ANTIBODY RESPONSE AMONG SEROPOSITIVE INDIVIDUALS AFTER MEASLES VACCINATION

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Abstract

Background: Measles is one of the leading causes of childhood mortality worldwide. A live-attenuated vaccine controls measles infection in industrialized countries, and measles has been targeted by the WHO for global eradication following the eradication of poliomyelitis.

Objective: To determine the antibody response to measles virus in seropositive volunteers after vaccination with live attenuated measles vaccine.

Methods: Fifty two measles virus seropositive normal volunteers have been enrolled in this study, they were 36 males and 16 females, their age ranged between 15-45 years. 26 of them were vaccinated with measles virus vaccine and 26 were injected with diluent supplied with measles virus vaccine (placebo). Antibodies against measles virus were detected in volunteer's sera prior to, one and four weeks after vaccination, using ELISA method.

Results: There was marked rising in the mean of antibodies after vaccination, the OD readings were 1.72 and 1.95 during first and fourth week respectively. Data analysis showed that there was a significant difference of OD value among seropositive vaccines. And there was a significant elevation of serum antibody in the first week, but the fourth week had very high OD readings, which may reflect an increase in the concentration of antibodies.

Conclusion: Measles virus vaccine was safe, and at the same time effective. There was no evidence of transient suppression of the humoral immune response and there was an elevation of serum antibody titer among vaccinated individuals.

Key words: Antibody, seropositive, measles vaccination

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Introduction

Measles is one of the leading causes of childhood mortality world wide, in addition to causing an acute respiratory infection. Measles is associated with profound transient suppression of cell-mediated immunity[1]. This immuno-suppression contributes to the major complications of measles: pneumonia, diarrhea, and other secondary infections; in rare cases, measles can also cause encephalitis and persistent infection of the central nervous system[2].

A live-attenuated vaccine controls measles infection in industrialized countries, and measles has been targeted by the World Health Organization (WHO) for global eradication following the eradication of poliomyelitis[3].

Thus, while eradication is a primary goal, frequent reemergence of measles in many countries[4]. During 1997-1998 in Eastern Mediterranean Region the number of cases reported increased by 58% from previous outbreak, outbreaks were reported in Iran, Syria, Saudi Arabia, and Morocco[5].

In our country an outbreak of measles had occurred at the same period[6]. So our aim as a preparation for an anticipated Global Measles Eradication Programme in Iraq, and to check the potency of the available measles virus vaccine.

Subjects & Methods

Subjects

A total 52 apparently healthy volunteers were included in this study, their ages ranged from 15-45 years, (36 males and 16 females). The volunteers were age and sex matched, and was subdivided into two groups.

Group 1: Included 26 individuals, they were vaccinated with measles vaccine. The mean age group was (30.2) year. (69.2%) of them were males and 30.8% were females.

Group II (control) Included 26 individuals, they were injected with the diluent supplied with measles vaccine (placebo). The mean age group was (27.8) year. 69.2% of them were males and 30.8% were females.

Blood sample collection and preparation:

Two and a half ml venous blood was aspirated under sterile technique from each subject in the studied groups, prior to and 1and 4 weeks after injection of vaccine or diluent supplied with the

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vaccine; and was placed in dry tube for sera separation. The separated sera were dispensed into closed-capped tubes in 0.2 ml aliquots and stored at -20ºC till tested.

Enzyme Immunoassay for the Determination of IgG Antibodies:

Antibodies against MV were detected in volunteer's sera (prior to, one and four weeks after vaccination) using ELISA-test, which done according to the manufacturer instruction and as follows:

The low positive control served as the cut-off value and when the absorbance of the subject sample was more than 10% above the cut-off value, the result was regarded as positive and the absorbance more than 10% below the cut-off value, the result was regarded as negative, results in between that could not clearly be defined and they were regarded as questionable. The higher OD, the higher levels of anti- immunoglobulins are present. The mean cutoff value was calculated, the OD was (1.104) any OD reading higher than this OD reading by 10% was considered as positive, and any OD reading below by 10% was considered as negative.

Results

Rising serum antibody titer after measles vaccination:

Serum IgG level against MV in the sera of the subjects had been measured by using ELISA technique, which measure the optical density (OD) of readings. The mean OD reading of group 1 was 1.55 while the mean OD of group II was 1.52 before vaccination. During the first week of measles vaccination the mean OD was 1.72, and in the fourth week the mean OD reading was 1.95 (Figure 1).

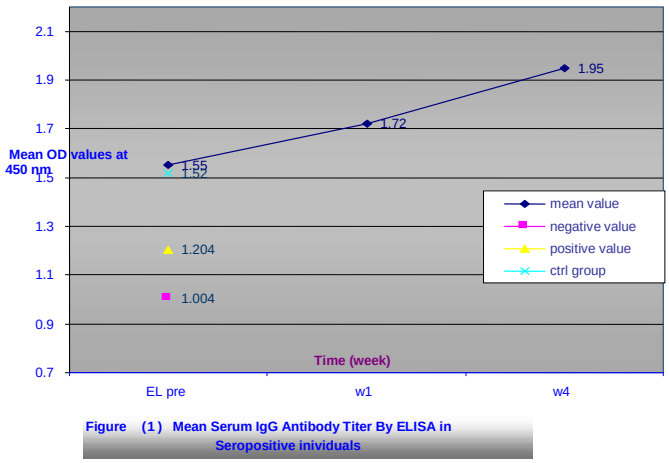

Figure (1) Mean Serum IgG Antibody Titer By ELISA in Seropositive inividuals

Data analysis showed that there was a significant difference of OD value among seropositive vaccines, which was not a matter of sampling variability. And there was a significant elevation of serum antibody in the first week, but the fourth week had very high OD readings, which may reflect an increase in the concentration of antibodies (Table 1).

Table 1: IgG levels by ELISA (OD) between prevaccination and postvaccination among seropositive individuals

Cs	Pre		Week 1		P value
sig	Mean	Variance	Mean	variance	0.04
	1.55	0.03	1.72	0.01	
	pre		Week 4		
Sig.	Mean	Variance	Mean	Variance	0.001
	1.55	0.03	1.95	0.009	
ns	Mean	Variance	Mean	Variance	0.14
	1.72	0.01	1.95	0.009	

Discussion

All studied subjects had preexisting antibody to measles prior to inoculation of vaccine, a significant changes in antibody levels was observed during first and fourth week after vaccination. However, no significant changes in antibody levels after measles vaccination using either haemagglutination inhibition (HAI) or ELISA were observed[7].

Ninety per cent of Indian children who had pre-vaccination measles antibodies showed a rise in HI antibodies[8].

Humoral immunity is not essential for recovery from MV infection but the antibody response is brisk following natural measles infection. Active B cell proliferation during the week after the onset of the rash may reflect expansion of virus specific clones since specific antibodies appear with the rash and increase to peak levels 2-3 weeks later[9], and persist for life, which may be important in preventing reinfection[10].

Our results of an in vitro study in lymphocyte culture indicated that preexisting antibody play a very important role in prevention of infection[11].

In a study conducted in South Africa, reciprocal IgG antibody titers rose at one month after vaccination, and most of the studied children had previously been exposed to measles or measles vaccine[12]. The discrepancy of the results reported by others compared to the present study may be due to the effect of ethnic group on

seroresponse. Also different predominant HLA types may limit the selection of peptides presented by antigen presenting cells and may affect response to vaccine[13,14]. HLA frequencies were found to be different among different populations[15].

For successful measles eradication vaccination campaign targeting till the age of 18 regardless of history of measles disease or vaccination status should be done in addition to routine vaccination program.

In conclusion, the available measles vaccine was safe, and at the same time effective. There was no evidence of transient suppression of humoral immune response and there was an elevation of serum antibody titer among vaccinated individuals.

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