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VACCINE PROPHYLAXIS AS THE KEY TO SUCCESS AGAINST POLIOMIELYTIS

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Abstract. *Poliomyelitis (lat. acute anterior poliomyelitis, Henne-Medin's disease) is an acute infectious disease caused by Poliovirus (types 1, 2 and 3). The disease most often occurs in childhood, either individually or in epidemics. The routes of transmission of the infection are the oral-fecal route. The infection can occur without any symptoms or as a general infection, such as meningitis or paralysis. The clinical picture of the disease shows the appearance of several stages: the pre-lytic stage, the paralysis stage and the recovery stage. The fastest way to confirm the diagnosis is to prove viral RNA by PCR in stool, blood or cerebrospinal fluid. There are also serological neutralization tests. During the acute phase, symptomatic and supportive therapy is carried out, and after the acute phase, active physical therapy and rehabilitation are carried out in more severe forms of the disease. Today, this disease is very rare, thanks to systemic active immunization. Primary immunization against poliomyelits (polio) is in the first year of life with three doses of pentavalent Pentaxim vaccine, six weeks apart, and revaccinations are carried out according to the mandatory vaccination calendar in the second, seventh and fourteenth years of life. The vaccine given in multiple doses provides protection throughout life.* ***The aim*** *of this paper is to compare the results of successfully implemented vaccine prophylaxis at the level of primary health care for the territory of the Pomoravlje District in Serbia in the period from 2008-2012.* ***Results and discussion.*** *Based on the Report on Immunization against Poliomyelitis in the Pomoravlje District in the period 01.01.2011 - 31.12.2011, it was noted that by far the largest number of persons vaccinated with the OPV vaccine was in the municipalities of Despotovac, Paracin, Rekovac and Svilajnac, where the percentage of those vaccinated was 100%. Based on the data, it can be seen that the smallest response of children was in the territory of the municipality of Cuprija (81.36%). Statistical data processing in the SPSS Statistics 20 showed that the third revaccination carried out at the age of 14 has a statistical significance of $p<0.05$, $\chi 2=14.02$ at the level of the city of Despotovac for the calendar year 2012. compared to the five-year period from 2008-2012.* ***Conclusion.*** *Based on the statistically processed results, a high level of coverage and high success rate of the implemented vaccination for the five-year period from 2008-2012 was observed for the territory of the Pomoravlje District. The key to success in the fight against infectious diseases is reflected in the implementation of mandatory immunizations according to the vaccination calendar prescribed by each country and is considered one of the best ways to reduce morbidity, eliminate, even eradicate infectious diseases.*

Keywords: *poliomyelitis, vaccination calendar, immunization, Pomoravlje District*

1. INTRODUCTION

Poliomyelitis (lat. *Poliomyelitis epidemica anterior acuta*) is an acute infectious disease caused by polioviruses type 1, 2 or 3, which belong to the group of enteroviruses of the *Picorna* virus family. The disease is characteristic of children between the ages of 3 and 8, so poliomyelitis is referred to differently under the name "infantile paralysis".

Poliomyelitis is most often transmitted through the fecal-oral route, although the possibility of transmission through droplets is not excluded. It occurs most often during the summer months. Polioviruses enter the body orally (contaminated food or water) [1], after which they are localized on the mucous membrane of the oropharynx and ileum. It is believed that poliovirus infects epithelial cells in the mucosa of the gastrointestinal tract after ingestion and then spreads and multiplies in the submucosal lymphatic tissue of the tonsils and Pajero's plates [2]. In the majority of infected diseases, it ends in this, so-called. alimentary phase.

During the clinical manifestation of the infection, three phases of the disease can be distinguished. The first stage of the disease is related to the digestive system because the primary localization of the virus is on the epithelium of the oropharynx, small intestine and mesenteric lymph glands, from where the virus enters the blood. When the causative agent enters the bloodstream, the phase of viremia and hematogenous dissemination of the virus to the organs of the reticuloendothelial system (liver, spleen, bone marrow) occurs. The disease most often ends in the digestive phase, when it proceeds as a "small disease", in the form of a flu infection or summer diarrhea. Even more often, the infection goes unnoticed. In the viremia phase, signs of serous meningitis may appear, but it can also go unnoticed [3].

There are other theories about the spread of the virus to the CNS. According to Sabin [4, 5], the virus reaches the regional nerve ganglia through the blood,

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and from there neurotropically to the CNS. According to Bodian, the virus reaches the soft brain cells and choroid plexus through the blood, and then into the cerebrospinal fluid and into the anterior horns of the spinal cord and other parts of the CNS. The main changes are found in the anterior horns of the spinal cord. Microscopically, infiltration can be observed in the vicinity of ganglion cells, and inside the cell itself, chromatolysis and degeneration of the nucleus. Degenerative changes, i.e. damage to neurons, represent primary lesions, and the inflammatory reaction occurs secondarily.

The diagnosis of the disease can be established on the basis of a detailed anamnesis, clinical picture, laboratory tests and epidemiological situation. The disease can be confirmed by isolating the virus from the oropharynx or feces, but the absolute confirmation of poliomyelitis is based on the increase in the titer of neutralizing antibodies in the acute and convalescent phases of the disease. The test is performed on all three types of polioviruses and the dynamics of the antibody titer speaks in favor of an acute infection. A fast, more sensitive and specific method for identifying specific viral RNA is the method of chain polymerization (PCR).

Isolation of poliovirus from cerebrospinal fluid (or brain and spinal cord at autopsy) is important for distinguishing wild from vaccine strains of poliovirus (post-vaccinal poliomyelitis), especially in settings where the incidence of poliomyelitis is low.

Treatment of poliomyelitis is symptomatic. Patients with non-paralytic forms of the disease should rest in bed for several days, with the use of analgesics and antipyretics [6]. In the case of paralytic forms of the disease [7], it is necessary to rest strictly in a bed with a hard surface and to place the removed limbs in the appropriate physiological position in order to prevent the occurrence of contractures. Passive physical therapy should be started when the progression of the paralysis stops and the patient's pain is alleviated.

In the middle of the last century, in a relatively short time, several polio vaccines appeared. Two, named after their discoverers, Salk's dead (inactivated polio vaccine or IPV) [8, 9] and Sejbin's live vaccine (oral polio vaccine or OPV) stood out for their quality [10]. The effect was extraordinary. The annual number of patients in the USA in the early 50s was measured in the tens of thousands, and soon after the introduction of mass vaccination [11, 12], it was reduced to a few hundred, and then the disease in that country was completely eliminated (the virus circulation cycle was stopped until 1979).

2. The Aim and Tasks of the Research Work

The aim of this research work is to examine whether mandatory systemic immunization (vaccination and revaccination) against polio is applied according to the vaccination calendar at the level of primary (Health Centers) health care for the territory of the Pomoravlje District in Serbia in the period from 2008-2012.

3. Methodology of the Research Work

A descriptive study was applied in this research paper. Previous annual reports on the immunization of children against polio in the territory of the Pomoravlje District were retrospectively analyzed. A special database was created for data entry in the time interval from 2008-2012. years. The data were calculated in the SPSS Statistics 20 software package. The data were presented graphically.

4. Results and Discussion

Poliomyelitis existed as an endemic disease for thousands of years and did not attract much attention until the 1880s when epidemics broke out in Europe and then North America. In 1988, the World Health Organization set itself a huge task related to the global eradication of paralytic poliomyelitis by the year 2000 [13, 14]. Great success was recorded in the countries of Western Europe thanks to preventive health care, which was based on the implementation of mass vaccination of children of a certain age according to the mandatory vaccination calendar. All children under the age of five were administered oral vaccines of the live attenuated strain against polio. One of the ideal measures was to improve surveillance and target populations and geographic areas where poliovirus transmission is high and significant.

Both OPV and IPV vaccines are still used today, as each has its own advantages [15]. The good points of OPV are that it is cheap, does not require unpleasant pricking and, most importantly, it mimics the natural route of infection. This means, on the one hand, that resistance is created at the level of the intestine, thus preventing the circulation of the "wild" poliovirus in the population. On the other hand, by excreting the vaccine strain from the body, it suppresses the "wild" strain, reaches susceptible people, and they involuntarily infect and become resistant [16]. The downside of OPV is that sometimes, although extremely rarely (the risk is less than one in a million), it can lead to paralysis. The main advantage of IPV rests on this disadvantage of OPV.

Infants receive the first dose of the IPV vaccine at the age of two months, and the third by the end of the sixth month. The interval between doses must not be shorter than four weeks. The first revaccination follows a year later, at the age of 18 months, the second (IPV or OPV) before starting school, and the third (also IPV or OPV) at the end of eight years of schooling [17]. In practice, IPV is given as part of the pentavalent vaccine. OPV is not used in pregnancy or in immunocompromised persons.

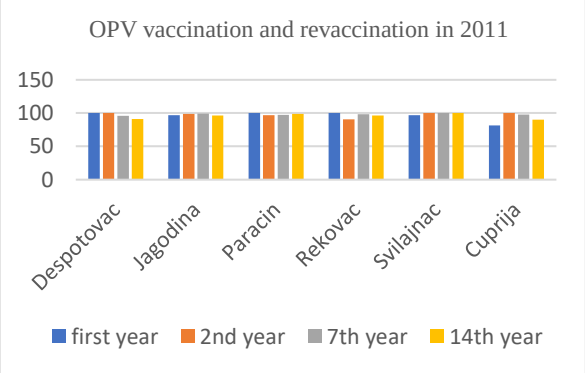

Figure 1. Graphic representation of immunization against poliomyelitis on the territory of the Pomoravlje District in the period 01.01.2011 - 31.12.2011.

Based on the Report on Immunization against Poliomyelitis in the Pomoravlje District in the period 01.01.2011 - 31.12.2011, it was noted that by far the largest number of persons vaccinated with the OPV vaccine was in the municipalities of Despotovac, Paracin, Rekovac and Svilajnac, where the percentage of those vaccinated was 100%. Based on the data, it can be seen that the smallest response of children was in the territory of the municipality of Cuprija (81.36%).

Immunization with OPV in the second year of life on the territory of the Pomoravlje District for the calendar year 2011 was successfully carried out (98.36%) in relation to the total number of children planned for vaccination, which was 1764 children. The best response for revaccination in the second year of life is in the cities of Despotovac, Svilajnac and Cuprija (100%), and the lowest response in the territory of the municipality of Rekovac (90.77%).

Revaccination of children with OPV at the age of 7 was fully carried out in the territory of the municipality of Svilajnac (100%), while the lowest response was in the municipality of Despotovac (95.95%) in the territory of the Pomoravlje District. However, bearing in mind that successfully carried out vaccination is considered coverage in the territory of one municipality if it is higher than 95% in relation to the number planned for revaccination, it can be concluded that revaccination in the 7th year of life for the calendar year 2011 was successfully implemented in the municipality of Despotovac, and also in the territory of the entire Pomoravlje District (98.36%).

Looking at the results of the revaccination carried out in the 14th year of life for the calendar year 2011, it can be seen that the highest percentage of successfully carried out revaccination in relation to the number planned for the specified calendar year was achieved at the level of the city of Svilajnac (100%), while the lowest response of children was on the territory of the municipality of Cuprija (90.20%).

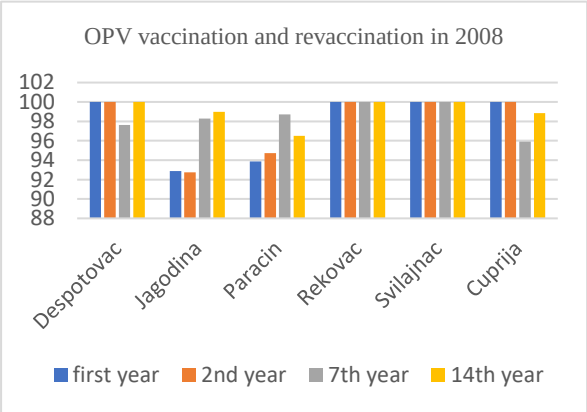

Figure 2. Graphic representation of immunization against poliomyelits on the territory of the Pomoravlje District in the period 01.01.2008 - 31.12.2008.

Statistical data processing in the SPSS Statistics 20 showed that the third revaccination carried out at the age of 14 has a statistical significance of $p<0.05$, $\chi 2=14.02$ at the level of the city of Despotovac for the calendar year 2012. compared to the five-year period from 2008-2012.

The lack of confidence in immunization against poliomyelitis and other infectious diseases has led to the disruption of routine and legally mandated immunizations implemented in all WHO member countries. That is why an adequate immunization policy was designed through public education programs through the media and posters, all with the aim of making positive decisions about childhood immunization. In many developed countries, thanks to the positive attitudes of society towards immunization and the commitment to achieve safe immunization coverage, conditions were created for poliomyelitis to be eliminated [18].

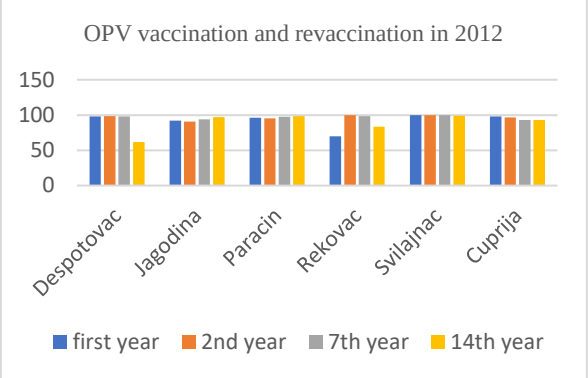

Figure 3. Graphic representation of immunization against poliomyelitis on the territory of the Pomoravlje District in the period 01.01.2012 - 31.12.2012.

Also, there are annual reports at the level of some countries that confirm such claims. That is why continuous education of both medical staff in health institutions and the entire population about the obligation of regular and timely implementation of primary health care in the prevention of many infectious diseases is very important [19]. Achieving the common goal is the complete eradication of the most severe forms of paralytic poliomyelitis. Epidemiological data obtained in this study also indicate that we are on the right track.

5. Conclusion

Based on the statistically processed results, a high level of coverage and high success rate of the implemented vaccination for the five-year period from 2008-2012 was observed for the territory of the Pomoravlje District. All this is with the aim of reducing morbidity and mortality from the mentioned disease, because vaccine prophylaxis is the best way to eliminate or eradicate poliomyelitis.

The perception of parents is extremely important in the assessment of knowledge about vaccines and vaccination against poliomyelitis, their active participation in the activities of additional immunization against poliomyelitis. Solutions resulting from effective public education programs can help parents in making decisions that are in the interest of their children's health, as well as the health of the wider social community.

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