

Research article

An outbreak of Lumpy skin disease in Dairy herds of Pabna and Sirajganj districts, Bangladesh

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Lumpy skin diseases (LSD) is an economically important emerging viral disease of cattle. An outbreak of LSD was experienced in different parts of Bangladesh including Sirajganj between the last half of 2019 to first quarter of 2020. This investigation was carried out to know the outbreak scenario of the disease in the Pabna and Sirajganj districts of Bangladesh. The LSD was diagnosed based on the clinical signs and data were collected from 97 dairy farms of two affected regions through a preformed questionnaire. A total of 886 animals were examined from those farms which includes milking cows, dry cows, heifer, calves and bulls. High fever, enlargement of superficial lymphnode and nodule on different parts of the body were most frequently encountered clinical signs during the investigation. One hundred and ninety seven animals were found positive and showed obvious signs of LSD in mild, moderate and severe form. The proportionate prevalence was 22.2% (95% CI 19.5-25.1%) which is quite similar to the other scientific findings. The morbidity rate was slightly high in the Pabna district (22.6%; 95% CI 19.4-26.1%) than in the Sirajganj (21.3%; 95% CI 16.6-26.8%). The morbidity rate was higher in the female cattle's (24.9%; 95% CI 20.3-29.8%) compare to the males 15.3% (95% CI 8.4-24.7%). Due to the more number of vectors prevalence of LSD was high in autumn (26.4%) and late autumn (36.5%) than the other seasons. Though most of the farmers rely on the veterinarians for the treatment of this disease but some of them were reluctant due to the treatment cost. So it's important to focus on the prevention of LSD rather than the treatment.

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1. INTRODUCTION

Lumpy skin disease (LSD) is a viral disease of cattle caused by Lumpy skin disease virus (LSDV) (Buller et al., 2005). The causative agent is a double stranded DNA virus and it is a member of the Capripox virus genus belongs to Poxviridae family (Tulman et al., 2001; Buller et al., 2005). In 1929 LSD was first diagnosed in Zambia and thereafter regarded as enzootic in Africa. In Bangladesh, outbreak of this virus was first confirmed in 2019 (Khalil et al., 2020). The

infectious disease is found in cattle and water buffalo, but LSDV does not naturally infect sheep and goats because it is highly species specific virus (Sevik et al., 2016; Beard, 2016). The thick skin *Bos indicus* is less susceptible to clinical disease than fine skin *Bos taurus* (Karaotçu et al., 2017). The virus transmitted by different way such as blood-feeding insects and some tick with mechanical transmission (*Aedes aegypti*, *Anopheles stephensi* and *Culex quinquefasciatus* mosquito, *Stomoxys calcitrans*, *Culicoides rubeculosus*, *Musca*

confiscate, tabanids and hard tick), fomites like as contaminated water and feed and environment, iatrogenic transmission by injectable veterinary equipment (Coetzer et al., 2004; Gubbins 2019; Rahman 2020). The disease is characterized by fever, multiple nodules on the skin and mucous membranes, lesions in the respiratory and gastrointestinal tracts, the diameter of the nodules may vary from 2 to 5 cm, enlarged superficial lymph nodes, emaciation, oedema of the skin, and sometimes death due to secondary bacterial infection (Beard 2016; Sevik et al., 2016; Karaotçu et al., 2017). The incubation time has not been reported under field condition but the onset of fever occurs after 6-9 days upon inoculation of virus in controlled environment. At the initial stage of infection high fever is observed in the affected animal which may exceed 41°C and persists for a week and all the superficial lymph nodes becomes enlarged along with the erected hair (Salib et al., 2011; Karaotçu et al., 2017). The nodular lesions develop over the body after 7 to 19 days of virus inoculation and particularly found on the head, neck, udder, scrotum, vulva and perineum (Karaotçu et al., 2017). The multiple nodular lesion involve dermis and epidermis, and may extend to the underlying subcutis but infrequently may extend to the striated muscle, and may be well circumscribed to coalescing (Awad et al., 2010). The nodules are quickly ulcerate on the mucous membrane of the eye, nose, mouth, rectum, udder and genitalia, and by then secretion like as ocular, nasal discharge and saliva (Abdallah et al., 2018). The cut section of nodules found of creamy grey to white colour, initially may contain exude serum, and over 2 weeks becomes a cone shape central core containing of necrotic material (Awad et al., 2010). To increase risk of myiasis when the nodules may become necrotic and ulcerate and 4% of animals suffered from LSD complications and observed of other different complications such as corneal opacity, recumbency, mastitis, cellulitis and philgmone, abortion, lameness, infertile and pneumonia (Salib et al., 2011; Beard 2016). LSD severity depends on the age, immunological status and Breed of the host. The disease can successfully controlled by regional large-scale vaccination campaign with effective homologous vaccines and high vaccination coverage whereas the Gorgan goat pox (GTP) vaccine protect from clinical signs of Lumpy Skin Disease (Gari et al., 2015). All strains of capripoxvirus (sheep pox, goat pox and lumpy skin disease) are

antigenically indistinguishable and one strain provides immunity against all other strains after recovery (Kitching et al., 2003). Other measures such as early detection of outbreaks, restriction on cattle movements are also proven effective to stop the spread of this virus. Live attenuated goat pox vaccine is used in intra-dermal or sub-dermal route to prevent the spread of disease in Bangladesh (DLS 2019). Economic losses depend on the morbidity rate, severity and brought about by mortality to high financial losses due to chronic debility in affected cattle, reduced production, decrease of growth rates, increase treatment costs at the herd level, severe and permanent damage to hides, decreasing their commercial value, severe emaciation etc. (Green 1959; Davies 1991; Gari et al., 2015; Tuppurainen et al., 2018). There are limited report regarding the assessment of the LSD in those cattle farms and this study was performed to know the epidemiology, severity, status of treatment, preventive and control measures and compare among the different regional rural farms in Bangladesh.

2. MATERIALS AND METHODS

A cross sectional study was conducted on total 97 cattle farms in Pabna and Sirajganj District of Bangladesh. The data collection from different regions of this two districts. A village name of Ratonpur beside Gumani River (sub-district Faridpur) in Pabna. B. Two villages name Chorachitolia and Chayra beside Gumani River nearest of the Baghabari Milk Vita (Sub-district Shahjadpur) in Sirajganj; Table 1. Bangladesh Milk Producers Cooperative in Union Limited (BMPCUL), one of the largest and oldest dairy cooperative in Bangladesh collects milks from those dairy farms.

Table 1. Descriptive characteristics of the study sites and sampling population in Selected Dairy farms.

Levels	Categories	N
Number of farms	Pabna	64
	Sirajganj	33
	Total	97
Numbers of cattle studied	Milking cow	334
	Dry cow	64
	Heifer	91
	Calf	300
	Bull	85

Data collection and Processing

Few villages of these two districts were preferred for having highest number of farms in small range as well as those nearest of the milk viti and two district are closely situated which facilitate the study on outbreaks of disease. The farm assessment were mainly based on the long interviews that were conducted with the farm personnel's, usually the family. Face to face questions was asked to fulfil a preformed questionnaire with parameters related to Lumpy Skin disease and direct investigation was carried out to observe the physical findings and management of these farms.

Descriptive analysis was performed by calculating animal level prevalence and results were expressed in terms of percentages and 95% CI. Prevalence was calculated dividing total number of LSD positive individuals by total number of sampled populations in the study. Similarly, the prevalence was calculated for overall and individually for two different study sites (Pabna and Sirajganj) and stratified for types of cattle (Milking cow, dry cow, heifer, calf and bull). The prevalence of LSD was similarly estimated based on severity in different types of cattle. Temporal distribution of the morbidity percentage at different seasons (Summer, Rainy, Autumn, Late autumn, Winter and Spring) and responders' treatment facilitator on farm were visualized in graphs produced in MS Excel program. Limitedly, further statistical analysis (Logistic regression) were not considered in the presented study because of individual data uncertainty of individual cattle type on the study sites.

3. RESULTS

During the rainy season of 2019, dairy farmers of Pabna and Sirajganj district reported an outbreak of a nodular disease in their farms. A detailed physical examination of the effected cattle was carried out during the visit in the affected farms. LSD was diagnosed on the basis of few common clinical sings. The most common clinical signs that were observed was high fever, enlargement of superficial lymph nodes, nodule on the different parts of the body skin e.g. neck, body, leg, head and scrotum, ulceration of the nodule, plaque formation, oedema on the leg; Figure 1. A total of 886 animals of 97 farms from two sites were examined and 197 animals (22.2%; 95% CI

19.5-25.1%) were found positive for LSD based on clinical signs. Out of which 140 animals (22.6% 95% CI 19.4-26.1%) from Pabna and 57



Figure 1. a) Nodules on all over the body; b) Nodular lesion in thoracic region c) Nodules in scrotum; d) Edema of left hind limb cause lameness; e) Oozing of blood from lesion; f) Plaque formation in recovery stage.

animals (21.3%; 95% CI 16.6-26.8%) from Sirajganj were clinically positive for LSD (Table 2). Observation revealed among the 334 milking cows 83 were showed signs of LSD (24.9%; 95% CI 20.3-29.8%), while 29.7% (95% CI 18.9-42.4%), 25.3% (95% CI 16.7-35.5%), 19.7% (95% CI 15.3-24.6%) and 15.3% (95% CI 8.4-24.7%) dry cows, heifers, calves and bulls were effected respectively in those areas; Figure 2.

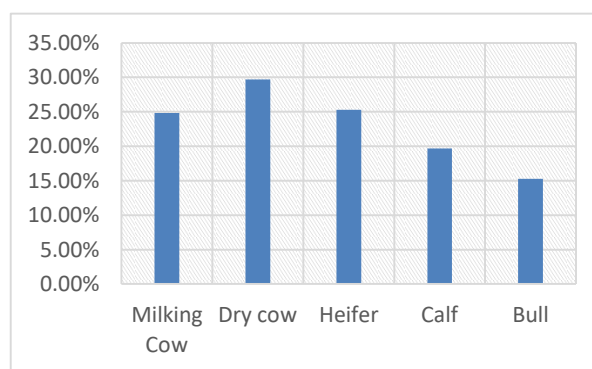


Figure 2. Morbidity rates of LSD in different types of cattle.

Based on the severity of clinical signs LSD patients were subdivided into 3 categories (mild, moderate and severe). Cattles with multiple clinical signs described earlier with plenty of

Table 2. Animal level proportionate prevalence of LSD in the selected 97 sampled dairy farms located in Pabna and Sirajganj districts in Bangladesh.

Level of animal criteria		Total sampled	Total positive	Proportionate prevalence	95% CI
LSD at animal level	Overall	886	197	22.2	19.5 – 25.1
	Study site 1	619	140	22.6	19.4-26.1
	Study site 2	267	57	21.3	16.6-26.8
Milking cow	Overall	334	83	24.9	20.3 – 29.8
	Study site 1	271	64	23.6	18.7-29.1
	Study site 2	63	19	30.2	19.2-43.0
Dry cow	Overall	64	19	29.7	18.9 – 42.4
	Study site 1	53	14	26.4	15.3-40.3
	Study site 2	11	5	45.5	16.7-76.6
Heifer	Overall	91	23	25.3	16.7 – 35.5
	Study site 1	52	13	25.0	14.0-38.9
	Study site 2	39	10	25.6	13.0-42.1
Calf	Overall	300	59	19.7	15.3 – 24.6
	Study site 1	206	44	21.4	16.0-27.6
	Study site 2	94	15	16.0	9.2-25.0
Bull	Overall	85	13	15.3	8.4 – 24.7
	Study site 1	25	5	20.0	6.8-40.7
	Study site 2	60	8	13.3	5.9-24.6

** Place 1= Pabna; Place 2= Sirajganj area farm

nodules throughout the body were diagnosed as severe LSD, whereas patient with less symptoms with few nodules were classified as mild case of LSD. Cows from the 2nd lactation stage were mostly effected and lower infection rate was observed in subsequent lactation stage, 24.4%, 13.4 and 13.4 in 3rd, 4th and 5th lactation sequentially. Among 83 positive milch cow, 45.8% were shows moderate signs (Table 3).

Claves of 4-6 months of ages (33.9%) were more susceptible and most of them showed mild symptom (39%). Similar to the claves most of the heifers (52.2%) were mildly effected with LSD, whereas maximum dry cows (42%) shows moderate sign of the disease (Table 3).

The temporal pattern of this disease portray that, in autumn (32.5%) and late autumn (36.5%) the disease prevalence was at its pick compare to the other seasons rainy (4.1%), winter (16.8%) and spring (10.1%) (Figure 3). According to the farmers most of them were rely on registered veterinarian (47.7) for the treatment of this disease. Some of them treated their animals with local quack (36.1) and others don't give any treatment (16.2) (Figure 4).

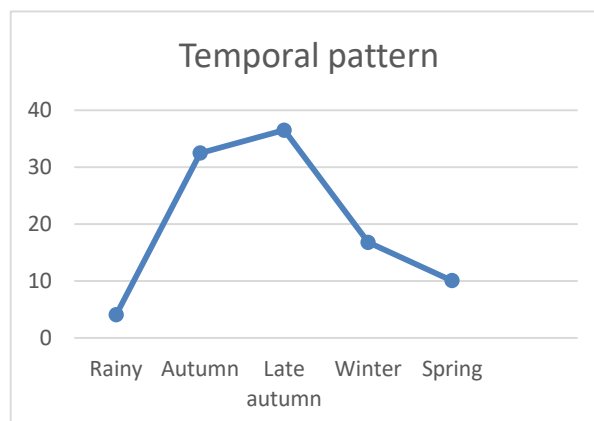


Figure 3. Morbidity rate of lumpy skin disease in different seasons.

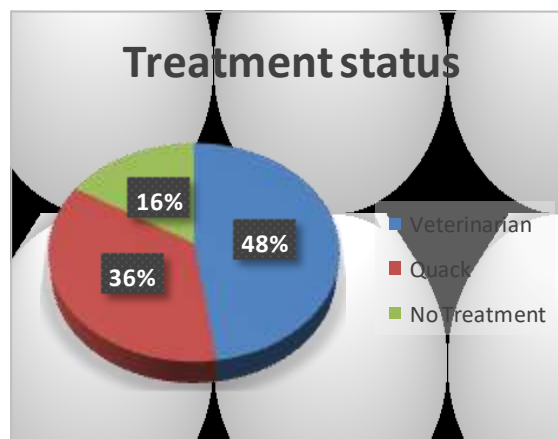


Figure 4. Treatment status approached by the farmers.

Table3. Distribution of LSD cases based on severity and animal level estimators.

Variable names	Categories	Numbers of affected cases	Percentages
Severity of affected Milch cow	Mild	20	24.1
	Moderate	38	45.8
	Severe	25	30.1
Lactation stage	1	9	11.0
	2	31	37.8
	3	20	24.4
	4	11	13.4
	5	11	13.4
Severity of affected calves	Mild	23	39.0
	Moderate	22	37.3
	Severe	14	23.7
Affected calf by age	1 to 3 Months	14	23.7
	4 to 6 Months	20	33.9
	7 to 9 Months	15	25.4
	10 to 12 Months	10	16.9
Severity of dry cows	Mild	5	26.3
	Moderate	8	42.1
	Severe	6	31.6
Severity of heifers	Mild	12	52.2
	Moderate	7	30.4
	Severe	4	17.4

4. DISCUSSION

Lumpy skin disease (LSD) is one of the most important disastrous emerging disease that cause substantial economic loss to affected areas. According to the Department of Livestock services (DLS) of Bangladesh there were LSD first outbreak in Chattogram district of Chattogram division then the disease spread progressively in several regions of Bangladesh within year 2019 (DLS 2019; Khalil et al., 2020). The tentative diagnosis of LSD is usually based on the characteristic clinical signs such as high fever, multiple nodules on the skin, swollen of superficial lymph nodes, show lameness with oedematous swelling on the leg. These clinical signs also matches with findings reported in earlier report (Karaotçu et al., 2017; Abdallah et al., 2018). Present study shows that the overall prevalence of LSD was 22.2% (95%CI 19.5-25.1%) in the selected of Pabna and Sirajganj regions in Bangladesh. found 21% morbidity of LSD during outbreak in Barishal region of Bangladesh (Khalil et al., 2020). The findings of this study about the prevalence of LSD is also supported by the researcher around the world who found similar prevalence in their study (Salib et al., 2011; Abutarbush et al., 2015; Al-Salihi et al., 2015 and Abdulqa et al., 2016). According to

this study morbidity rate is higher in cows and heifer compare to the bull. That indicates females are more susceptible to LSD than the males which is supported by some other scientific reports (Salib et al., 2011; Abdulqa et al., 2016). This may be due to the female cattle's are kept for the longer period in farms for production purpose which usually increase the exposure time, whereas, in the dairy farms male cattle's are sold at the very young age. Present study revealed that calves at the early age (4-6Month) 33.9% were more susceptible than the adults. The higher prevalence in calves may be due to the lower immunity and the susceptibility of the virus at early age. This finding is in agreement with the reports of (Ahmed et al., 2008; Vorster et al., 2008). The morbidity rate of LSD were high in autumn and late autumn and this findings is supported by some other researcher (Ayelet et al., 2014). This kind of temporal pattern in case of LSD may be due to the high humidity and increase number of vectors in those seasons. It is very important to know that prevention of LSD disease is more beneficial than its treatment to avoid high economical loss due to loss of milk production, loss of live weight due to deaths and added of treatment cost, medicine cost.

5. CONCLUSIONS

This study reported the outbreak scenario of Lumpy Skin Diseases in cattle of Pabna and Sirajganj District of Bangladesh. The overall prevalence of the disease was 22.2%. The disease reached at its peak after the rainy season due to the increased number of vectors that transmitted this disease. This disease also caused a significant production loss. It is important to find a reliable solution to prevent the disease.

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