



Status of Protective Anti-Mumps Antibody in Relation with Sociodemographic Change at a Tertiary Care Hospital in Bangladesh

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Abstract

Background: Mumps is a major problem worldwide as it is highly contagious in regions where population density is higher. The viruses are spread rapidly by respiratory droplets and also has nosocomial transmission, with health care workers exposed frequently. **Objective:** The purpose of the present study was to evaluate the immune status of mumps by determining the anti-mumps antibody (IgG) level in a tertiary care hospital of Bangladesh. **Methodology:** This cross-sectional observational study was conducted in the Department of Microbiology, Sylhet MAG Osmani Medical College, Sylhet, Bangladesh during the period from January 2018 to December 2018 for a duration of one year. By convenient sampling, apparently healthy adult individuals (n=120) were selected according to enrollment criteria. All data were processed and analyzed with the help of SPSS Version 21.0. **Results:** A total of 180 participants were recruited in this study. The maximum number of participants 95(52.78%) were found in the age group of 18 to 27 years. Protective immunity against mumps was found in 55 (70.51%) male participants, and in the case of socioeconomic status, the highest was found in middle socioeconomic status, which was 62 (63.9%). Protective immunity against mumps was found in 45 (78.9%) participants with a history of close contact with mumps infection and in 77 (62.6%) participants with no history of close contact with mumps infection, which differed significantly (P=0.029). **Conclusion:** In this study, participants with a history of close contact with mumps infection had more protection against mumps infection. [Bangladesh Journal of Infectious Diseases, June 2026;13(1):3-7]

Keywords: Mumps virus; anti-mumps antibody; sociodemographic change; Bangladesh

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Introduction

Mumps is an acute contagious viral disease caused by the Mumps virus and is a type of acute respiratory infectious disease that is prevalent worldwide. The inflammation and swelling of the parotid glands are the main clinical features of Mumps Virus infection, but the virus can also damage many internal organs and the central

nervous system and cause the emergence of a variety of clinical manifestations, including pancreatitis, orchitis, oophoritis, deafness, aseptic meningitis, encephalitis, and other complication¹. The double-layered envelope surrounding the mumps virus is one of the highest contributing factors to its virulence, working through a series of protein. The M protein contributes to viral budding

from infected cells. Primary replication occurs in nasal or upper respiratory tract epithelial cells.

The virus quickly spreads to the local lymphoid tissue, and a primary viraemia occurs and thereby the virus spreads to distant sites in the body. Alternatively, the virus may ascend from the buccal mucosa up Stensen's duct to the parotid gland². The parotid gland is usually involved, and also occur in the CNS, testis or epididymis, pancreas, and ovary. A few days after the onset of illness, the virus can again be isolated from the blood, indicating that virus multiplication in target organs leads to a secondary viraemia. Parotitis is the most frequent presentation, occurring in 95.0% of those with clinical symptoms³. The mumps virus is a virus with multiple tropisms, mainly epithelial and glandular but also neurological⁴. Mumps is transmitted by respiratory contamination via infected droplets of contaminated saliva; as for all respiratory viruses, a first stage of replication in the upper airway epithelium is observed. The virus then spreads to the target organs, probably via the bloodstream, although the virus is very rarely detected in the blood⁵.

Immunity is permanent after a single infection. There is only one antigenic type of mumps virus, and it does not exhibit significant antigenic variation. Antibodies to the HN glycoprotein, the F glycoprotein, and the nucleocapsid protein (NP) develop in serum after natural infection⁶. Antibodies to the NP protein appear earliest (3-7 days after the onset of clinical symptoms) but are transient and are usually gone within 6 months. Antibodies to HN antigen develop more slowly (4 weeks after onset) but persist for years⁷. Antibodies against the HN antigen correlate well with immunity. Even subclinical infections are thought to generate lifelong immunity. A cell-mediated immune response also develops. Interferon is induced early in mumps infection. In immune individuals, IgA antibodies are secreted in the nasopharynx, which exhibit neutralizing activity. Passive immunity is transferred from mother to offspring; thus, it is rare to see mumps in infants younger than 6 months⁸.

Overall, this study provides baseline evidence on serological immunity patterns against Mumps in relation to sociodemographic characteristics and highlights the necessity for ongoing surveillance regarding adult immunization. Future studies incorporating larger sample sizes, multi-center participation, and molecular confirmation of exposure history would help further clarify immunity gaps and guide national preventive strategies.

Methodology

Study Settings and Population: This descriptive cross-sectional study was conducted in the Department of Microbiology, MAG Osmani Medical College, Sylhet, Bangladesh, over one year from January to December 2018. The study population consisted of apparently healthy adults aged 18 to 45 years residing in the Sylhet region. Individuals within this age range who were clinically healthy at the time of recruitment were considered eligible for inclusion. Exclusion criteria included a history of prior Mumps vaccination, current or recent use of immunosuppressive or long-term corticosteroid therapy, and any known condition associated with immunocompromised. Participants were selected through a convenience sampling approach based on their availability, accessibility, and willingness to participate. Each enrolled participant was assigned a unique serial identification number for proper documentation and data management. Prior to recruitment, the purpose and procedures of the study were explained clearly to all potential participants. They were provided the opportunity to ask questions, and written informed consent was obtained only after ensuring their full understanding and voluntary agreement to participate. All ethical principles were strictly maintained throughout the study.

Sample Collection Procedure: After maintaining strict aseptic precautions, 3 mL of venous blood was collected using a sterile disposable 5 mL syringe and transferred into a vacutainer tube. The sample was allowed to clot at room temperature for approximately 30 minutes. Serum was then separated by centrifugation at 2,000 rpm for 10 minutes. Subsequently, 100 µL of the separated serum was carefully transferred into a sterile Eppendorf tube, securely capped, labeled, and stored at 2-8°C until analysis. All reagents were maintained at the recommended temperatures according to the manufacturer's instructions prior to use. Serum IgG antibodies against Mumps virus were measured using an enzyme-linked immunosorbent assay (ELISA) method with the Mumps IgG ELISA kit (CALBIOTECH, A Life Science Company, CA 92020, USA; Catalog No. MP060G, Lot No. MPG5544), following the procedures outlined in the manufacturer's package insert. All steps of the assay were performed consecutively without interruption to ensure test reliability and accuracy.

Statistical Analysis: Statistical analyses were performed with SPSS software, version 22.0 (IBM SPSS Statistics for Windows, Version 22.0.

Armonk, NY: IBM Corp.). Continuous data that were normally distributed were summarized in terms of the mean, standard deviation, median, minimum, maximum, and number of observations. Categorical or discrete data were summarized in terms of frequency counts and percentages. When values were missing, the denominator was stated. Chi-square test was used for comparison of categorical variables. Every effort was made to obtain missing data. A two-sided P value of less than 0.05 was considered to indicate statistical significance.

Ethical Clearance: All procedures of the present study were carried out in accordance with the principles for human investigations (i.e., Helsinki Declaration) and also with the ethical guidelines of the Institutional Research Ethics Committee. Formal ethics approval was granted by MAG Osmani Medical College, Sylhet; Memo no: SOMC/2018/91. Participants in the study were informed about the procedure and purpose of the study and confidentiality of information provided. All participants consented willingly to be a part of the study during the data collection periods. All data were collected anonymously and analyzed using the coding system.

Results

After fulfilling criteria, a total of 180 participants were recruited. In this study, 122(67.8%) participants had protective immunity against mumps, and 58(32.2%) participants had no protective immunity against mumps (Figure I).

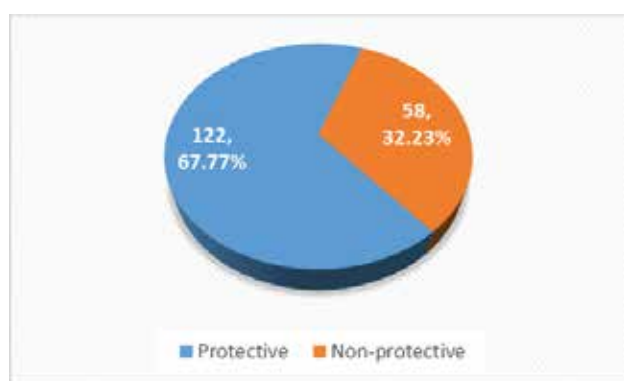


Figure I: Pie chart showing distribution of participants according to protective immunity against mumps (n=180)

A maximum number of participants, 95(52.78%) were found in the age group of 18 to 27 years (Figure II).

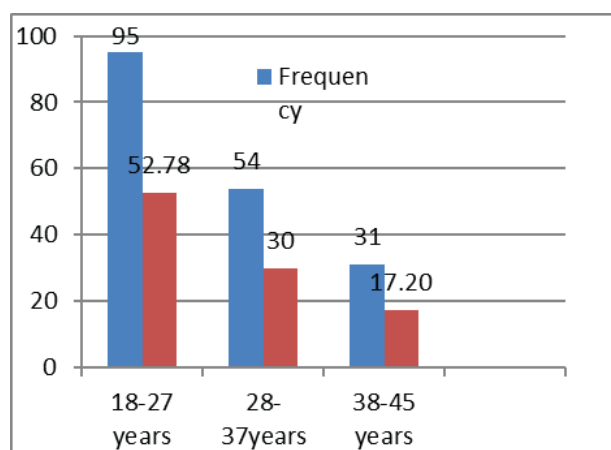


Figure II: Bar diagram showing distribution of the participants according to age (n=180)

Protective immunity against mumps was found in 55(70.5%) male participants and 67(65.7%) female participants (Table 1).

Table 1: Protective Immunity Against Mumps Between Male and Female (n=180)

Gender	Protective Immunity		P Value
	Present	Absent	
Male	55(70.5%)	23(29.5%)	0.492
Female	67(65.7%)	35(34.3%)	
Total	122	58	

Chi- Square (X2) test was performed to see the association. $P \leq 0.05$ was determined as level of significance.

The highest protective immunity against mumps was observed in the middle socioeconomic status, at 62(63.9%), followed by lower and higher socioeconomic statuses, at 55(74.3%) and 5(55.6%), respectively (Table 2).

Table 2: Protective Immunity among Different Socioeconomic Status (n=180)

Socio-economic	Protective Immunity		P Value
	Present	Absent	
Lower	55(74.3%)	19(25.7%)	0.255
Middle	62(63.9%)	35(36.1%)	
Higher	5 (55.6%)	4 (44.4%)	
Total	122	58	

Chi- Square (X2) test was performed to see the association. $P \leq 0.05$ was determined as level of significance.

Protective immunity against mumps was found in 74(64.3%) participants of urban and 48(73.8%) participants of rural. Protective immunity did not differ significantly among different residence ($P=0.190$) (Table 3).

Table 3: Protective Immunity Against Mumps in Different Residence (n=180)

Residence	Protective Immunity		P Value
	Present	Absent	
Urban	74(64.3%)	41(35.7%)	0.190
Rural	48(73.8%)	17(26.2%)	
Total	122	58	

Chi- Square (X2) test was performed to see the association. $P \leq 0.05$ was determined as level of significance.

Protective immunity against mumps was found in 45(78.9%) participants with a history of close contact with mumps infection and in 77(62.6%) participants with no history of close contact with mumps infection. Protective immunity differed significantly ($P=0.029$) (Table 4).

Table 4: Protective Immunity of Participants with History of Close Contact with Mumps Infection (n=180)

H/O Close Contact	Protective Immunity	No Protective Immunity	P Value
Yes	45(78.9%)	12(21.1%)	0.029
No	77(62.6%)	46(37.4%)	
Total	122	58	

Chi- Square (X2) test was performed to see the association. $P \leq 0.05$ was determined as level of significance.

Discussion

By convenience sampling, a total of one hundred eighty apparently healthy adult populations in Sylhet MAG Osmani Medical College campus were included in this study. Among them, 122 (67.8%) participants had protective immunity. Almost similar information was shown by a study conducted in India, where 68.0% had protective immunity, with the rest (32.0%) having no protective immunity among the participants⁹. This study showed that the protective immunity against mumps was found in 69 (56.6%) participants from the age group 18 to 27 years; 34 (27.9%) participants from the age group 28 to 37 years and 19(15.6%) participants from the age group 38 to 45 years. According to the national surveillance data of Japan, about 53.6% of mumps cases were adults¹⁰. In the recent past, data provided by the Government of India showed that about 60.0% of subjects had mumps infection, of which 80.0% were adult individuals¹¹. So, the immunity to mumps seemed to be waned with increasing age, and that is why the adult population is more prone to infection of mumps¹².

Protective immunity against mumps was found in 55(70.5%) male participants and 67 (65.7%) participants of female. Statistically, protective immunity did not differ significantly ($P=0.49$), so sex

difference was not effective in changing antibody titer against mumps. The studies done in the USA have shown almost the same outcome¹³. In this study, we found protective immunity against mumps in 55(74.3%) participants of lower class, 62(63.9%) participants of middle class, and 5 (55.6%) participants of higher class. Protective immunity did not differ significantly ($P=0.255$) among different socioeconomic classes. But in this study, protective immunity declined in the higher class. A study conducted at 2016 has shown almost the same outcome that there is an association between socioeconomic status due to less exposure to mumps in the higher class¹⁴.

Protective immunity against mumps was found 74(64.3%) participants of urban areas and 48 (73.8%) participants of rural. On statistical analysis, protective immunity did not differ significantly among different residences ($P=0.190$). Another study was conducted in Taiwan in 2015, where higher proportions of mumps cases due to high population density¹⁵. It might be because most of the participants living in urban areas were in an overcrowded environment, who were more prone to mumps infection¹⁶.

Protective immunity against mumps was found in 45(78.9%) participants with a history of close contact with mumps infection and in 77 (62.6%) participants with no history of close contact with mumps infection. Protective immunity differed significantly ($P=0.029$) between those with a history of close contact with mumps infection and those without. An observational study about outbreaks of mumps was conducted in Korea in 2012 and showed that mumps had occurred among secondary school students, 83.0% who share a common dormitory¹⁷. It might be because individuals with a history of close contact with a mumps-infected person could acquire immunity through subclinical infection, as mumps is highly contagious and spreads rapidly¹⁸.

According to the weekly epidemiological record, once an infection has run its course, a person is typically immune for life¹⁹. Among the participants with no history of mumps infection, participants may have gotten immunity from subclinical infection, herd immunity, and some of the participants might have given an incorrect history.

Conclusion

The study findings indicate that protective anti-Mumps IgG antibodies are not universally present among healthy adults, and immunity levels vary noticeably across different sociodemographic groups. A substantial proportion of participants lacked adequate protective antibody levels,

suggesting persistent vulnerability to Mumps infection within the adult population. Variations in immunity appeared to be influenced by factors such as age distribution, socioeconomic background, living conditions and awareness patterns. These results highlight the potential risk of Mumps transmission in community and institutional settings and emphasize the importance of continuous serosurveillance, increased public health awareness, and reconsideration of immunization strategies, including possible catch-up vaccination approaches for adults.

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Conflict of interest:

All authors declare that they have no The authors declared no conflict of interest.

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Authors' contributions

Jahan T, Das P, Hoque SA, had involved in protocol preparation, data & sample collection and literature search and manuscript writing. Jahan T, Sinha SP were involved in manuscript preparation and revision. All the authors have read and approved the final version of the manuscript.

Data Availability

The datasets used and analyzed during the present study are derived from hospital surveillance systems and DGHS databases. Data are available from the corresponding author upon reasonable request and subject to approval by the relevant institutional authorities.

Ethics Approval and Consent to Participate

Ethical approval for the study was obtained from the Institutional Review Board. As this was a prospective study the written informed consent was obtained from all study participants. All methods were performed in accordance with the relevant guidelines and regulations.

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