RESEARCH ARTICLE

The Course of the Epidemic process of measles on the territory of the republic of Kazakhstan

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ABSTRACT

The article conducts a retrospective epidemiological analysis of long-term and annual dynamics of the incidence of measles of the population of the Republic of Kazakhstan for the period 1993-2015 years. The "average annual rate of decline/increase" and predicted (theoretical) incidence of measles in 2016 are calculated. The prediction method that was based on finding analytical expressions of the trend to determine the level of incidence of measles for the next year is used. Analysis of monthly incidence of measles identified winter-spring seasonality. The increasing of incidence was observed from mid January to April. Analysis of cases of the measles on the territory, cases at 2-week intervals in 2015was made. The average lengths of hospital stay of patients.

Keywords: measles, incidence, retrospective epidemiological analysis.

INTRODUCTION

A serious problem for society is the disease of measles among children and adults. Measles is recorded in different regions of the country with varying degrees of intensity. People, that were not vaccinated and are without a history of this disease, are the main victims for the disease. Currently, the disease remains an infection with high epidemiological, social and economic significance. According to WHO annually at least 40 million children become infected with measles, and less than 10% of them are registered. Serious complications of the measles are pneumonia, encephalitis and meningoencephalitis. More severe forms of measles infect older people.

There is still no clear understanding of the epidemic process of measles in the period of eliminations and other recent changes in its course. Therefore, the tasks that are associated with the development and implementation of measures in practice aimed at reducing the incidence of measles by achieving and maintaining the processes of elimination of endemic measles are relevant and timely [1-5].

The aim of this work was to study the manifestations of the epidemic process of measles of the population of the Republic of Kazakhstan.

Materials and methods of researching

A retrospective analysis of the incidence of measles with the use of accounting and reporting documentation was performed: "Report on separate infectious and parasitic diseases" form # 1 and form # 2. Retrospective epidemiological analysis: a study of long-term dynamics of incidence for the years 1993-2015, structure, levels, trends and forecast for the near future; the annual frequency, according to epidemiological indications – areas of risk. Data analysis was performed using programs MS Excel.

THE RESULTS OF THE STUDY AND THEIR DISCUSSION

Intensive analysis of incidence in long-term dynamics of measles in the Republic of Kazakhstan for 1993 and 2015 is shown in figure 1. Maximal indicator of the incidence during the period of observation was registered in 2005 - 106.4 per 100 thousand populations; in 2009 there was not a case of the disease. However, there is an increase of incidence rates in 1993, 1994, 1998, 1999, 2004, 2014 and 2015, when the rates per 100 000 population was 19, 5; 10, 7; 12, 4; 9, 31; 14, 68; 1, 86 and 13.3.

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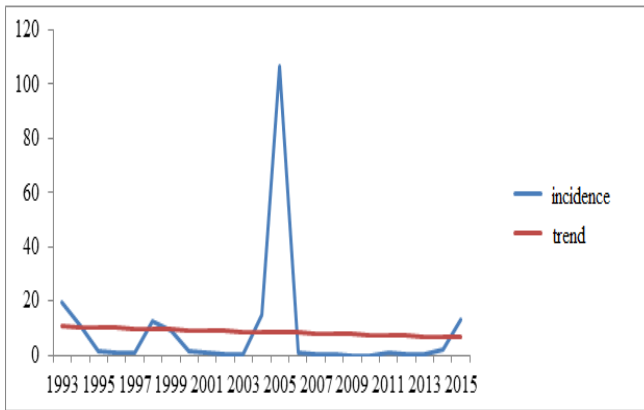
Fig1 - long-term dynamics of measles in the Republic of Kazakhstan for 1993 and 2015

For maintaining of collective population immunity, annually maintenance of the coverage of children with vaccination against measles with two doses at the level of 95-98%is required. According to the literature [4] the rise of vaccination and re-vaccination against measles increased to 99-100% since 1996. It should be noted that in 1995, when the percentage of coverage with two doses of LMV(live measles vaccine) in the Republic was very low and 84.7%, the incidence of measles in the population later in 1996 and 1997 was also low - 0,77-0,76 per 100 thousand population. During this period, a certain number of not immune to measles population was accumulated and, in the subsequent 1998-1999 the country had a measles epidemic with low intensity. The indicators of incidence were 12.4-9,31per 100 000 of the population. Since 1997, the percentage of vaccination coverage against measles LMV of children, teenagers, and students began to rise till 95% and above. However, rises of the incidence of measles in the country continued to be registered. From 2000 till 2002interepidemical period of measles was noted. The percentage of measles vaccination coverage and the first and second doses of LMV reached quite high rates 96-100%. In 2003 in the Republic there have been 24 cases of measles that conducted 0.16 per 100 thousand of population as against 18 cases with a rate of 0.12 per 100 thousand populations in 2002. The intensity of the epidemic process is marked by a large rise in the incidence of measles since 2004.These manifestations of epidemic process were associated with the quality of vaccination against measles in the country and with a low percentage of measles vaccination coverage in the decreed groups of the population. From September 2004 to May 2005, the country

registered a measles epidemic severe intensity. Since 2006, after national immunization campaign (NIC), among the population there is a decrease of incidence of measles until the end of 2013. Later in 2014-2015 a measles epidemic with indicators of the intensity at the peak was recorded in 2015 - 13.3 per 100 thousand population. This is explained with the decrease in vaccination coverage against measles, vaccine refusal of decreed groups of the population that led to the increasing of immune segment of the population and, as consequence, to the decreasing of collective immunity. Using the method of least squares, theoretical level of incidence from 1993 till 2015 was calculated. For quantifying of long-term trends of incidence "the average annual rate of decline/increase" was calculated. The average annual rate of decline of incidence was Tch= -2, 2% and is estimated from the gradation of V. D. Belyakov as a moderate rate of decline. In addition to evaluating the direction and a moderate rate of decline, there are little cyclical fluctuations that characterize peculiarities of the epidemic process of measles. In this case, the epidemic process of measles has traits of uncontrolled infection and is characterized, in particular, by periodic rising and downs in some years. However, the incidence of measles depends entirely on the percentage of vaccination coverage of 95% and above, from the organization and carrying out of the vaccination business in the regions, the quality of the vaccine, compliance with the rules of transportation, storage, vaccination techniques, preparedness of people responsible for carrying out vaccinations and many other factors. Dynamics of the incidence Trends in between 1993 and 2015 had a slight wave-like (circular) nature in separate years, the epidemic rise of incidence, the duration of which was 3, 4 and 8 years was observed. Estimating the obtained data we can say: if marked for the previous period trend will remain by 2016, the incidence can take any value in the range of 26.8% to -0.9 000% 000 in the forecast year. Predicted (theoretical) incidence of measles in 2016 will be 6.3 per 100 000 population. However, we used prediction method based on finding analytical expressions of the trend for measles in the next year. Using this method, the ability to detect the predicted incidence of measles by 2016 was failed. In connection with the irregular course of the epidemic process, when it was flare of the incidence of measles on the territory of the Republic of Kazakhstan in 2004-

2005 and 2014-2015, where the incidence was (of 14.68 and 106.4 per 100 thousand population of 1.86 and 13.3) high incidence rates in 2005 - 106.4 per 100 000 population didn't make possible to determine the predicted incidence rate for the next period by this technique. Analysis of measles cases in the population of the Republic of Kazakhstan (RK) in 2015 shows that most cases were recorded in the first half of the year, from January to August. The maximum number of cases were registered in January – 12, in February - 18 and in March – 41. In July and from September till December there was not registration of cases (fig-2).

Fig 2: Monthly distribution of incidence of measles in the period of outbreak among the population of the Republic in 2015

Analysis of monthly incidence of measles identified winter-spring seasonality. The increased incidence is observed from mid January till April. The peak is recorded in March and amounted to 11.8 per 100 000 population. In accordance with picture 2, the highest incidence rates are recorded in January - 3.4 per 100 000 population, in February - 5.2, in March - 11.8, in April to 2.6. The duration of the recovery period was 4 months. The low incidence is recorded in May – 0, 7, June and August - 0.6 per 100 000 population. The average annual incidence rate in 2015 was 25.1 per 100,000 populations. Analysis of cases on the territory found that 63 (72,4%) cases were registered in the city, 24 (27.6%) in rural areas. Analysis of measles cases at 2-week intervals in 2015 is reflected on the Figure 3.

Fig 3: Reported cases of measles in the period of the outbreak for weeks among the population of the Republic (a 2-week interval) in 2015

Figure 3 shows that most cases were recorded, starting since 14.01.15 till 31.01.15 – 12 (13,8%), since 01.02.15 till 14.02.15 – 10 (11,5%), since15.02.15 till 28.02.15 – 8 (9,2%), since 01.03.15 till 14.03.15 – 16 (18.4%), since 15.03.15 till 31.03.15 – 25 (28,7%), since 01.04.15 till 14.04.15 – 8 (9,2%) cases.

The average duration of patient hospitalization was 8.9 days. The average length of time between date of illness and date of medical care was 4, 1 day.

CONCLUSIONS

The dynamics of measles in the Republic of Kazakhstan is characterized by a downward trend and long-term cyclical course of the epidemic process. The average annual rate of decline in incidence was Tch= -2,2% and is estimated from the gradation of V. D. Belyakov as a moderate rate of decline. Dynamics of incidence in 1993 – 2015 had a slight wave-like (circular) nature in separate years, the epidemic rise of incidence, the duration of which was 3, 4 and 8 years was observed.

Analysis of monthly incidence of measles identified winter-spring seasonality. High incidence rates are recorded from January to April months.

The average annual incidence rate in 2015 was 25.1 per 100,000 populations. Analysis of cases on the territory found that 63 (72, 4%) cases were registered in the city, 24 (27.6 per cent) in rural areas.

Analysis of measles cases weekly intervals in 2015 showed that most of the measles cases were from the 4th to the 7th weeks and from the 10th to the 14th weeks, that coincides with the seasonal

rise of the incidence of measles during the outbreak.

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