

HEALTH EDUCATION OF THE POPULATION ABOUT THE PREVENTION POSSIBILITIES OF HPV INFECTION

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Abstract. Introduction. Human papillomaviruses (Human Papillomavirus-HPV) are DNA viruses, belonging to the family Papillomaviridae, genus Papillomavirus. It is estimated that at least 80%-100% of people between the ages of 18-25 come into contact with this virus during sexual contact, while only about 30% of people develop symptoms of infection. Chronic HPV infection increases the risk of cervical cancer by 65 times, and in the case of oncogenic "high-risk" types by 130 times (HPV 16, HPV 18, HPV 31, HPV 35), namely cancer of the cervix, vulva and vagina in women, genital organs in men, as well as throat and anus cancer in both sexes. CIN within the framework of HPV infection and pathogenesis can be viewed as a productive infection (replicative) that is most often transient and spontaneously regresses (viral phase) and transformational with the development of dysplasia in a smaller number of HPV-infection-related lesions (neoplastic phase). As a preventive measure, there are vaccines against HPV (Gardasil, Gardasil 9 and Cervarix), which are not mandatory according to the vaccination calendar and contribute to preventing the development of HPV infection, and are particularly effective in the fight against HPV types 16 and 18, which in most cases cause cervical cancer. **The aim** of this work is to compare the obtained data on the optional Gardasil 9 vaccination carried out on the territory of Pomoravlje and Pcinja districts in Serbia in the year 2022. **Methodology of the research work.** A descriptive study was applied in this research paper. A special database was created for data entry in the time interval in year 2022. The data were calculated in the SPSS Statistics 20 software package. The data were presented graphically. **Results and discussion.** Based on statistically processed data, it can be seen that in the south of Serbia, out of the total number of distributed vaccines, which was 253 vaccines for the Pcinja district, 86 vaccines (33.99%) were administered. Comparing the data with the Pomoravlje district, there is a significant difference in the number of distributed (769) and the number of applied vaccines (408), which indicates that 53.06% of the distributed doses were applied for the period from June 2022 by the end of the same year. Statistical processing of the obtained data showed that the Gardasil 9 vaccination with the first and second doses of the vaccine in persons older than 9 years and persons older than 15 years was best carried out in 2022 in the Pomoravlje District in the cities of Jagodina (59.41%) and Svilajnac (54.02%), and the smallest in the cities of Rekovac (35, 71%) and Cuprija (40.35%). While the least was implemented in the territory of the Pcinja District in 2022 were in the cities: Bosilegrad, Presevo and Trgoviste based on distributed doses and remaining unused vaccines (stock). The highest response for optional free vaccination was in the cities of Surdulica (66.675%), Bujanovac (39.58%) and Vranje (36.36%) in Pcinja District. **Conclusion.** By comparing the statistical data, it can be concluded that the success rate of vaccination is significantly higher in central Serbia, in the territory of the Pomoravlje District (53.06%), than in the south of Serbia, in the territory of the Pcinja District (33.99%). Through educational lectures on vaccination against HPVirus, children, adults and the entire population acquire positive attitudes about prevention as one of the most effective methods in suppressing and spreading the said disease.

Keywords: HPV infection, cervical cancer, vaccine prophylaxis, education

1. INTRODUCTION

Papillomaviruses belong to the *Papillomaviridae* family. These are specific viruses that cause infections of the epithelium of the skin and mucous membranes in humans (*Human papilloma viruses-HPV*) and animals especially according to the epithelium of the skin and mucous membrane. Based on the nucleotide sequence of the genome, which consists of double-stranded circular DNA, HPVs are divided into 5 genera, of which *alpha-* and *beta-papillomaviruses* are important for human medicine and pathology [1].

Due to the proven and confirmed ability of certain types of viruses from this group to have a high oncogenic potential, HPVs are divided into high- and low-risk HPV types [2]. If it is a low-risk type, genital warts (condylomata acuminata) appear which are contagious and transmitted through sexual intercourse. A high-risk type of virus is dangerous due to the occurrence of abnormalities of the epithelium of the cervix (cervical dysplasia). The WHO reported that human papillomavirus is the second leading cause of death from cervical cancer in women [3].

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In the early 70s, with the development of molecular biology, molecular research on this virus began. More than 150 genetically distinct types of HPV have been identified, and approximately 40 of them infect the lower genital tract. High-risk genotypes (16, 18, 31, 33, 35, 39, 45, 51, 56, 58, 59, 68) have a tendency to persist and integrate into the human genome, while low-risk genotypes (6, 11, 42, 43, 44, 54, 61, 70) have a low oncogenic potential. The infection is transmitted by direct or indirect contact. In the majority of cases, HPV infection is acute, that is, the virus is completely eliminated from the body, usually after 8 to 12 months after infection [4]. In a smaller number of cases, viral DNA can be incorporated into the genome of infected cells. Long-term HPV persistence is thought to lead to progression to invasive cancer [5].

Demonstration of HPV DNA (so-called Screening) has diagnostic significance, while genotyping has great prognostic and therapeutic significance, as it enables the recognition of whether patients are at high or low risk for the development of cancer. Nucleic acid is proven by swab samples and tissue samples obtained by biopsy or surgical removal. Due to the high specificity and sensitivity, the most commonly used techniques are target amplification, PCR and Real-time PCR, but also the technique of hybrid capture, reverse hybridization, etc. [6].

Therapy includes the use of antiproliferative drugs, DNA synthesis inhibitors, cryotherapy and surgical removal of lesions. Cryosurgery, electrosurgical knife therapy, excision and laser vaporization are the most commonly used today, which is the most perfect therapy today.

Three vaccines have been approved by the FDA to prevent human papillomavirus infections: Gardasil, Gardasil 9, and Cervarix [7, 8]. All three vaccines prevent infection with high-risk HPV types 16 and 18, which cause about 70% of cervical malignancies [9].

2. THE AIM AND TASKS OF THE RESEARCH WORK

The aim of this paper is to compare the obtained data on the non-compulsory immunization with the Gardasil 9 vaccine in the territory of Pomoravlje and Pcinja Districts in Serbia in the year 2022.

3. METHODOLOGY OF THE RESEARCH WORK

A descriptive study was applied in this research paper. A special database was created for data entry in the time interval in year 2022. The data were calculated in the SPSS Statistics 20 software package. The data were presented graphically.

4. RESULTS AND DISCUSSION

Genital HPV infection is one of the most common sexually transmitted infections in the world [10]. Infection with one or more HPV types during life is in 75% of the sexually active population and this happens at an early age, in the period of 15-25 years of age.

Genital warts are manifested as pointed or flat, flat, buried, pigmented single or more often multiple. Condyloma acuminatum are pink or brown nodules of various sizes and shapes present on the genitals and can usually be seen in the perianal area, on the vagina, lips and vulva [11], but can also be found on the penis, the skin of the lower abdomen or thighs. Flat warts (condylomaplana) typically appear on the cervix. A colonoscopy with a Pap test (PAP) as part of a gynecological examination is necessary for their identification and aims at early detection of precancerous and cancerous changes in the cells of the cervix [12].

Gardasil prevents type 6 and type 11 infections, which cause genital warts. The Gardasil 4 vaccine is called a quadrivalent vaccine because it protects against four types of HPV – 6, 11, 16 and 18. The newest vaccine, Gardasil 9 (nine-valent), protects against 5 more types of HPV. In addition to non-infectious particles, they may also contain histidine, polysorbate 80, and aluminum salts [13].

Immunity in persons vaccinated with the Gardasil vaccine lasts for 8 years, and in persons vaccinated with the Cervarix vaccine for 9 years [14]. All three vaccines are given in three doses, intramuscularly, over six months. But studies have shown that people who have received three doses of the vaccine have the same level of protection as people who have received two doses of the vaccine [15].

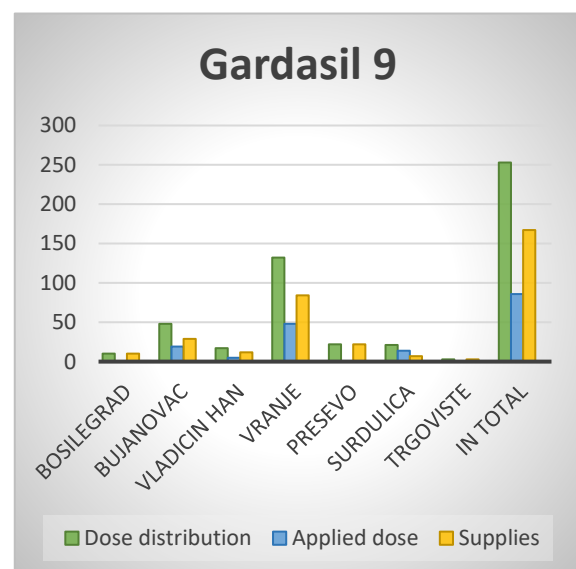


Figure 1. Comparison of the total number of applied doses of Gardasil 9 vaccines in 2022 in the Pcinja District

Based on the Law on the Protection of the Population from Infectious Diseases, the Rulebook on Immunization and Method of Protection with Medicines and the Rulebook on the Program of Mandatory and Recommended Immunization of the Population against Communicable Diseases, immunization with the nine-valent Gardasil vaccine is recommended for children over the age of nine, before the first sexual intercourse, and primarily to children of the seventh grade of elementary schools during the

implementation of systematic examinations. For children aged 9-14, the Gardasil vaccine is given in two doses six months apart. For those aged 15 and older, it is administered in three doses: the first dose upon admission, the second after two months, and the third after six months. After the distribution of a certain number of vaccines, mass immunization against HPV began to be implemented, for the first time in our country, from June 2022. From the figure 1, it can be seen that in the south of Serbia, out of the total number of distributed vaccines, which amounted to 253 vaccines for the Peinja District, 86 vaccines (33.99%) were applied, which is less than 50% in relation to the number of distributed doses. Comparing the data with the Pomoravlje District, there is a significant difference in the number of distributed (769) and the number of applied vaccines (408), which indicates that more than 50%, more precisely 53.06% of the distributed doses were applied for the period from June 2022 by the end of the same year. The remaining stocks are 361 vaccines in the territory of the Pomoravlje District. So, it can be concluded that the success rate of vaccination is significantly higher in central Serbia, in the territory of the Pomoravlje District (53.06%), than in the south of Serbia, in the territory of the Peinja District (33.99%). The highest response for optional free vaccination against HPV for the Pomoravlje District in 2022 was in the cities of Jagodina (59.41%), Svilajnac (54.02%) and Paracin (48.39%), and the lowest in the cities of Rekovac (35.71%) and Cuprija (40.35%). For the Peinja District, the lowest response for vaccination in 2022 was in the cities of Presevo, Bosilegrad and Trgoviste, 100%, i.e. none of the required doses of vaccines were administered. The highest response for optional free vaccination was in the cities of Surdulica (66.675%), Bujanovac (39.58%) and Vranje (36.36%). Taking into account the great effectiveness of the vaccine in the fight against HPV with high oncogenic potential, it is recommended that more attention and effort should be devoted to health education of the population at the level of primary health care. This should be carried out in the form of organized lectures (education) in both primary and secondary schools with a multidisciplinary approach of all health workers, both medical and pharmaceutical. In this way, health education of the population and a certain higher level of health culture of the population about the danger of HPV infection and possible complications that can cause a high mortality rate, especially when it comes to cervical cancer, would be carried out. Timely and timely protection of the entire population from HPV infection is of great importance not only for the individual, but also for the wider social community.

Based on the research conducted, the WHO recommended that two doses of the vaccine be given, although three doses at 0, 2, 6 months are still the recommendation in the US. According to the Center for Disease Control from the USA, about 79 million Americans are infected with the human papillomavirus. About 14 million new infections are recorded every year [16]. Types 16 and 18 are responsible for 95% of cervical cancers [17]. HPV type 16 is the most malignant and responsible for the highest percentage of CIN 3 lesions (45%) and cervical cancer (55%). HPV 16 and 18 cause

about 70% of cervical cancers worldwide, 68% of squamous cell carcinomas and 85% of adenocarcinomas [18]. Localization of changes and cancer potential depend on the type of virus, it causes different changes in different places in the form of condylomas, intraperitoneal neoplasias and invasive cancers of the cervix and vulva [19,20].

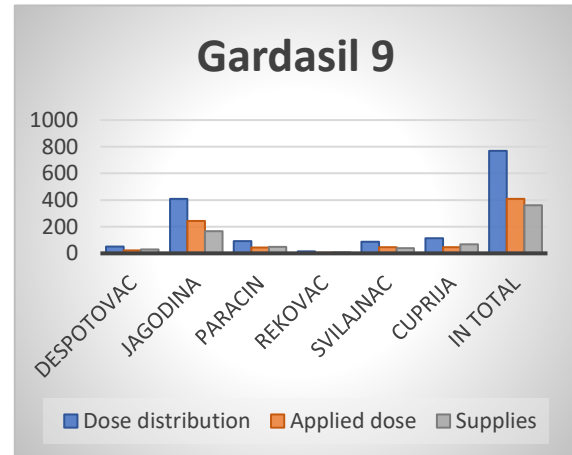


Figure 2. Comparison of the total number of applied doses of Gardasil 9 vaccines in year 2022 in Pomoravlje district

Since 2006, there has been a 56% reduction in HPV infection among teenage girls in the US, although immunization coverage with this vaccine has been relatively low [21, 22]. A reduction in the occurrence of condylomas in teenagers has also been observed. In some other countries, where HPV vaccine coverage is higher, such as Australia, the degree of reduction is significantly higher, there was even a reduction in the number of cases of precancerous lesions of the cervix.

In Serbia, an indirect indicator of the problem of this infection is the fact that cervical cancer is on the rise in our country. In terms of mortality rate, Serbia is the second country in Europe.

That is why it is recommended that children older than 9 years of age receive the HPV vaccine before entering into sexual relations, preferably at the age of 11 or 12, and those who did not receive it at that age can receive it later. Three doses are recommended for those over 14 years of age. Young women can receive the vaccine up to the age of 26, and young men up to the age of 21. All three registered vaccines are safe.

5. CONCLUSION

By comparing the statistical data, it can be concluded that the success rate of vaccination is significantly higher in central Serbia, in the territory of the Pomoravlje District (53.06%), than in the south of Serbia, in the territory of the Peinja District (33.99%). Through educational lectures on vaccination against HPV, children, adults and the entire population acquire positive attitudes about prevention as one of the most effective methods in suppressing and spreading the said disease. This is all with the aim of raising health awareness among the population and reducing the costs

of the health system during the treatment of possible complications of HPV infection, as well as reducing the morbidity and mortality of this disease at the level of one country.

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