information about the morbidity, mortality, case fatality and other information related to food and mouth disease (FMD) were collected on a prescribed questionnaire. Disease was confirmed on the basis of clinical picture with high fever and lesions in mouth and foot.

Control Group

Twelve villages without any infection/ outbreak of FMD in the same Tehsil/ District were also visited and the data was collected from the same questionnaire as mentioned above for comparison purpose. The names of control villages were 110/7-R, 3/14-L, 116/7-C-R, 113/7-R, 112/7-R, 119/7-E-R, 105/7-R, 106/7-R, 118/7-D-R, 107/7-R, 114/7-R and 38/14-L.

Designed Performa

The information on a prescribed performa was collected by local veterinary staff under the supervision of two of the authors. Performa was having the comprehensive questions suggested for the epidemiological information of the disease. It was having questions like about the population of cattle, buffaloes and other small ruminants, about the outbreaks of FMD, time and space of outbreak, effects of the outbreak, morbidity and mortality, movement to animals, near livestock markets, grazing pattern, season, main clinical signs and their frequency. A total of 20 performa per village were filled taking information directly from the farmer.

Economic Losses

The different auction markets of livestock fairs, slaughter houses, middleman, private veterinary practitioner and

farmers were consulted in and around Tehsil Chichawatni about the prices of livestock breeds at various ages and of different sexes (Table 1).

Table 1. The Reference Prices Table

Prices	Buffalo	Cattle
Price of young male	Rs.2000	Rs. 1500
Price of young female	Rs. 3500	Rs. 3000
Price of Adult male	Rs. 10000	Rs. 12000
Price of Adult Female	Rs. 20000	Rs. 22000
Veterinary Service*	Rs. 600	Rs. 600
Charges for young Diseased animal		
Veterinary service*	Rs. 1200	Rs. 1200
Charges for Adult Diseased animal		

*Veterinary service charges include cost of drugs and doctor visit fee.

Price given below was according to the effect of disease on production or reproduction basis.

Loss of calves (fetus) due to abortion @ Rs. 900/-

Veterinary Services charges:

Doctor visit fee	: Rs. 300
Drugs for FMD for Adult	: Rs. 1200
Drugs for FMD for Young	: Rs. 600
Drugs for Abortion	: Rs. 600
Drugs for Mastitis	: Rs. 700
Milk rate/liter @	: Rs. 40/-

The economic losses due to FMD were calculated from the above approximate prices.

RESULTS

Epidemiological Findings

Total buffalo and cattle population in the 12 infected/outbreak villages was 4897. Morbidity, mortality and case fatality rates were 5024 (63.83%), 1625 (19.12%) and 32.34%, respectively (Table 1).

Cattle

In total population of cattle 2571, morbidity, mortality and case fatality rates were 53.20%, 15.25% and 28.65%, respectively (Table 2). In young cattle out of 834 morbidity mortality and case fatality rates were 56.47% 22.90% and 40.55% while in adult population 1737, it was 51.64%, 11.57% and 22.40% respectively (Table 3).

Buffalo

Out of total buffalo population 5926, morbidity, mortality and case fatality rates were 61.69%, 20.80% and 33.72% respectively (Table 2)

In young buffalo calves 2083 morbidity, mortality and case fatality rates were 65.82%, 30.77% and 46.75% respectively. In adult buffalo population of 3843 morbidity mortality and case fatality rates were 59.46%, 15.40% and 25.9% respectively (Table 3).

Young animals of both species were more susceptible than adults. Morbidity rate 61.99% was higher in buffaloes than cattle that were 53.20% (Table 3).

Clinical Symptoms

Based on information from the questionnaire, frequency of clinical signs observed was as follows;

Anorexia (64.10%),

Depression (61.20%),

Mouth epithelial erosions (60.22%),

Laminitis (59.01%),

Drooling (57.98%),

Muzzle hyperemic (57.92%),

Temperature range 101-105 °F (48.62%),

Mastitis (40.20%),

Temperature range 105 °F-107 °F (5.20%) and

Abortion (0.9%).

In the effected villages, goat and sheep population was 4907 and 1015 respectively, but no disease was observed in both species during the period of study. Epidemiological data was also collected from control villages, but no FMD was observed. Few sporadic cases of hemorrhagic septicemia were reported from the control villages during the study period.

The economic losses due to FMD were observed Rs. 27448000/- (\$ 322918) during the study period (Six months) in the infected/ outbreak villages (Table 4, 5).

Table 2. Morbidity, mortality and case fatality in cattle and buffaloes effected with FMD

Species	Total Population	Morbidity (%)	Mortality (%)	Case Fatality (%)
Cattle	2571	1368 (53.20)	392 (15.25)	28.65
Buffalo	5926	3656 (61.69)	1233 (20.80)	33.72
Total	8497	5024 (63.83)	1625 (19.12)	32.34

Table 3. Morbidity, mortality and case fatality rates in cattle and buffaloes according to their age

Species	Age	Population	Affected	Died	Case Fatality (%)
Cattle	Young	834	471	191	40.55
	Adult	1737	897	201	22.40
Buffalo	Young	2083	1371	641	46.75
	Adult	3843	2285	592	25.90

Table 4. Overall economic losses

Disease	Mortality charges	Morbidity* charges	Total milk loss	Total Economic loss
FMD	In Cattle : Rs. 4166000	In Cattle : Rs. 1359000	Rs. 2023200	Rs. 27448900
	In Buffalo : Rs. 12451500	In Buffalo : Rs. 3964800		
		Mastitis : Rs. 3416000		
		Abortion : Rs. 68400		

Table 5. Economic losses on the basis of sex and age

Species		Young		Adult	
		Male	Female	Male	Female
Cattle	Dead	86	105	70	131
	Cost	129000	315000	840000	2882000
	Affected	201	270	325	572
	Cost	120600	162000	390000	686400
Buffalo	Dead	295	349	120	472
	Cost	590000	1221500	1200000	9440000
	Affected	938	1100	415	1870
	Cost	562800	660000	498000	2244000

Losses due to 3414 animals suffering from Mastitis Rs. 700/- per animal : 3416000

Losses due to 76 animals (Abortion) buffalo Rs. 900/- per animal : 68400

Milk loss 1405 animals per 6 litre/day for the period of 20 days Rs. 12/liter : 2023200

Total Loss : 27448900 (\$ 322918)

DISCUSSION and CONCLUSION

Total buffalo and cattle population was 8497. Morbidity and mortality rates were 5024 (63.83%) and 1625 (19.12%), respectively while case fatality rate was observed 32.34%. Morbidity, mortality and case fatality rates in cattle were 53.20%, 15.25% and 28.65%, respectively. These findings rate in full accordance with the study of Dutta et al. (1983). The reason for no FMD in control villages could be better husbandry practices by those villages as they were economically strong and were giving more importance to animals. Secondly as the vaccination cover to this all area was less so we could not associate vaccination with the absence of disease. So the main reasons would be better husbandry practices and tropical conditions of the area. Another reason would be the presence of livestock markets in the area where FMD is found more prevalent so we could associate the presence of livestock market with the incidence of disease.

Out of total buffalo population 5926 morbidity, mortality and case fatality rates were 61.69%, 20.80% AND 33.72% respectively. In young buffalo calves 2083 morbidity, mortality and case fatality rates were 65.82%, 30.77% and 46.75% respectively, while in 3843 adult buffalo population, morbidity, mortality and case fatality rates were observed as 59.46%, 15.40% and 25.90% respectively. Blacksell et al., (2008) conducted the seroprevalence of foot and mouth disease (FMD) virus in the Lao People's Democratic Republic (Lao PDR) from 1996 to 2005, using structured surveillance. Sero-positivity ranged from 65.7% (Vientiane Capital, 1996) to 3% (Houaphan city, 2005) for cattle and buffalo.

Sheep and goat population in villages where outbreak occurred was 1015 and 4907 respectively. No disease was observed in both species during study period. These finding fully coordinate with the study of Pay (1988).

Furthermore greater incidence of FMD is enhanced by cattle fairs, common grazing, drinking from ponds and mixing of animals from infected neighboring villages (Chamnanpood et al., 1996 and Nielen et al., 1996). We got a different response in cattle in buffaloes, the reason could be as very little information is available how buffalo

responds to various pathogens including FMD virus as compared to cattle.

Garabed et al., (2009) used genetic data from field isolates of foot-and-mouth disease virus (FMDV) to trace the source of recent outbreaks of FMD, to design better vaccines and diagnostic tests for FMDV. They also suggested that epidemiologic methods could be applied extensively to molecular data to explore the causes of genomic variation in disease-causing organisms so more work is need in this respect. The present study provided initial information about the presence of the disease that could provide the basis for an effective strategy for an FMD control programme.

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