Pakistan Veterinary Journal
ISSN: 0253-8318 (PRINT), 2074-7764 (ONLINE)
Accessible at: www.pvj.com.pk

RESEARCH ARTICLE

Sero-Surveillance of Hemorrhagic Septicemia in Buffaloes and Cattle in Southern Punjab, Pakistan

Umer Farooq*, Zaka Saeed[1], Muhammad Ather Khan[2], Iftikhar Ali[1] and Muhammad Fiaz Qamar

University College of Veterinary & Animal Sciences, The Islamia University of Bahawalpur; [1]Livestock &Dairy Development Department, Govt. of Punjab, Dera Ghazi Khan; [2]Department of Epidemiology & Public Health, University of Veterinary & Animal Sciences, Lahore, Pakistan
*Corresponding author: pathophysio@hotmail.com

ARTICLE HISTORY

Received: January 20, 2011
Revised: January 29, 2011
Accepted: February 17, 2011

Key words:
Buffaloes
Cattle
Hemorrhagic septicemia
Sero-surveillance

ABSTRACT

The present investigation was executed to study the sero-surveillance of hemorrhagic septicemia (HS) in buffaloes and cattle in district Dera-Ghazi-Khan, Punjab, Pakistan. The average geometric mean titers (GMT) recorded against HS in diseased buffaloes and cattle were 5.7 and 6.1, respectively. The morbidity, mortality and case fatality rates were 57.58, 52.30 and 90.83% in young buffalo calves; and 3.17, 1.92 and 60.65% in adult buffaloes, respectively. In case of young cattle calves, morbidity, mortality and case fatality rates were 8.63, 5.27 and 61.11%, respectively, while in adult cattle, these values were 4.83, 2.18 and 45.23%, respectively. The present study revealed that the mortality, morbidity and case fatality rates due to HS were greater in young calves than the adults both in buffaloes and cattle. Furthermore, buffaloes were found to be more susceptible to the disease than the cattle.

To Cite This Article: Farooq U, Z Saeed, MA Khan, I Ali and MF Qamar, 2011. Sero-surveillance of hemorrhagic septicemia in buffaloes and cattle in Southern Punjab, Pakistan. Pak Vet J, 31(3): 254-256.

INTRODUCTION

Hemorrhagic septicemia (HS) has a wide distribution particularly in tropical countries. In Asia, HS epidemics may occur as an alarming and devastating disease in cattle and buffaloes, jeopardizing the economic return of the animal to a dangerous extent (Benkirane and De Alwis, 2002). Buffaloes are considered to be more susceptible than the cattle. It is an acute pasteurellosis manifested by a highly fatal septicemia with the causative agent being *Pasteurella multocida* serotype B:2 (Wijewardana, 1992). Radical changes in weather, including the advent of monsoon, debility caused by seasonal level of low nutrition and work pressure are some of the predisposing factors which ignite the occurrence of the disease in Pakistan (Farooq *et al.,* 2007). Clinical manifestations include high rise in body temperature (104-108°F), respiratory distress, nasal discharge, salivation, tongue protrusion, reluctance to move, development of hot painful swelling and edema on throat, brisket or occasionally forelegs.

Studies on the sero-prevalence of HS have been carried out in other regions of the world extensively (Zyambo *et al*., 1985; Dutta *et al*., 1990; Molina *et al*., 1994). However, keeping in view scanty work documented from Pakistan (Sheikh *et al*., 1996; Khan *et al*., 2006; Khan *et al.,* 2011), the present study was executed to know sero-prevalence of HS in buffaloes and cattle in Southern Punjab (Dera Ghazi Khan), Pakistan.

MATERIALS AND METHODS

Geo-location of study

An active surveillance was undertaken to understand the sero-prevalence of HS in 10 villages of Dera Ghazi Khan (DGK), Punjab, Pakistan located at 30'03" North and 70'38" East at an altitude of 112m above the sea level. The overall climate of the district is dry with scanty rain fall. The winter is not very cold and the climate is hot during the remaining part of the year, but it is very hot in summer. The temperature during summer is usually about 115°F while during winter season the mercury goes down as far as 40°F. Due to barren mountain of Koh-Suleman and sandy soil of the area, windstorms are very common in summer season especially in July-August period. The summer season of the district usually touches the highest point of temperature in Pakistan.

Experimental animals

Ten villages with the infection/outbreak of HS in district DGK were randomly selected to study sero-surveillance in order to estimate the sero-prevalence. A

Table 1: Comparative GMT values against HS in buffaloes and cattle

Species	Group	Distribution of animals on basis of HS titer										GMT
		2^{-0}	2^{-1}	2^{-2}	2^{-3}	2^{-4}	2^{-5}	2^{-6}	2^{-7}	2^{-8}	2^{-9}	
Buffaloes	Affected	11	15	19	31	17	5	2	0	0	0	5.7
	Healthy	0	0	0	9	23	28	32	5	3	0	34.3
Cattle	Affected	8	11	24	22	25	7	3	0	0	0	6.1
	Healthy	0	0	2	11	19	31	29	8	0	0	32.0

total of 4248 animals (2963 buffaloes and 1285 cattle) from these villages were further divided into young (below 1 year) and adult (above 1 year) animals both for buffalo and cattle. Each homestead was visited from door to door in all villages and the relevant information regarding the affected animals (morbidity, mortality and case fatality rates) was recorded on a questionnaire. For comparison purposes, 10 villages (control) free of infection in the same district were also surveyed.

Blood collection and serological analysis

Blood samples (6 ml) without anticoagulant were collected from HS affected 100 buffaloes and cattle each. Matched samples from 100 healthy buffaloes and cattle each were also collected which served as control. Serum from each sample was decanted and stored at -20°C until analysis.

Antibodies against *Pasteurella multocida* were measured by indirect haemagglutination test (IHA) using human blood group 'O' (Bain *et al.,* 1982). Briefly, two fold dilutions of the test sera starting from 1:5 to 1:640 were made in normal saline using microtitre plates (96 wells) and added 25 µl amount to all the wells of plate except those of column 11 and 12 which served as control. First four wells (A-D) of column 11 were added with known negative serum and last four wells (E-H) with the known positive serum. Sensitized RBC's (1%) were added in equal amounts (25 µl) to all the wells of the plate, so that column 12 served as control for the RBC's. The plates were incubated at room temperature for two hours and the observations were recorded. Thereafter, the plates were kept reincubated under refrigeration for overnight, shaken vigorously, allowed to resettle and were read again. Results were interpreted as positive (no bead formation) or negative (bead formation with sharp clear margins). The IHA antibody titers against HS were converted into geometric mean titers (GMT) for each group (Burgh, 1998).

Statistical analysis

For analysis purpose, the animals (buffalo and cattle) were divided into two age groups i.e. young and adult. Data thus collected regarding mortality, morbidity and case fatality were subjected to Chi square analysis.

RESULTS AND DISCUSSION

Hemorrhagic septicemia is a disease of utmost economic importance particularly in Asia where the susceptible animal population consists of 432 million cattle and 146 million buffaloes, which constitutes 30 and 95% of the world's cattle and buffalo population, respectively (FAO, 1995). In India, during the past four decades, HS is documented to be responsible for 45-55% of all bovine deaths. During the 12 years period from 1974 to 1986, it accounted for 58.7% of the aggregate of deaths due to five endemic diseases, *viz*. foot-and-mouth disease (FMD), rinderpest, black quarter, anthrax and HS (Dutta *et al.*, 1990). In an active surveillance study in Sri Lanka, it was shown that in the 1970's, around 15% buffaloes and 8% cattle died of HS annually (De Alwis and Vipulasiri, 1981). Similarly, 34.4% of all deaths in susceptible stock (Sheikh *et al.,* 1996) and 31.48% mortality have been reported in buffalo calves (Khan *et al*., 2011) in Pakistan. The results of this study also clearly indicate that HS is a vital hurdle in the economic uplift of the livestock sector with high incidence rates and alarming morbidity, mortality and case fatality rates.

In the present study, the comparative values of GMT against HS, deducted through IHA test, both for buffaloes and cattle are presented in Table 1. It was noticed that the GMT value was 5.7 for affected buffaloes in comparison to 34.3 in healthy ones. Similarly, it was 6.1 in affected cattle in contrast to 32.0 in healthy ones. Hence, in diseased buffaloes, the titer was lesser as compared to diseased cattle making them more susceptible to the disease. These results are in line with the findings of De Alwis *et al.* (1986) who have reported a higher GMT values for cattle as compared to those for buffaloes. Similarly, the mean GMT values of 4.12 and 64.41 for affected and recovered animals have been reported by Khan *et al.* (2006).

In the total population of 4248 animals from 10 infected/outbreak villages, the overall morbidity, mortality and case fatality rates were 17.39, 14.66 and 84.30%, respectively with buffaloes having significantly higher values as compared to cattle (Table 2). In buffalo population, the morbidity, mortality and case fatality rates were 22.30, 19.64 and 88.04%, respectively; however, for the cattle population, these values were 6.07, 3.19 and 52.56%, respectively. These results are in accordance with those of De Alwis (1981), who documented overall mortality rate of 45.2 and 15.8% for buffaloes and cattle, respectively. Similarly, Sheikh *et al.* (1996) have also documented 9% mortality and 78% case fatality rates of HS in buffaloes, whereas these values were 2.5 and 62% in cattle. A mortality rate of 31% has been reported in buffaloes by Suhail *et al.* (2003) in North Waziristan Agency, Pakistan. Radostits *et al.* (2005) have reported that the overall mean case fatality for buffaloes is nearly three times as high as in cattle. Buffalo has been considered the most susceptible animal to HS throughout the world with highest incidence, morbidity, mortality and case fatality rates. Perhaps, the genetic makeup of the buffalo makes it an ideal host for the causative parasite hence increasing its susceptibility to the disease.

Young stock of both buffaloes and cattle was more affected as compared to the adult ones (Table 3). The morbidity, mortality and case fatality rates were significantly higher in young stock. In buffaloes, these values were 57.58, 52.30 and 90.83% for calves; and 3.17, 1.92 and 60.65%, for adult buffaloes, respectively. Similarly, in case of cattle, the calves had the morbidity, mortality and case fatality rates of 8.63, 5.27 and 61.11%, respectively in comparison to the values of 4.83, 2.18 and 45.23% for adult cattle. These findings coincide with those of Khan *et al.* (2006), who have also reported that the young stock of both buffaloes and cattle have higher morbidity, mortality and case fatality rates as compared to the older ones. The exhaustion of the maternal immunity against HS after the 60th day of life and delayed vaccination might be attributed to the higher susceptibility of the young calves (Mahmood *et al*., 2007).

Table 2: Overall morbidity, mortality and case fatality in buffaloes and cattle affected with HS

Species	Population (n)	Morbidity	Mortality	Case fatality
Buffalo	2963	661 (22.30)	582 (19.64)	79 (88.04)
Cattle	1285	78 (6.07)	41 (3.19)	37 (52.56)
Total	4248	739 (17.39)	623 (14.66)	116 (84.30)
$\chi 2$		3.639	3.802	9.635
Df		1	1	1
P Value		0.05	0.05	0.001

Values in parenthesis are percentages.

Table 3: Morbidity, mortality and case fatality in buffaloes and cattle affected with HS according to their age

Species	Age	Population (n)	Morbidity	Mortality	Case Fatality
Buffalo	Young	1042	600 (57.58)	545 (52.30)	55 (90.83)
	Adult	1921	61 (3.17)	37 (1.92)	24 (60.65)
Cattle	Young	417	36 (8.63)	22 (5.27)	14 (61.11)
	Adult	868	42 (4.83)	19 (2.18)	23 (45.23)
$\chi 2$			5.228	1.497	2.961
Df			3	3	3
P Value			0.20	0.70	0.50

Values in parenthesis are percentages.

Conclusions

It can be concluded that HS is endemically occurring in cattle and buffaloes. Buffaloes are more susceptible to the disease as compared to the cattle. However, the young stock of both is highly affected in terms of morbidity, mortality and case fatality of HS as compared to the adult ones.

REFERENCES

Bain RVS, MCL De-Alwis, GR Carter and Gupta BK, 1982. Hemorrhagic septicemia. FAO Animal Production and Health Paper No. 33, Rome, Italy.

Benkirane A and MCL De Alwis, 2002. Hemorrhagic septicemia, its significance, prevention and control in Asia. Vet Med-Czech, 47: 234-240.

Burgh MA, 1998. Simple method for recording and analyzing serological data. Avian Dis, 2: 362-365.

De Alwis MCL and AA Vipulasiri, 1981. An epizootiological study of hemorrhagic septicemia in Sri Lanka. Ceylon Vet J, 28: 24–35.

De Alwis MCL, TG Wijewardana, A Sivaram and AA Vipulasiri, 1986. The carrier antibodies status of cattle and buffaloes exposed to hemorrhagic septicemia. Ceylon Vet J, 34: 33-42.

De Alwis MCL, 1981. Mortality among cattle and buffaloes in Sri Lanka due to hemorrhagic septicemia. Trop Anim Health Prod, 13: 195-202.

Dutta J, BS Rathore, SG Mulick, R Singh and GC Sharma, 1990. Epidemiological studies on occurrence of hemorrhagic septicemia in India. Indian Vet J, 67: 893-899.

FAO, 1995. Production Yearbook 1995, FAO, Statistics Division, Rome, Italy.

Farooq U, M Hussain, H Irshad, N Badar, R Munir and Q Ali, 2007. Status of hemorrhagic septicemia based on the epidemiology in Pakistan. Pak Vet J, 27: 67-72.

Khan A, U Saddique, R Ahmad and H Khan, 2006. Serosurveillance of hemorrhagic septicemia in cattle and buffaloes in district Malakand, NWFP. J Agric Biol Sci, 1: 11-14.

Khan A, MK Saleemi, MZ Khan, ST Gul, M Irfan and MS Qamar, 2011. Hemorrhagic septicemia in buffalo (*Bubalis bubalis*) calves under sub-tropical conditions in Pakistan. Pak J Zool, 43: 295-302.

Mahmood AK, MA Sheikh, S Akhtar, G Nabi and HB Rashid, 2007. Duration of maternally derived antibodies against *Pasteurella multocida* in cow calves. Pak Vet J, 27: 92-94.

Molina HA, ED Pena, G Camer and MA Padilla, 1994. An outbreak of hemorrhagic septicemia among Carabaos in Northern Samer. Philippine J Vet Med, 31: 27-31.

Radostits OM, CC Gay, DC Blood, KW Hinchcliff and PD Constable, 2005. Veterinary Medicine. Saunders - Elsevier, New York, USA, pp: 658-659.

Sheikh MA, M Anzam and AR Shakoori, 1996. Observations on hemorrhagic septicemia in Pakistani livestock. J Vet Med B, 43: 293-304.

Suhail SM, UA Daur, M Syed, N Ahmad and A Ijaz, 2003. Prevalence of major livestock diseases in North Waziristan Agency. Sarhad J Agric, 19: 423-428.

Wijewardana TG, 1992. Hemorrhagic septicemia. Rev. Med. Microbiol, 3: 59-63.

Zyambo GCN, RC De-Rooij, PDS Moorhouse and HF Schels, 1985. The emergence of hemorrhagic septicemia as a disease of economic importance in Zambia. Proc. 4th Int Symp Vet Epidemiol Econ, 18-22 Nov, Singapore, pp: 395-397.