DOI: 103126/JNPS.V4113

Original Article

An Outbreak Investigation of Mumps in Eastern Nepal – An Observational Study

Manoj Chaudhary[1], Pankaj Chaudhary[2], Surya Bahadur Parajuli[3], Hem Sagar Rimal[4]

[1] Assistant Professor, Department of Paediatrics, Birat Medical College Teaching Hospital, Budhiganga, Morang, Nepal.
[2] Microbiologist, National Public Health Laboratory, Teku, Kathmandu, Nepal.
[3] Associate Professor and Head of Department, Department of Community Medicine, Birat Medical College and Teaching Hospital, Budhiganga, Morang, Nepal.
[4] Professor and Head of Department, Department of Paediatrics, Birat Medical College Teaching Hospital, Budhiganga, Morang, Nepal.

Article History
Received on - 2024 Mar 19
Accepted on - 2024 May 28

Keywords:
Mumps; outbreak; Nepal

Online Access

DOI: https://doi.org/10.60086/jnps1109

Abstract

Introduction: Mumps is an acute viral infection caused by a paramyxovirus. Mumps outbreak has been observed in different parts of the world, recently an outbreak was observed in South Africa in May 2023. Although, mumps is a vaccine preventable disease it has not been included in the routine immunization schedule of Nepal as well as it does not fall under the category of notifiable disease. The study was done to investigate the risk factors of mumps outbreak in eastern Nepal.

Methods: This was an observational, descriptive study, conducted in eastern Nepal from May 2023 to October 2023. 160 children, up to the age of 14 years were clinically diagnosed as mumps were included in the study. The diagnosis was confirmed by PCR testing of buccal swab. Demographic variables of the study population were noted.

Results: Mumps outbreak peak was observed from May to October 2023. Affected children were mostly belonging to Morang district (108,68%) followed by Sunsari (43,27%). 129 children affected were in the schools (81%). Most commonly affected children were of age group of five to nine years. Parotid swelling was the most common presenting complaint which occurred in all children followed by fever in 138 children (86.3%).

Conclusion: Mumps is a common infectious disease affecting Nepalese children. School children are more vulnerable to this disease. Parotid swelling and fever are the commonest presenting symptoms.

Introduction

Mumps is an acute viral infection caused by a paramyxovirus which is generally a mild childhood disease, mostly affecting children between five to nine years of age. Children are the most vulnerable population affected from mumps and its complications. It usually involves pain, tenderness, and swelling of parotid glands and nonspecific prodromal symptoms like fever, myalgia, anorexia, malaise, and headache.[1,2] Clinical case definition is an illness with acute onset of unilateral or bilateral tender, self-limited swelling of the parotid and or other salivary gland(s), lasting at least two days and without other apparent cause.[3] The average incubation period of mumps is 16 to 18 days, with a range of 12 to 25 days.[4] The infectious

Correspondence

Manoj Chaudhary,
Birat Medical College Teaching Hospital,
Budhiganga, Morang,
Nepal.
Email: drmanojkc497@gmail.com

period is considered from two days before to five days after parotitis onset.[5] Mumps disease can be spread through saliva or mucus and the person can be infected by mumps virus through coughing, sneezing, talking, sharing items and touching of other patients.[2]

The mumps outbreak is defined as three or more cases linked by time and place according to CDC.[6] Frequent outbreaks of mumps are common among children all over the world. South Africa had also experienced a mumps outbreak in different provinces.[7] Mumps outbreaks occurred in households, schools, universities, athletics teams and workplaces. In Nepal, 8898 cases were reported in 2022, which is quite an alarming picture.[8]

Although, mumps is a vaccine preventable disease, mumps vaccine has not been included in the routine immunization schedule of Nepal. This has kept the Nepalese children always at risk for mumps outbreak. Recently, an outbreak occurred in different provinces of Nepal from May to June 2023. There is a lack of knowledge about the disease, mode of transmission, prevention and vaccination, especially in this part of the world. Hence, this study was frame worked to investigate the etiology, source of transmission and risk factors of mumps outbreak among the children in eastern Nepal.

Methods

This was an observational, descriptive study, done in Paediatric OPD, Ward and ICU of Birat Medical College Teaching Hospital (BMCTH), Morang, Nepal. Ethical clearance was granted from the Institutional Review Committee, BMCTH. (Ref: IRC-PA-323/2023). After getting the ethical approval, the study was conducted for six months from May to October 2023. We enrolled 160 children up to the age of 14 years after taking written informed consent form the parents. The parents who did not give consent and those children who had parotid swelling due to other visible causes were excluded. Diagnosis of mumps was done mostly clinically with complaint of bilateral or unilateral swelling of parotid glands. Confirmatory diagnosis was done by polymerase chain reaction (PCR) testing of buccal swab in National Public Health Laboratory (NPHL), Teku, Katmandu, Nepal. Buccal swab was collected aseptically and transported in viral transporting media (VTM) in cold chain box from the study site to the laboratory where PCR of swab were done. Buccal swab of all patients was not collected due to limited resources and logistic issues. Convenience sampling method was used for data collection. Data were collected in pre-designed performa which included: name, age, sex, occupation, race, ethnicity, sign and symptoms, knowledge about disease and vaccination status of the study population. Data entry was done on MS-Excel sheet and analyzed using SPSS 26. Mean, median, mode, frequency, interquartile range calculated were used for descriptive data.

Results

Mumps outbreak occurred from May to October of 2023 with the total incidence of 160 cases in eastern Nepal. The epidemic curve is depicted in Figure 1. Among total cases, 108 children (68%) were from Morang district, 43 children were from Sunsari district (27%) and few from neighboring Saptari and Jhapa districts as shown in Figure 2.

Transmission of disease occurred mostly in school among 129 children (81%) whereas 23 children (14%) acquired the disease from their family members and eight children (5%) got the disease from their neighbors as represented in Figure 3. The demographic profile of the children are represented in Table 1. Most of the study population were Hindu by religion. Majority of the children were Brahmins by cast followed by Chhetri and Tharu. Most commonly affected children were of age group five to nine years followed by one to five years groups and 10 to 14 years adolescent groups, with mean age of six years. None of the children were vaccinated with mumps vaccine.

The clinical features of the study populations are shown in Table 2. Parotid swelling was the most common presenting complaint which occurred in all children. Considering the laterality, 104 (64.4%) children had bilateral parotid swelling while remaining 57 (35.6%) children developed unilateral parotid swelling. Among the study population, 138 children (86.3%) had associated fever whereas 38 children (23.75%) also developed other symptoms like loss of appetite, headache, sore-throat. Two children had previous history of mumps in the past. Among all children, 150 children (93.75%) recovered fully with no complications. However, 11 children (6.9%) needed hospitalization and 10 children (6.25%) developed complications like meningoencephalitis, pancreatitis, orchitis, acute glomerulonephritis, temporary hearing loss and local abscess. However, there was no mortality among the mumps children.

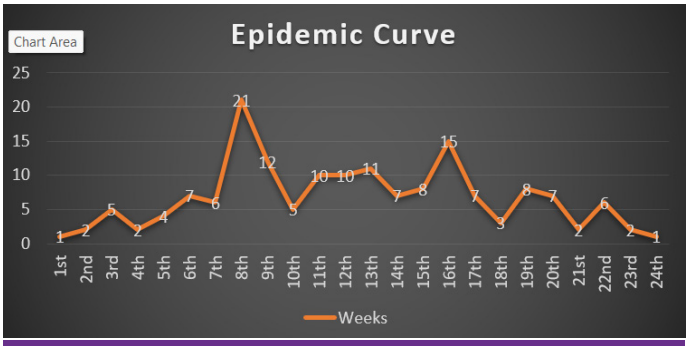

Figure 1: Incidence of mumps

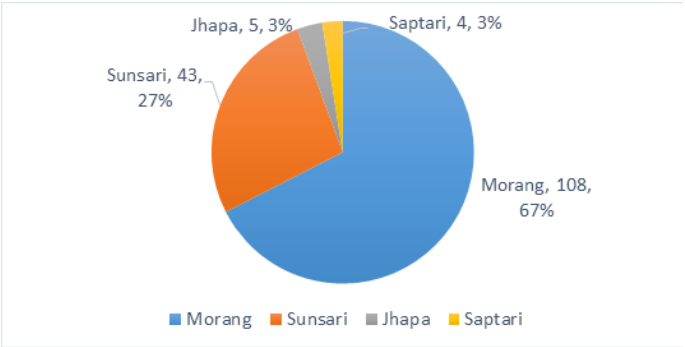

Figure 2: Frequency of Mumps Case according to District

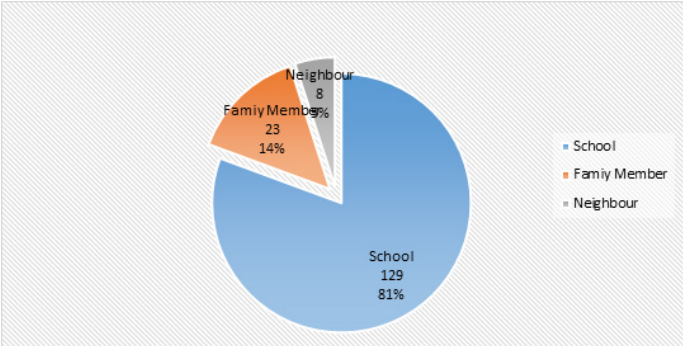

Figure 3: Source of Transmission

Table 1: Demography of the children with mumps

Characteristics	Frequency (%)
Age	
1 - < 5 year	38 (23.8)
5 - 9 year	109 (68.1)
10 - 14year	13 (8.1)
Mean age	6.09 year (Median = 6)
Sex	
Male	99 (61.9)
Female	61 (38.1)
Race	
Bahun	57 (35.6)
Chetri	28 (17.5)
Tharu	18 (1.3)
Newar	8 (5.0)
Muslim	5 (3.1)
Others	44 (27.5)
Religion	
Hindu	139 (86.9)
Buddha	13 (8.1)
Muslim	8 (5.0)
Mumps vaccine not received	160 (100)
Previous history of mumps	2 (1.25)
History of travel	3 (1.87)

Table 2: Symptoms and outcome of mumps

Characteristics	Frequency (%)
Parotid swelling	160 (100)
Bilateral	103 (64.4)
Unilateral	57 (35.6)
Fever	138 (86.3)
Others	38 (23.75)
Hospital admission	11 (6.9)
Outcome	
Improved	160 (100)
Death	0 (0)
Complications	10 (6.25)

Discussion

Mumps occurs worldwide. It is endemic year-round and is a common disease in Nepal. It is a vaccine preventable disease and its vaccine has not been included in the routine immunization schedule of Nepal. This has led to the result of frequent mumps outbreaks in our country. Mumps outbreak recently occurred in different districts of eastern Nepal; Morang, Sunsari and Jhapa from May to October 2023. Mumps outbreak was multifocal involving many places of Morang, Sunsari, Jhapa and Saptari districts. Buddhiganga, Itahari, Biratnagar and Sundarharaicha were mostly affected areas of Morang and Sunsari district, which are more crowded than the surrounding districts.

In our study, transmission of disease occurred mostly in overcrowding places like school (81%) followed by family (14%) and neighbors (5%). As the disease affects the children more, it is well expected that schools would be the most common site of epidemic outbreaks. This pattern is also shown in mumps outbreaks in developed regions like Israel and New York, with mumps transmission associated with intense contact among students in religious schools.[9,10] Historical records as far back as the eighteenth century document that mumps epidemics occurred worldwide, and were more frequent in crowded environments.[11]

In our study, none of the children were vaccinated against mumps. This is a harsh reality that Nepal does not currently offer mumps vaccination in its national immunization schedule. In private sectors, however, mumps vaccine is infrequently given as MMR vaccine. This leaves the unvaccinated population more vulnerable to the disease and results in regular mumps outbreak in our country. In countries where there is no vaccination against mumps, its incidence remains high, with epidemic peaks every two to five years. In the United States, more than 185,000 mumps cases were reported each year

prior to vaccine introduction.[12]

Mumps outbreak remained prolonged for six months from May to October 2023. Still, there was no any action taken by local and central Governing body to break the transmission chain of disease. It arises the question about the pandemic preparedness and tackling emergency situation in Nepal. Mumps is notifiable disease in many countries of world like USA, England, EU / EEA countries, while in Nepal it is not notifiable disease. There was no event-based surveillance for prompt outbreak detection and response. Although complications of mumps are relatively rare, it still is deadly and can result in complications like meningitis, encephalitis, transient loss of hearing, pancreatitis, acute glomerular nephritis, orchitis etc. In our study, only 10 (6.25%) developed complications. They were admitted in hospital and treated in Paediatric ward and PICU. All children improved except one child developed encephalitis with sequel of para paresis.

In our study, most commonly affected children were of age group of five to nine years (68.1%) with males (99;61.9%) predominant in comparison of females. In congruence to our finding, in the United States, more than 185,000 mumps cases were reported each year prior to vaccine introduction, affecting predominantly children aged five to nine years.[12] The outbreak was characterized by predominance of male students, the majority of whom had been previously vaccinated due to waning of the immune response against mumps and emergence of genotypes not included in the vaccines. Mumps was more common among males than females across all age groups in the EU / EEA annual report with an overall male to female notification rate ratio of 1:3. The annual age distributions of mumps cases from the EU / EEA since 2000 support these observations, with the highest proportion between 2000 and 2006 among those aged five to nine years.[13]

Parotid swelling was most common presenting complaint which occurred in all children. Majority of the children (64.4%) in the present study developed bilateral parotid swelling while 35.6% children developed unilateral parotid swelling. Similarly to our finding, a study by Paul S et al reported that all children (94;100%) with mumps developed swelling of salivary glands. Among them 93 (98.9%) developed parotid swelling with 69 (73.4%) bilateral and 24 (25.5%) unilateral swelling of parotid glands.[14] Chandrakant S Moghe et al also reported bilateral swelling of the neck in 105 (65%), and unilateral swelling among 57 (35%).[15]

In our study, fever was second most common symptoms (86.3%). Chandrakant S Moghe et al reported fever being present among 113 (70%) cases while Paul S et al reported all children (94;100%) developed fever.[14,15] Children also developed other nonspecific symptoms like nausea, vomiting, loss of appetite, headache, sore-throat and pain abdomen.

In our study, out of 160 mumps cases, 11 (6.9%) children needed hospitalization. 150 (93;75%) children improved without any complications while 10 (6.25%) developed complications like meningoencephalitis, pancreatitis, orchitis, acute glomerulonephritis, temporary hearing loss and local abscess. All children with complications survived. These findings were similar with ECDC, Annual epidemiological report 2021 with hospitalization rate (4.5%) and complication rate (6.5%) while 2619 (93.5%) had no complication.[13] The estimated hospitalization rate from Hospital Episode Statistics (HES) data was 6.1% overall for mumps orchitis, 0.35% (154 / 43,344), for mumps meningitis and 0.33% (146 /43,344) for mumps pancreatitis.[13] The main complications reported in the mumps outbreak study from Jerusalem, Israel, were 3.8% mumps orchitis in boys above 12 years of age and 0.5% meningoencephalitis.[9] Orchitis was the most common complication (120 cases, 7% of male patients ≥ 12 years of age), in the New York outbreak and, and to 6.1% and 0.3% in England and Wales respectively.[16]

Lack of mumps immunization, overcrowding and no event-based surveillance for prompt outbreak detection and response were the risk factors of mumps outbreak. Probable contributing factors to the mumps outbreak could be lack of awareness about the disease and mode of transmission, delays in the recognition and reporting of mumps cases, delays in the implementation of control measures. The roles of these factors need to be further explored.

Although this study is limited to the eastern part of the country, the present findings should be considered by the policy makers to include mumps vaccination in the immunization schedule. It is encouraged that the outbreak studies should be carried on from all over the country which can represent more clearer picture of the morbidity and mortality of mumps among school children.

Conclusion

Mumps is a common disease among school children and frequent outbreaks are common in our country. Children of age five to nine year were commonly affected by mumps. Most children acquired the disease at their schools. Although the disease has low hospitalization rate and low complications rate, the morbidity of the disease can't be undermined.

References

1. Mumps, World Health Organization (WHO), https://www.who.int/teams/health-product-policy-and-standards/standards-and-specifications/vaccine-standardization/mumps.
2. Mumps, Centers for disease control and prevention (CDC) https://www. cdc.gov/ mumps/index.html

3. Mumps; 2008 Case Definition Centers for disease control and prevention (CDC) https://www. cdc.gov/nndss/index.html

4. Henle G, Henle W, Wendell KK, Rosenberg P. 1948. Isolation of mumps virus from human beings with induced apparent or inapparent infections. J Exp Med. 88:223-232.
DOI: 10.1084/jem.88.2.223
PMID:18873870 PMCID:PMC2135813

5. Meyer MB. 1962. An epidemiologic study of mumps; its spread in schools and families. Am J Hyg. 75:259-281.
DOI: 10.1093/oxfordjournals.aje.a120248
PMID:14473149

6. Confirmation of mumps outbreak, South Africa (11 MAY 2023), National Institute for Communicable Disease; https://www.nicd.ac.za/

7. Mumps Outbreak Control Guide March 2021, New York State Department of Health Bureau of Immunization, https://www.cdc.gov/mumps/outbreaks.html

8. World and national data, maps & rankings; https://knoema.com/atlas

9. Zamir CS, Schroeder H, Shoob H, Abramson N, Zentner G. Characteristics of a large mumps outbreak: Clinical severity, complications and association with vaccination status of mumps outbreak cases. Hum Vaccin Immunother. 2015;11(6):1413-7
DOI: 10.1080/21645515.2015.1021522
PMID: 25874726 PMCID: PMC4514179

10. Barskey AE, Schulte C, Rosen JB, Handschur EF, Rausch-Phung E, Doll MK, et al. Mumps outbreak in Orthodox Jewish communities in the United States. N Engl J Med. 2012 Nov 1;367(18):1704-13.
DOI: 10.1056/NEJMoa1202865
PMID: 23113481

11. Hirsch, A. Mumps (Parotitis epidemica s. polymorpha). In Handbook of Geographical and Historical Pathology; New Syndenham Society: London, UK, 1886; Volume III, pp. 277-283.

12. Kelley PW, Petruccelli BP, Stehr-Green P, Erickson RL, Mason CJ. The susceptibility of young adult Americans to vaccine-preventable infections. A national sero survey of US Army recruits. JAMA 266:2724-2729.
DOI: 10.1001/jama.266.19.2724
PMID:1942425

13. European Centre for Disease Prevention and Control. Mumps. In: ECDC. Annual epidemiological report for 2018. Stockholm: ECDC; 2021, https://www.ecdc.europa.eu/en/publications-data/mumps-annual-epidemiological-report-2021

14. Paul S, Mahajan PB, Sahoo J, Bhatia V, Subba SH. Investigating Mumps Outbreak in Odisha, India: An Opportunity to Assess the Health System by Utilizing the Essential Public Health Services Framework. Am J Trop Med Hyg. 2017 May;96(5):1215-1221.
DOI: 10.4269/ajtmh.15-0593
PMID: 28500809 PMCID: PMC5417219

15. Moghe CS, Goel P, Singh J, Nayak NR, Dhuria M, Jain R, et al. Mumps outbreak investigation in Jaisalmer, Rajasthan, India, June-September 2016. J Med Virol. 2019 Mar;91(3):347-350.
DOI: 10.1002/jmv.25324
PMID: 30252936 PMCID: PMC6409212

16. Yung CF, Andrews N, Bukasa A, Brown KE, Ramsay M. Mumps complications and effects of mumps vaccination, England and Wales, 2002-2006. Emerg Infect Dis. 2011 Apr;17(4):661-7; quiz 766.
DOI: 10.3201/eid1704.101461
PMID: 21470456 PMCID: PMC3377415