

Outbreak of Lumphy skin disease in cattle at Muktagachha Upazilla, Mymensingh, Bangladesh.



This clinical report is submitted for partial fulfillment of the degree of Doctor of
Veterinary Medicine (DVM)

Submitted By:

Roll No: 15/61

Reg. No: 01483

Intern ID: 56

Session: 2014-15

**Faculty of Veterinary Medicine
Chittagong Veterinary and Animal Sciences University
Khulshi, Chittagong - 4225.**

Outbreak of Lumphy skin disease in cattle at Muktagachha Upazilla, Mymensingh, Bangladesh.



A clinical report submitted as per approved style and contents

.....

Signature of Author

Md. Musa ali

Roll No: 15/61

Reg. No: 01483

Intern ID: 56

Session: 2014-15

.....

Signature of Supervisor

Dr. AMAM Zonaed Siddiki

Department of Pathology and Parasitology

Chittagong Veterinary and Animal Sciences

University.

Chittagong Veterinary and Animal Sciences University
Khulshi, Chittagong –4225.

CONTENTS

SL. NO	NAME OF THE CONTENTS	PAGE NO.
1	Abstract	4
2	Chapter 1: Introduction.	5-7
3	Chapter 2: Materials and Methods	8-11
4	Chapter 3: Result	12-13
5	Chapter 4: Discussion	14-15
6	Chapter 5: Conclusion	16
7	Acknowledgement	17
8	REFERNCES	18-19

Abstract

Lumpy skin disease is known as a significant disease affecting cattle of many parts of the world including Bangladesh. A recent outbreak was reported from different parts of Bangladesh including Muktagachha Upazila under Mymensingh division for the first time in the last quarter of 2019. This investigation was carried out to know the outbreak scenario of the disease in Muktagachha Upazila. LSD outbreak were reported at the Upazila level during July to December, 2019. A total of 847 cases were recorded including 5 recorded deaths attributed to LSD. The total morbidity, mortality and case fatality rates were 6.8%, 0.039% and 5.4% , respectively. Ten unions under Muktagachha Upazila experienced outbreaks of LSD in 2019. Higher incidence of LSD outbreaks was reported in August to October 2019 while the lower incidence was reported in November to December.2019.

Keyword: Outbreak, Fatality, Mortality, Higher, Incidence, Bangladesh.

Chapter One

Introduction

Lumpy skin disease (LSD) is a viral disease of cattle caused by lumpy skin disease virus (LSDV). The causative agent is a member of the Capripoxvirus genus in the poxviridae family (Buller *et al.*, 2005). LSDV has double-stranded DNA genome, which encodes 30 homologous of poxviral proteins known to be structural or nonstructural and it is antigenically and genetically closely related to sheep pox virus (SPPV) and goat pox virus (GTPV) with nucleotide sequence identities of 96% between species (Tulman *et al.*, 2001).

The principle means of transmission is by arthropod vector including mosquitoes, biting flies and ticks. Morbidity rates vary between 10 to 20% and mortality rates of 1-5% are expected. LSD is endemic in most African countries. Since 2012 it has spread rapidly through the Middle East and southern and eastern Europe.¹ Three countries in Asia have reported the first occurrence of the disease to OIE in 2019: Bangladesh (outbreak start date 14/07/2019), China (outbreak start date 03/08/2019), and India (outbreak start date 12/08/2019). The first outbreak in Bangladesh was reported to the Department of Livestock Services (DLS) on 22/07/2019. Cases occurred in three upazilas (Anowara, Karofuli, and Patia) in Chattogram district of Chattogram division. An investigation revealed 66 cases in cattle with LSD clinical signs of 360 susceptible animals (attack rate of 18%) and no deaths. Samples were collected and tested positive for Capripoxvirus by real-time PCR at the Central Disease Investigation Laboratory (CDIL) (Figure 1) in Dhaka.

LSD has been reported in most countries in most of Africa, parts of the Middle East and Turkey. Since 2015, the disease has spread to most of the Balkan countries, the Caucasus and the Russian Federation, Where the disease continue to spread. From 2019, several outbreaks of LSD have been reported by Members in South and East Asia (OIE, 2019). It has been occurred because of global climatic changes, vectors and trade movement in animals and animal products. Clinical lesions can be confused with Bovine Herpes Virus 2 infections, insect bites, dermatophilosis and bovine besnoitiosis. And so, laboratory diagnosis is needed. Laboratory diagnosis can be performed by using serological and molecular techniques and virus isolation by cell cultures (OIE, 2010).

This study was carried out to explore epidemiological investigation and biochemical changes in cattle caused by Lumpy Skin Disease Virus (LSD) in the Muktagachha Upazila, Mymensingh by which detection of risk factors and some control measures like herd management, vaccination program can be taken. As LSD has been seemingly found in Mymensingh District and outbreak occurred. Although this virus could infect all breeds of cattle irrespective of age and sex, but *Bos taurus* are found more susceptible than *Bos indicus* (Gumbe, 2018). Yet, there is no research investigation conducted to find out risk factors, role of vectors and transmission in Bangladesh. In endemic areas morbidity is usually 10% and mortality ranges between 1 and 3% (Davies *et al.*, 1991). In Muktagachha Upazila, by assessing the epidemiological data; the total morbidity rate recognized 1.93% and mortality rate was less than morbidity rate. Geographical distribution map shows the case outbreak of LSD in this upazila by which immediate control measures, treatment against LSD can be taken. Awareness program among farmers in different unions can be raised and that they can be minimized economic loss of livestock population.

Upazila veterinary Hospital is the best source of information about animal diseases and their prevention and treatment. People from different remote areas come to Muktagachha Veterinary Hospital to get utility of their animals. By appraising this report, a part of strategy can be taken about Lumpy Skin Disease Virus (LSDV) in upazila.

LSD has been reported in most countries in most of Africa, parts of the Middle East and Turkey. Since 2015, the disease has spread to most of the Balkan countries, the Caucasus and the Russian Federation, Where the disease continue to spread. From 2019, several outbreaks of LSD have been reported by Members in South and East Asia (OIE, 2019). It has been occurred because of global climatic changes, vectors and trade movement in animals and animal products. Clinical lesions can be confused with Bovine Herpes Virus 2 infections, insect bites, dermatophilosis and bovine besnoitiosis. And so, laboratory diagnosis is needed. Laboratory diagnosis can be performed by using serological and molecular techniques and virus isolation by cell cultures (OIE, 2010).

Therefore, my study was concentrated on Muktagachha Upazila with the following objectives:

To know the prevalence of LSD in cattle in Muktagachha Upazila.

To assess clinical features of LSD.

Chapter Two

Materials and Methods

Study area & Study period

The study area was Muktagachha Upazila under the district of Mymensingh. The study was carried out in Upazila Veterinary Hospital (UVH), Muktagachha, Mymensingh district during my internship placement from October 13, 2019 to December 20, 2019.



Study design and animal selection

The animals were selected from Muktagachha Upazila Veterinary Hospital which brought into from different areas around Muktagachha. Firstly, a total number of cattle were recorded through preset questionnaire survey and the number of data of clinically suspected lumpy skin diseased were recorded.

Data collection and questionnaire design

Domesticated ruminants (cattle) those who brought to Muktagachha Upazila Veterinary Hospital were considered to be reference population. In study periods about 212 cattle were treated in Upazila Veterinary Hospital due to different diseased condition. Among them total lumpy skin disease affected cattle were 15 and healthy cattle were 15 (Positive group =15, Control group =15).

The required information for the lumpy skin disease was collected directly from the owner of the animal through a structured questionnaire. The questionnaire was filled up by repeated questioning to the owners. The questionnaire includes following information such as: Demographic information (age, sex, body weight, breed, color, and species), socio-economic status of the farmer (farmers occupation, monthly income), patient data (duration of illness, history of deworming , number of infected animal, body condition), management system (type of feed supplied, housing pattern, type of floor, vaccination, hygienic measurement), and owner complain .The farm owner reported that there was a marked reduction in milk production(40% less milk).

Lumpy skin disease was diagnosed by physical examination, laboratory diagnosis and clinical findings of diseases condition.

QUESTIONNAIRE

1. Name of the farm: _____

2. Owners name: _____

3. Location: _____

4. Cow I.D: _____

5. Age: _____

6. Sex: _____

7. Body weight: _____

6. Breed: _____

7. Parity: 1/2/3/4/above 4 _____

8. Clinical signs: a. _____

b. _____

9. Physical Examination: a. Temperature: _____

b. Mucous membrane: _____

c. Urination: _____

d. Defecation: _____

Clinical Examination

The cattle had fever (above 40 °C) for more than two days.

Skin lesions and lesions in the mucous membranes of the mouth, lacrimation, nasal discharge.

Skin lesions (2to 6 cm diameter nodules) occurred mostly in the area of neck, back and whole body.

Mammary gland and teat lesions were also observed in some of the cows.

Burst of nodules, edematous swelling in their limbs and exhibit lameness.

Enlarged superficial lymph nodes.



Fig: Clinical Sign of LSD.

Statistical Analysis

Data collected were entered into Excel-2007 and the results were expressed as mean \pm standard deviations. Differences between the LSDV-infected and healthy groups were calculated by using the two-sample *t*-test. $P < 0.05$ was considered to be statistically significant. All statistical analysis was performed with SPSS 19.0 (SPSS Inc., Chicago, IL, USA).

Chapter Three

Result

Table 1

Table 1 shows number of outbreaks, morbidity, mortality and case fatality rates in different unions of Muktagachha Upazila. Population at risk refers to the number of susceptible cattle in herds where at least one case was reported.

Unions	Population at risk	No. of affected animal	Morbidity rate%	No. of dead animal	Mortality rate %	Case fatality %
Mankon	1998	78	0.64%	2	0.02	2.3
Basati	8350	49	0.58%	0	0	0
Tarati	12073	83	0.63%	0	0	0
Baragram	13237	85	0.57%	0	0	0
Kumarghata	12901	94	0.72%	0	0	0
Kashimpur	14247	93	0.61%	0	0	0
Dulla	12272	74	0.60%	0	0	0
Ghoga	12826	88	0.63%	2	0.01	2.1
Daogaon	10289	104	0.91%	0	0	0
Kheruajani	10917	99	0.91%	1	0.009	1
Total		847	6.8%	5	0.039%	5.4%

Source: Upazila Veterinary Hospital, Muktagachha

LSD outbreaks were reported at the Upazila level from July to December, 2019. During this period, 847 cases were recorded and 5 recorded deaths attributed to LSD. The total morbidity, mortality and case fatality rates were 6.8%, 0.039% and 5.4% respectively (Table-1).

Temporal distribution of LSD

10 unions under Muktagachha Upazila experienced outbreaks of LSD in 2019. High incidences of LSD outbreaks were reported in August to October, 2019 while the lowest incidence was reported in November to December, 2019.



Geographical Map

Chapter Four

Discussion

Livestock plays an important role in the economy of Bangladesh. About 83.9 percent of total households in the country own livestock. In the last year and recently, an emerging disease has been reported in Bangladesh which is Lumpy Skin Disease. Bangladesh has now encountered the second consecutive year's outbreak of LSD. The first outbreak occurred on 22/07/2019 and was reported to the Department of Livestock Services (DLS, 2019). Clinical disease is seen in cattle and wildlife animals such as the Arabian oryx and water buffalo, but does not naturally infect sheep and goats (Davies and Otema, 1981). The disease is characterized by fever, nodules (2 to 5 cm in diameter) on the skin and mucous membrane lesions in the respiratory and gastro-intestinal tracts, and enlarged superficial lymph nodes. It has an important economic impact on the cattle industry due to loss in milk production and condition, infertility, abortion, damaged hides, and sometimes death because of secondary bacterial infections (Carn, 1993). Mortality rates in naïve population of cattle may reach 5% whereas morbidity rates vary from 3 to 80%. It is thought that LSDV is transmitted among cattle by biting insects (such as mosquitoes, flies and ticks that include species from the Glossina, Muscidae, and Tabanidae families, in addition to some species of Hard tick).

Lumpy skin disease is considered to be the most precious disease of livestock industries through worldwide. There is gigantic variation in the morbidity and mortality rates of LSD outbreaks. It depends on these factors: geographic location and climate; the management conditions; the nutritional status and general condition of the animal; breed of cattle affected; immune status; population levels and dissemination of putative insect vectors in the various habitats; virus virulence. The morbidity rate for LSD ranges from 0.60 to 0.90%. However, the morbidity rates are considered more usual. Higher rates have been encountered in epizootics in Shekerkhil, Puichori union and the Sadanpur although so far much lower rates may occur during the same epizootic. In addition, high morbidity and mortality rates 1.93% and 0.04%. The first outbreak in Bangladesh was reported to the Department of Livestock Services (DLS) on 22/07/2019. Cases occurred in three upazilas (Anowara, Karnofuli, and Patiya) in Chattogram district of Chattogram division. An investigation revealed 66 cases in cattle with LSD clinical signs of 360 susceptible animals (attack rate of 18%) and no deaths. Samples were collected and tested positive for Capripoxvirus by real-time PCR at the DLS Central Disease Investigation Laboratory (CDIL).

This study also focused on serum biochemical changes in Lumpy skin diseased affected cattle in

Muktagachha Upazila, Mymensingh, Bangladesh. Serum biochemical references of cattle naturally infected with LSDV are scanty. The measurement and evaluation of the biochemical profile may be helpful in elucidating the pathogenesis and prognosis of the disease. Significant changes occur in the blood biochemical parameters of the animals exposed to viral diseases (Nikolay *et al.*,2013). Additionally, Nikolay *et al.*, reported that changes in the level of serum ALT, AST, and total protein could be used as prognostic markers of the course of the bovine leukaemia virus infection. Biochemical indicators can be helpful in understanding the course of the disease. Therefore, this study was designed to investigate changes that may occur in serum enzyme activities in cattle infected with LSDV.

Chapter Five

Conclusion

The study was carried out to find out the morbidity and mortality rate on LSD in the cattle of the Muktagachha Upazila, Mymensingh, Bangladesh. Lumpy skin disease is an important transboundary disease of cattle and has recently spread out in Asia. It is the outcomes of interaction of various factors associated with the risk factors, pathogens, vectors and the environment. Although the overall prevalence of Lumpy skin disease in cattle was relatively lower in the study area. The findings from this study will be used as a baseline for further epidemiological studies for the development of sustainable programs towards the control of LSD in Muktagachha along with Bangladesh.

Acknowledgments

All praises are due to the Almighty Allah, the creator and supreme authority of the universe, have been enabled the author to accomplish this work

The author would like to express his deep sense of gratitude and thanks to his supervisor assistant professor Dr. AMAM Zonaed Siddiki, Dept. of Pathology and Parasitology, Chattogram Veterinary and Animal Sciences University, whose in encouragement and support help for the completion of the report.

The author wishes to express his gratitude to Professor Dr. Abdul Ahad, Dean, Faculty of Veterinary Medicine, Professor Dr. A.K.M. Saifuddin, Director of external affairs, Chattogram Veterinary and Animal Sciences University.

The authors express their deep sense of gratitude to District Livestock Officer (DLO), Veterinary Surgeon (VS) and all the respondent farmers of Mymensingh region in Bangladesh who cooperated during the period of data collection.

REFERNCES

- Abutarbush S. M. Hematological and serum biochemical findings in clinical cases of cattle naturally infected with lumpy skin disease. *Journal of Infection in Developing Countries*. 2015;9(3):283–288. doi: 10.3855/jidc.5038.
- Bowden T. R., Babiuk S. L., Parkyn G. R., Copps J. S., Boyle D. B. Capripoxvirus tissue tropism and shedding: a quantitative study in experimentally infected sheep and goats. *Virology*. 2008;371(2):380–393. doi: 10.1016/j.virol.2007.10.002.
- Buller R. M., Arif B. M., Black D. N., et al. Family poxviridae. In: Fauquet C. M., Mayo M. A., Maniloff J., Desselberger U., Ball L. A., editors. *Virus Taxonomy: Classification and Nomenclature of Viruses. Eighth Report of the International Committee on Taxonomy of Viruses*. San Diego, Calif, USA: Elsevier Academic Press; 2005. pp.
- Carn V. M. Control of capripoxvirus infections. *Vaccine*. 1993;11(13):1275–1279. doi: 10.1016/0264-410X(93)90094-E.
- Davies F. G. Lumpy skin disease of cattle: a growing problem in Africa and the Near East *World Animal Review*. 1991; 68:37–42.
- Davies F. G., Otema C. Relationships of capripox viruses found in Kenya with two Middle Eastern strains and some orthopox viruses. *Research in Veterinary Science*. 1981;31(2):253–255.
- Irons P. C., Tuppurainen E. S. M., Venter E. H. Excretion of lumpy skin disease virus in bull semen. *Theriogenology*. 2005;63(5):1290–1297.
- Lubinga J. C., Tuppurainen E. S. M., Coetzer J. A. W., Stoltsz W. H., Venter E. H. Evidence of lumpy skin disease virus over-wintering by transstadial persistence in *Amblyommahebraeum* and transovarial persistence in *Rhipicephalus decoloratus* ticks. *Experimental and Applied Acarology*. 2014;62(1):77–90. doi: 10.1007/s10493-013-9721-7.
- Nikolay S., Dimitrinka Z., Ivanka S., Nikolina R., Teodora M. Investigation of some hematological and blood biochemical parameters in cattle spontaneously infected with bovine leukosis virus. *Macedonian Veterinary Review*. 2013;36(2):107–110.

Office International des Epizooties (OIE) *Lumpy Skin Disease, Chapter 2.4.14 OIE Terrestrial Manual*. Paris, France: Office International des Epizooties; 2010.

The Food and Agriculture Organization of the United Nations (FAO) *Emergence of Lumpy Skin Disease (LSD) in Europe*. Vol. 33. Rome, Italy: The Food and Agriculture Organization of the United Nations (FAO); 2015.

Tuppurainen E. S. M., Oura C. A. L. Review: lumpy skin disease: an emerging threat to Europe, the Middle East and Asia. *Transboundary and Emerging Diseases*. 2012;59(1):40–48. doi: 10.1111/j.1865-1682.2011.01242. x.

Tuppurainen E. S. M., Venter E. H., Coetzer J. A. W. The detection of lumpy skin disease virus in samples of experimentally infected cattle using different diagnostic techniques. *Onderstepoort Journal of Veterinary Research*. 2005;72(2):153–164.