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Review Article

Others Section

HPV Risk Factors and Prevention Behaviours: A Review

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ABSTRACT

Introduction: Human Papillomavirus (HPV) is one of the most commonly diagnosed Sexually Transmitted Infections (STIs) that is responsible for the majority of Cervical Cancer (CC) cases.

Aim: The present study aimed to review HPV risk factors and prevention behaviours.

Materials and Methods: In this study, articles indexed in databases, such as PubMed, Scopus, EMBASE, and Google Scholar were reviewed. In total, 29 papers on the risk factors and the associated prevention methods in this area were evaluated.

Results: Risk factors and prevention of HPV infection were classified into three domains: individual, behavioural, and psychosocial. There were differences with regard to age, race, marriage and the number of pregnancies, in the individual domain. In the behavioural domain, conflicting evidence was found on oral contraceptives and the use of condom. In the psychosocial domain, the main risk factors for HPV include: believing in fatalities of the cancer, the shame of the disease, and fear of vaginal examination. Meanwhile, the fear of developing HPV led to the prevention of high risk behaviours.

Conclusion: Given the limited research on risk factors or HPV prevention in Iran and the contradictions observed in the results of studies, there is a need for further investigations to obtain basic information on risk factors and prevention. In this regard, widespread health education is a necessity for raising the awareness of individuals about HPV infection prevention.

Keywords: Human papillomavirus, Prevention, Risk factors, Women

INTRODUCTION

A major health concern of the modern age, HPV is one of the most commonly diagnosed STIs in many countries [1]. In addition, it is one of the most prevalent STIs in women with multiple sexual partners [2,3]. Some types of HPV can cause genital warts and CC [4]. HPV is a prerequisite for nearly all cases of CC occurring around the world [5], causing 530,000 cases of CC and 275,000 mortalities every year [6]. Approximately, 75%-85% of sexually active individuals are infected with HPV during their lifetime [7]. Generally, sexual behaviour is a known risk factor for HPV infection. However, International Agency for Research on Cancer (IARC) studies has identified the number of sexual partners as an important risk factor for HPV infection [8].

Signs and symptoms of HPV are not visible in all people since the immune system attacks the virus and clears the HPV infection, typically within two years [9]. While the immune system clears a specific HPV type in body, it does not mean that the person will not be infected with another or the same type of HPV infection. Therefore, people with HPV should be encouraged to accomplish primary prevention through condoms and vaccinations [10].

Depending on the context of society, culture and beliefs, there is a variety of factors affecting the incidence of HPV. In addition, several prevention methods have been proposed for this disease. With this background in mind, this study examined all the factors related to the infection and assessed the barriers and incentives for preventing HPV, such as the impact of demographic characteristics and sexual behaviours. In the present study, the factors related to the infection and prevention of HPV and the existing challenges were reviewed. In other words, the researchers of the article dedicated efforts to answering the question of what factors affect the incidence of HPV in women and the factors that are effective in preventing HPV in women. Identifying these factors can help plan and implement the necessary interventions to prevent or reduce the incidence of HPV.

MATERIALS AND METHODS

In this review study, descriptive and analytical articles related to HPV were extracted from PubMed, Scopus, Google Scholar, EMBASE, Iranmedex and SID databases. In searching for articles, the keywords included “human papillomavirus”, “infection-related factors”, “risk factors” and “prevention-related behaviours”. The inclusion criteria were articles published between 2006-2016, Persian and English articles published in scientific and research journals, both inside and outside the country with full text and articles that examined the HPV-related factors and prevention behaviours in Iran and across the world. Considering studies on both genders, only information related to women was used in this study. The exclusion criteria involved studies that only had HPV infection based on clinical observations and studies with only male participants.

First, the articles were searched and extracted according to the inclusion and exclusion criteria and based on their titles and abstracts. After exclusion of unrelated articles, the full texts of the relevant papers were approved, prepared and reviewed. Afterwards, their results were extracted according to the studied factors. The result of the reviews included factors affecting HPV and HPV-related prevention behaviours. Following that and in order to confirm the selection of articles, the results were presented to a higher scientific degree researcher, followed by applying a strategy of understanding to resolve the disagreements. The rate of HPV infection in this review was based on clinical and laboratory observations. In total, 29 articles were reviewed and the results were reported.

RESULTS

In total, 762 articles were found in the initial search. The applied protocol reduced the number of articles. As a result, after reviewing articles based on the inclusion criteria, the number of articles decreased. Finally, 29 articles on the HPV infection risk factors and prevention behaviours from 13 countries were investigated.

Factors Related to HPV Infection and Prevention

Although studies on the factors associated with HPV in Iran are very limited and have more emphasised the prevalence and types of HPV, studies from other countries indicated that the infection is caused by different factors. In this study, the factors associated with infection and prevention of HPV were classified into three domains, individual, behavioural, and psychosocial areas.

Individual Domain

In a study, there was a higher risk of developing HPV in white people (4.40: 1.16±16.73 95%CI) [11]. However, in another study, no significant difference was found between different races in terms of HPV emergence [12,13]. In addition, there was a lack of consensus on the relationship between education and infection and prevention. Two studies reported a positive relationship between education and infection [14,15], while a negative relationship was shown by Zhang R et al. [16]. In three studies, no relationship was detected between occupation and HPV infection [14,16,17]. In one study, no correlation was observed between the number of pregnancies and HPV [16]. Meanwhile, another study demonstrated an elevation in the incidence of HPV due to increased number of pregnancies [14]. Nevertheless, Jahdi F et al., obtained different results, suggesting that those who had fewer pregnancies were more likely to be infected with HPV in Iran [18]. Only in one study, the volume and duration of period was related to HPV [16].

On the other hand, no correlation was observed between family history of genital warts and increased incidence of genital HPV [16,19]. However, in two other studies with the similar context, genital warts were associated with an increased incidence of HPV [13,19]. Moreover, there was no association between family history of CC and HPV infection. However, the history of other malignancies had a significant correlation with HPV infection [14]. Meanwhile, Zhang R et al., showed that the family history of skin infections with HPV had a positive correlation with genital HPV [16]. The association between some individual factors and HPV infection is shown in [Table/Fig-1] [11,13,17,19-26].

Behavioural Domain

The association between some behavioural factors and HPV is shown in [Table/Fig-2]. Among the listed HPV risk factors, there was consensus on the impact of sexual activity in this regard. In the study of Bacopoulou F et al., there was a statistically significant correlation between sexual activity and HPV33 infection (RR=1.086; p=0.31) [19]. Duration of having multiple sex partners was also a major risk factor for HPV [13,14]. People married for 15 years had nearly twice chance of developing HPV [27]. A study in Iran showed a relationship between the frequency of sexual intercourse and HPV [18]. However, no such association was reported by a study in China [16]. Furthermore, Manga M et al., marked a significant relationship between the age at the first pregnancy and HPV [14].

The number of sexual partners was a cause of infection [14,16,19,28]. A study found that having three or more partners within 12 months increased the risk of HPV [19]. This relationship was confirmed by two other studies as well [11,13]. Lack of using contraceptives was another HPV risk factor [26]. Moreover, highest level of HPV prevention behaviour was observed in those who used contraceptives [29]. In a research in Iran, lack of contraceptive use was associated with HPV [18]. However, in two other studies, there was no correlation between the type of contraceptive (e.g., condom, hormone, and IUD) and HPV infection [14,17]. A study in Iran

Factors	Author/s	Method	Location, year	Number of samples	Results
Age	Zhang R et al., [16]	Population-based	China, 2013	10.000	The HPV infection was higher in women over 40 years.
	Wilson KL et al., [13]	Cross-sectional	USA, 2016	1105	HPV infection was higher in older women. However, the difference between age groups was not statistically significant.
	Shafaghi B et al., [20]	Cross-sectional	Iran, 2013	851	The incidence was higher in the 18-25 years.
	Shahramian I et al., [21]	Cross-sectional	Iran, 2011	265	
	Bacopoulou F et al., [19]	Descriptive	Greece, 2015	97	There was no relationship between age and the disease.
	Khodakarami N et al., [17]	Population-based	Iran, 2012	825	
	Manga M et al., [14]	Cross-sectional	Nigeria, 2015	209	The most affected age group was 30-45 years.
	Garg A et al., [15]	Cross-sectional	India, 2016	214	The most affected age group was 25-26 years. However, the difference between age groups was not statistically significant.
	Ghedira R et al., [22]	Cross-sectional	USA, 2016	2134	Age above 16 years had a higher risk.
	Del ROA-Ospina et al., [11]	Cross-sectional	Columbia, 2016	494	The highest incidence of HPV occurred at ages above 25 years.
Social class and income	Zhang R et al., [16]	Population-based	China, 2013	10.000	While the non-affected group had a higher income, it was not statistically significant.
	Ghedira R et al., [22]	Cross-sectional	USA, 2016	2134	Low income women were more affected by the virus.
	Strohl AE et al., [23]	Cross-sectional	USA, 2015	215	Vaccination rates were higher in people with higher incomes.
	Massey PM et al., [24]	Cross-sectional	Senegal, 2016	2286	Prevention behaviours were higher in a higher social class
Marital status	Zhang R et al., [16]	Population-based	China, 2013	10.000	A greater number of subjects in the non-affected group were married, but this difference was not statistically significant.
	Manga M et al., [14]	Cross-sectional	Nigeria, 2015	209	There was no significant difference between the affected and non-affected groups in terms of marital status.
	Wilson KL et al., [13]	Cross-sectional	USA, 2016	1105	
	Ghedira R et al., [22]	Cross-sectional	USA, 2016	2134	
	Salehifar D et al., [25]	Cross-sectional	Iran, 2015	147	Marriage was a predictor of vaccine admission.
Parity	Gol I et al., [26]	Descriptive	Turkey, 2016	110	Reducing parity was a factor in prevention of HPV.
	Ghedira R et al., [22]	Cross-sectional	USA, 2016	2134	Parity was a risk factor for infection.
	Zhang R et al., [16]	Population-based	China, 2013	10.000	

[Table/Fig-1]: Research on the association between some individual factors and HPV infection [11,13,17,19-26].

Factors	Author/s	Method	Location	Number of samples	Results
Smoking	Zhang R et al., [16]	Population-based	China, 2013	10.000	Smoking was lower in the negative HPV group.
	Del RõÂo-Ospina et al., [11]	Cross-sectional	Columbia, 2016	2134	
	Manga M et al., [14]	Cross-sectional	Nigeria, 2015	209	
	Göl I et al., [26]	Descriptive	Turkey, 2016	110	Smoking was a risk factor for HPV.
	Siddharthar JR et al., [30]	Cross-sectional	India, 2014	400	
	Khodakarami N et al., [17]	Population-based	Iran, 2012	825	The HPV infection was not related to smoking.
Age of marriage or first intercourse	Zhang R et al., [16]	Population-based	China, 2013	10.000	Early onset of sex had a statistically significant relationship with HPV infection.
	Göl I et al., [26]	Descriptive	Turkey, 2016	110	
	Soori T et al., [33]	Cross-sectional	Iran, 2013	250	A percentage of people with genital warts had sex under age of 14 years.
	Bacopoulou F et al., [19]	Descriptive	Greece, 2015	97	In the affected group, the mean age of the first sexual relationship was 15.3 years.
	Strohl AE et al., [23]	Cross-sectional	USA, 2015	215	Delay in the onset of sex was a way of preventing HPV and CC.
	Del RõÂo-Ospina et al., [11]	Cross-sectional	Columbia, 2016	2134	The first sexual relationship at an age below 15 years was associated with an increased risk of developing HPV.
	Khodakarami N et al., [17]	Population-based	Iran, 2012	825	The HPV infection was not related to the age at marriage.
Monogamy or polygamy	Göl I et al.,, [26]	Descriptive	Turkey, 2016	110	Monogamy was a factor in preventing HPV.
	Manga AE et al., [14]	Cross-sectional	Nigeria, 2015	209	Women in polygamous families were more likely to have HPV, compared to those in monogamous families.
	Shahramian I et al., [21]	Cross-sectional	Iran, 2011	256	
	Malakouti J et al., [27]	Cross-sectional	Iran, 2015	221	Having a second wife increased the risk of infection.
	Khodakarami N et al., [17]	Population-based	Iran, 2012	825	Polygamy was one of the risk factors.

[Table/Fig-2]: The association between some behavioural factors and HPV.

demonstrated a significant relationship between oral contraceptives and the presence of this virus [18]. Meanwhile, Siddharthar JR et al., reported that long-term consumption of oral contraceptives was a risk factor for CC [30]. In some studies, use of condom had a preventive effect on HPV [16,29]. However, in one study, no significant association was found between condom use and HPV infection [14].

Vaginal infections or STDs are associated with an increased and a high risk of HPV [11,26,31]. In one study, lack of performing cervical screening was associated with higher incidence of CC. In addition, there was a higher possibility of HPV infection in women, who had no regular cervical screening for more than 10 years [16]. However, a significant difference was found between the two groups of a survey with and without HPV [13]. Ghosh I et al., stated that treatment of genital infections was necessary to reduce the cumulative effect of HPV and vaginal infections in CC [32].

Psychosocial Domain

In two studies, the partner was prohibited from referring to health centres [12,34]. The most common psychological barriers to prevention included shame and fear of examination, pain and uncomfortable screening [10,12,35-36]. In addition, the fear of being recognised and believing in not being treated were among the barriers to screening presented in a study [12]. Fort VK et al., mentioned the fear of having an HPV infection as a barrier [37]. Nevertheless, Stephens DP et al. affirmed that the fear of developing HPV would encourage the prevention and injection of the vaccine [38]. In two studies, considering the fatality of cancer was one of the barriers to screening [12, 37].

DISCUSSION

Review of the literature has revealed the lack of research on risk factors and prevention of HPV in Iran to this date. Therefore, the studies related to this issue conducted in the world were reviewed for the first time to address the challenges and contradictions in the results of the conducted studies of this area. The cultural, social, and economic differences between the less-developed regions play a role in increased exposure to HPV risk factors [11].

According to the literature, there is a wide range of factors associated with HPV, which might be different depending on population, geography and subjects. As shown in [Table/Fig-1], age was an influential factor for HPV virus infection in the individual domain. Generally, age plays an important role in determining the prevalence of cytological changes [11]. The conducted reviews in this field revealed the lack of consensus among researchers on the age range of patients. To date, the underlying mechanism of HPV and role of age are still unknown. There is a possibility of a significant decrease in the oestrogen levels of postmenopausal women, which might reduce the ability to eliminate HPV or increase the potential for other infections resulting in HPV. In addition, there might be a higher rate of HPV infection among older women due to the recurrence of an ongoing or potential HPV infection [16]. These conflicting results might be due to the differences in the characteristics of the studied participants. Therefore, further research must be conducted in this area.

Few studies have been conducted on race, education, and social class, and there is a lack of consensus among the researchers, which demands further investigations. Genetic differences between racial groups may lead to a variety of functional factors in the immune response, inflammation and metabolism to HPV infection [39]. The findings on marriage found no association with HPV infection in this respect [13,18]. Nevertheless, Salehifar D et al. emphasised on the role of marriage in preventing HPV infection [25]. On the other hand, there was consensus on recognising the number of pregnancies as a risk factor for HPV. In this regard, the hormonal changes during pregnancy may be the cause of higher vulnerability to HPV [31]. In addition, parity was associated with an increased risk of HPV, which was agreed by the researchers. Regarding the impact of pregnancy, child delivery may expose an individual to a higher risk of infection [11]. According to the literature, there was a lack of consensus on the association between family history of genital warts and the virus infection. Moreover, there was no agreement on the relationship between education and HPV infection. According to the reviewed articles, no correlation was found between occupation and HPV infection.

In the behavioural domain, which is presented in [Table/Fig-2], there was an almost complete agreement on smoking as a risk factor for HPV infection. Chelimo C et al., suggested that smoking acts as a contributing factor for CC [31]. Sexual activity is one of the major risk factors for the development of the HPV, confirmed by the researchers of the present study. Sexual intercourse with an individual who has HPV can lead to infection with the virus. However, the virus may be suppressed by the immune system. If not destroyed by the immune system, the HPV infection would not only affect at the physical and clinical level, but also it would exert impact on the psychological and emotional levels [40]. The cause of lack of ability of the immune system of some people to clear the virus is still not known. Nevertheless, evidence exists on the involvement of secondary bacterial and viral infections, viral load, number of pregnancies, birth control pills, and smoking [5]. Most researchers found early age at the first pregnancy and STIs as risk factors for HPV. The use of oral contraceptives is regarded as a contributing factor in the development of CC [39]. It seems that the induction of HPV is more likely done due to cervical ectropion. Moreover, estrogen and progesterone can affect the cells of the cervix and increase cell proliferation [41].

There was agreement among the researchers regarding the multiplicity of sex partners as well as polygamy in some countries, where polygamy was among the risk factors. In HPV patients, the length of living with sexual partners was also significantly higher [13]. The lack of condom use was one of the risk factors reported by several studies in this article. Conflicting evidence has been presented considering the use of condoms and the risk of HPV and related illnesses. Regular use of condoms reduces the risk of genital warts by about 60-70%, decreasing CC and CIN as well [31]. While condoms are useful in prevention of all STIs, it is worth mentioning that independent use of condom can only reduce the risk of developing an HPV virus and does not completely eliminate it. In addition, the use of a condom is likely to be abandoned after a few months in a stable relationship [42]. The incidence of HPV infection increases with vaginal infection and sexually transmitted diseases. It seems that HPV may be an important pathogenic agent in the onset and extension of local cervical lesions in the early stages, indicating the importance of performing HPV genotype for preventing primary cervical lesions in healthy cervical or primary stages of cervical ulceration [16]. Chronic inflammation of the cervix and malnutrition can increase the possibility of infection with the HPV virus [43].

Regarding the psychological aspect, patients with HPV in two studies believed that there was no need for screening because the cancer was fatal and untreatable. The shame of the disease was a barrier for screening, which was agreed by researchers. Psychological and social pressure is high in people with HPV and more information must be provided by the healthcare providers and researchers in this regard [44]. Fear of having HPV was a barrier to prevention in several studies. Meanwhile, fear of disease was mentioned as an incentive for prevention in a study. The fear of CC alone may be a significant cause of using HPV vaccine and protection at the school and university age [13].

Despite the behavioural risk factors, all active women are at risk of developing HPV and consequently cervical disorder [45]. Risk factors can be reduced using both primary (training, and vaccine) and secondary (cervical screening) prevention methods [46]. The presence of various agents associated with the HPV in the studied communities showed that public health services should provide prevention programs for HPV infections. There is a need for health education programs with an awareness-raising approach in the health sector [40], providing special programs for health workers [47] and designing culturally-appropriate interventions [13]. In this respect, a program is required to improve patient knowledge about HPV, which could lead to adopting HPV prevention behaviours [10]. Another strategy for the prevention of cervical cancer is cervical screening and early diagnosis of cervical lesions [48]. Cervical cancer screening is still a major necessity in Iran. Generally, this process starts at age of 30, repeats every five years, and eventually ends at age of 69 years in Iran [49]. Mohseni SM et al. have recommended extensive screening program for HPV infection in one of the Iranian provinces [50].

CONCLUSION

The current study compared the results of studies on HPV risk factors in Iran with other countries. There are a limited number of studies on risk factors and HPV prevention in Iran, which was one of the major drawbacks of the current research. Based on the results of this review, there was a variety of factors associated with HPV, which were sometimes different depending on variables of population, geography and culture. One of the reasons for this variation can be due to the cultural and social differences between the studied communities. Finding challenges, guiding further studies, and designing prevention interventions are required in this area. According to the results of the present study, it is recommended that a qualitative study be conducted on the risk factors and prevention of the infection in each culture and society. It seems that culture can be effective in choosing prevention programs for HPV, especially in countries with resource constraints.

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