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QUINTIP RECORDATI INITIAL DATA CONCERNING THE PECULIARITIES OF HUMAN PAPILLOMAVIRUS INFECTION EPIDEMIOLOGY IN UKRAINE AND THE PROSPECTS FOR ITS PREVENTION

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The purpose of the study was to evaluate the human papillomavirus infection prevalence among women in different regions of Ukraine using the Quintip Recordati database. The Quintip Recordati database data, containing 195 records, was analyzed using frequency analysis methods. The distribution features of different HPV strains among the surveyed women living in other regions were determined. The frequency of seropositive results was analyzed also depending on the degree of urbanization. It was found that the number of positive tests was 38.5 % of the total sample size. When comparing the frequency of detection of highly oncogenic strains, it was found that they are more often registered in cities with a larger population. The authors showed that the prevalence of human papillomavirus infection in the surveyed women is twice higher comparing the average European level. Papillomavirus infection high prevalence in Ukraine is supposed to be the result of low vaccination coverage, lack of mass screening, lack of awareness and limited access to preventive programs. The frequency of detection of highly oncogenic HPV strains is higher in urbanized regions. The authors conclude that human papillomavirus infection diagnostic screening methods widespread implementation in Ukraine can significantly reduce the incidence of cervical cancer. They are sure that cervical cancer prevention will continue to rely on secondary prevention methods.

Key words: human papillomavirus, epidemiology, women's health, screening, prevention, vaccination.

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ПОЧАТКОВІ ДАНІ QUINTIP RECORDATI СТОСОВНО ОСОБЛИВОСТЕЙ ЕПІДЕМІОЛОГІЇ ПАПІЛОМАВІРУСНОЇ ІНФЕКЦІЇ В УКРАЇНІ ТА ПЕРСПЕКТИВ ЇЇ ЗАПОБІГАННЯ

Метою даного дослідження була оцінка поширення папіломавірусної інфекції серед жінок різних регіонів України. Проведений аналіз даних бази Quintip Recordati, що містить 195 записів методами частотного аналізу. Визначені особливості розподілу різних штамів папіломавірусної інфекції серед обстежених жінок, які проживають у різних регіонах. Проведений аналіз частоти серопозитивних результатів в залежності від ступеня урбанізації. Встановлено, що кількість позитивних тестів склала 38.5 % від загальної чисельності вибірки. При порівнянні частоти виявлення високоонкогенних штамів встановлено, що вони частіше реєструються у містах з більшим населенням. Автори висвітлили, що поширеність папіломавірусної інфекції в обстежених жінок вдвічі перевищує середньоевропейські рівні. Скоріше за все, висока поширеність папіломавірусної інфекції в Україні є наслідком низького охоплення вакцинацією, відсутності масового скринінгу, браку обізнаності та обмеженого доступу до профілактичних програм. Частота виявлення високоонкогенних штамів ВПЛІ вище в урбанізованих регіонах. Автори висловлюють, що широке впровадження скринінгових методів діагностики ВПЛІ в Україні може суттєво зменшити захворюваність на рак шийки матки. Вони впевнені, що профілактика раку шийки матки й надалі спиратиметься на методи вторинної профілактики.

Ключові слова: вірус папіломи людини, епідеміологія, жіноче здоров'я, скринінг, профілактика, вакцинація.

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Cervical cancer (CRC) is one of the most common malignancies in women of reproductive age, ranking fourth among the causes of cancer morbidity and mortality in women worldwide. According to the Global Cancer Surveillance Agency (GLOBOCAN), more than 604 thousand new cases of CRC and about 342 thousand deaths were registered in 2020 indicating a significant burden of this pathology on health systems, especially in low- and middle-income countries.

In some Latin American countries such as Honduras, El Salvador, Nicaragua, Panama, Peru and others CRC is the second most common cancer, it is reported that it ranks first in Bolivia [14]. Furthermore, in Bolivia, CRC ranks first by incidence while in other countries such as Mexico, Nicaragua, El Salvador, Honduras, Panama, Peru and others this cancer ranks second. There are countries where CRC ranks first by mortality such as Belize, Honduras, Nicaragua, Peru, and others [7, 14].

The situation with CRC in Eastern European countries, including Ukraine, is particularly alarming, because of insufficient level of human papillomavirus (HPV) vaccination coverage and screening programs [13, 22, 43]. In Ukraine CRC is consistently among the top five most common cancers in women. According to the National Cancer Registry, more than 3000 CRC new cases and more than 1000 deaths related to it are registered annually.

Persistent infection with HPV was showed to be highly pathogenetically important in CRC, primarily of those highly oncogenic types as HPV16 and HPV18 [43]. The virus has the ability to integrate into the cervical epithelial cells genome initiating complex molecular processes resulted in neoplasia and malignant transformation. However, not every case of HPV infection leads to cancer development indicating high immune response factors importance, together with comorbidities and socio-behavioural aspects.

Given the fact that the natural course of cervical cell transformation from infection to invasive cancer lasts for years, a unique window of opportunity is created for early intervention and this disease prevention. The use of vaccines, modern screening technologies (i.e. cytological examination, HPV testing etc.) as well as reproductive health education can effectively reduce CRC incidence and mortality. Despite the evidence base concerning the causal relationship between HPV and CRC the level of both population and certain doctors awareness remains poor. We should stress on additionally existing barriers – economic, cultural and organizational that limit the efficacy of preventive strategies implementation [1].

A comprehensive study conducted in Ukraine from 2014 to 2016 analyzed more than 40000 women of different age groups [6]. 34 % of these women were HPV seropositive, with 65 % of these infections were caused by high-risk HPV genotypes (oncogenic), and mixed infections were involved in 90 % of these cases. The most common identified high-risk genotypes were HPV16 (23 %), HPV53 (16 %), HPV31 (14 %), HPV33 (11 %), HPV66 (11 %), and HPV-68 (11 %). Young women, especially those under 30 years of age, demonstrated the highest level of HPV infection. The expression of cervical intraepithelial neoplasia (CIN) was inversely correlated with the number of HPV genotypes detected. CIN III lesions were associated with fewer genotypes, predominantly HPV16 which was detected in 70 % of CIN III cases [5, 6].

Despite direct comparative studies between country and urban areas in Ukraine are few, general trends observed in other countries suggest that urban areas tend to have higher HPV prevalence rates possibly due to increased sexual activity, earlier sexual debut and greater access to health services including screening and vaccination. The reported prevalence rates in country areas are expectedly lower which may be explained by limited access to health care, lower screening and vaccination rates and potential hypodiagnosis [5, 111]. We believe that further research focusing on country-urban differences in Ukraine is needed to develop targeted public health strategies for HPV prevention and control.

The purpose of the study was to evaluate the human papillomavirus infection prevalence among women in different regions of Ukraine using the Quintip Recordati database.

The data of the Quintip Recordati database [5] containing 195 records were analyzed using frequency analysis methods. The distribution features of different HPV strains among the examined women living in different regions of Ukraine were determined.

The frequency of seropositive results was analyzed depending on the degree of urbanization. The main ways of preventing HPV infection were determined.

The number of positive tests was found to be equal to 38.5 % of the total which is much higher pertaining the similar indexes established for Eastern European countries. The distribution of cases of different HPV types is shown in Table 1.

Table 1

HPV strains distribution in the surveyed population

Strain	Cancer risk	Frequency	
		Absolute	Relative
6	Low	25	12.8
16	High	12	6.2
31	High	11	5.6
33	High	7	3.6
39	High	7	3.6
42	Low	6	3.1
45	High	3	1.5
52	High	4	2.1
53	High	7	3.6
56	High	7	3.6
59	High	2	1.0
61	Low	6	3.1
66	High	4	2.1
68	High	10	5.1
70	Low	5	2.6
73	High	4	2.1
82	High	2	1.0

Despite the relatively wide geography of the study, its representativeness is low (Fig. 1). The largest number of studies was conducted in big cities – Kyiv and Odesa which are very heterogeneous in terms of population structure, in particular the cohort of women of fertile age – many of residents in these cities are currently internal migrants or are temporarily in the city (studying, working under a contract, etc.).

When comparing the frequency of highly oncogenic strains detection, it was found that they are more often registered in cities with larger populations. Given the limitations of the sample, it is impossible to establish regional characteristics but the revealed trends towards to increase the HPV frequency in urbanized regions deserves attention (Fig. 2).

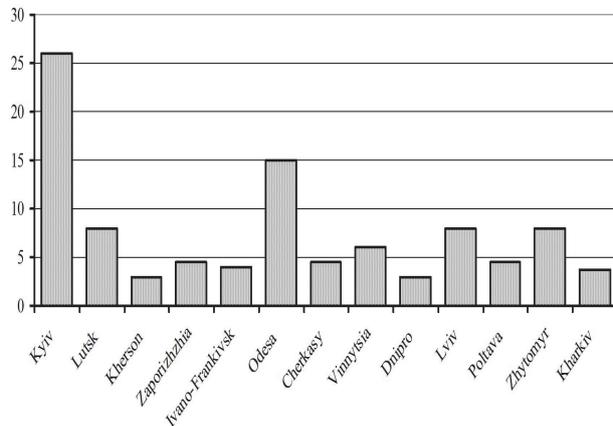


Fig. 1. Distribution of respondents by cities of Ukraine.

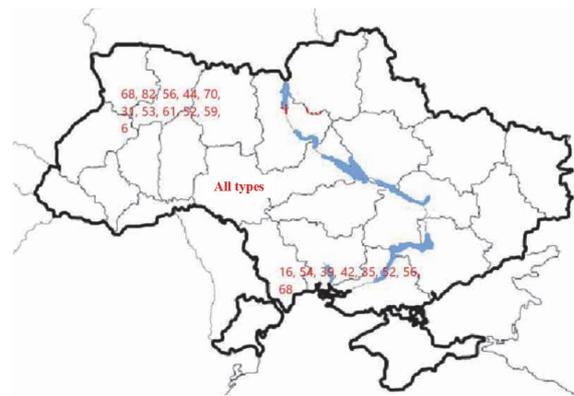


Fig. 2. Medico-geographical peculiarities of HPV distribution inside the Ukrainian population.

Therefore, we believe that HPV high prevalence in Ukraine is the result of low vaccination coverage, lack of mass screening, lack of awareness and limited access to preventive programs. In countries with systematic screening (e.g., Sweden, the United Kingdom, the Netherlands, etc.) the incidence and mortality from CRC decreased by 2–3 times over several decades [1]. This is a direct result of women regular testing, reliable results recording and an established referral mechanism. We want to attract attention that highly accurate HPV tests are now available additionally to usual Pap test that allow to detect the oncogenic types of the virus presence even before cellular changes appear and could be performed even at home (self-sampling) [5] which is especially important for countryside and isolated regions.

Important that similar problem of CRC absolute incidence increasing is observed in women of reproductive age throughout the Europe and world especially in the age group from 29 till 35 years [1]. Specialists from many branches of medicine – gynecologists, oncologists, pathologists, cytologists, radiologists, health care organizers etc. – are actively studying this problem, as a result of which knowledge of this disease etiology, pathogenesis, prevention, clinical features, diagnostics and treatment has significantly deepened [15, 28, 35].

Age-standardized incidence of CRC rates indicate that 97 % of all cases are caused by HPV (Fig. 3). HPV16 and HPV18 are known to be connected for 90 % of HPV-associated cancers [10] although the incidence of cases associated with HPV45, 33 and 35 is increasing [37]. These data demonstrate a high incidence of cervical cancer in many African countries as well as in some countries in Southeast Asia and Latin America.

Persistent infection increases the risk of intraepithelial lesions or CRC formation which accounts for approximately 80 % of HPV-associated cancers. The prevalence of cervical infection generally declines after 30 years [10, 30]. Cervical infection was also registered to be the result of HPV-associated anal disease higher prevalence [30]. Seventy percent of vulvar cancer cases and 75 % of vaginal cancer cases are known to be associated with HPV [35].

With the purpose of data obtained discussing we will pay attention to the following. Comparing the data we obtained with modern studies in this field it should be stressed that some discrepancies might be due to geographical and population factors. Thus, a recent study from China (Frontiers, 2024) using the data of above 149000 women with different cervical conditions demonstrated the presence of HPV52 (36.6 %), HPV58 (18.9 %), HPV16 (8.8 %) in women with ASC-US cytological pattern. HPV16, 52, 58, 33 and 18 were established to be the five main strains in patients with high-grade squamous intraepithelial lesions (HSIL), but the most frequent strain was HPV16 (65.31 %) in CRC cases [6].

5990 clinical cases were analyzed in Indian CRC and preliminary stages meta-analysis where HPV infection was detected in 71.3 % of women with CIN II–III/HSIL 59.2 % in patients with CIN I/ high-grade

squamous intraepithelial lesions and 34.8 % – in patients with atypical squamous cells of undetermined significance [22].

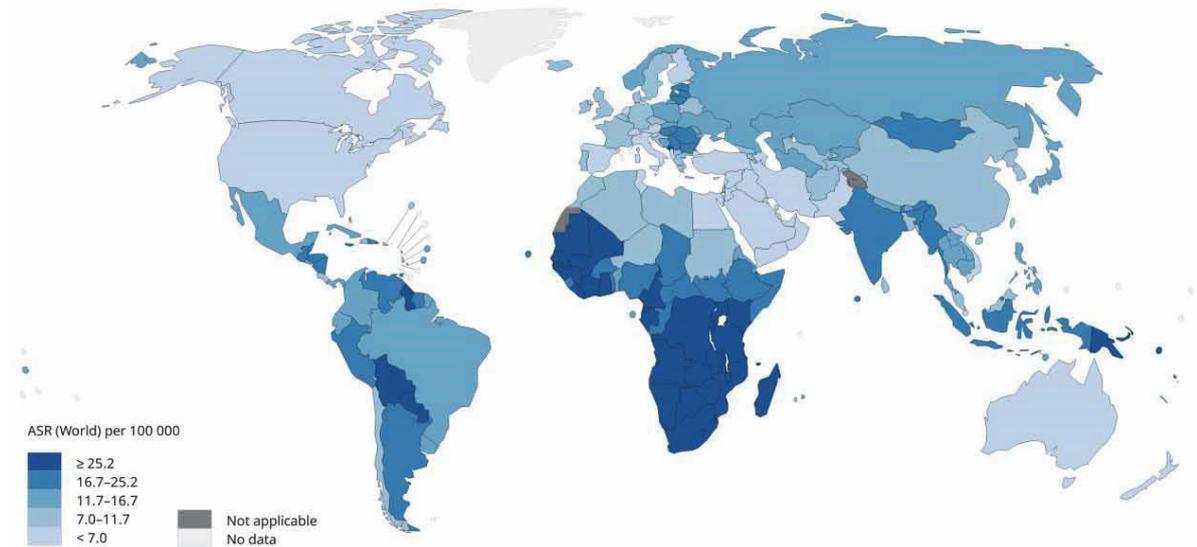


Fig. 3. Age-standardized incidence of worldwide cervical cancer rates in 2020. (Source: International Agency Research on Cancer, WHO 2020). Licence: CC BY-NC-SA 3.0 IGO [24].

According to domestic sources, in Ukraine, even with normal cytology, 3.8 % of women carry HPV16/18 while in the presence of HSIL/CIN – 2/3 (54–62.8 %) and in the case of invasive cancer – 74–83 % of cases have HPV16/18 [6, 28]. According to the Lancet Global Assessment, the total HR-HPV positivity equals to 6.45 % worldwide but any type of HPV is found in 11.7 % of women [28]. At the same time, in such countries as India and Pakistan, HR HPV foci are very high (over 70 %) in stages CIN II–III and in invasive carcinoma. According to this study, the spectrum of HPV positivity in Ukraine corresponds to international trends and confirms the role of HPV16/18 in >70 % of cervical pathology – HSIL and CRC.

HPV epidemiology among women shows clear differences between country and urban areas depending on such factors as access to health care, socioeconomic status and cultural practices [1, 13]. The studies provided revealed differences in HPV prevalence between country and urban populations [43].

HPV genotypes both the prevalence and distribution is a phenomenon that was studied primarily in women. Though, when examining the HPV infection cycle, it becomes clear that men also play a fundamental role. Although this phenomenon was not studied yet as thoroughly as in women some studies have revealed interesting data.

HPV is widely present in men. In a study conducted among men whose female partners had cervical intraepithelial lesions, 41.9 % of samples were positive [26] while in another study conducted among young men under 25 years of age, the proportion of positive samples reached 51.8 %. These latter data have some correlation with data on women of the same age who also had a higher percentage of positive results [44].

Similar data were obtained in a study in which the percentage of positive results in men was approximately 63.5 % which is significantly higher than that in women in the same study (39.5 %). Although an analysis of prevalence by age and gender was not conducted, it can be seen that the percentage of positive results is higher in the 18–30-year-old group [12].

Taking into account the HPV infection natural history it is most logical to assume that stable couples share the same HPV arsenal. However, a study of heterosexual couples in which the woman had cervical intraepithelial lesions found that only 28 % of couples had matching results for at least one HPV which is likely due to differences in the time to infection resolution in men and women. Furthermore, co-infection was more common in men than in women (64 % and 30 %, respectively). Men with multiple infections reported having more than five sexual partners in their lifetime, a factor associated with HPV prevalence [14].

A study of 444 women (233 urban and 211 country) in the eastern Brazilian Amazon revealed 14.6 % of overall HPV infection rate with 15 % among urban women and 14.2 % among country women.

Marital status was identified as a significant risk factor among country women aged 13–25 years with higher prevalence rates among single, divorced and widowed individuals [1, 23]. Although a study in the southern province of Yunnan (China) involving 367 women (177 country and 190 urban) demonstrated that urban women had a higher overall HPV infection rate (16.3 %) compared with country women (13.0 %). Infections with multiple genotypes were more common among urban participants and age-specific prevalence patterns differed between the two groups [46].

There are differences between country and urban areas in awareness of HPV vaccination [11, 46, 47]. Country residents in USA demonstrated lower both HPV awareness and HPV vaccine vs country residents: awareness levels were 55.8 % and 58.6 %, respectively, vs 67.2 % and 65.8 % in urban areas.

CRC incidence rates underline these differences. A study of data from 2000 to 2019 established the overall HPV-related cancer rate among women living in non-metropolitan was 13.5 per 100000 that is significantly higher pertaining the issuing data (11.7 per 100). It's worth to note that incidence rate among women increased from 1.06 in 2000–2004 to 1.15 in 2015–2019 [14].

HPV causes approximately 26–30 % of head and neck cancer cases [24]. Currently, the incidence of HPV-associated oropharyngeal squamous cell carcinoma (OPSCC) is increasing in developed countries (up to 90 % of cases are positive for HPV16) [21].

Both HPV and OPSCC accounted for 33 % of cases worldwide in 2021. It should be mentioned that prevalence varies significantly by country, from 0 % in southern India to 85 % in Lebanon [8]. Furthermore, HPV+ cases of OPSCC are more common than HPV- cases of OPSCC in individuals who do not use tobacco or alcohol [20]. A decrease in the prevalence of HPV+ cases of OPSCC with age was previously reported and historically most HPV+ OPSCC cases were registered in men [20].

The incidence of HPV+ OPSCC increased significantly in some European countries over the past two decades [20, 25, 32] while epidemiological data are sparse in low- and middle-income countries of South Asia and sub-Saharan Africa, making it unclear whether similar increasing trends are absent or simply undetected in these regions [27]. HPV accounts for 26 % of both conjunctival intraepithelial neoplasia and conjunctival squamous cell carcinoma (with high frequencies of genotypes 16, 18 and 33), HPV infection results in an eight-fold increase in these two neoplasms possible development [4].

Several factors contribute to these country–urban differences [9, 13, 28, 43]. More urbanized areas tend to offer better access to preventive services, including HPV vaccination and regular screening, leading to higher diagnostic efficacy. Higher education and income levels in urban settings are also associated with higher levels of health awareness and use of preventive care. Additionally, cultural norms and behaviours such as age of sexual debut and parity differ between country and urban populations determining the patterns of HPV infection.

Analyzing the data obtained it should be stressed that despite the initial implementation costs, systematic screening reduces the costs of severe cancer forms treating, reduces disability among women of productive age and is an investment in the health of the nation that pays off in the medium and long term.

Hence, screening around the world helps to raise women's awareness of HPV and CRC and to form a responsible attitude towards health prevention. At the same time, the fear of a cancer diagnosis is also reduced because it is no longer a death verdict if detected at an early stage.

CRC vaccination is very important and promising in terms of reducing morbidity. Although HPV infections typically regress spontaneously within 1–2 years, and not all genotypes are associated with cancer, HPV infections and associated diseases should be taken seriously [34]. Currently, vaccines provide the best and most cost-effective prevention option. All currently used vaccines are based on the virus-like particle (VLP) L1 protein, which is considered a potent immunogenic protein that spontaneously self-assembles from pentamers [33].

Gardasil (4vHPV) was the first vaccine approved by the Food and Drug Administration in 2006. It covers four HPV types (6, 11, 16 and 18) [29]. The bivalent vaccine Cervarix (2vHPV) which covers HPV 16 and 18 was approved in 2007. 2vHPV was also been shown to protect against HPV31, 33 and 45 and to reduce genital warts caused by HPV6 and 11 [29]. The two vaccines contain different adjuvants; Cervarix proteins are produced in insect cells infected with baculovirus while Gardasil proteins are produced in *Saccharomyces cerevisiae* [34].

A nine-valent version of Gardasil (9vHPV) was later developed. It includes additionally five L1 virus-like particles, specifically oncogenic HPV types 31, 33, 45, 52 and 58 and shows better results than 4vHPV in preventing low- and high-risk HPV infections [14].

However, despite the widespread use of vaccines (Cervarix®, Gardasil®, and Gardasil 9®) challenges in optimal vaccination rates achievement still remain [15]. Safety concerns, misconceptions about the vaccine's impact on sexual behavior and lack of awareness hamper vaccination efforts in Latin American countries. Overcoming these barriers requires targeted educational campaigns, training of healthcare providers and community engagement initiatives [19].

To effectively address these challenges, strategies that include intersectoral partnerships, evidence-based decision-making, and community engagement are critical. Addressing vaccination inequalities, improving monitoring systems, and raising awareness are paramount to achieving comprehensive cervical cancer prevention in Latin America [3].

According to the Centres for Disease Control and Prevention and the Advisory Committee on Immunization Practices, two or three doses of the 9vHPV vaccine are recommended for men and women aged 9 to 45 years [45]. To ensure greater access to vaccination in countries with low vaccination coverage, particularly in low- and middle-income countries, administering a single dose of a bivalent or nonavalent vaccine may be a viable strategy to ensure equitable vaccination coverage.

Several studies demonstrated how a single dose of HPV vaccine induces neutralizing antibodies that, although present at lower titres than those produced by two- or three-dose vaccination, are capable of preventing viral infection and the development of recurrent cervical lesions. Moreover, immunity also appears to be mediated by non-neutralizing antibodies and neutrophil degranulation, and antibody avidity indices to the L1 protein are very similar to those in individuals who received three doses [31].

Gardasil and Cervarix vaccines induce cross-protection against non-vaccine types of the virus, such as HPV31 and HPV45 but with lower antibody titers than to the epitopes included in the vaccines. Vaccination can be performed starting at 9 years of age; however, since 2006, additional vaccination has been recommended for women up to 26 years of age, and since 2011 for men up to 21 years of age, as well as for some special population groups up to 26 years of age. In addition, due to the increase in HPV infection in adults, vaccination is now recommended for women and men at 45 years of age [14].

Primary CRC prevention does not replace secondary prevention. Hence, women should adhere to national screening programs to prevent cervical cancer [18]. WHO recommends cervical cancer screening from age 30 years and older [39]. Unequal access to screening is one of the main reasons for the sharp disparities in cervical cancer incidence and mortality between low- and high-income countries.

In 2020, to reduce HPV circulation and eliminate cervical cancer, WHO launched the Global Strategy to Accelerate the Elimination of Cervical Cancer as a Public Health Problem by 2030. This initiative includes strengthening vaccination, screening, and treatment of women with cervical cancer [39]. Eliminating cervical cancer does not mean eliminating HPV circulation, so primary prevention, based on a gender approach, is a critical tool [2].

There are many methods for cancer progression evaluation such as visual inspection with acetic acid (VIA), a procedure used to detect cervical intraepithelial neoplasia. The results interpretation is crucial for positive or negative result determination as well as for clinical management strategies choose in case of positive result.

Since 1990, ELISA has been used as the primary screening method in some countries [36]. To assess the squamocolumnar junction, which is the area with the highest risk of developing dysplasia, a Papanicolaou smear (Pap-test) or thin-layer liquid-based cytology is performed [17].

Colposcopy is a diagnostic procedure used to examine the cervix, vagina, and vulva in women who have previously undergone VIA or who have a positive Pap-test or HPV DNA test to detect high-risk oncogenic genotypes. This test is also used after treatment for intraepithelial and invasive carcinoma [17].

Viral genome identification can be accomplished using HPV DNA test – a multiplex test capable to detect the high-risk HPV genome using polymerase chain reaction (PCR) [38]. Currently, the Roche Cobas® test is the only HPV test approved by the FDA as an independent screening test for women 25 years and older. Genome amplification should not include only the L1 protein, as it may not be expressed after viral infection.

A more thorough option is testing for HPV mRNA and the expression of the E6 and E7 oncoproteins which are detectable markers of integration of the viral genome with the host genome [38].

There is currently no validated diagnostic or screening method for men and for other HPV-related cancers. However, HPV has been detected in several samples: seminal fluid, acetic acid phenocopies, urethral samples and penile swabs. Among the diagnostic methods, the most widely used is PCR [40].

Tertiary prevention targets disease both clinical and initial phases. It is prescribed to symptomatic patients and aims to reduce the disease severity and any associated sequences [40]. With regard to HPV-associated cancer, some retrospective studies show a significant protective effect of the HPV vaccine in women and men who have undergone surgery for HPV infection [24].

In particular, vaccination should be considered for all HIV-infected individuals aged 27 years and older undergoing treatment for high-grade squamous intraepithelial lesions. On the other hand, in women, adjuvant vaccination reduces the risk of recurrence by approximately 80 % in patients who have undergone surgery for I cervical intraepithelial neoplasia II lesions and CRC FIGO stage 1A1 [42]. However, whether vaccination is more effective as neoadjuvant therapy or as an adjunct to conization is still debated, although the effect appears to be achieved within 30 days of standard treatment. Moreover, a reduction in the rate of relapses after treatment in vaccinated patients has also been confirmed for benign neoplasms [42].

Resuming, one should to conclude that HPV-induced carcinogenesis detailed investigation, analysis of efficacy of CRC existing approaches to prevention, diagnosis and treatment is of extreme importance for medicine, public health and health policy.

Currently, the only way to block the chain of transmission is vaccination, but HPV vaccination programs, especially gender-neutral ones, are still in their infancy in many countries, especially in less developed countries [41]. This makes it difficult to achieve herd immunity, especially among men, who were invited to vaccination only years after the introduction of the first vaccine. There is growing evidence that only gender-neutral vaccination will lead to significant control of HPV-related diseases in both women and men and CRC most effective prevention, especially if vaccination coverage among girls in a given region is low [16].

Therefore, the introduction of HPV systematic, accessible and regular screening in Ukraine can radically reduce the CRC incidence and mortality thus repeating the successful experience of the European Union countries.

Taking into account all abovementioned, it is logical to assume that in the coming years, CRC prevention will continue to rely on secondary prevention methods. Furthermore, another global public health goal should be to provide scientific evidence to establish optimal vaccination timing to prevent the greatest number of cancer recurrences and improve treatment outcomes. Finally, health communication should also play a key role. In fact, standardizing both the quality and quantity of information could lead to increased adherence to various vaccinations awareness campaigns which must already overcome the stigmas and psychological factors that complicate promotion and prevention efforts.

Conclusions

1. HPV prevalence in surveyed women is twice higher pertaining the average European level.
2. The biomarker HPV types importance (especially of HPV16/18) is important for risk stratification, surveillance and therapeutic tactics.
3. The frequency of highly oncogenic HPV strains detection is higher in urbanized regions.
4. Papillomavirus infection high prevalence in Ukraine is supposed to be the result of low vaccination coverage, lack of mass screening, lack of awareness and limited access to preventive programs.
5. HPV diagnostic screening methods widespread implementation in Ukraine can significantly reduce the incidence of cervical cancer.
6. The data obtained confirm the importance of type-specific HPV testing implementation into routine cervical pathology screening practice.
7. CRC prevention will continue to rely on secondary prevention methods.

Prospects for further research include rapid completion of epidemiological studies on the prevalence of cervical cancer in Ukraine, analysis of the data obtained, and their dissemination to specialists in the oncogynecological field in order to systematize diagnostic measures and their widespread implementation in the practice of screening cervical pathology. The final task is a significant reduction in morbidity and mortality rates for cervical cancer.

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FEATURES OF PERFORMANCE AND POSSIBLE COMPLICATIONS OF IMMEDIATE DENTAL IMPLANTATION UNDER COMPLEX ANATOMICAL CONDITIONS

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Dental implantation is one of the most advanced methods of restoring missing teeth. Depending on the timing of implant placement after tooth extraction, immediate and delayed dental implantation are distinguished. Delayed dental implantation is a classical approach, involving the placement of a dental implant 4 to 6 months after tooth extraction. Immediate dental implantation refers to the placement of the implant directly after the extraction procedure. This literature review examines techniques for immediate dental implantation in cases with complex anatomical conditions and analyzes possible complications that may arise both intraoperatively and in the long-term postoperative period.

Key words: dental implantation, complex anatomical conditions, tooth extraction, bone plastic, adentia.

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ОСОБЛИВОСТІ ПРОВЕДЕННЯ ТА МОЖЛИВІ УСКЛАДНЕННЯ ОДНОМОМЕНТНОЇ ДЕНТАЛЬНОЇ ІМПЛАНТАЦІЇ ЗА СКЛАДНИХ АНАТОМІЧНИХ УМОВ

Дентальна імплантacja являється найсучаснішим методом відновлення втрачених зубів. За терміном встановлення дентального імплантанту після операції видалення зуба виділяють одномоментну та відстрочену дентальну імплантацию. Відстрочена дентальна імплантация є класичною методикою, яка передбачає встановлення дентального імплантанту через 4–6 місяців після операції видалення зуба. Одномоментна дентальна імплантация передбачає встановлення дентального імплантанту відразу після видалення зуба. Проведено огляд літератури щодо методик проведення одномоментної дентальної імплантациі за складних анатомічних умов, а також можливих післяопераційних ускладнень, які можуть виникати як інтраопераційно, так і у віддалений післяопераційний період.

Ключові слова: дентальна імплантация, складні анатомічні умови, видалення зуба, кісткова пластика, адентія.

The study is a fragment of the research project "Algorithm for comprehensive treatment of inflammatory processes and prevention of pathological scar formation on the skin of the head and neck following planned and emergency surgical interventions", state registration No. 0124U000093.

Currently, one of the optimal methods for replacing dental arch defects is dental implantation. Dental implants can restore both a small defect (1–2 teeth) and complete jaw edentulism. Scientists and practicing physicians are continually working to improve and simplify both the surgical stage of dental implantation and subsequent orthopedic rehabilitation [13].

A special place among the techniques of the surgical stage of dental implantation is occupied by immediate implantation. This technique involves placing an artificial tooth root (dental implant) right after