

Varicella Seroprevalence Among Turkish Medical Students and the Validity of Disease History

To the Editor:

Varicella is the leading cause of vaccine-preventable death among children in the developed world. Adults with a definite history of chickenpox are usually immune,¹ and 71% to 93% of adult patients without a definite history of varicella are also seropositive.^{2,7} A serologic test may thus be cost-effective for determining varicella zoster virus (VZV) immunity in adults with a negative history prior to immunization against varicella. On the contrary, children without a clear history of varicella have seroprevalence rates ranging from 9% to 68% depending on age and clinical history.⁸ An intermediate prevalence may sometimes be found in young adult populations, which have a greater risk than young children for developing serious complications such as pneumonia and encephalitis.⁹ Medical students have a high risk of exposure to varicella in pediatric clinics, especially in areas where varicella immunization is not routine as it is now in much of the world.

Susceptible medical students are thus at increased risk for infection and, if infected, can expose susceptible patients at high risk.^{10,11} Airborne nosocomial transmission of VZV has occurred without direct contact with the index patient.¹² Screening medical students with a negative history for varicella antibody can determine susceptibility.^{4,6} This study sought to determine varicella seroprevalence among medical students.

Preclinical medical students (class 3), 20 to 23 years of age, were recruited in 1998 from the Hacettepe University Faculty of Medicine. Verbal informed consent was obtained from all subjects. Students were excluded if they had a history of previous vaccination or if they had had immunosuppressive therapy, blood products, or immunoglobulins within 3 months before enrollment.

A questionnaire was administered regarding history of varicella and serologic samples were drawn for antibody to VZV. Serum samples were stored at -20°C until IgG antibodies

were assayed. A commercial kit was used (Serion ELISA classic Varicella-Zoster-Virus IgG Lot VAR.3, Serion Immundiagnostica GmbH, Würzburg, Germany). The assay thresholds were less than 60 mIU/mL for seronegative, 60 to 80 mIU/mL for equivocal, and greater than 80 mIU/mL for seropositive.

Statistical analysis was performed using SPSS software (SPSS, Inc., Chicago, IL) for Windows 7.5 (Microsoft Corp., Redmond, WA). Geometric mean titers and 95% confidence intervals (CI₉₅) were calculated. Histories of varicella infection were compared with the seropositivity to determine sensitivity, specificity, and positive and negative predictive values.

Mean age was 21.3 ± 0.8 years. Males comprised 41.3% of the study group. One hundred eighty (98.3%) of the students were immune and 4 (2.2%) were seronegative. None of the students had been vaccinated. The geometric mean titer of seropositive cases was 1,182 mIU/mL (CI₉₅, 1,056 to 1,323 mIU/mL). There was no difference between male and female students regarding geometric mean titer.

Overall, 104 students (56.5%) said that they had had varicella. All students with a positive history were seropositive (positive predictive value, 100%). Of the students with negative or unknown histories, only 4 were seronegative (negative predictive value, 5.0%). History had 57.8% sensitivity and 100% specificity. Students with positive histories had higher geometric mean titers (1,378 mIU/mL; CI₉₅, 1,197 to 1,586 mIU/mL) than did those with negative histories (959 mIU/mL; CI₉₅, 802 to 1,146 mIU/mL) (*P* = .002; Table).

This study found that 2.2% of the medical students at Hacettepe University Faculty of Medicine lacked immunity to VZV, results comparable to those of other studies of adults.^{2-7,13}

It has been suggested that immunity levels of 94% or more are needed to interrupt virus transmission.^{1,14} VZV infection is not rare among medical students of Hacettepe University (one to two cases per year). This results in loss of academic time for the student, potential transmission to patients, and sometimes closure of a ward to control varicella transmission.

TABLE

THE GEOMETRIC MEAN TITERS (MIU/ML) OF VARICELLA ZOSTER ANTIBODIES ACCORDING TO HISTORY

	No.	GMT	CI ₉₅
History*			
Negative	76	959	802-1,146
Positive	104	1,378	1,197-1,586
Total	180	1,182	1,056-1,323

GMT = geometric mean titer; CI₉₅ = 95% confidence interval.
**P* = .002.

Overall, 56.5% of the students indicated that they had a positive history of varicella, but only 5.0% were determined to be susceptible. These data support other reports that describe negative histories of varicella as being unreliable.^{2,7} Screening hospital personnel with negative histories for varicella antibodies, when applicable, may assist in identifying susceptible individuals. Because approximately 70% to 90% of adults without a history of varicella will be immune, it should be cost-effective to perform serologic tests and immunize the few who are seronegative. Healthcare workers, including medical students, who do not have a history of varicella should be tested serologically, and those who are seronegative and without a contraindication should be immunized.^{1,14}

Not every hospital has a policy for VZV control. No employee screening program for varicella has existed in this institution, but immunosuppressed patients are frequently admitted to various wards throughout the hospital. Screening personnel with a negative or uncertain history of varicella is likely to be cost-effective because a varicella serologic test costs \$14 (U.S. dollars), most individuals are immune, and a dose of varicella vaccine costs \$55 to \$60 (U.S. dollars) in Turkey. Medical students should be included in this protocol.

REFERENCES

- Centers for Disease Control and Prevention. Prevention of varicella: recommendations of the Advisory Committee on Immunization Practices. *MMWR* 1996;45(RR-11):1-36.
- Ronan K, Wallace MR. The utility of serological testing for varicella in an adolescent population. *Vaccine* 2001;19:4700-4702.

3. Kelley PW, Petruccioli BP, Stehr-Green P, Erickson RL, Mason CJ. The susceptibility of young adult Americans to vaccine-preventable infections: a national serosurvey of US Army recruits. *JAMA* 1991;266:2724-2729.
4. Struewing JP, Hyams KC, Tueller JE, Gray GC. The risk of measles, mumps and varicella among young adults: a serosurvey of US Navy and Marine Corps recruits. *Am J Public Health* 1993;83:1717-1720.
5. Ferson MJ, Bell SM, Robertson PW. Determination and importance of varicella immune status of nursing staff in a children's hospital. *J Hosp Infect* 1990;15:347-351.
6. Alter SJ, Hammond JA, McVey CJ, Myers MG. Susceptibility to varicella-zoster virus among adults at high risk for exposure. *Am J Infect Control* 1986;7:448-451.
7. McKinney WP, Horowitz MM, Battiola RJ. Susceptibility of hospital-based health care personnel to varicella-zoster virus infections. *Am J Infect Control* 1989;17:26-30.
8. Lieu TA, Black SB, Takahashi H, et al. Varicella serology among school age children with a negative or uncertain history of chickenpox. *Pediatr Infect Dis J* 1998;17:120-125.
9. American Academy of Pediatrics, Committee on Infectious Diseases. Recommendations for the use of live attenuated varicella vaccine. *Pediatrics* 1995;95:791-796.
10. Venkitaraman AR, John TJ. Chickenpox outbreak in staff and students of a hospital in the tropics. *Lancet* 1982;2:165.
11. Venkitaraman AR, John TJ. The epidemiology of varicella in staff and students of a hospital in the tropics. *Int J Epidemiol* 1984;13:502-505.
12. Gustafson TL, Lavelly GB, Brawner ER, Hutcheson RH, Wright PF, Schaffner W. An outbreak of airborne nosocomial varicella. *Pediatrics* 1982;70:550-556.
13. Kanra G, Tezcan S, Badur S, Turkish National Study Team. Varicella seroprevalence in a random sample of the Turkish population. *Vaccine* 2002;20:1425-1428.
14. Committee on Infectious Diseases, American Academy of Pediatrics. Varicella vaccine update (RE9941). *Pediatrics* 2000;105:136-141.

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