AN EPIDEMIOLOGICAL STUDY ON BOVINE HAEMORRHAGIC SEPTICAEMIA IN HARYANA

Subash Chander Verma¹, N.K. Mahajan², Gita Malik³ and J.P. Dahiya⁴
College of Veterinary Sciences,
CCS Haryana Agricultural University, Hisar - 125 004, India

ABSTRACT

Information on Haemorrhagic Septicaemia (HS) in bovines (1995-98) was obtained from 237 veterinary surgeons working in all nineteen districts of Haryana through a questionnaire and analysed using student’s ‘t’ test and Pearson’s multiple correlation. Besides, eleven HS outbreaks were also investigated during 1998-99. The prevalence of HS in buffaloes and cattle was low (0.31 and 0.25%, respectively), but case fatality rate (CFR) was high (58.90 and 38.94%, respectively). The CFR was significantly (P<0.01) higher in young buffaloes than young cattle. The four years data revealed an increasing trend of HS outbreaks. The HS was found to be positively correlated with high rainfall, humidity and low temperature. Foot and mouth disease (FMD) was a common preceding infection in many HS outbreaks. Pasteurella multocida B:2 organisms were isolated from all the eleven outbreaks investigated. Antibiogram pattern revealed that majority of organisms were sensitive to enrofloxacin, gentamicin and chloramphenicol and resistant to sulphadimidine and oxytetracycline. Annual economic loss due to HS in buffaloes in Haryana was estimated around Rs. 58 millions.

INTRODUCTION

The scope of epidemiology in modern animal husbandry practice is continuously widening. Epidemiological data provide information on various diseases which are a prerequisite for planning, execution and monitoring of disease control programmes. It is an important requirement for assessing economic impact of a disease and also for developing disease forecasting system. Among infectious diseases, Haemorrhagic Septicaemia is one of the major problems affecting bovines in this part of the country. According to annual report (1996-97) of Department of Animal Husbandry and Dairying, Government of India, there were 1518 outbreaks of HS causing mortality of 4746 animals out of a total of 13491 affected animals. In Haryana during 1997 alone, 26 outbreaks of HS in buffaloes were investigated by the Department of Veterinary Public Health and Epidemiology of CCS Haryana Agricultural University, Hisar. In addition, many more outbreaks occurred which might not have been reported. So the present investigation was carried out to study epidemiology of HS in local conditions to create base-line data which will be helpful in disease control programmes and in focussing research priorities.

MATERIAL AND METHODS

To collect information on HS in buffaloes and cattle for the years 1995-1998, a comprehensive questionnaire was designed and distributed among 237 veterinarians working in Government Veterinary Hospitals in all nineteen districts of Haryana. At least ten Veterinary Hospitals (except Panchkula where there are only six Veterinary Hospitals) from each district were surveyed for collection of information. The prevalence and Case Fatality Rate (CFR) of HS were calculated for the period 1998-99 on the basis of following formulae:
No. of cases of HS

\[ \text{Prevalence} = \frac{\text{No. of cases of HS}}{\text{Animal population at risk}} \times 10^n \]

No. of deaths due to HS during a given period

\[ \text{CFR} = \frac{\text{No. of deaths due to HS during a given period}}{\text{Total no. of animals affected from HS during the period}} \times 10^n \]

The data collected were coded, analysed and interpreted statistically using Pearson's multiple correlation and student's 't' distribution test (Snedecor and Cochran, 1967).

The observations made by field veterinarians on HS (1995-98) were corroborated/verified by epidemiological investigation of eleven HS outbreaks and by isolation of causative organisms and their antibiogram pattern. A total of eleven outbreaks suspected for HS in buffaloes, reported in the Department of Veterinary Epidemiology and Preventive Medicine during the period March 1998 to May 1999, were investigated. For isolation of the causative organism, samples were collected from dead as well as live animals suspected of HS. From dead animals, heart blood and tracheal swabs in trypticase soya broth (TSB) were taken following aseptic precautions. From live animals; nasal swabs and blood from jugular vein were collected. Mouse inoculation test was employed for isolation of causative organisms. The isolates were identified on the basis of their cultural characteristics, bacterial morphology, staining reactions, sugar fermentation and other biochemical properties (Cowan and Steel, 1975). These isolates were tested for drug sensitivity as per the procedure (Bauer et al., 1966) using disc diffusion method. Economic losses due to HS in buffaloes in the eleven outbreaks were also calculated and then it was generalized for the whole state of Haryana taking into consideration the prevalence of HS.

RESULTS AND DISCUSSION

From the reported information, it was observed that the number of HS outbreaks showed an increasing trend over the years 1995 to 1998. In 1995, 63 outbreaks were recorded as compared to 64 outbreaks in 1996, 130 outbreaks in 1997 and 146 in 1998 throughout the state of Haryana. In contrast to the observation made by field veterinarians from all over Haryana in the present study, Dutta et al. (1990) classified Haryana under low risk areas for HS. Outbreaks were mainly recorded in the months of January, February and between July to December during all these four years. There were year to year fluctuations and also in different geographic areas. These fluctuations were probably due to wide variation in the extent and distribution of rainfall particularly during the period from July to September. De-Alwis (1992) reported that HS outbreaks were usually associated with the humid weather and increased incidence was recorded during wet seasons. Sheikh et al. (1996) reported that HS outbreaks did occur at all times of the year but those occurring during wet seasons tend to spread, presumably due to the longer survival of the organism under moist conditions.

Relationship between age and mortality

The disease was mainly observed in buffaloes and to a lesser extent in cattle. In buffaloes, young ones were more prone than adults as depicted by higher CFR in buffaloes below 2 years of age (60.10±1.73%) as compared to the above 2 years age group (54.20±2.10%). While in cattle, it was slightly lower in animals below 2 years of age (36.94±2.94%) as compared to the above 2
years of age (43.64±4.65%). The CFR was highly significant (P<0.01) within the species in animals below 2 years of age group while significant (P<0.05) in above 2 years age group. There is general agreement that buffaloes are more susceptible than cattle. De-Alwis (1980) reported that mortality among buffaloes was three times higher than cattle due to HS in Sri Lanka.

### Effect of vaccination on mortality

The CFR was comparatively-low in vaccinated animals (58.10 and 37.62%) than unvaccinated animals (63.04 and 45.64%) in buffaloes and cattle, respectively. During 1995-98, a number of outbreaks were also recorded during winter months in those areas where routine vaccination was carried out before start of rainy season (May-June). The cause for occurrence of disease in vaccinated animals might be the low efficacy and under dosing of the available vaccines and those animals which might have escaped vaccination (late pregnant/neonates) but generally considered under vaccinated population. Majority of the veterinarians opined that the effective immunity lasted for 3-4 months after vaccination with alum-precipitated vaccine and there should be second vaccination before the onset of winter (October-November).

### Economic loss due to HS

From the present study, it was found that majority (67%) of veterinarians observed very little (< 1 kg) loss in milk production due to HS vaccination. On the other hand, as a result of HS disease (during illness of 5 to 10 days), the milk loss found to vary from 5 kg to complete cessation (64.13%). This point needs to be emphasized to the reluctant animal owners who do not volunteer for vaccination of their animals. While going through the reports of veterinarians on approximate cost of treatment incurred on a recovered case of HS, majority of them (57.01%) reported it to be between Rs. 400-600, though a few (15.60%) reported up to Rs. 1000.

### Association of HS with other diseases

About 67% respondent veterinarians found that foot and mouth disease (FMD) was associated with HS outbreaks. Generally, outbreaks of HS followed FMD outbreaks in the same animals. Preceding FMD infection probably lowers the disease resistance or causes stress on the animals leading to precipitation of HS. Other diseases associated with HS included malignant head catarrah and surra. Statistically significant correlation (P<0.05) was observed between the occurrence of HS and FMD outbreak in buffaloes and highly significant correlation (P<0.01) between the occurrence of HS and surra in cattle and significant correlation (P<0.05) with pneumonia in both the species. These observations indicated that FMD, pneumonia and surra can be associated with HS outbreaks.

### Response of different antibiotics used by field veterinarians in HS

It was reported by 29.11% veterinarians that enrofloxacin responded well, while 21.50% found gentamicin and 9.41% chloramphenical to be effective in treating cases of HS. Forty seven per cent of the respondents reported that sulphadimidine was ineffective in treating cases of HS. Streptopenicillin was also reported to be ineffective. Regarding oxytetracycline, 13.50% responded that it was effective while 5% responded otherwise. It is well known fact that P. multocida readily changes its antibiogram and develops resistance to common chemotherapeutic agents in use.

### HS prevalence and mortality

Though the period prevalence (1998-99) for buffaloes as well as cattle was low (0.31 and 0.25%, respectively), the CFR was very high in buffaloes (38.96 2.94%) than in cattle (58.98 1.73%), thereby indicating that it was an important cause of mortality particularly in buffaloes. Saini et al. (1991) reported overall morbidity of 0.41% and CFR of 20.21% due
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<tr>
<th>Village of Outbreak</th>
<th>Ampicillin</th>
<th>Gentamicin</th>
<th>Nalidixic acid</th>
<th>Sulfadiazine</th>
<th>Amoxicillin</th>
<th>Cefotiam</th>
<th>Erythromycin</th>
<th>Chloramphenicol</th>
<th>Ofloxacine</th>
<th>Norfloxacin</th>
<th>Spectinomycin</th>
<th>Doxycycline</th>
<th>Tetracycline</th>
<th>Erithromycin</th>
<th>Cimetidine</th>
<th>Amikacin</th>
<th>Polymyxin B</th>
<th>Polymyxin E</th>
<th>Nalidixic acid</th>
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<td>1. Mirikan (Hisar)</td>
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<td>3. Ugalaran (Jind)</td>
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<td>10. Sukhmanpur (Fatehabad)</td>
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<td>11. Sonki (Rewari)</td>
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</table>

R - Resistant  
S - Sensitive  
MS - Moderately sensitive  
- - Not done
to HS in Punjab during 1989-90.

The HS outbreaks attended during March 1998 to May 1999

In all the eleven outbreaks, animals (buffaloes and cattle both) showed pneumonic form of HS with pyrexia (105-108°C). Only in a few animals, the classical mandibular swelling was observed. Samples collected from affected animals in all the outbreaks yielded *P. multocida* organisms which were confirmed biochemically. The majority of isolates were indole, catalase, glucose, sucrose, mannitol and mannose positive while methyl red, Voges-Proskauer test, dulcitol and arabinose negative. No growth was seen on MLA. On typing, these were found to be B:2 or 6:B subtypes. Asian serotype designated as B:2 or 6:B has been reported from India (Khera, 1979), Sri Lanka (De-Alwis et al., 1990) and Pakistan (Sheikh et al., 1996). However, Kumar et al. (1996) have also reported isolates of A:1, A:3 from cattle and A:3 from buffaloes in India.

*In vitro* sensitivity pattern of eleven *P. multocida* isolates (Table 1) revealed that majority of these isolates were sensitive to enrofloxacin, gentamicin and chloramphenicol, moderately sensitive to pefloxacin and ciprofloxacin and resistant to sulphadimidine, oxytetracycline, streptomycin, amoxycillin and tetracycline. These results indicated development of resistance against the commonly or traditionally used drugs. Almost similar sensitivity pattern has been reported by Sharma *et al.* (1979) and Gupta *et al.* (1996) except for chlorotetracycline. Yaqub *et al.* (1997) found that steroidal or non-steroidal anti-inflammatory agents alongwith broad spectrum antibiotics were effective in treating cases of HS.

The field veterinarians should go for Antibiotic Sensitivity Test whenever they encounter a case/outbreak of HS. In the mean time, they may opt for enrofloxacin, gentamicin or chloramphenicol for treating a case of HS. The farmers/animal owners should get their animals vaccinated against HS routinely at least twice a year. The loss in milk production due to HS vaccination is very low but if HS outbreak occurs, the farmers have to bear a huge price for treatment.

On the basis of eleven outbreaks investigated, the economic losses resulting from HS were calculated as follows:

<table>
<thead>
<tr>
<th></th>
<th>Affected</th>
<th>Died and their value</th>
<th>Loss due to mortality (Rs.)</th>
<th>Survived and the treatment cost</th>
<th>Loss due to morbidity (Rs.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total lactating buffaloes</td>
<td>67</td>
<td>38 x 17100</td>
<td>649800</td>
<td>29 x 2100</td>
<td>60900</td>
</tr>
<tr>
<td>Total non-lactating buffaloes</td>
<td>53</td>
<td>22 x 7600</td>
<td>167200</td>
<td>31 x 600</td>
<td>18600</td>
</tr>
<tr>
<td>Total buffalo heifers</td>
<td>246</td>
<td>149 x 2100</td>
<td>312900</td>
<td>97 x 600</td>
<td>58200</td>
</tr>
</tbody>
</table>

Total economic losses based on personal observation in eleven outbreaks = Rs. 1267600.

If the same is generalized for Haryana based on 0.31% HS prevalence in buffaloes, the annual loss due to HS alone in buffaloes were estimated around Rs. 58 millions. No attempt seems to have been made before for calculating economic losses due to HS in Haryana or India. However, De-Alwis (1980) has estimated annual losses to be Rs. 90 million in Sri Lanka due to HS.

**ACKNOWLEDGEMENT**

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REFERENCES