

## Original Research Article

# Clinical profile of mumps in children in a tertiary care hospital in Kashmir

Ummer M. Bhat, Naseer Yousuf Mir\*, Wamiq Farooq, Bashir U. Zaman,  
Mohammad Imran Malik

Department of Pediatrics, Government Medical College Srinagar, Jammu and Kashmir, India

**Received:** 30 December 2022

**Accepted:** 02 February 2023

### \*Correspondence:

Dr. Naseer Yousuf Mir,

E-mail: mirnasirgmc@gmail.com

**Copyright:** © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

## ABSTRACT

**Background** Mumps is one of the oldest human illnesses known to humans. Mumps is caused by a paramyxovirus, which is a single-strand RNA virus. Mumps is characterized by painful, unilateral, or bilateral swelling of the salivary glands, in particular, the parotid glands.

**Methods:** This is a hospital-based prospective observational study. All children of age  $\leq 18$  years, both males and females with acute onset of unilateral or bilateral tender, self-limited swelling of the parotid or other salivary gland without other apparent cause.

**Results:** Of the 150 clinically diagnosed mumps cases, 87 (58%) were male and 63 (42%) were female (male-to-female ratio of 1.4:1). There was no case below 1 year but there were 40 cases between 1 and 5 years. The 40% belonged to the lower middle class of socioeconomic status as per Kuppuswamy's scale, followed by the upper-middle and lower-middle class. Only 15 patients (10%) were completely immunized whereas the immunization status of 8% patients was not known, and the rest of the patients were non-immunized (82%). Fever was the most common presentation (150 patients;100%), followed by parotid involvement. Parotitis was present in 146 (97.3%) cases at some point during the illness, 36 patients (24%) had unilateral and 110 patients (73.3%) had bilateral involvement. 16% of patients had multiple salivary gland involvement. Mean duration of illness was  $9.0 \pm 2$  days.

**Conclusions:** Mumps is a significant public health problem to warrant investment in prevention through vaccination.

**Keywords:** Socioeconomic, Salivary glands, Immunization

## INTRODUCTION

Mumps is one of the oldest human illnesses known and is thought to have been first recorded by Hippocrates in the 5<sup>th</sup> century B. C. in his book of epidemics. He described a painful epidemic illness with swelling of the testes in male patients, and around the neck and jaw, which is likely to be a description of the most characteristic symptom of mumps that we know today, swelling of the parotid gland(s). During the late 18<sup>th</sup> century, a physician named Robert Hamilton made the first association between mumps and its implication in central nervous system (CNS) disease during the documentation of a fatal case (Hamilton, 1790). In 1908, a causative agent for mumps

was suggested by Granata (first cited in (Wollstein, 1916)), who reported that the illness may be caused by a filterable pathogen after experiments using rabbits resulted in swelling of the parotid glands following direct inoculation with filtrate from a patient. In 1933, Johnson and Goodpasture carried out a series of experiments showing that mumps is caused by a virus (Johnson and Goodpasture, 1934).<sup>1-5</sup>

Mumps is caused by a paramyxovirus, which is a single-strand RNA virus in the Rubula virus genus in the family Paramyxoviridae, order mononegavirales.<sup>1,2</sup> Paramyxoviruses have a negative-sense non-segmented RNA genome, which means they first must be transcribed

into a positive-sense RNA that acts as an mRNA.<sup>3,4</sup> It is an animal virus that is unable to replicate outside a living animal cell.<sup>5</sup> These viral particles spread to other organs through the circulatory and lymphatic systems. Two immune defenses try to control spread of virus. Circulating antibodies are generated to neutralize the virus, and a cell-mediated immune response occurs in the lymph nodes, spleen, and blood to destroy the virus attacking an individual.<sup>6</sup> The virus is spread by respiratory droplets, saliva, or fomites containing respiratory droplets or saliva.<sup>7-9</sup> Humans are the only natural host of the mumps virus.<sup>7-9</sup> Temporal analysis of seasonal variations in the transmission of mumps may indicate a peak of transmission in the spring.<sup>4</sup> The pathogenesis of the virus in the human body remains unclear.<sup>10</sup>

Mumps is characterized by painful, unilateral, or bilateral swelling of the salivary glands, in particular, the parotid glands.<sup>10</sup> The most common form of parotitis is called "epidemic parotitis" and is more commonly referred to as "mumps." There are 2 distinct phases of mumps, the prodromal phase and the swelling phase.<sup>11-15</sup> The prodromal phase typically presents with the initial onset of mild systemic symptoms such as low-grade fever, headache, myalgia, neck pain, malaise, and poor appetite.<sup>16,17</sup> Fever usually resolves after 4 days.

## METHODS

This is a hospital-based prospective observational study conducted in postgraduate department of post graduate department of pediatrics and neonatology, G. B. Pant general hospital, an associated hospital of government medical college Srinagar. The study duration was 18 months from November 2020 to April 2022. The aims and objectives of this study was to determine clinical and epidemiological profile of children with mumps presenting to this tertiary care hospital.

### Inclusion criteria

All children of age  $\leq 18$  years, both males and females with clinical diagnosis of mumps were included in the study.

### Definition of mumps

Acute onset of unilateral or bilateral tender, self-limited swelling of the parotid or other salivary gland, lasting 2 or more days and without other apparent cause.

### Exclusion criteria

Children, whose parents or guardians did not agree to be a part of the study (non-consenting) were excluded from the study.

### Data collection

All children presenting to the hospital with symptoms of

mumps fulfilling the inclusion and exclusion criteria were enrolled in the study. An informed consent was taken from the parents or guardians of the patients. The ethical clearance was provided by the hospital ethical committee board.

### Statistical analysis

All the collected data was recorded in Microsoft excel and analyzed using SPSS v23. Categorical variables were described as frequencies and percentages. Discrete variables were described in terms of median and interquartile range. Continuous variables were summarized as mean and standard deviation and finally, the appropriate statistical tests were applied for data analysis. Statistical significance was set at  $p < 0.05$ .

## RESULTS

A total of 150 clinically diagnosed cases of mumps were selected based on inclusion and exclusion criteria. Of the 150 clinically diagnosed mumps cases, 87 (58%) were male and 63 (42%) were female (male-to-female ratio of 1.4:1). The age of infected patients ranged between 1 year and 18 years of age (mean,  $8.2 \pm 3$  years old; median, 8 years old). The sex distribution of cases is shown in Table 1. The age distribution of cases is presented in Table 2. There was no case below 1 year but there were 40 cases between 1 and 5 years, 23 in boys and 17 in girls. The largest number was in the year-group of 6 to 10 with 80 cases, 45 in boys and 35 in girls. In the age group of 11-15 years, there were 20 cases, 13 in boys and 7 in girls. There were very few cases beyond 15 years: 6 in males and 4 in females, 16-18 years old had mumps.

**Table 1: Gender distribution.**

Gender	N	Percentage (%)
Male	87	58
Female	63	42
<b>Total</b>	<b>150</b>	<b>100</b>

**Table 2: Age distribution.**

Age (Years)	Males	Females	Total (%)
<b>1-5</b>	23	17	40 (26.7)
<b>6-10</b>	45	35	80 (53.3)
<b>11-15</b>	13	7	20 (13.3)
<b>16-18</b>	6	4	10 (6.7)

Our data suggested that majority of patients, 40% belonged to lower middle class of socioeconomic status as per Kuppaswamy's scale, followed by upper-middle and lower-middle. Our data is represented in Table 3.

The immunization status is shown in Table 4. It was found only 15 patients (10%) were completely immunized whereas the immunization status of 8% patients was not known, and the rest of the patients were

non immunized (82%). For statistical purposes, patients whose immunization status was not known were also considered as non-immunized. So, a total of 135 (90%) patients were considered as non-immunized.

**Table 3: Socioeconomic status.**

Socioeconomic status as per Kuppuswamy's scale	N	Percentage (%)
Upper lower	37	25
Lower middle	60	40
Upper middle	45	30
Upper	8	5

Table 3 showing the majority of patients, 40% belonged to the lower middle class of socioeconomic status as per Kuppuswamy's scale, followed by upper-middle and lower-middle.

**Table 4. Immunization status of patients with mumps.**

Status	N	Percentage (%)
Immunized	15	10
Non-immunized	135	90

**Table 5: Clinical features at presentation to hospital, (n=150).**

Clinical presentation	N (%)	Mean duration (days) ± SD
Fever	150 (100)	5.0±1.2
Constitutional symptoms (headache, myalgia or fatigue)	90 (60)	5.2±2.1
Swelling of salivary glands	150 (100)	5.48±1.1
Parotid swelling	146 (97.3)	
Unilateral	36 (24)	
Bilateral	110 (73.3)	
Submandibular swelling	25 (16.7)	
Unilateral	5 (3.3)	
Bilateral	20 (13.4)	
Cough and cold	125 (83.3)	4.67±1.3
Difficulty in swallowing	120 (80)	4.21±2.0
Earache	30 (20)	2.01±2.0
Abdominal swelling	3 (2)	4.56±2.2
Scrotal swelling	4 (2.7)	4.12±1.3

The presenting clinical features of cases were as follows. Fever was the most common presentation (150 patients; 100%), followed by parotid involvement. Parotitis was present in 146 (97.3%) cases at some point during the illness, 36 patients (24 %) had unilateral, and 110 patients (73.3 %) had bilateral involvement. Sixteen percent of the subjects had multiple salivary gland involvement for a prolonged duration. The mean duration of illness was 9.0±2 days.

Constitutional symptoms like headache, myalgia or fatigue were seen in 90 patients (60%). Cough and dysphagia were seen in 83.3% and 80% of the patients respectively.

The distribution of the cases based on clinical presentation is depicted in Table 5.

## DISCUSSION

In our study, 150 clinically diagnosed cases of mumps were selected based on inclusion and exclusion criteria. Of the 150 clinically diagnosed mumps cases, 58% were male and 42% were female (male-to-female ratio of 1.4:1). Male preponderance was consistent with studies like Raut et al, Ravindra et al, Bemard et al, Heikki et al and others.<sup>18-21</sup>

In our study, the age of infected patients ranged between 1 year and 18 years of age (mean, 8.2±3 years old; median, 8 years old). Moghe et al reported the median age to be 9.4 years (range: 7 months-38 years) and 97 (60%) were males.<sup>22</sup>

In our study, there was no case below 1 year but there were 40 cases between 1 and 5 years, 23 in boys and 17 in girls. The largest number was in the year-group of 6 to 10, with 80 cases, 45 in boys and 35 in girls. In the age group of 11-15 years, there were 20 cases, 13 in boys and 7 in girls. There were very few cases beyond 15 years: 6 in males and 4 in females. These results were in agreement with Arshad et al, Sharma, John et al and others.<sup>23-25</sup>

Our data suggested that the majority of patients, 40% belonged to lower middle class of socioeconomic status as per Kuppuswamy's scale, followed by the upper-middle and lower-middle, which is consistent with results from Gupta et al.<sup>26</sup>

A study conducted by Bakker et al from Canada showed an incidence of mumps among 15% of vaccine recipients, which was similar to our study.<sup>27</sup>

In our study, the patients reported with fever and predominantly bilateral parotid involvement. Fever was the most common presentation, followed by parotid involvement. Parotitis was present in 97.3% of cases at some point during the illness, 24% had unilateral, and 73.3% had bilateral involvement. Sixteen percent of the subjects had multiple salivary gland involvement for a prolonged duration. The mean duration of illness was 9.0±2 days. Constitutional symptoms like headache, myalgia or fatigue were seen in 90 patients (60%). Cough and dysphagia were seen in 83.3% and 80% of the patients respectively. Our findings were similar to studies done by Arshad et al and Moghe et al.<sup>22,23</sup>

In a study by Arshad et al, all the patients (100%) were having bilateral parotid enlargement, the hallmark of mumps.<sup>23</sup> Fever was present in 13 (36.1%) boys and 10

(52.6%) girls. The fever was usually mild and self-limiting or 57.1% of children having fever were in the age group of 9-12 years. Among the children in whom fever was present, rural group 23 (100%) as compared to urban 0(0%) were febrile which is significant.

The study by Indranil et al reported bilateral parotid swelling in 92.3% of cases, among the general symptoms fever was the most common presentation, reportedly present in 92.3% of study subjects.<sup>28</sup> The overall mean duration of parotid swelling was calculated to be 6.85±1.89 days with 6.73±1.95 days and 6.95±1.86 days for the male and female, respectively, which was similar to our study.

### Limitations

There was potentially recall bias regarding the date of illness onset.

### CONCLUSION

The Indian government proposes that mumps is not a significant enough public health problem to warrant routine immunization, however the data presented from Kashmir suggests otherwise. This study should be taken into account alongside other literature within the body of evidence that proposes mumps as a significant enough public health problem to warrant investment in prevention through vaccination.

*Funding: No funding sources*

*Conflict of interest: None declared*

*Ethical approval: The study was approved by the Institutional Ethics Committee*

### REFERENCES

- Rubin S, Kennedy R, Poland G. Emerging mumps infection. *Pediatr Infect Dis J*. 2016;35(7):799-801.
- Tyor W, Harrison T. Chapter 28: Mumps and rubella. *Handbook Clin Neurol*. 2014;123:591-600.
- Centers for Disease Control and Prevention. Mumps cases and outbreaks. 2017. Available at: <http://www.cdc.gov/mumps/outbreaks.html>. Accessed on March 24, 2017.
- McLean HQ, Fiebelkorn AP, Temte JE, Wallas GS. Prevention of measles, rubella, congenital rubella syndrome, and mumps, 2013: summary recommendations of the Advisory Committee on Immunization Practices (ACIP). *Center for Disease Control and Prevention Recommendations and Reports*. 2013;62(RR04):1-34.
- Caserta MT. 2014. Mumps (epidemic parotitis). *Merck Manual Professional Version*. Available at: <http://www.merckmanuals.com/professional/pediatrics/miscellaneous-viral-infections-in-infants-and-children/mumps#v102306>. Accessed on March 6, 2022.
- Reichmann ME. Animal virus. *Access Science*. 2014.
- Fiebelkorn A, Barskey A, Hickman C, Bellini W. Chapter 9: Mumps. *VPD Surveillanc Manual*, 5<sup>th</sup> ed. 2012.
- Vaccines. Available at: <https://www.cdc.gov/vaccines/pubs/surv-manual/chpt09-mumps.pdf>. Accessed on March 14, 2022.
- Office of Disease Prevention and Health Promotion. IID-1.5 Reduce cases of mumps (U.S.-acquired cases). 2017.
- The Healthy People 2020. Available at: <https://www.healthypeople.gov/2020/topics-objectives/objective/iid-15-0>. Accessed on March 14, 2022.
- Latner DR, Hickman CJ. Remembering mumps: E1004791. *PLoS Pathogens*. 2015;11(5).
- Rubin S, Eckhaus M, Rennick L, Bamford C, Duprex W. Molecular biology, pathogenesis and pathology of mumps virus. *J Pathol*. 2015;235:242-52.
- World Health Organization. Mumps virus nomenclature update: 2012. Available at: <http://www.who.int/wer/2012/wer8722/en/>. Accessed on March 14, 2022.
- Centers for Disease Control and Prevention. Mumps: For healthcare providers, 2016. Available at: <https://www.cdc.gov/vaccines/vpd/mmr/public/index.html#what-is-mmr>. Accessed on January 5, 2023.
- Van Panhuis W, Grefenstette J, Jung S. Contagious diseases in the United States from 1888 to the present. *New Engl J Med*. 2013;369(22):2152-8.
- Zamir C, 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.
- Fiebelkorn A, Coleman L, Belongia E. Measles and mumps antibody response in young adults after a third dose of measles-mumps-rubella vaccine. *Open Forum Infect Dis*. 2014;1(1): S58.
- Arkansas Department of Health. Mumps. Available at: <http://www.healthy.arkansas.gov/programs/Services/infectiousDisease/CommunicableDisease/Pages/Mumps.aspx>. Accessed on March 24, 2022.
- Burns C, Dunn AM, Brady MA, Starr NB, Blosser CG, Garzon DL. *Pediatr Primary Care*. 6<sup>th</sup> ed. Philadelphia, PA: Elsevier. 2017.
- Raut SK, Kulkarni PS, Phadke MA, Jadhav SS, Dhorje SP. Persistence of Antibodies Induced by Measles-Mumps-Rubella Vaccine in Children in India? *Clin Vaccine Immunol*. 2007;14(10):1370-71.
- Gupta RK, Jennifer Bt, MacMahon E. Mumps and the UK epidemic. 2005;2005:330.
- Bernard H, Schwarz NG, Melnic A, Bucov V, Caterinciuc N, Pebody RG et al. Mumps outbreak ongoing since october 2007 in the republic of Moldova. *Euro surveillance*. 2008;13(13):8.
- Peltola H, Prasad SK, Subhash VK, Mikko P, Suresh SJ, Rajeev MD. Mumps Outbreaks in Canada and

- the United States: Time for New Thinking on Mumps Vaccines. *Clin Infect Dis.* 2007;45(4):459-66.
24. Moghe CS, Goel P, Singh J. Mumps outbreak investigation in Jaisalmer, Rajasthan, India, June-September 2016. *J Med Virol.* 2019;91(3):347-50.
  25. Arshad AS, Shamila H, Khan I, Syed MA. Patterns of mini-outbreaks of mumps at South Kashmir, Pulwama, India 2007-2011. *Nitte University J Heal Sci.* 2013;3:52-5.
  26. Sharma J. Surveillance of Mumps Cases in Lakhimpur District, Assam and Importance of MMR Vaccine. *American Journal of Drug Delivery and Therapeutics.* AJDDT. 2015;2(1):016-9.
  27. John TJ. An outbreak of mumps in Thiruvananthapuram district. *Indian Pediatr.* 2004;41(3):298-300.
  28. Gupta M, Tripathy JP, Verma M, Singh MP, Kaur R, Ratho RK et al. Seroprevalence of measles, mumps and rubella antibodies among 5-10 years old children in north India. *Indian J Med Res.* 2019;149:396-403.
  29. Bakker W, Mathias R. Mumps caused by an inadequately attenuated measles, mumps and rubella vaccine. *Can J Infect Dis.* 2001;12(3):144-8.
  30. Saha I, Haldar D, Paul B, Shrivastava P, Das DK, Pal M et al. An epidemiological investigation of mumps outbreak in a slum of Kolkata. *J Commun Dis.* 2012;44(1):29-36.

**Cite this article as:** Bhat UM, Mir NY, Farooq W, Zaman BU, Malik MI. Clinical profile of mumps in children in a tertiary care hospital in Kashmir. *Int J Contemp Pediatr* 2023;10:290-4.