Seroepidemiological study of mumps in Mosul

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ABSTRACT

Objectives: to evaluate the prevalence of mumps specific IgG antibodies in sera of different age groups and sexes of Mosul population.
Methods: ٤٤٠ sera of different age groups and sexes were collected and tested by ELISA test.
Results: Seropositivity against mumps virus among different age groups was ٦٨% (males ٣٦% and females ٣٢%, the difference was not significant). However, significant differences ($p< ٠.٠٥$) were seen among males and females at different age groups.
Conclusion: Seropositivity in age group ٠-٩ years which was within the introduction of MMR was the lowest. indicating that the level of immunity developed by MMR vaccine was below the herd immunity threshold.

Key words: Mumps, serological test, IgG antibodies

الخلاصة

هدف الدراسة: تقييم نسبة انتشار الاجسام المضادة نوع ج ضد فايروس النكاف في مصول الفئات العمرية المختلفة لاشخاص من مدينة الموصل.
طرق العمل: تم جمع ٤٤٠ عينة من مختلف الفئات العمرية في الموصل وتم فحصها بطريقة الاليزا.
النتائج: ايجابية المصول للفئات العمرية المختلفة كانت ٦٨% (٣٦% ذكور و ٣٢% إناث ولا يوجد بينها فروقات معنوية) بينما هنالك فروقات معنوية للفئات العمرية لكل من الذكور والإناث.
الاستنتاج: إن ايجابية الموصول لفايروس النكاف في الفئة العمرية ٠-٩ سنة والتي كانت ضمن خطة التلقيح باللقاح الثلاثي (MMR) كانت أقل ما يمكن والتي توضح أن مستوى المناعة المتولدة لهذا اللقاح كانت أدنى مستوى المناعة الثابتة .

Mumps is an acute infectious disease of children and young adults, caused by paramyxovirus, an enveloped single stranded RNA virus.[١] Mumps infection is seen in all year around and cases are accumulating during winter. In countries of tropical and subtropical zone, mumps is an infection of early childhood. The virus is transmitted by droplet or direct contact and the primary site of replication is the epithelial cells of upper respiratory tract.[٢]

Infection begins with moderate to sever prodromal stage followed by enlargement of one or more of the salivary gland (primarily parotid glands).[٣] Since the introduction of the vaccine, there has been progressive decline in the number of reported cases of mumps all over the world and the immunity induced by vaccine should last through childhood depending on the type of vaccines.[٤] The prevalence of mumps infection in population is indicated by seropositivity rates which vary in different countries.[٥] However, during the past few years there were cumulative reports on the occurrence of relatively large mumps epidemics in countries with routine immunization against the disease.[٦,٧]

The current study is designed to test the sera of population of Mosul city at different ages for mumps antibodies using ELISA test.

Materials and Methods

Sera

Venous blood (٥-١٠ ml) was collected in plane tubes from ٤٤٠ of people of both sexes attended hospitals in Mosul city during ٢٠٠٧. Sera were separated by centrifugation at ٢٠٠٠ rpm for ٢٠ minutes and stored at -٢٠ ˚C until the time of the assay. The target number of sera to be tested for each group followed the European Seroepidemiology Network guidelines.[٨]

Serological Test

Mumps specific IgG antibodies were determined using ELISA test (Abbott mumps antibodies) for quantitative measurement of specific IgG antibodies against mumps virus in human sera. ELISA test was performed according to the manufacturer instructions.

Data were analysed statistically using Wilcoxon Sank Test and Mann-Whitney Confidence Interval and Test.

RESULTS

The distribution of sera according to sex was ٢٣٢ males (٥٢.٧%) and ٢٠٨ females (٤٧.٣%) The distribution of different age groups of both sexes and seropositivity to mumps virus is shown in Table ١ and Table ٢. The percentage of seropositivity among different age groups in male was ٣٦% and females ٣٢% which is not significant. However, significant differences were seen among male at the different age groups (P< ٠.٠٥), and female at different age groups (P< ٠.٠٥). The total percentage of seropositivity in all sera tested was ٦٨% and significant difference (P< ٠.٠٥) was seen among different age groups (Table ٣).

The incidence of mumps seropositivity in the sera of different age group as measured by ELISA is shown in Figure ١. Mumps antibodies were detected in ٥٥% of the sera in the ٠-٩ age group, while in the ١٠-١٩ age group the incidence was ٥٩% and that of age group ٢٠-٢٩ was ٦٠%. However, in sera from individuals ≥٣٠ years of age, high incidence of mumps antibodies (٧٥%-٨٠%) except age group ٦٠-٦٩ years old.

Table ١: The distribution of male sera at different age groups and seropositivity to mumps virus

Age groups	No. of samples tested	% of positive
٠-٩ years	٦٠	٢٨
١٠-١٩ years	٥١	٣٥
٢٠-٢٩ years	٢٧	٣٤
٣٠-٣٩ years	١٨	٢٩
٤٠-٤٩ years	٣٠	٣٨
٥٠-٥٩ years	٢٦	٤١
٦٠-٦٩ years	٢٠	٤٧

Table ٢: The distribution of female sera at different age groups and seropositivity to mumps virus

Age groups	No. of samples tested	% of positive
٠-٩ years	٥٧	٢٧
١٠-١٩ years	٣٦	٢٤
٢٠-٢٩ years	٢٠	٢٦
٣٠-٣٩ years	٢٩	٤٦
٤٠-٤٩ years	٣٣	٤٢

٥٠-٥٩ years	٢٥	٣٩
٦٠-٦٩ years	٨	١٩

Table ٣: The distribution of total sera at different age groups and seropositivity to mumps virus.

Age groups	No. of samples tested	% of positive
٠-٩ years	١١٧	٥٥
١٠-١٩ years	٨٧	٥٩
٢٠-٢٩ years	٤٧	٦٠
٣٠-٣٩ years	٤٧	٧٥
٤٠-٤٩ years	٦٣	٨٠
٥٠-٥٩ years	٥١	٨٠
٦٠-٦٩ years	٢٨	٦٦

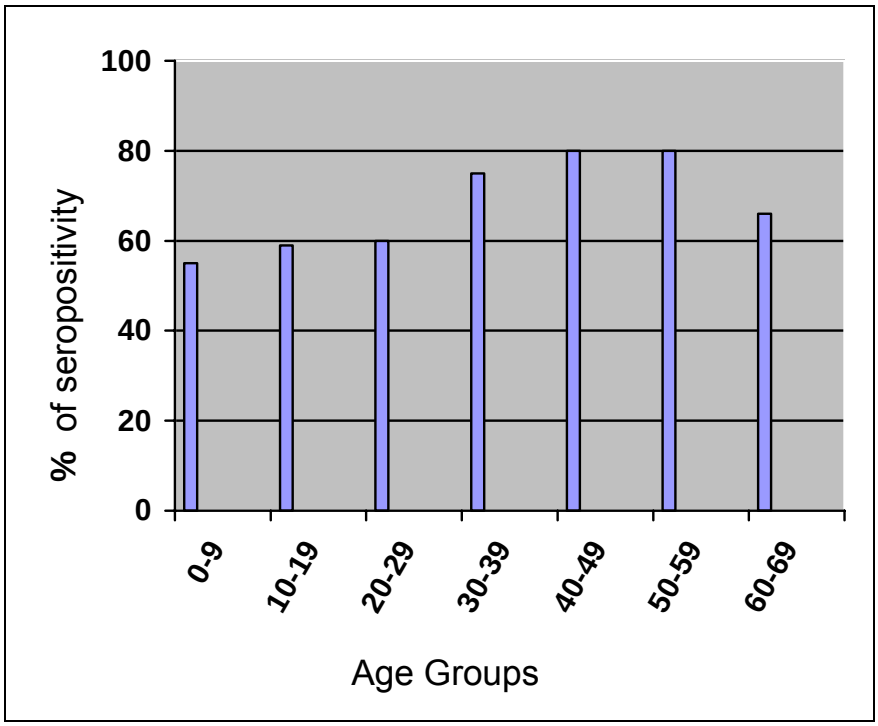

Figure ١. The incidence of mumps seropositive in age group sera from Mosul population as measured by ELISA.

Discussion

Important advances in the knowledge and understanding of infectious diseases have been made by seroepidemiological studies. Such studies will continue to be of value as changing epidemiological and social factors influencing the incidence and severity of variety of infections. Serosurveys have a valuable role in the assessment of the level of immunity to mumps following natural infection or vaccination and may lead to identification of subpopulation at an increased risk for mumps outbreak.

The current study was carried out to assess mumps antibodies in sera of people of Mosul city attending different hospitals measured by ELISA which is shown as sensitive and specific.[٩-١١]

There have been many reported surveys for mumps antibodies in different parts all over the world,[٤,٦,٧,١٢] but non in Mosul city. MMR vaccine was first introduced in Iraq in ١٩٩٦; therefore, the first age group (٠-٩ years old) was involved in the vaccination programe. The rest of groups were not vaccinated. We really do not know whether those who were vaccinated had single or two doses.

The seropositivity of vaccinated group ١ who received at least single dose was ٥٥%. which is much lower than in other countries.[١٢-١٤] This can be explained probably by low vaccination coverage to this age group or having single dose of the vaccine or failure of the vaccine to elucidate high antibody titer. Reports from Ministry of Health showed outbreaks of mumps vaccinated in young age group. Recent outbreaks have been described among two doses recipients[٦,٧,١٥].

The high incidence of seropositivity to mumps virus in other age groups (not vaccinated) probably explained by exposure to the wild type virus.[١٦]

There are different assessment regarding the protective immunity threshold for mumps ranging from ٩٠-٩٢%[١٦] and ٧٥-٨٦%[١٧]. The seropositivity in the present study for Mosul population (٦٨%) which is lower than the lower limit of the mumps protective immunity threshold range needed to prevent mumps epidemics.

Although ELISA is highly sensitive test, but recently it has been shown that ELISA had sensitivity around ٨٠% in comparison with the neutralization test.[١٨] It might also be possible that the epitopes of mumps antigen employed by the ELISA kit do not entirely recognized antibodies induced by strain of virus isolated in Iraq. Whatever the reasons are, mumps vaccination programme should be evaluated in Iraq.

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