Original Article

Evaluation of Measles, Rubella, Mumps, Hepatitis B and Varicella Zoster Antibodies in Medical and Dental Students in Shiraz, Iran

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Abstract

Measles, rubella, mumps, hepatitis B virus (HBV) and varicella zoster virus (VZV) cause infectious diseases that can be effectively prevented by vaccination. Vaccination of medical students is important, because they are more likely to become exposed and infected by these viruses. A total of 180 students, consisting of 90 women and 90 men, were serologically screened for measles, rubella and mumps, HBV and VZV antibodies. Their sera were examined for Immunoglobulin G (IgG) antibody against these viruses by using ELISA IgG kits. Total antibody against measles, rubella, mumps, HBV and VZV were 52%, 100%, 76%, 68% and 15% respectively. There was no significant difference in antibodies level according to gender.

The results of this study indicate vaccination is vital for medical student prior to hospital training.

Keywords: Measles, Rubella, Mumps, IgG, ELISA

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Introduction

Vaccination is a suitable method for preventing contagious diseases [1]. Currently, vaccination can provide protection against viruses such as measles, rubella, mump, HBV, VZV, etc.

Measles is a high risk and transmissible virus that causes significant mortality among children. Annually infection by measles virus accounts for 4% of mortality in children aged less than 4. Significantly, the prevalence of infection by measles virus has been reported to approximate 98% in developing countries [2, 3].

Unlike measles, rubella cause mild infection in children but can cause serious disease in pregnant women. During the first trimester of gestation, rubella virus may cause intrauterine infection and afflict the fetus with congenital rubella syndrome (CRS), by passing through the placenta [4]. Annually 200,000 new CRS cases are reported, mostly from developing countries.

Infection by mumps virus is mild and less serious than rubella and may cause orchitis and meningitis [5]. A nationwide vaccination program against mumps virus was launched in Iran during 2003 and 5 to 25 years - old individuals were vaccinated by MR (measles and rubella) vaccine.

Despite significant decrease in symptomatic measles and rubella infections, some individuals are still vulnerable to these viruses [3].

Hepatitis B virus (HBV) and varicella zoster virus (VZV) are two viruses that have become a global concern. HBV vaccination program started in 1984 in many countries around the world. This virus accounts for one million deaths yearly, with approximately 350 million carriers. Altogether, one billion people have been infected with HBV infection totally. In 1993, first HBV vaccination program was launched in Iran [6]. Fortunately, HBV incidence has been decreased in Iran during the last decade. This can be due to increasing knowledge and awareness of people about possible risk factors [7]. HBV has diverse routes of transmission. Risk factors such as needle stick, hemodialysis, blood transfusion, sharing needle among drug users, high risk sexual behavior, etc. [8]. Every contaminated object or infected person by HBV can cause disease. Among the 350 million people with chronic infections the mortality rate due to HBV such as end-stage cirrhosis and hepatocellular carcinoma (HCC) ranges from 15 to 25 percent [9].

Primary VZV mostly infects children and causes chicken pox or varicella [9].This virus affects many children aged from 2 to 5 years in temperate climate. Adults are more sensitive to VZV than younger age group [10].

Also VZV has seasonal outbreak and is prevalent in late winter and early spring every second year [10, 11]. VZV infection have been reported to occur in patients with vascular diseases during last decades and causes serious infections in immunocompromised people [12]. Furthermore, this virus causes a wide range of neural disease [12, 13].

Country's health organizations are responsible for eradicating these viruses.

Infections caused by these noxious viruses are contagious and can spread quickly and may trigger a pandemic. [14-16]

The personnel of most hospitals and clinical centers are at risk of infection with these viruses, because they are commonly in contact with infected patients. Also medical students who pass basic sciences and enter clinical training stage are needed to be vaccinated if they lack protective antibodies against these viruses. Therefore, the aim of the present study was to determine immunity against aforementioned viruses in medical students before attending hospital courses.

Materials & Methods

Blood samples were collected randomly from 180 medical and dental students including 90 males and 90 females, aged from 18 to 21 years. The sera were separated by centrifugation at 5000 rpm and stored at -20°C and then transferred to The Department of Bacteriology and Virology of Shiraz University of Medical Sciences, Shiraz, Iran. The sera were used to evaluate antibodies against measles, mumps, and rubella, HBV and anti-VZ viruses using ELISA method [2, 14].

The ELISA kits employed for antibody detection included measles virus IgG ELISA (IBL company), RUB IgG (DIAPRO company), anti-mumps virus IgG ELISA (EURUIMMUN company, Germany), Anti-HBs commercial immune enzyme (anti-HB kit, Radim, Italy) and VZV (EURUIMMUN company, Germany). In all, the manufacturer's instructions for kit were followed in examinations.

The statistical analysis was done using Chi-square test and SPSS (Version 17) software. Thoroughly, P values less than 0.05 were considered statistically significant.

Results

The highest (100%) and the lowest (15%) level of protection were observed against rubella and VZV respectively (Fig. 1). The respective rates of other antibodies were 52%, 76% and 68% for measles, mumps and HBV. Except for anti HBV, there was no significant difference between males and females in the incidence rates of other under-investigation viruses. Females were more protected than males against HBV. Anti HBV was significantly acceptable in 66 women in comparison with 56 men. Throughly, the P value was 0.05.

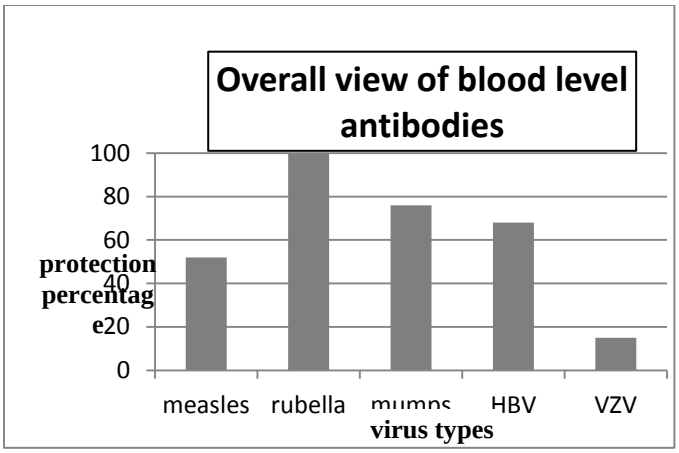

Figure 1: Explicit comparison among rate of antibodies in measles, rubella, mumps, HBV and VZV

Discussion

The present study was performed to determine the rate of vaccination-induced protection against measles, rubella, mumps, and hepatitis B viruses among medical and dental students. As a point, students had not been vaccinated against varicella zoster virus at all. Despite vaccination against viruses, immunity rate was not sufficient in any individuals, except for rubella virus with100% protection.

The low protection rate of measles virus compared to other viruses studied is a matter of concern. This virus was responsible for 777000 deaths in 2000 (1, 15) and opposite to its low prevalence in developed countries, morbidity caused by measles virus in developing countries is relatively high [2, 16].

In 2002, the University of New South Wales launched an investigation on vaccination rates [15]. The protection rates were 70.5%, 1.9%, 89.6%, 87.4%, 73.8% and 67.1% for HBs, HBc, VZV, rubella, measles and mumps respectively.

Another study showed that more than 90% of the students reported were immune to measles, mumps, rubella, and hepatitis B [16].

In 2003, an investigation was carried out after vaccination campaigns in Tehran, Iran [17]. Surprisingly, even though vaccines lacked anti-mumps capacity, results showed high and acceptable protection against this virus**.** This event might relate to accidental childhood infections that have led to production of antibody. Unlike what we found, their results showed high protection rate against measles which may be due to decreasing antibody titers over time or even can be due to insufficient dosage of vaccines for optimal protection**.**

In 2006, another research was done in Shiraz, Iran [18]. They found more protection against rubella than measles which was consistent with our findings. However, they found higher rate of antibody against measles among 20 to 26 years-old individuals that can be due to long lasting immunity.

According to the results from current study, unexpectedly, protection against VZV and HBV were 15% and 68% respectively, considering that none of the students had been vaccinated against VZV.

Even though there was no considerable variability in regard to gender, we found different prevalence regarding HBV among males and females. One reason is that 31 males and 19 females had never been vaccinated or because of oversight had not received a complete course of vaccination. In addition, the difference in the abovementioned prevalence maybe due to the inherent resistance of males (n=56) compared to females (n=66) to HBV. Another study has indicated a higher protection against measles in women compared with men [19].

Vaccination has been considered as an important health care issue according to global application of immune-prophylaxis and chemoprophylaxis that indicates mandatory vaccination for all hospital staffs, especially students attending clinical courses [19].

Furthermore, vaccination is regarded as an effective strategy to prevent dissemination of viruses. The production of high titer protective antibody guarantees protection against viral infection in the community and is geared towards applying accurate dose of vaccine and observing appropriate immunization schedules [19].

In conclusion it is recommended that antibody titer be evaluated in medical students across the country before attending clinical courses.

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Conflict of Interest

All authors have reported no conflict of interest.
The study was approved by the Ethic' committee of Shiraz University of Medical Sciences.

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