

# Evaluation of Hepatitis A, Hepatitis B, Hepatitis C, Human Immunodeficiency Virus, Measles, Rubella, Mumps, and Chickenpox Seropositivity of Final-Year Medical School Students

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**Cite this article as:** Binay UD. Evaluation of hepatitis A, hepatitis B, hepatitis C, human immunodeficiency virus, measles, rubella, mumps, and chickenpox seropositivity of final-year medical school students. *Arch Basic Clin Res.*, 2023;5(3):409–412.

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## ABSTRACT

**Objective:** Medical school students, like health-care workers, are in the risk group in terms of infections that can be transmitted through blood, body fluids, and droplets. Therefore, they should be screened for vaccine-preventable diseases and vaccinated against the infections to which they are susceptible. In this study, it was aimed to examine the immune status of final-year medical school students who have had hepatitis A, hepatitis B, hepatitis C, human immunodeficiency virus (HIV), measles, rubella, mumps, and varicella serology checked.

**Methods:** The viral serology results of final-year medical school students between December 1, 2019, and December 1, 2022, were retrospectively analyzed.

**Results:** The data of a total of 76 students with a mean age of 25 years were analyzed, and 51.3% (39) of the students were female. The rate of students having their viral serology checked was 82.9% (63). No hepatitis B, HIV, or hepatitis C infection was detected in any of the students. The immunity rates of the students against hepatitis B, hepatitis A, measles, mumps, rubella, and varicella were 87.3%, 20.8%, 61.5%, 75.8%, 89.3%, and 95.3%, respectively.

**Conclusion:** Immunity rates of medical school students against hepatitis A, measles, and mumps are low, and the viral serology of the students should be checked and they have to be vaccinated against infections that they are susceptible to before going into clinical practice.

**Keywords:** medical school students, seroprevalence, vaccination, vaccine preventable infections

## INTRODUCTION

Health-care workers are in the risk group for diseases such as hepatitis A, hepatitis B, hepatitis C, human immunodeficiency virus (HIV), measles, rubella, mumps, and chickenpox that can be transmitted through blood, body fluids, and droplets.<sup>1</sup> It is recommended that health-care workers be vaccinated for vaccine-preventable diseases.<sup>2</sup> Medical school students are also considered health-care workers when they start clinical practice. In this context, it is recommended that medical school students be vaccinated when necessary by checking their viral serology.<sup>1-4</sup>

In this study, it was aimed at examining the immune status of final-year medical school students who have had hepatitis A, hepatitis B, hepatitis C, HIV, measles, rubella, mumps, and varicella serology checked.

## METHODS

This study was planned as a retrospective, cross-sectional study and was conducted with the approval of the local ethics committee (Erzincan Binali Yıldırım University, Clinical Research Ethics Committee, Date: December 22, 2022/Decision No: 2022-08/7).

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**Received:** June 23, 2023

**Accepted:** September 4, 2023

**Publication Date:** September 28, 2023

The medical school students are told the importance of having their viral serology checked during the infectious diseases and clinical microbiology courses that they take in the third class and during the infectious diseases and clinical microbiology clinical practice that they take in the fifth class, and the students are directed to the infectious diseases and clinical microbiology outpatient clinic. Medical school students who apply to the outpatient clinic are routinely tested for hepatitis B surface antigen, hepatitis B surface antibody, hepatitis C antibody, anti-HIV, anti-hepatitis B core immunoglobulin G (IgG), anti-hepatitis A IgG (anti-HAV IgG), measles IgG, rubella IgG, mumps IgG, and chickenpox IgG. If it is necessary, they are referred to the relevant family physician for vaccination.

In this context, the viral serology results of the final-year medical school students of Erzincan Binali Yildirim University who applied between December 1, 2019, and December 1, 2022, were examined.

Demographic characteristics of the students, information about whether they had been vaccinated before, and laboratory data were obtained from personal anamnesis forms and patient registration files.

The serological markers were detected by enzyme-linked immunosorbent assay using Architect kits on an Architect Plus i2000 SR (Architect Systems and Abbot Diagnostics Division, USA).

### Statistical Analysis

The Number Cruncher Statistical Systems 2007 (Kaysville, Utah, USA) program was used for statistical analysis. Descriptive statistical methods (mean, median, frequency, ratio, minimum, and maximum) were used while evaluating the study data.

## RESULTS

The study was conducted with a total of 76 final-year medical school students, and 51.3% (39) of the students were female. The age of the students varies between 24 and 28 years, with an average of 25.07 years. About

82.9% (63) of the students applied to the outpatient clinic to have their viral serology checked (Table 1).

When the data of the students whose serology results could be reached were examined, hepatitis B, hepatitis C, and HIV infection were not detected in any of them. Immunity rates against hepatitis B were determined to be 87.3%. Measles, mumps, rubella, chickenpox, and anti-HAV IgG could not be tested on all students who applied for examination due to the exhaustion of test kits in the laboratory from time to time. When the data of the students were examined, the rates of measles, mumps, rubella, and chickenpox IgG positivity were 61.5%, 75.8%, 89.3%, and 95.3%, respectively. Immunity levels against hepatitis A were found to be 20.8% (Table 2).

## DISCUSSION

Medical school students are in the risk group in terms of infections that can be transmitted through blood, body fluids, and droplets since they start clinical practice in the hospital.<sup>1-4</sup> For this reason, it is important to know their serological status against vaccine-preventable infections and to be vaccinated for infections to which they are susceptible to.<sup>5,6</sup>

In our study, the rate of students getting tested for viral serology was 82.9%. When similar studies in the literature were examined, no rate of testing was found. Since the study design was planned to examine the serological status of the students participating in the survey, only the results of the tested students were shared.<sup>3,6,7</sup> In this context, it is important to support medical school students to have their viral serology checked before they start their profession and to direct them to the relevant outpatient clinics in their institutions from the first year they start the faculty.

In our study, hepatitis B, hepatitis C, and HIV infections were not detected in any of the students. Immunity rates against hepatitis B were 87.3%. The hepatitis B vaccine was introduced in our country in 1998 by including it in

### MAIN POINTS

- Medical school students are in the risk group in terms of infections that can be transmitted through blood, body fluids, and droplets.
- Medical school students are required to have their viral serology checked before they do their internship at the hospital.
- It is important to ensure that they are vaccinated according to the results of viral serology.

**Table 1.** Demographic Characteristics and Status of Checking Viral Serology

Age average (minimum–maximum)	25.07 (24–28) years
Gender	n (%)
Female	39 (51.3)
Male	37 (48.7)
Status of testing	n (%)
Yes	63 (82.9)
No	13 (17.1)

**Table 2.** Serology Results of Students

	Positive n (%)	Negative n (%)
HBsAg	0	63 (100)
Anti-HCV	0	63 (100)
Anti-HIV	0	63 (100)
Anti-HBs	55 (87.3)	8 (12.7)
Anti-HAV IgG	11 (20.8)	42 (79.2)
Measles IgG	24 (61.5)	15 (38.5)
Mumps IgG	25 (75.8)	8 (24.2)
Rubella IgG	25 (89.3)	3 (10.7)
Varicella IgG	41 (95.3)	2 (4.7)

Anti-HAV IgG, hepatitis A immunoglobulin G antibody; Anti-HBs, hepatitis B surface antibody; Anti-HCV, hepatitis C antibody; HBsAg, hepatitis B surface antigen; Anti-HIV, human immunodeficiency virus antibody; IgG, immunoglobulin G.

the routine childhood vaccination schedule. It is accepted that those born after 1991 were vaccinated theoretically, with catch-up vaccinations between 2005 and 2009.<sup>8</sup> When the studies in the literature were analyzed, the immunity rates against hepatitis B in studies including those born after 1991 varied between 92.2% and 93.7%, and the finding in our study supports the literature.<sup>5,6,9-11</sup> This finding is also evidence that the vaccination rates in our country are high, and it is an indication that the World Health Organization has fulfilled an important step in achieving the viral hepatitis elimination 2030 targets.<sup>12</sup>

Immunity rates against hepatitis A, another vaccine-preventable hepatotropic virus in our study, were found to be low at 20.8%. This finding is similar to the rates in studies conducted in recent years with medical, dentistry, and nursing school students in our country.<sup>5,6,9,11</sup> It is important to ensure that people who are in the risk group for hepatitis A infection and who are susceptible, like medical school students and other health-care professionals, are vaccinated.<sup>8,13</sup> Hepatitis A vaccine was added to the routine childhood immunization schedule in 2012, and since this age group is not yet included in working life, the immunity status of health-care workers against hepatitis A should be determined and those who are susceptible should be vaccinated.<sup>8</sup>

The immunity rates of the students in our study against measles, mumps, rubella, and varicella were 61.5%, 75.8%, 96.3%, and 95.3%, respectively. In the study of Karadeniz and Alaşehir,<sup>5</sup> this rate was 57.1%, 74%, 89.3%, and 93.7%, respectively; in the study of Saç et al,<sup>11</sup> it was found to be 82.2%, 98.7%, 98.6%, and 93%. In the study conducted by Alay et al, a nationwide multicenter study, the immunity rates of health-care workers against measles, mumps, rubella, and varicella were found to be

77.6%, 81.6%, 81.5%, and 83.6%, respectively.<sup>14</sup> In the study conducted by Yekenkurul with health-care workers, immunity rates against measles, mumps, rubella, and chickenpox were determined with at 89%, 79%, 93%, and 96%, respectively.<sup>15</sup> The rubella and varicella immunity rates in our study support the literature, and it was determined that the measles and mumps immunity rates were lower compared to the literature. This situation can be explained by incomplete vaccination. Of course, it may also be related to the small number of our sample.

Measles outbreaks are seen from time to time in our country and around the world, and it is absolutely necessary to ensure that health-care workers are vaccinated.<sup>16,17</sup> Since measles vaccine is routinely administered in the form of measles-mumps-rubella vaccine,<sup>18</sup> it is possible that health-care workers can be vaccinated only by checking measles serology.

It has been shown that screening for viral serology before vaccination is cost-effective in current studies.<sup>19-21</sup> Although cost-effectiveness analysis was not performed in our study, it is clear that it is important to examine viral serology before vaccination in light of current studies.

The limitation of our study is that it cannot be generalized for the whole country due to the small number of students.

In conclusion, medical school students should be directed to have their viral serology checked before they go into clinical practice, and they should be vaccinated against the infections to which they are susceptible.

**Data Availability Statement:** Data will be shared upon request.

**Ethics Committee Approval:** Ethics committee approval was received for this study from the ethics committee of Erzincan Binali Yildirim University (Date: December 22, 2022, Decision No: 2022-08/7).

**Informed Consent:** Informed consent was not obtained as it was a retrospective study. Permission was obtained from the hospital management where patient data were obtained.

**Peer-review:** Externally peer-reviewed.

**Declaration of Interests:** The author declare that they have no competing interest.

**Funding:** The author declared that this study has received no financial support.

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