Outbreak investigation of lumpy skin disease in dairy farms at Barishal, Bangladesh

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A B S T R A C T

Lumpy skin disease is explained as a significant cattle disease affecting cattle of many parts of the world. An outbreak was experienced in different parts of Bangladesh including Barishal for the first time in the last quarter of 2019. This investigation was carried out to know the outbreak scenario of the disease in southern part of Bangladesh. A total of 726 cattle were included in this study covering 59 dairy farms of Barishal region from September 2019 to December 2019. Morbidity rate was found 21% (CI: 18-24%) and mortality was 1% (CI: 1-2%) in the outbreak area. Young animals (24%) and pregnant animals (70%) were significantly more susceptible compared to aged animals (17%) and non-pregnant animals (15%), respectively. Moreover, male and crossbred cattle were slightly more prone to the infection in comparison to their counterparts. About 45% of the affected animals showed nodular and remaining 55% had edematous lesions. Almost 90% of the affected animals were treated with NSAID followed by antibiotics, antihistaminic, steroid drugs and antiviral drugs where only 20% of the affected animals were treated by authorized veterinary personnel. This was the first epidemiological investigation in the mentioned outbreak area which may serve as a baseline for LSD research in the location needed for developing effective control strategy.

Keywords: Cattle, Lumpy skin disease, Morbidity, Barishal, Bangladesh

Introduction

Lumpy skin disease (LSD) is an economic viral disease of cattle caused by lumpy skin disease virus (LSDV) under the family Poxviridae (El-khabaz, 2014). LSD shows multiple clinical signs as fever, lameness, lacrimation, pain, nodule in skin, arthritis, enlarged lymph nodes etc. (Ince et al., 2016; Sprygin et al., 2019; Tasioudi et al., 2016). The incubation period in natural outbreaks was estimated to be 1–4 weeks (Alemayehu et al., 2013). Mortality and morbidity of this viral disease was recorded approximately 1-3% and 26-40%, respectively (Tuppurainen, E., Alexandrov, T. & Beltrán-Alcrudo, 2017). The World Organization for Animal Health (OIE) identified LSD as a notifiable disease because of the economic impact (Ahmed and Zaher, 2008; Klement, 2018; Mercier et al., 2018). Skin lesions leave permanent scars and decrease the value of hides and restrictions to the global trade of live animals and animal products (El-Kholy et al., 2008; Molla et al., 2017). There were many factors identified as risk factors for LSD. The disease was found more severe in cows in the peak of lactation and causes a sharp drop in milk yield and young animals show usually more severe clinical signs (Ince et al., 2016; Ince and Türk, 2019). Increasing trend in prevalence of LSD was observed during hot and humid environment as the vector responsible for the infection was found more frequently during the mentioned sweaty condition (Klausner et al., 2017). Female Aedes aegypti mosquitoes were observed to transmit LSDV from infected to susceptible cattle in 2–6 days post-feeding in experimentally infected animals (Al-Salihi and Hassan, 2015). Experimentally, stable flies were
able to mechanically transmit capripoxvirus between sheep and live LSDV has been isolated from stable flies after feeding on infected cattle (Chihota et al., 2001). The spread of infection within a region might be compounded by uncontrolled animal movements, communal grazing and nomadism (Rouby and Aboul'soud, 2016; Salib and Osman, 2011). However, transmission did occur when common drinking troughs were used, thus confirming the suspicion that infected saliva might contribute towards the spread of the disease (EFSA, 2015).

LSD infecting mainly African and Asian countries but now identified as a major concern for European nations as cases rising slowly in later mentioned area (Ayelet et al., 2014; Beard, 2016; Zeynalova et al., 2016). In the last quarter of 2019, LSD outbreak happened across Bangladesh for the first time. This study was performed to know the epidemiology of LSD outbreak in southern part of Bangladesh. These findings may form a baseline for further LSD related study in Bangladesh.

Materials and Method

Ethical Approval

No institutional ethical approval was taken as it was a non-invasive observational study rather oral consent from the farm owners was taken.

Study Design and Data Collection

A cross sectional study was conducted on 50 dairy farms in southern (Barishal) region of Bangladesh (Figure 1). Farms having 5 or more cattle were included in this study. All individual animals of the selected farms were identified as sampling unit (N=726). Farms were categorized into small (1-10), medium (11-20) and large (>20) according to their cattle population. Breed (local, crossbreed), age (young, aged), sex (male, female), pregnancy status (pregnant, non-pregnant) along with clinical symptoms related data were collected. If only nodular lesions were observed in naked eye were designated as nodular form of disease; having any other abnormalities including arthritis or swollen brisket were considered as edematous form of disease. All data were collected from the owner’s face to face interview. Information on prescribed medicine of the affected animals was collected in this study. Medication was classified as non-steroidal anti-inflammatory drugs (NSAID), antibiotic, antihistaminic, steroid anti-inflammatory drugs (SAID) and anti-viral drugs. Total 100 prescriptions were analyzed in this study where antibiotics were the main component to watch.

Data Analysis

Data were coded and entered into the excel spreadsheet. Chi square test was performed on StataIC-13 and P value less than or equal 0.05 was considered as significant.

Results

Prevalence of Lumpy Skin Disease

Overall morbidity rate of LSD at animal level in the affected area was found 21% (CI: 18-24%) and mortality rate was 1% (CI: 1-2%) during the outbreak. In case of signs observed during the outbreak, nodular lesions observed in 45% of the cases where remaining 55% showed edematous sign in skin (Figure 2)

Risk Factors Associated with The Disease Occurrence

Several factors such as farm size, age, sex, breed and pregnancy were taken into consideration in the risk factor analysis (Table 1). Age and pregnancy showed significant (P<0.05) association with disease occurrence. Twenty four percent of the young animals were affected with LSD compared to 17% of the aged animals. Pregnant animals were significantly (P<0.001) more susceptible (70%) than the non-pregnant animals (15%). On the other hand, farm size, sex and breed showed no statistically significant relationship with disease occurrence in χ² test. Although analysis showed large sized farms, male animals and crossbreed animals were affected in greater percentage than their counterparts (Table 1).

Figure 1. Location of study area inside Bangladesh. Barishal located inside Bangladesh along the coastal belt

Treatment Practice

NSAID drugs were used in 90% of the cases followed by antibiotics (80%), antihistaminic (65%), steroids (30%) and antiviral drugs (10%) in the outbreak area of this study. This study showed that nearly 90% of the case animals were treated with NSAID drugs that mainly included ketoprofen (45%), paracetamol (25%), meloxicam (20%) and flunixin (10%) (Figure 3). Among 80% animals treated with antibiotics frequently used drugs were ceftriaxone (35%), ceftiofur sodium (25%), streptopenicillin (20%), amoxicillin (10%), oxytetacycline (5%) and gentamycin (5%) (Figure 3). Antihistaminic drugs used 65% of the cases where pheniramine maleate, chlorpheniramine maleate and diphenhydramine were used 60%, 30% and 10% of cases, respectively (Figure 3). Steroidal drugs also used for 30% of the affected animals. Dexamethasone and combination of dexamethasone and prednisolone used 20% and 30% of cases, respectively (Figure 3). Antiviral drugs used 10% of the cases namely acyclovir. On the other hand, in 80% of the cases there was no registered veterinarians prescription rather medication used through communicating with non-authorized personnel.
A Figure 2. Lesions observed in naked eye was considered as nodular (A) or edematous form (B) of lumpy skin disease (arrow mark).

Table 1. Association of different categorical variables with the occurrence of LSD in cattle of southern part of Bangladesh tested by Chi square test ($\chi^2$ test)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Category</th>
<th>Observation</th>
<th>Positive (%)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farm size</td>
<td>Small (1-10)</td>
<td>119</td>
<td>22 (18.49)</td>
<td>0.23</td>
</tr>
<tr>
<td></td>
<td>Medium (11-20)</td>
<td>433</td>
<td>76 (17.55)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Large (&gt;20)</td>
<td>174</td>
<td>41 (23.56)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>Young (≤12 Months)</td>
<td>160</td>
<td>39 (24.38)</td>
<td>0.05*</td>
</tr>
<tr>
<td></td>
<td>Adult (&gt;12 months)</td>
<td>566</td>
<td>100 (17.67)</td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td>Female</td>
<td>640</td>
<td>120 (18.75)</td>
<td>0.45</td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>86</td>
<td>19 (22.09)</td>
<td></td>
</tr>
<tr>
<td>Breed</td>
<td>Local</td>
<td>149</td>
<td>27 (18.12)</td>
<td>0.72</td>
</tr>
<tr>
<td></td>
<td>Cross</td>
<td>577</td>
<td>112 (19.41)</td>
<td></td>
</tr>
<tr>
<td>Pregnancy</td>
<td>Pregnant</td>
<td>31</td>
<td>22 (70.97)</td>
<td>&lt;0.001*</td>
</tr>
<tr>
<td></td>
<td>Non-pregnant</td>
<td>695</td>
<td>108 (15.54)</td>
<td></td>
</tr>
</tbody>
</table>

*Significant (P≤0.05)

Figure 3. Frequency of medicines used during the outbreak in southern part of Bangladesh

Discussion

In this study we investigated the first outbreak of LSD in southern part of Bangladesh. 50 dairy farms were taken under investigation where 21% morbidity and 1% mortality was recorded. According to the Department of Livestock Services (DLS) of Bangladesh there was an unknown cattle disease spread throughout the regional cattle population with homologous clinical manifestation of LSD in mid-2019 was confirmed by real-time PCR technique as LSD (DLS, 2019). This was the very first time LSD was detected in Bangladesh, a south-east Asian country having around 242 million cattle. Along with Bangladesh, two more Asian countries (India and China) reported the first outbreak during mid-2019 (DLS, 2019). As Bangladesh and China shares a major proportion of border with India, three countries might have contributed spreading the disease to each other. Moreover, Bangladesh is situated in tropical region of the world where the environment is best fitted for different vectors needed for LSD transmission.
The morbidity and mortality observed by the present study is analogous with previous findings of different countries (Al-Salihi and Hassan, 2015; Body et al., 2012; Kasem et al., 2018). Furthermore, this study revealed effect of some risk factors on the outbreak which has been proved earlier in different regions. Higher attack rate (23%) among the large farms was recorded compared to medium and small scale farms (17-18%). A previous study observed higher morbidity and mortality rate in intensive breeding farms than small scale farms and was described as the effect of difference in management system (Kasem et al., 2018). However, in the present study the association was not statistically significant (P value=0.23) and therefore it can be concluded that all animals of the study area regardless of size of the farm were exposed to the infection equally. Young animals were more susceptible than the aged animals having similarity with the finding of Ahmed and Kawther (2008); yet disagrees with finding of Kasem et al. (2018). Male animals were more prone to LSD according to this study although contradicts with findings of Salib and Osman (2011). Since the effect of sex on the occurrence of disease was not statistically significant (P value=0.45) in this study, caution should be taken in concluding this relationship. Cattle population of Bangladesh is mainly local zebu cattle and crossbred Holstein Friesian or Sahiwal cattle due to her cattle breeding policy. However, no statistically significant (P value=0.72) variation of LSD infection observed in crossbred animals compared to local cattle breed. This finding is concordant with the observation of previous study (Tageldin et al., 2014). Higher morbidity rate of LSD infection in pregnant animals was observed with high significance level (P value<0.001). Stress of pregnancy and compromised immunity during this period might explain this phenomenon.

Prescribed medicine in the outbreak area was investigated in the preset study and it showed that almost 80% of the cases were treated with antibiotics although LSD is a viral disease. The morbidity rate of the study indicates that LSD might become one of the major diseases of cattle in Bangladesh. Therefore, it is necessary to have specific knowledge on effective preventive and treatment strategies. The risk factors identified in the present study might facilitate prevention in future. On the other hand to control an outbreak, a medication guideline might be the ultimate tool for vets and farmers. Use of high percent of antibiotics might be because sometime veterinary doctors choose antibiotics to prevent secondary bacterial infection. However, this practice has serious disadvantages like antimicrobial resistance of environmental pathogens and commensal microbes. It was observed that a remarkable percent of LSD affected patients were treated by the non-authorized person such as quack or pharmacy owners might be because proper law enforcement is not usually in place and lack of awareness. The percent of antibiotic use was higher in those cases which needed a strict control measure to check further public health hazard. However, this study did not follow the cases after treatment to compare the effect of medication therefore conclusion cannot be drawn. A national treatment guideline and vaccination strategy to control LSD is highly recommended to prevent further outbreaks. Besides, vaccination with local viral isolates might be needed for effective control of LSD in Bangladesh.

References


