

The ongoing outbreak of mumps affecting all age groups among Gazans, occupied Palestinian territories, 2013

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ABSTRACT

Mumps is a contagious disease occurring worldwide and affecting all age groups. There is no specific treatment for mumps. Mumps can be prevented by immunization using MMR. The study aimed to describe the epidemiology of the mumps outbreak, to identify the community factors favoring a mumps outbreak and to describe the public health actions taken and the lessons learned during the outbreak. This study was a cross sectional study including all notified cases of mumps in Gaza strip (GS) during the year 2013. During the year 2013, a total of 1891 clinically diagnosed mumps cases were reported with an overall incidence of 116/100000. The majority of cases 1181 (62.5%) were male. Age varied from one year to 83 years with a mean age of 13.7 years. 1708 (90.3%) of cases occurred among children aged 6 to 15 years who received only one dose of mumps vaccine. Geographically, the disease occurred mainly in Khan-Younes governorate (53.4%) followed by Mid-Zone governorate (28%). Different complications were reported among 133 (7%) cases. These complications were orchitis (3.5%), pancreatitis (2%) and meningitis (1.5%). Number of deaths has been reported. The MMR vaccine is effective in most individuals but it does not give a complete protection. The majority of reported cases occurred in population who received one dose of mumps vaccine reflecting insufficient seroconversion rate in this group. Introducing a second dose of mumps vaccine in the year 2009 in the expanded program of immunization (EPI) clearly improved the rate of seroconversion based on the small number of reported cases among children born after that date. In conclusion, the main cause of this outbreak was the incomplete vaccine efficacy. Vaccination coverage, waning immunity and cold chain do not have a role in this outbreak. In this situation, a national immunization campaign must be implemented and a continuation of two doses of mumps vaccine policy is recommended.

Keywords: Contagious disease, immunization, epidemiology, public health, mumps virus.

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INTRODUCTION

Mumps is a contagious disease caused by a paramyxovirus. Mumps occurs worldwide (CDC, 2014). It primarily affects the salivary glands and sometimes it is called infectious parotitis (WHO, 2014). Humans are the only known natural hosts (Medscape, 2014). Mumps incidence peaks predominantly in late winter and spring, but the disease has been reported throughout the year. The virus is acquired by respiratory droplets. In 15 to 20% of infections, cases are asymptomatic (can transmit the virus) (CDC, 2009). Approximately 40 to 50% may have only nonspecific or primarily respiratory symptoms.

Parotitis is the most common manifestation and occurs in 30 to 40% of infected persons (CDC, 2012). Reportedly 70 to 80% of symptomatic cases are bilateral with unilateral swelling occurring first (Medscape, 2014). Among the most feared complications of mumps are orchitis, oophoritis, meningitis, loss of hearing which in rare cases can be permanent, encephalitis, and pancreatitis which sometimes can be severe, and on rare occasions, fatal (CDC, 2010).

There is no specific treatment for mumps. Mumps can be prevented by immunization. Mumps vaccination has

been widely in use since the triple measles, mumps, and rubella (MMR) vaccine was introduced in the 1980s. Although the MMR vaccine appears very effective, protection against mumps is not complete and not sufficiently long lasting (waning with time) (National Network for Immunization Information, 2010). WHO recommends routine mumps vaccination as a two-dose schedule for countries that regard mumps as a public health priority in order to achieve a high level of population immunity which mean the virus does not normally circulate in the community, even at low levels, so even with reduced protection from a waning response there would be no outbreak (WHO, 2009). Sometimes catch-up vaccination campaigns may be conducted to obtain an immunization rate of 90%, the recommended population immunity required to interrupt transmission of the virus (the herd immunity threshold) (Boxall et al., 2008).

In countries where vaccination was introduced and high coverage was sustained the incidence of the disease has dropped tremendously (WHO, 2014). Among well vaccinated populations, sporadic mumps outbreaks are reported and have been attributed mainly to primary vaccine failure in individuals who received only one dose of MMR vaccine (Hindiyeh et. al., 2009). When a mumps outbreak is suspected, it should be confirmed by conducting a laboratory investigation on 5 to 10 cases only (Hindiyeh et. al., 2009). To control an outbreak of mumps, the best first-line response is to do a national mass vaccination campaign for susceptible people with an isolation of cases. Vaccination of exposed individuals does not prevent progression to infection but may prevent future infection (Health Protection Surveillance Centre, 2009).

Globally, outbreaks of mumps have continued to exist since the 1980s even in countries achieving high coverage rates with routine vaccination (Boxall et al., 2008). More recently, large outbreaks occurred in the United Kingdom from 2004 to 2005 (Savage, 2005), in the United States in 2006 (Barskey et al., 2009), and in Bavaria, Germany from August to October 2010 (Otto et al., 2010). In some of the outbreaks, cases arose even in individuals who received two doses of the MMR vaccine but the attack rate was much higher in the unvaccinated people.

In Palestine, with its two geographically distributed areas, the disease is endemic even in West Bank or Gaza Strip with an incidence varying from 2 to 10 per 100,000. According to the Palestinian schedule for immunization, MMR was mandatory introduced to the national schedule of EPI in 1985 to be given at 15 months. In 2009, a second dose of MMR vaccine was introduced for children at the age of 18 months and the first one was moved to 12 months.

Unfortunately in West bank, two outbreaks of mumps emerged during the last 20 years. The first outbreak was reported in Hebron in 1996 with an incidence of 84 per

100000 population. The second outbreak started in Nablus district at the end of the year 2003 then spread to other governorates (Tulkarem and Jenin) with a continual increase in cases until December 2005, when the incidence rate was 132 per 100,000 population. The mumps outbreak was attributed to waning immunity (secondary vaccine failure) or possible breakdowns in the public sector cold chain system due to frequent power cuts. So the Palestinian Ministry of Health decided to enact a national immunization campaign in West Bank and Gaza Strip to boost the immunity of children. The campaign was implemented in West Bank with high percentage of different adverse events. As a result, the campaign in the Gaza Strip was stopped. Since April 2013, a predictable increase of mumps cases was reported in Khan-Younes governorate. Then cases followed in Mid-Zone, Rafah, Gaza and North governorates. The Palestinian Ministry of Health declared that Gaza governorates are facing a mumps outbreak.

Aim of the study

The study aimed to describe the epidemiology of the mumps outbreak, to identify the community factors favoring a mumps outbreak, to describe the public health actions taken and to state the lessons learned.

METHODOLOGY

This study was a cross sectional study. The study population included all notified cases of mumps in Gaza Strip (GS) during the year 2013. Data was statistically analyzed using SPSS.

RESULTS

Since April 2013, a mumps outbreak which is still ongoing in Gaza Strip, began in Khan-Younes, Ma'en area. During the year 2013, a total of 1891 cases of clinically diagnosed mumps were diagnosed. The index case has not been identified. The majority of cases (62.5%) were male with a male:female ratio of 100:60. The overall mumps incidence during 2013 was 116 per 100000 population. Ages varied from one year to 83 years with a mean age of 13.7 years. About 90.3% of cases occurred among primary and secondary school students who received only one vaccine while 3.7% of cases received two doses and 6% of cases received no vaccine. Geographical distribution showed that the disease occurred mainly in Khan-Younes governorate (53.4%) followed by Mid-Zone governorate (28%). The most affected side of the body was the right side (59.7%), the left side (35.9%) and both sides (4.4%). Different complications were reported among 133 (7%) cases. These complications were orchitis (3.5%), pancreatitis (2%) and meningitis (1.5%). No death has been reported.

DISCUSSION

This is the largest outbreak of mumps seen in more than 20 years and the number of reported cases reflects the number of patients coming to the doctors or clinics. The real number of cases is surely higher. Those cases not seeking care or asymptomatic cases cannot be known. Epidemiologists investigated what happened in Gaza Strip. Was it a failure of the vaccination program? Was it a primary vaccine failure (when the vaccinated individual either does not create any specific antibodies in response to the vaccine, or produces too little)? Was it a secondary vaccine failure (when the antibody levels decline over time)? Or was there a problem with the cold chain process?

One of the possibilities for the mumps outbreak is vaccination coverage. The vaccination program in Palestine is one of the best programs worldwide (Ramlawi, 2014). The vaccination coverage with one dose of MMR vaccine among Palestinian refugees increased gradually from the time of its introduction in 1985 until 2013 where the coverage exceeded 95% (MOH, 2013). The immunization coverage of infants with the current recommended schedule has ranged between 94 and 100%. Even with high mumps vaccination coverage, mumps was still endemic in Palestine and even in neighboring countries within the EMRO/WHO region and worldwide. In this outbreak, there were some cases among children who received two doses of MMR vaccine which highlights that outbreaks can occur even in highly vaccinated populations. This in part takes us to the next possibility of the outbreak which is the question of vaccine efficacy.

The raised question is why are highly vaccinated populations having mumps outbreaks? And why young children who have been vaccinated with two-doses of MMR have been affected? Is the vaccine effective in producing sufficient antibodies? According to CDC, one dose of MMR vaccine is about 80% effective at protecting an individual against mumps (CDC, 2010); two doses are about 90 to 95% effective. With the accumulation of about 20% of children who are incompletely vaccinated each year with only one vaccine, there are still enough susceptible children to sustain transmission of the infection and to infect non-immune adolescents and adults. What is going on here in the context of the outbreaks is a number of people who have received the vaccine but are susceptible anyway because it does not give a complete protection.

One of the other possibilities is a waning immunity. The first suspicion when an outbreak of mumps started and affected all age groups including those more than 30 years of age, was that waning immunity was responsible. Several studies showed that antibodies induced with one dose of vaccine wane over time, which leads to mumps outbreaks in primary and secondary school children (Vandermeulen et al., 2009). Since widespread vaccination in the area began in 1985, if waning immunity

were a primary problem in the mumps epidemic of Gazans, older vaccinated people (born after 1985) would account for the majority of cases. In this epidemic over 90% of cases presented in people under the age of 15 years, concluding that waning immunity was not a major factor.

One other possibility for this outbreak is a failure in the cold-chain during vaccination. In Gaza, implemented measures assure the cold chain process are:

1. An electronic thermometer measures the temperature every 6 min. The apparatus gives a retrograde measure for one month and after connection to the computer, it gives the measures for the previous two years. It gives detailed information about the change of temperature, maximum and minimum readings and line curve.
2. Vaccine Vial Monitoring.
3. Expiry date.
4. Freeze Tag which is an electronic temperature measuring device. If vaccines exposed to temperatures below zero 0°C for more than 1 h, the display changes to alarm.
5. Temperature measurement with every shipment for 240 h (10 days).

With these implementations, a problem with the cold-chain process is unlikely to play a role in this outbreak.

CONCLUSION

Our study concluded that high immunization coverage could not prevent mumps outbreaks. The mumps outbreak in Gaza is a result of the incomplete percentage of protective immunity in a population where individuals only receive one MMR vaccination. Two-doses of the mumps vaccine are necessary to achieve adequate seroconversion rates in a population. Vaccination coverage, waning immunity and cold chain had only minor roles in this outbreak. Hence, the implementation of Palestinian EPI program should continue.

RECOMMENDATIONS

Though prevention of mumps outbreaks through mass double vaccinations of children under the age of two years is the best concept for the future, present outbreaks require immediate attention. To control an outbreak of Mumps, the best first-line response is to do a national mass vaccination campaign for susceptible people as soon as possible, and secondly is to isolate cases.

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