

Should We Consider another Booster Dose of Measles Vaccine?

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Abstract

Background: To date, 36 years has passed since the beginning of measles vaccination; the disease is still circulating around the world, threatening lives of human beings especially in developing countries. In recent years, we have confronted measles in previously vaccinated adults from all over the country.

Objective: To find out if there is a need for changing our routine measles vaccination schedule.

Methods: In a cross-sectional study, 241 medical students (127 males and 114 females) were randomly selected. We measured the titer of antibody against measles in their blood using ELISA.

Results: Ninety-eight (40.7%) out of 241 had positive, 39 (16.2%) borderline, and 104 (43.1%) negative antibody titers.

Conclusion: In this study, only 40.7% of the previously vaccinated students had positive antibody titers, while the rest remained susceptible to contract wild measles virus.

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Keywords • Measles • vaccines • antibody titer • ELISA

Introduction

In 1998, WHO reported one million deaths in children under five years old due to this disease.¹

Measles immunization in Iran is an expanded program. Since 1973, all infants have received live attenuated measles vaccine (0.5 ml SC, A.I.K strain, Razi Institute) at the 9th and 15th months of life.

In recent years, however, there had been small outbreaks of acute febrile exanthematous illnesses observed over the country, which were clinically compatible with measles. Moreover, measles was serologically confirmed in some of these cases.²

In developing countries measles is still a major cause of morbidity and mortality, especially in infants.³ The majority of available data indicate a vaccine efficacy of more than 95%.³

Waning of the vaccine-induced immunity is not believed to be a major problem for measles, although concerns have been raised about its existence.⁴

This study was conducted to determine the prevalence of positive

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Table 1: Age distribution in comparison with level of antibody titers

Age (Yrs)	Number (%) of subjects with			Total
	Positive titer	Intermediate titer	Negative titer	
18	9 (28.1%)	6 (18.8%)	17 (53.1%)	32
19	32 (52.5%)	5 (8.2%)	24 (39.3%)	61
20	25 (43.1%)	8 (13.8%)	25 (43.1%)	58
21	14 (33.3%)	12 (28.6%)	16 (38.1%)	42
22	18 (37.5%)	8 (16.7%)	22 (45.8%)	48
Total	98	39	104	241

measles antibody titers in a group of medical students, and to compare the results with other studies to find out if there is a need for changing our routine measles vaccination schedule.

Patients and Methods

We conducted this cross-sectional survey on medical students volunteers of the *Isfahan University of Medical Sciences* in October 2000. The subjects were comprised of 241 medical students [127 (52.7%) males and 114 (47.3%) females] aged 18 to 22 years (Mean±SD:20±1.32). All participants had received their routine vaccination against measles twice during their infancy and had no history of physician-diagnosed measles.

We considered antibody titers of <8 IU/μl as negative, 8–12 IU/μl as intermediate, and >12 IU/μl as positive.

After taking 5 ml of venous blood sample from each student, we separated the serum, and stored the samples frozen at -20°C. The IgG was measured using ELISA (IBL Kit, Germany). Data were analyzed by χ^2 test, and one-way analysis of variance (ANOVA) using SSPS software.

Results

One-hundred and four (43.1%), 39 (16.2%), and 98 (40.7%) students had negative, intermediate, and positive antibody titers, respectively.

Of males, 50 (39.4%), 17 (13.4%) and 60 (47.2%), and of females, 54 (47.4%), 22 (19.3%), and 38 (33.3%) had negative, intermediate, and positive antibody titers, respectively.

Antibody titers in each age are shown in Table 1. No statistically significant correlation was found be-

tween antibody titer and age (p=0.69).

The correlation between antibody titers and sex also did not turn to be statistically significant (p=0.148) (Table 2).

Discussion

In our study, 98 (40.7%) students had positive antibody titers, implying that the majority of subjects were susceptible to measles. On the other hand, due to careful supervision at vaccination centers and the second dose administered in 15 month of the age, we deduce that perhaps reasons other than primary failure could be operative for this low rate of seropositivity.⁵ The students were young and had no apparent measles in childhood, meaning that there has been protection against the disease due to vaccine-induced immunity over their adolescence.

Lauri, *et al.* reviewed extensively the literature on the duration and quality of the measles vaccine-induced immunity, and noticed that waning immunity was present in only a very small proportion of those being vaccinated.⁶ In another study, 15 years after vaccination, 100% of subjects tested positive for measles antibody.⁷ Secondary vaccine failure have been reported from China and Canada.^{4,8} One study conducted in Greenland demonstrated that although measles HI antibodies were no longer detectable in some subjects, antibodies demonstrated by neutralization and revaccination were associated with a classic booster antibody response.^{9,10}

Our results are completely at variance from other studies in high percentage of seronegativity.⁵ The most convincing evidence of secondary vaccine failure would be provided by confirmed measles disease in a person who had a documented seroconversion after vaccination.⁷

Table 2: Sex distribution in comparison with level of antibody titers

Gender	Number (%) of subjects with			Total
	Positive titer	Intermediate titer	Negative titer	
Male	60 (47.2)	17 (13.4)	50 (39.4)	127
Female	38 (33.3)	22 (19.3)	54 (47.4)	114
Total	98	39	104	241

Should we consider another booster dose of measles vaccine?

Mathematical models predict that immunity levels of 93.5% to 96% would be necessary to eliminate measles transmission.^{11,12} As a consequence, it seems that other epidemiological studies in different age groups in different parts of Iran need to be conducted.

Our results show that waning vaccine immunity could be more than a mere possibility, which if proved it would stretch beyond a matter of local or even national significance and then we should change our measles vaccination plan, and probably add a booster dose of vaccine in adulthood.¹³

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