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Mumps in Varna Region (2011-2015)

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ABSTRACT

Mumps is a viral childhood infection that is vaccine-preventable. The applied routine vaccination is safe and highly effective in reducing disease incidence. The purpose of the present work is to investigate the epidemiology of mumps in Varna region from 2011 to 2015. We performed a retrospective analysis using report data of Regional Health Inspectorate – Varna for the period 2011-2015. During the specified 5-year period a decrease in incidence rate of epidemic mumps has been observed in Varna. Disease affected all age groups (124 cases in total), but the incidence rate was the highest in 5-9-year-old (37 cases) followed by the group of children of 1-4 years of age (27 cases in total). Cases have been recorded during all months of the year but peaks were registered in November (18 cases), February (17 cases) and May (17 cases). To minimize the susceptible population and to eliminate the disease, high MMR (measles-mumps-rubella) vaccine coverage must be maintained in the society.

Key words: Mumps, Epidemics, Mumps vaccine, Parotitis

Introduction

Mumps is an acute viral infection typical for children and young adults in all geographic areas of the world. Currently, it is broadly preventable by routine and safe vaccination.

Mumps virus is transmitted from person to person via airborne or droplet routes with an incubation period ranged from 14 to 25 days (Salisbury et al., 2013). It is usually a mild disease with fever, headache and swelling of the salivary glands, but some complications can occur especially among adults. The most common complications reported are meningitis which can occur in 50% of all cases and orchitis which is detected in up to 25% of post pubertal males respectively (Galazka et al., 1999). In rare cases orchitis results in sterility, while oophoritis develops in approximately 5% of female cases and does not affect fertility.

In Bulgaria routine mumps immunization has been introduced among children older than 12 months in 1972 with a live vaccination strain Sofia-6. From 1987 to 1991 the immunization was carried out at age of 13 months with a single-antigen mumps vaccination strain Leningrad-3.

Between 1992 and 2000, one dose of combined measles-mumps-rubella (MMR) vaccine that contained mumps vaccination strain Urabe AM-9 was used among children at age of 13 months. Finally, a booster dose of combined measles-mumps-rubella (MMR) vaccine that contained mumps vaccination strain Jeryl Lynn was introduced at age of 12 years in 2000. Vaccine effectiveness for this strain ranged from 73% to 91% for one dose and was 92% for two doses (Dayan and Rubin, 2008). Nowadays, Priorix is the mandatory anti-mumps vaccine in the official immunization schedule of Bulgaria.

Although obligatory, the anti-mumps immunization is not 100% effective and cases are constantly reported all around the country. Except the official notification data, relevant and actual scientific information about the recent epidemiology of mumps in region Varna is missing. Therefore, the purpose of the present work is to investigate the dynamics of mumps morbidity in Varna for the period 2011-2015 and to estimate the potential risk it poses to public health in the region.

Materials and Methods

We performed retrospective analysis (2011-2015) using notification data of Regional Health Inspectorate – Varna. EU possible, probable and confirmed case definitions considered in the number of reported cases. Corresponding incidence rates were calculated by dividing the number of cases for each year by the official estimates (National Statistical Institute, <http://www.nsi.bg/>) for the total population number. The resulted figures were multiplied by 100000 and the presented incidence rates are annual rates per 100000 inhabitants.

Results

During the analyzed period a total of 124 mumps cases and a mean 5-year incidence of 5.26 per 100000 were reported in region Varna. The analysis of data showed that from 2011 to 2015 the morbidity of mumps in region Varna steadily declined from 70 cases in 2011 (incidence of 15.05 per 100000) to 11 cases in 2015 (incidence of 2.23 per 100000) (Figure 1). However, only 5 of all registered cases were confirmed serologically by Hemagglutination inhibition test in the laboratory of Regional Health Inspectorate – Varna.

Cases have been recorded during all months of the year but the disease showed typical winter-spring seasonality with peaks registered in November (18 cases), February (17 cases) and May (17 cases) (Figure 2). The lowest incidence was observed during the summer-early autumn (June-October) – 7 cases in total for the 5-year period.

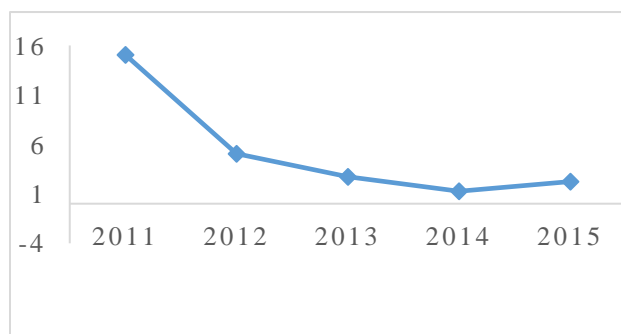


Figure 1. Incidence rate of mumps (cases per 100000 inhabitants) in region Varna for 2011-2015.

Disease affected all age groups, but the incidence rate was the highest in 5-9-year-olds (37 cases) followed by the group of children of 1-4 years of age (27 cases in total). Out of 124 persons with reported mumps, 18 (14.5%) were unvaccinated and 9 (7.3%) were under the recommended age for first dose of immunization.

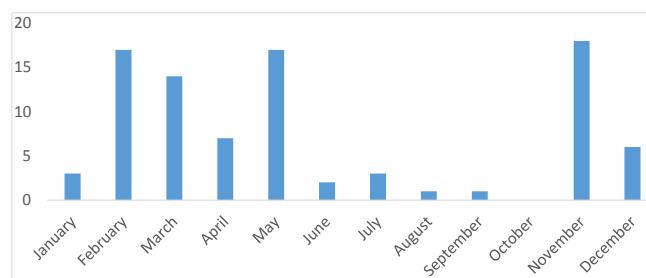


Figure 2. Seasonal distribution of mumps cases in region Varna for 2011-2015.

During the examined period number of male cases (60.5%) is bigger than the number of affected females (39.5%) (Figure 3).

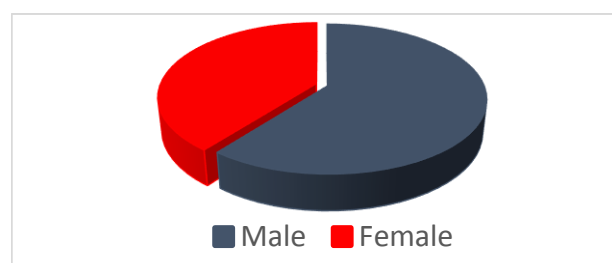


Figure 3. Sex distribution of mumps cases in region Varna for 2011-2015.

The best way to prevent mumps is the mumps vaccine administered as measles-mumps-rubella (MMR) combined preparation that prevents most but not all cases of mumps. Table 1 shows the vaccination coverage during 2011-2015 in region Varna compared to the immunization rate in whole country. The vaccination coverage among children at age of 13 months in Varna region was lower than the mean vaccination coverage in Bulgaria while the coverage with MMR2 (the booster dose at 12 years) in Varna was higher than in the whole country.

Table 1. Immunization coverage with MMR vaccine in Bulgaria and in region Varna.

| | Vaccine | | Booster dose | |
|------|---------|-------|--------------|-------|
| | Whole | Varna | Whole | Varna |
| 2011 | 94.5% | 92.7% | 93.9% | 94.5% |
| 2012 | 93.7% | 89.8% | 94.0% | 95.5% |
| 2013 | 95.1% | 92.2% | 93.5% | 95.3% |
| 2014 | 93.2% | 86.9% | 88.6% | 89.7% |
| 2015 | 91.5% | 84.3% | 86.9% | 89.5% |

Complications occurred in 11 of all cases – they were distributed as follows: in 2011 one orchitis and two pancreatitides; in 2012 – three pancreatitides; in 2013 – one pancreatitis, one meningitis and one orchitis; in 2014 – one pancreatitis; in 2015 – one not defined complication. However, no fatal mumps cases were registered for the last five years in region Varna.

Discussion

The current work shows that despite the mandatory immunization against mumps in Bulgaria, the disease is still an important factor in infectious morbidity in region Varna with a mean 5-year (2011-2015) incidence of 5.26 per 100000. The incidence rate progressively diminished with the time – more than 7-fold decrease in the frequency is detected between the beginning and the end of the studied period – a standard trend observed at both international and national scales after implementation of obligatory vaccination (Galazka *et al.*, 1999). It should be mentioned that the reported figures represent the crude incidence rate of all possible, probable and confirmed cases and the number of laboratory confirmed cases for the investigated period is only five. Typical complications were reported in 11 cases, which indicated that some of the probable cases were missed in the serological diagnosis.

Disease affected all age groups, but children under 9 years were most vulnerable. This is in accordance with majority of authors who consider the age group of 5-9 year olds the most affected before the introduction of mumps vaccine (Takla *et al.*, 2014). In addition, the lowest seroprevalence rates in Bulgaria (40%) were detected among children 1-4 year-olds and the highest one (75.1%) was among 15-19 year-olds. There is no evidence for the level of antibodies which should be considered protective, but it does seem that high levels of circulating mumps antibodies are important in protective against outbreak (Eriksen *et al.*, 2013).

Regarding the gender distribution male cases predominated over female cases – a previously reported tendency in Eastern Europe (Kuzmanovska *et al.*, 2010).

According to Centers for Disease and Prevention two doses of measles-mumps-rubella (MMR) combined vaccine are 88% effective in preventing mumps while one dose is 78% effective (Centers for Disease Control and Prevention, 2015). The vaccination coverage among 13 month-old children in Varna region was comparable but however lower than the mean vaccination coverage in Bulgaria, which is a possible reason for higher morbidity among children aged 5 to 9 years.

The results of our study confirm that high vaccine coverage may not suffice to prevent mumps cases but infection of vaccinated individuals may manifest as mild disease without complications. To minimize the susceptible population and to eliminate the disease, high MMR (measles-mumps-rubella) vaccine coverage must be maintained in the population.

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