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SERO-SURVEILLANCE OF HEMORRHAGIC SEPTICEMIA IN CATTLE AND BUFFALOES IN DISTRICT MALAKAND, NWFP

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ABSTRACT

The present study showed the Sero-surveillance of Hemorrhagic septicemia in cattle and buffaloes in district Malakand, NWFP, Pakistan. The average geometric mean titre (GMT) was recorded against hemorrhagic septicemia in buffaloes in the range of 4.12 to 46.98, while those in cattle were recorded in the range of 4.45 to 46.40. In young buffalo calves, incidence rate, mortality rate and morbidity rate was observed as 22.25%, 21.19% and 95.25%, respectively. In adult buffaloes, morbidity, mortality and case fatality rates were 5.49%, 1.65% and 30%, respectively. In case of young cattle calves, morbidity, mortality and case fatality rates were recorded as 3.94%, 1.77% and 45%, respectively. While in case of adult cattle, morbidity, mortality and case fatality rates were recorded as 2.51%, 0.39% and 15.79%, respectively. During present investigation the incidence rate, mortality and case fatality due to Hemorrhagic septicemia was found greater in the young calves as compared to the adult in both buffaloes and cattle.

Keywords: sero-surveillance, hemorrhagic septicemia, cattle, buffaloes, Malakand.

INTRODUCTION

Hemorrhagic septicemia (HS) is an acute pasteurellosis caused by particular serotypes of *Pasteurella multocida* and manifested by an acute and highly fatal septicemia principally in cattle and water buffaloes; the latter are thought to be more susceptible. It has been reported in bison, camels, elephants, horses, and donkeys, and there is evidence of its occurrence in yak. HS is a major disease of cattle and water buffalo in Asia, Africa, and some countries of southern Europe and the Middle East. Although it may be seen at any time of year, the worst epidemics occur during the rainy season. It is most common in the river valleys and deltas of Southeast Asia among buffaloes used in rice cultivation.

Study on the sero-prevalenous on Hemorrhagic septicemia has been carried out in other region of the world as well as some areas of the Punjab province in Pakistan (Molina *et al*., 1994; Dutta *et al*., 1990; Zaka, S., 1998 and Zyambo *et al*., 1986).

Keeping in view the above mentioned facts the present study was undertaken to collect a data regarding the severity of the Hemorrhagic septicemia (HS) disease in the region and to know exactly about the strength of Hemorrhagic septicemia (HS) antigen in the blood of the animals either vaccinated or unvaccinated. Furthermore, the findings of the present study would be helpful to chalk out the strategy for precise control and prevention of the disease.

MATERIALS AND METHODS

The present study was conducted to find out the sero-prevalanous of Hemorrhagic septicemia in cattle and buffaloes in district Malakand, NWFP, Pakistan.

Experimental animals

Blood samples were collected in test tubes from both ten healthy and ten infected animals (five each vaccinated against hemorrhagic septicemia and five each were un-vaccinated). 6ml of blood was collected from each animal and were kept overnight at room temperature in slanting position. The sera was separated through centrifugation 3000 rpm for 10 minutes and stored at -20°C for further studies.

Laboratory Assay

Antibodies against the pasteruella multocida were measured by using classical indirect haemagglutination test (IHA) using human blood "O" (RBC's Bain *et al*., 1982).

Test Procedure

The test was carried out in microtitre plates of Flow Laboratories, each having 96 U shaped wells, arranged in 8 rows and 12 columns designated as A-H and 1-12, respectively. Two fold dilutions of the test sera starting from 1:5 to 1:640 were made in normal saline solution and added in 25µl amounts to all the wells of plate except those of column 11 and 12 which were maintained as controls. 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. All the wells of the column 12 were added with normal saline solution. Sensitized RBC's (1%) were added in equal amounts (25µl) 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 under

refrigeration for overnight shake lightly, allowed to resettle and read again. Results were interpreted as under:

Positive: No button formation, clumping occurring in an unordered and ragged pattern.

Negative: Button formation, RBC's clumping in an organized and regular pattern.

CALCULATION OF GMT

The GMT was calculated by the following formula:

$$GMT = n\sqrt{X_1.X_2 ------X_n}$$

n = Number of titres
x = Value of titre

RESULTS

The total population of cattle and buffaloes in selected villages/towns was 4371. Out of which young male and female livestock were 731 and 1037, while the adult male and female livestock were 416 and 2187, respectively. The total population of the young male and female buffalo was 313 and 442, while the adult male and adult female was 182 and 909, respectively (Table-1).

Table-1. Total livestock population in selected villages/towns in district Malakand.

Animals	Male		Female		Total
	Young	Adult	Young	Adult	
Buffaloes	313	182	442	909	1846
Cattle	418	234	595	1278	2525
Total	**731**	**416**	**1037**	**2187**	**4371**

The population of the total young male and female cattle was 418 and 595, while the adult male and female cattle were 234 and 1278, respectively (Table-1). Table-2 showed the average geometric mean titre (GMT) in vaccinated, unvaccinated, recovered and affected buffaloes in district Malakind in the range of 4.12 to 46.98.

Table-2. Calculation of geometric mean titre (GMT) against hemorrhagic septicemia in buffaloes through indirect haemagglutination assay (IHA) in various classified areas of district Malakand.

Animal condition	Town	Big villages	Small villages	Average GMT
Affected	3.99	4.19	4.18	4.12
Recovered	63.99	73.51	55.71	64.41
Un-vaccinated	13.92	18.38	12.13	14.81
Vaccinated	55.71	48.48	36.75	46.98

Table-3 showed the average geometric mean titre (GMT) in vaccinated, un-vaccinated, recovered and affected cattle in district Malakind in the range of 4.45 to 46.4.

Table-3. Calculation of geometric mean titre (GMT) against hemorrhagic septicemia in cattle haemagglutination assay (IHA) in various classified areas of district Malakand.

Animal condition	Town	Big villages	Small villages	Average GMT
Affected	5.27	3.48	4.59	4.45
Recovered	63.97	55.69	48.48	56.05
Unvaccinated	10.55	9.19	15.99	11.91
Vaccinated	42.22	48.48	48.50	46.4

In young buffalo calves, incidence rate was observed as 22.25% along with 21.19% and 95.25% mortality and case fatality, respectively. In adult buffaloes, morbidity, mortality and case fatality rates were 5.49%, 1.65% and 30%, respectively (Table-4).

Total population of young cattle was 1013. Out of which morbidity, mortality and case fatality was recorded as 3.94%, 1.77% and 45%, respectively while in case of total population of adult cattle was 1512, morbidity, mortality and case fatality rates were 2.51%, 0.39% and 15.79%, respectively (Table-4).

Table-4. Annual incidence, mortality and case fatality rates due to HS in buffaloes and cattle population in 10 randomly selected villages/towns of district Malakand.

Animal	Age Group	Pop 'n'	AA 'n'	DA 'n'	MB %	MR %	CF
Buffaloes	Young*	313	42	42	13.42	13.42	100
	Adult*	182	12	-	6.59	-	-
	Young**	442	126	118	28.5	26.69	93.65
	Adult**	909	48	18	5.28	1.98	37.5
Total	**Young**	**755**	**168**	**160**	**22.25**	**21.19**	**95.23**
	Adult	**1091**	**60**	**18**	**5.49**	**1.65**	**30**
Cattle	Young*	418	18	7	4.31	1.67	38.8
	Adult*	234	02	-	0.85	-	-
	Young**	595	22	11	3.69	1.85	50
	Adult**	1278	36	6	2.82	0.47	16.6
Total	**Young**	**1013**	**40**	**18**	**3.94**	**1.77**	**45**
	Adult	**1512**	**38**	**06**	**2.51**	**0.39**	**15.79**

Pop = Population
AA = Affected Animal
DA = Died Animal
MB = Morbidity
MR = Mortality
CF = Case fatality

* = Male
** = Female

DISCUSSION

Hemorrhagic septicemia (HS) is one of the most important diseases of bovines in South Asian and Middle Eastern countries. Epidemiological studies in neighboring country was reported over a period of thirteen years (1974-1986) in India indicated that mortality-wise, H.S. was placed first and morbidity-wise, second as compared to four other epizootic diseases namely, foot and mouth disease, rinderpest, anthrax and black quarter (Dutta *et al*., 1990). Many states in India were marked as high risk zones. About 26 outbreaks have been recorded in Punjab State from 1989 to 1990 (Saini *et al*., 1991).

Similarly, outbreaks of Hemorrhagic septicemia (HS) was recorded in Srilanka (De Alwis and Vipulasiri, 1980), Zimbabwe (Lane *et al.*, 1992), South Asia, The Middle East and Africa (FAO, 1989). The morbidity rate reported was 6.40 and the mortality rate was 6.28 per hundred thousand of bovine population (Dutta *et al.*, 1990). A wide range of Mortality rate (5 to 90%) was reported in different outbreaks and seasons in India, Nepal and the Philippines (FAO, 1991). Most of the outbreaks have been managed by medical treatment alone and resulted in poor survival rate.

These findings are in accordance with the study of Shahid (1999) who reported mortality (23.13%), morbidity (21.71%) and case fatality (93.89%), respectively. The case fatality of young buffaloes in this survey was 95.23% who observed 95.45% case fatality in young buffaloes. The results obtained in the present study regarding mortality, morbidity and case fatality are in close vicinity with the findings of Sheikh *et al*. (1996) who carried out study on observation on hemorrhagic septicemia in 9 districts of Punjab, Pakistan showed 11% incidence, 9% mortality and 78% case fatality rates of hemorrhagic septicemia in buffaloes, whereas these values were 4%, 2.5% and 62% in cattle.

Morbidity, mortality and case fatality in young cattle was 3.94%, 1.77% and 45%, respectively, while in adult cattle these values recorded were as 2.51%, 0.39% and 15.79%, respectively. These findings are in accordance with the study of Shahid (1999) who recorded the morbidity, mortality, case fatality in young cattle was 3.52%, 1.76% and 50%, respectively, while in adult cattle these records were 2.1%, 0.36% and 17.50, respectively as concerned the morbidity of young cattle in this study in partial agreement with result obtained by Ibrahim (1993) who recorded 2.45%, respectively.

The findings observed during the present study regarding the mortality, morbidity and case fatality in both buffaloes and cattle were in agreement with the finding of Saini *et al*. (1991) who reported 19.8% mortality in buffaloes and 23.7% mortality in cattle, respectively. De-Alwis and De-Alwis (1981) reported higher mortality in buffaloes (45.2%) as compared to cattle (15.8%) in Sri Lanka due Hemorrhagic septicemia (HS).

It can be concluded that the occurrence of the disease was higher in buffaloes when compared to cattle in the present study. Hemorrhagic septicemia (HS) is endemically occurring in cattle and buffaloes in region under investigation and has incurred severe economic loss to poor livestock farmers of the area.

Furthermore, the results obtained in present investigation regarding the Sero-surveillance, antibody titer and geometric mean titer in cattle and buffalo against Hemorrhagic septicemia (HS) could be used as baseline data for the preparation of vaccines in order to control and prevent the outbreak of disease.

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