



Research Article

Demographic Factors Influencing Lumpy Skin Disease (LSD) Prevalence at Barishal District, Bangladesh: A Retrospective Study

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ARTICLE INFO	ABSTRACT
<p>Article history Received: 01 Jan 2023 Accepted: 09 Mar 2023 Published: 31 Mar 2023</p> <p>Keywords Demographic factors, Influence, Lumpy skin, Disease, Bangladesh</p> <p>Correspondence Abu Sayed ✉: a.sayedpstu@gmail.com</p> <p> OPEN ACCESS</p>	<p>Lumpy Skin Disease (LSD), a contagious viral disease, had been a matter of great concern for Bangladesh since the outbreak of LSD occurred in the mid of 2019. Later the disease began to show symptoms like significant production loss, infertility, aberrant pregnancies, abortions, and even fatalities. So, a retrospective study was carried out to investigate the prevalence rate and determine the demographic factors that influence LSD occurrence in cattle at Barishal district, Bangladesh. The study was performed at Upazila Veterinary Hospital, Babuganj, Barishal from January 2021 to June 2022. Among 2047 clinical cases recorded at the hospitals, 44 cases were found as LSD-positive. The prevalence rate of LSD in the aforementioned territory was 2.15%. The highest prevalence was estimated in June 2022 (13.39%) followed by May 2022 (7.32%), August 2021(4.35%), February 2021(4.00%), April 2022 (2.23%), March 2021 (1.69%), February 2022 (1.53%), March 2022(0.76%), September 2021 (0.75%). In the contrast, no LSD case was detected in Jan 2021, May 2021, Jun 2021, Oct 2021, Nov 2021, Dec 2021, and Jan 2022. Breed [χ^2 (1, N=2047) =4.989, $p<.05$] and sex [χ^2 (1, N=2047) =4.695, $p<.05$] of the animals were identified as significant demographic factors for LSDV infections in this locality. Additionally, indigenous breeds [(2.63%), 95%CI: 2.454 (1.088-5.534)], females [(2.76%), 95%CI: 0.484 (0.248-0.946)] and older cattle (>5 years) (3.48%) had a greater prevalence rate than the crossbreeds, males and younger animals respectively. As LSD has recently become more prevalent, restriction of animal movements, control of vectors, proper vaccination and treatments, routine-wise animal screening, immediate isolation, and quarantine of the affected animals are some of the strategies that are strongly recommended and might be followed for reducing the LSD occurrence and spreading in this area.</p>
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Introduction

LSD (Lumpy Skin Disease) is a highly contagious viral disease caused by Lumpy Skin Disease Virus (LSDV) belonging to the family *Poxviridae*, subfamily *Chordopoxvirinae*, and genus *Capripoxvirus* (Gupta et al., 2020). Rising body temperature leading to fever, swelling of the lymph nodes (pre femoral and pre scapular lymph nodes most prevalently), and presence of numerous nodular lesions on the skin and mucous membranes typically with a diameter of about 2 to 5 centimeters are the major clinical hallmarks of LSD (Şevik et al., 2016). The epidermal and dermal layers of skin both are affected by the nodular lesions, however, the infection could also spread to the subcutaneous layer or even to the muscle (Abdallah et al., 2018). Additionally, the affected cattle may show lameness and experience swelling due to the progression of edema in their limbs (Haque et al., 2021). LSD is a

mechanical vector-borne disease transmitted to animals by biting arthropods including mosquitoes, flies, midges, and ticks (Ahmed et al., 2020). The disease is particularly more frequent during the wet season in young animals engaged in combined grazing on the pastures due to the abundance of arthropods (Gupta et al., 2020; Kiplagat et al., 2020). Zambia was the first country in Africa and then the Middle East to experience an LSD outbreak, which initially commenced in 1929 (Kasem et al., 2018). Since there has been a widespread outbreak in several countries, it is still challenging to determine the appropriate strain or variants for vaccine development (Ayelet et al., 2013). Midway through 2019, the local veterinary support authority in Bangladesh reported an outbreak of an unidentified disease with nodular skin lesions in cattle populations in different areas of Anwara, Karnaphuli, and Patiya of Chattogram district (Hasib et al., 2021).

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Thereafter, the clinical manifestation with a resemblance was observed in other areas across the country (Giasuddin et al., 2020; Khalil et al., 2021). The Department of Livestock Services (DLS) of Bangladesh confirmed the OIE in August 2019 according to clinical findings and thereafter by confirmatory molecular detection of LSDV through reverse transcriptase polymerase chain reaction (RT-PCR) (Hasib et al., 2021).

In Bangladesh, Livestock plays a crucial role in the development of both micro and macro economies of the country. In 2021-2022, the contribution of the livestock sector to our economy was 1.9%. Additionally, the total annual milk production in our country was 130.74 and 92.65 Lakh Metric Tons respectively (DLS 2021-22). At present, cattle (247 lakhs) are the most populated among all other domestic animals, consequently contributing significantly to the manufacturing of the following goods (DLS 2021-22). In order to lower the morbidity and mortality rates to secure animal life from LSD infection, numerous studies are going on for the development of LSD vaccines and suitable treatments. Additionally, several types of research had been conducted in various regions of Bangladesh regarding LSD prevalence and associated risk factors identification (Haque et al., 2021; Hasib et al., 2021; Pory et al., 2021; Sarkar et al., 2020). However, there was no comprehensive study available regarding the prevalence of LSD in Barishal district, Bangladesh. Hence, a retrospective study was undertaken to observe the overall prevalence rate of LSD and determine the associated risk factors in this area.

Materials and Methods

Study design and data collection

The study was carried out in Barishal from January 2021 to June 2022 with a retrospective study design, at Upazila Veterinary Hospital, Babuganj. A total of 2047 clinical cases of cattle were documented within the given period at Upazila Veterinary Hospital, Babuganj. General and clinical data were obtained from the hospital's record book, containing all the records of clinical cases of the patients who visited the hospital for the diagnosis and treatments.

Clinical diagnosis

The patients were examined and treated after coming to the hospital based on a tentative diagnosis. The

complaints of the owners, the history of patients and diseases as well as clinical indications were considered for the diagnosis and treatment of LSD. No confirmatory diagnosis was conducted for identifying LSD.

Data input and analysis

The obtained data were imported into Microsoft Excel (MS Excel, 2010) for calculating the prevalence rate of LSD. Chi-square statistics with cross-tabulation and correlation analysis were performed using IBM SPSS (Statistical Package for Social Sciences, Version 25) software.

Results and Discussion

A total of 2047 animal cases were investigated between January 2021 to June 2022, where 44 cases were detected positive for LSD on basis of clinical signs and symptoms including fever, anorexia, depression, excessive salivation, and cutaneous nodules in different parts of the body. The prevalence rate of LSD in cattle was 2.15%. Several studies were carried out to estimate and record the prevalence rate and significant risk factors for LSD in various territories of Bangladesh. In comparison to Chittagong (23%) (Badhy et al., 2021), Naogoan (49%) (Haque, NM and Gofur, RM, 2020), Dinajpur (41.06%), Mymensingh and Gaibandha (34%) (Chouhan et al., 2022), and Sylhet (13.65%) (Pory et al., 2021), the prevalence rate of this area was drastically lower. On the contrary, the prevalence rates of LSD in Dhaka (0.21%), Narayanganj (0.87%), Satkhira (0.06%), and Pabna (0.05%) were significantly lower than our current findings (Badhy et al., 2021). Such fluctuations are associated with a variety of parameters, including animal populations, breed, sex, age, management, and so forth (Hasib et al., 2021).

Table 1 depicts the potential factors correlated to the prevalence rate of LSD in the following region. Breed [χ^2 (1, N=2047) =4.989, $p<.05$] and sex [χ^2 (1, N=2047) =4.695, $p<.05$] of cattle were significantly correlated and associated with LSDV infection in this locality. According to the study, indigenous or local breeds [(2.63%), 95% CI: 2.454 (1.088-5.534)] had a greater prevalence rate than the cross breeds. This disease resistance capacity could be related to the genetic makeup and immunity of the individual animal. Likewise (Pory et al., 2021) recorded 57% infection rate in local and 43% in exotic cattle which is in agreement with our current findings.

Table 1. Effects of breed, age, and sex in LSDV infection

LSD				Breed					Total	Pearson's chi-square/Likelihood ratio/Fisher's exact test	Phi/Cramer's V coefficient	V
Case (P/N)	Indigenous	Cross Breed	Total	χ ² -Value	df	P-value*	Phi	Cramer's V				
Positive	37	7	44	4.989					.049			
Negative	1368	635	2003	1					.049			
Prevalence rate (%)	2.63	1.09	-						.026			
OR(95% CI)	2.454 (1.088-5.534)											
Total	1405	642	2047									
LSD				Age					Total	Pearson's chi-square/Likelihood ratio/Fisher's exact test	Phi/Cramer's V coefficient	V
Case (P/N)	<2 years	2-2.6 years	2.7-3 years	3.1-3.6 years	3.7-4 years	4.7-5 years	>5 years	χ ² -Value				
Positive	14	13	9	0	2	3	3	44	10.759			.073
Negative	711	472	191	11	207	328	83	2003	6			.073
Prevalence rate (%)	1.93	2.68	4.5	0	0.95	0.91	3.48	-	.096			
Total	725	485	200	11	209	331	86	2047				
LSD				Sex					Total	Pearson's chi-square/Likelihood ratio/Fisher's exact test	Phi/Cramer's V coefficient	V
Case (P/N)	Male	Female	Total	χ ² -Value	df	P-value*	Phi	Cramer's V				
Positive	12	32	44	4.695					.048			
Negative	874	1129	2003	1					.048			
Prevalence rate (%)	1.35%	2.76%	-						.030			
OR (95% CI)	.484 (.248-.946)											
Total	886	1161	2047									

*Correlation is significant at 0.05 level

Throughout the study, we found that the females [(2.76%), 95% CI: 0.484 (0.248-0.946)] are more likely than males (1.35%) to be affected by LSDV. Similarly, (Hasib et al., 2021) reported that LSDV infects females [(11%), 95% CI: 2.26 (1.28–4.00)] more comparatively than the males. This high occurrence of LSD in females may be linked to their exposure to a wide range of stressful situations, including parturition, pregnancy, and occasionally malnutrition (Kasem et al., 2018). Interestingly, (Pory et al., 2021) found female cattle (14.15%) as more resistant than males to LSD.

In this study, older animals (>5 years) (3.48%) were found to have a high rate of infection than younger ones. On the other hand, (Haque et al., 2021) showed

that LSD is more vulnerable to young male and female cattle. This variation may be due to poor animal and farm management strategies.

Figure 1 demonstrates the month-wise prevalence of LSD in cattle from January 2021 to June 2022. The highest infection rate was estimated in June 2022 (13.39%) followed by May 2022 (7.32%), August 2021(4.35%), February 2021(4.00%), April 2022 (2.23%), March 2021 (1.69%), February 2022 (1.53%), March 2022(0.76%), September 2021 (0.75%). In the contrast, no LSD case was detected in Jan 2021, May 2021, Jun 2021, Oct 2021, Nov 2021, Dec 2021, and Jan 2022. The overall month-wise prevalence figure demonstrates a recent spiking of LSD cases in this territory.

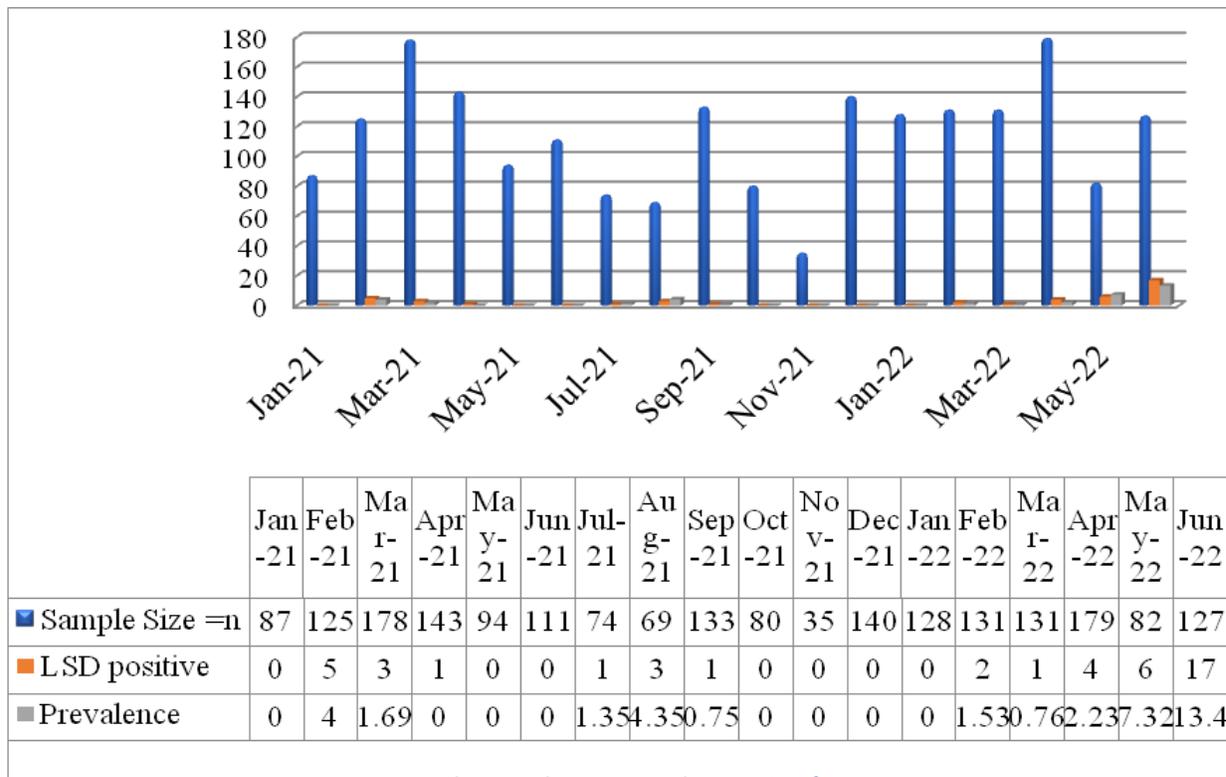


Figure 1. The month-wise prevalence rate of LSD

Conclusion

The study concludes that the overall prevalence of LSD was 2.15%, which is considerably lower than the rate in the majority of districts and sub-districts of Bangladesh. Additionally, the following study revealed that LSDV infections were markedly associated with the breed and sex of the animals. Besides that LSD has recently become more abundant in the following area. In order to protect animal life and stop the spread of LSD, restriction of animal movements, control of vectors, proper vaccination and treatments, animal screening, immediate isolation, and quarantine of the affected animals are some of the strategies that are strongly suggested for the reduction of LSD occurrences in this area.

Competing Interest

The authors declared that they have no competing interests.

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