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Original Article

Cervical Cancer Screening in Southern Iran: Understanding Prevalence and Predictors through the Health Belief Model Approach

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Abstract

Background: Despite the low incidence rate of cervical cancer, the mortality-to-incidence ratio from this cancer is currently high in Iran, because it is diagnosed in advanced stages. This study aims to determine the prevalence and predictors of cervical cancer screening among women.

Methods: This cross-sectional study was conducted in Kerman, Iran, 2022. The study population included women aged 21-65 years old referring to primary health care centers and maternity ward of Afzalipour Hospital. The sample size was calculated as 400 individuals. The participants were selected using the convenience sampling method. The data were collected based on the health belief model questionnaire and the validity and reliability of the Persian version were assessed by the researchers. The data were analyzed using SPSS 22.0.

Results: A total of 372 respondents, 191 (51.3%) had a Pap smear test and 11 (3%) received the HPV vaccine. The participants reported lack of sufficient information as the main reason for not receiving the vaccine (79.2%). Our finding indicated that older age (P<0.001), increasing perceived seriousness of cervical cancer (P=0.006) and decreasing perceived barriers to undergoing a Pap smear test (P<0.001) increase the odds of having a Pap smear test.

Conclusion: The results of the present study underscore the need for increasing knowledge with an emphasis on the perceived seriousness of cervical cancer among women. Additionally, the health system should cover the costs of Pap smear test, HPV test, and HPV vaccination to reduce the incidence and mortality of cervical cancer in Iran.

Keywords:

Cervical cancer
Health belief model
HPV vaccination
Pap smear test
Screening

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1. INTRODUCTION

Cervical cancer is the fourth most prevalent cancer, accounting for about 6.5% of all cancer cases, and the fourth leading cause of cancer deaths responsible for about 7.7% of all cancer-related deaths among women worldwide. Fortunately, cervical cancer is one of the most preventable cancers through HPV vaccination as primary prevention and regular screening as secondary prevention (1).

It is estimated that 604,127 new cases of cervical cancer with an age-standardized incidence rate (ASIR) of 13.3 per 100,000 women and 341,831 deaths from this cancer with an age-standardized mortality rate (ASMR) of 7.3 per 100,000 women occurred in 2020 worldwide. The evidence shows the global disparity in cervical cancer incidence and mortality so that more than 90% of new cases and deaths from this cancer occur in low and middle-income countries (1-3).

A systematic review indicated that ASIR of cervical cancer is about 6 per 100,000 women and ASMR is 1.04 per 100,000 women based on the population-based cancer registry system in Iran (4). While cervical cancer is not among the first five cancers regarding incidence rate in Iranian women (5), the mortality-to-incidence ratio is very high (about 42%) (4). The main reason for this is cervical cancer diagnosis at advanced stages in Iran (6). Additionally, the trend of cervical cancer incidence is increasing in Iran, unlike some other countries such as USA and Australia (7, 8).

Human papillomavirus (HPV) is the most significant risk factor for cervical cancer, particularly genotypes 16 and 18. The prevalence of HPV infection among women with normal cervical cytology was reported as 9.9% in 2019. The highest and lowest HPV prevalence in these women were in Oceania (30.9%) and Asia (9.4%), respectively. The age distribution of HPV infection indicated that the highest frequency is in teenagers in the world (9).

The prevalence of HPV infection among women aged 15-59 years old is estimated at 2.4% in Iran, and the highest frequency of HPV is in the age group of 25-34 years old. The prevalence of high and medium-risk genotypes is estimated at 3%, and the prevalence of low risk genotypes is estimated at 2.1% in Iran (10).

HPV vaccination plays an effective role in reducing the incidence of cervical cancer. countries with high vaccination coverage have reported a 73-85% decrease in the prevalence of HPV and 41-57% decrease in high-grade cervical cancer (11). Other important cofactors include experiencing the first intercourse at a young age, having multiple sexual partners, contracting sexually transmitted infections, multiparity, smoking, long-term use of oral contraceptives, and immunodeficiency (1).

Due to the slow growth of this cancer, the pre-cancerous stages could last 10-20 years, providing an ideal opportunity for screening interventions, and women aged 30-40 years old are more at risk of pre-cancerous lesions (12).

According to World Health Organization (WHO) recommendation, Pap smear screening should be performed every 3 to 5 years, and HPV test should be performed every 5 years among women aged 30-49 years old (1). Performing Pap smear test in the first three years of the start of screening has reduced prevalence and mortality by 70% in developing countries. Thus, Pap smear test is the most accessible and practical tool to prevent cervical cancer (12, 13). Also, randomized controlled trials have shown that HPV-based tests are very effective in detecting cervical precancerous lesions (11). However, about half of cervical cancer cases have no history of screening (14).

According to a report in 2020 it was estimated that the lifetime prevalence of cervical cancer screening among women aged 30 - 49 years was 43.6% in the world (16.9% in sub-Saharan Africa to 84.6% in Latin America) (15). Also, the lifetime prevalence of cervical cancer screening among women aged 30 - 59 years was 52.1% in Iran in2016 (7.6% in Sistan and Baluchestan to 61.2% in Isfahan) (16). The lack of knowledge and awareness of cervical cancer, the high cost of Pap smear tests, lack of privacy in healthcare facilities, feeling embarrassed during the examination, lack of time, lack of recommendation by doctors, fear of a positive test result, lack of a fixed program for screening, limited access to health services, lack of health system resources, and limited information about cervical cancer are the most important obstacles for cervical cancer screening (17-20).

The Health Belief Model (HBM) could be used to better understand how women decide to participate in screening. This model has a comprehensive and extensive role in disease prevention and emphasizes people's motivation and performance. According to this model, a person who participates in preventive interventions should first perceive the risk of cancer (perceived susceptibility) and, then, the importance of this risk and its numerous complications in physical, psychological, and socioeconomic dimensions (perceived seriousness). The incentives that a person receives from their surrounding environment are an effective factor in creating motivation (health motivation). Believing the applicability and positivity of participating in screening (perceived benefits) and The absence of more costly factors than the benefits (perceived barriers) is the final stage in the person's performance in the preventive behavior (13, 21).

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The low participation rate in cervical cancer screening programs in Iranian women leads to the diagnosis of this cancer in advanced stages. It is necessary to identify the predictive factors of participation in screening programs for this cancer. Therefore, the present study was designed to determine the prevalence and predictive factors of cervical cancer screening in the city of Kerman, Iran.

2. MATERIALS AND METHODS

2.1. Participants and Data

This cross-sectional study was conducted on women referring to primary health care centers and the maternity ward of Afzalipur Hospital in the city of Kerman in 2022. The inclusion criterion was women aged 21-65 years old. The exclusion criteria were being single, having a history of cervical cancer, having a history of precancerous disorders and cervical cell changes, having a history of high-risk positive HPV, having a mental illness or physical disability and lack of consent to participate in the study. The sample size was calculated as 400 individuals based on Karimi et al.'s study (22) and using the population mean estimation formula and considering the standard deviation of 0.88, confidence interval of 95% and margin of error of 0.09. The participants were selected using non-probability convenience sampling method. The women were interviewed considering the inclusion and exclusion criteria.

2.2. Instrument

The data were collected using the Health Belief Model questionnaire used in Aldohaian et al.'s study (12) and the validity and reliability of the Persian version of which were evaluated by the researchers. This questionnaire consisted of four parts. The first part included 6 items about person's knowledge and practice regarding Pap smear test. The second part contained 3 items related to person's knowledge and practice regarding HPV vaccine uptake. The third part consisted of 38 items related to the person's beliefs about cervical cancer screening based on HBM, including perceived susceptibility (3 items), perceived seriousness (7 items), perceived barriers (17 items), perceived benefits (8 items) and health motivation (3 items). All the items were evaluated based on a 5-point Likert scale, ranging from completely disagree to completely agree (1= completely disagree, 2=disagree, 3=not sure, 4=agree, 5= completely agree). The minimum scores of perceived susceptibility, perceived seriousness, perceived barriers, perceived benefits and health motivation were 3, 7, 17, 8 and 3, respectively, and the maximum scores of these domains were 15, 35, 85, 40 and 15, respectively. The fourth part included 8 items related to demographic data about age, educational level, marital status, marriage age, marriage period, socioeconomic status, number of children and employment status.

2.3. Validation of questionnaire

The questionnaire was translated in order to design its Persian version. The English questionnaire was first translated into Persian by a person who was fluent in this language and an expert in the field of health. Then, the Persian questionnaire was retranslated into English by another proficient translator. The translation quality was examined by an experienced group in the field of health. In cases where there was inconsistency between the translations, alternative words were suggested. The questionnaires were tested by a number of people in the target population in order to examine if they have the same understanding of the items. The questionnaire translation was finalized by making necessary modifications.

To evaluate the questionnaire validity, qualitative content validity and construct validity were used. Face-to-face interviews were performed with a number of experts in the field of women's health and prevention to examine content validity, and each item was discussed. The necessary modifications were made and the questionnaire content validity was confirmed.

The construct validity of the questionnaire was checked using confirmatory factor analysis (CFA) as one of the most important methods for evaluating construct validity (23, 24). The factorial construct of the questionnaire is confirmed when the fit indices of the CFA model follow the below requirements: root mean square error of approximation (RMSEA) <0.06, comparative fit index (CFI) > 0.90, Tucker-Lewis index (TLI) > 0.90, and the chi-square ratio to the degree of freedom ($\frac{\chi^2}{df}$) < 2 (25). Confirmatory factor analysis was performed using AMOS-24 (analysis of moment structures) software and the maximum likelihood method (26).

2.4. Data Analysis

After collecting the data, the questionnaires with more than 10% unanswered items were excluded from the study. The data were entered into SPSS 22.0. The data were analyzed using univariate and multivariate logistic regression analysis. The statistical significance level was considered 0.05.

3. RESULTS

The CFA results showed that the 5-factor construct of the questionnaire with 38 items has a good fit for the model.

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The evaluation indices after modeling showed a significant correlation between the related statements indicating that the evaluation indices of the model (RMSEA = 0.042, CFI = 0.92, TLI = 0.91, and $\frac{\chi^2}{df}$ = 1.667) has met the required standards. The $\frac{\chi^2}{df}$ value was equal to 1.667, which was smaller than 2, and RMSEA was equal to 0.042, which was smaller than 0.06. Besides, the CFI and TLI values, which should be greater than 0.90, were 0.92 and 0.91, respectively, and thus were acceptable for the current model (**Figure 1**).

Cronbach's alpha of perceived susceptibility, perceived seriousness, perceived barriers, health motivation and perceived benefits were calculated as 0.80, 0.86, 0.85, 0.71 and 0.81, respectively. Also, Cronbach's alpha of total questionnaire was calculated as 0.81.

Out of 400 questionnaires, 372 were examined (response rate: 93%). **Table 1** presents the participants' characteristics. The mean (± standard deviation) age of the participants was 36.3(± 9.5) years old. The majorities of participants had academic education (44.8%), a middle socioeconomic status (62.2%) and were married (93.6%) and housewives (61.3%). **Figure 2** presents 73.9% of the participants had knowledge about Pap smear test, and healthcare workers played the most important role in informing them about Pap smear (76.7%). More than two-thirds (68%) of women regarded pap smear as the primary test for cervical cancer screening. Only 18% of the participants did not consider cervical cancer as the most prevalent type of cancer among women, and 14.8% of the participants considered the appropriate age for cervical cancer screening to be 21-29 years old. About half of the participants (51%) reported that they have performed Pap smear test.

As presented in **Figure 3**, only 3% of the participants had received HPV vaccine. The participants reported lack of sufficient information as the main reason for not receiving the vaccine (79.2%). Only 7.8% of the participants considered the appropriate age for vaccination as 18 years old and below.

As presented in **Table 2**, the participants' mean scores in perceived susceptibility, perceived seriousness, perceived barriers, perceived benefits and health motivation were 7.5, 22.7, 39.6, 34.1 and 10.8, respectively.

Results of the multiple logistic regression model presented in **Table 3**. According to results of the univariate logistic regression analysis, the odds of performing Pap smear test increased by 1.09 times with every year increase in age (P<0.001). Moreover, the odds of performing Pap smear test increased by 1.32 times with each more child (P = 0.001). The odds of taking the test increased by 1.05 and 1.06 times with every year increase in marriage age (P=0.046) and marriage period (P=0.001), respectively. Women with a poor family socioeconomic status were 0.46 times more likely to perform Pap smear test compared to those with a good family economic status (P=0.02). The odds of taking the test increased by 1.10 and 1.15 times with each unit increase in the perceived benefit (P=0.001) and health motivation (P=0.001) scores, respectively. The odds of doing the test decreased by 0.92 times with each unit increase in the perceived barrier score (P<0.001).

The multivariate logistic regression analysis results showed age, perceived seriousness and perceived barriers were significantly correlated with performing Pap smear test. The odds of performing Pap smear increased by 1.09 times with every year increase in age (P<0.001). The odds of taking the test increased by 1.05 times with each unit increase in the perceived seriousness score (P= 0.006). The odds of taking the test decreased by 0.90 times with each unit increase in the perceived barrier score (P < 0.001).

4. DISCUSSION

The results indicated that 51.3% of the participants had a history of Pap smear test during their lifetime. The prevalence of cervical cancer screening by Pap smear test varies in different countries, ranging from about 19% and 63% in underdeveloped and developed countries (27). Results of other studies have revealed that the prevalence of Pap smear screening varies from 15.5% in Ethiopia to 93% in the United States (28, 29). In Iran's neighboring countries, the prevalence of Pap smear screening is reported to be 26% and 31.3% in Saudi Arabia and Turkey (12, 30). The prevalence of Pap smear screening varies in different regions of Iran and it is reported as 28.5%, 32% and 54.5% in Birjand, Zarandieh and Asad Abad, respectively (6, 31, 32). Although the prevalence of Pap smear screening in the city of Kerman is higher than in many regions of Iran, it is not optimal. The difference in the prevalence of Pap smear screening in different regions of the world and Iran could be attributed to factors such as access to screening services, women's level of awareness, attitudes and beliefs, and cultural issues of different societies.

In this study, only 3% of the participants had received the HPV vaccine. Global HPV vaccination coverage was estimated at 12.2% in 2018 (33), and only 13% of girls worldwide are fully protected against HPV infection in 2021 (34). The evidence shows disparities in HPV vaccination coverage between and within countries (35). Our results indicated HPV vaccination coverage was lower than that of many developing countries, and the participants reported a lack of sufficient information in this field as the most

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Table 1. Socio-demographic characteristics of participants (n = 372)

Variable	Mean (SD)/ Range / N (%)
Age (year)	
Mean ± SD	36.3 ± 9.5
Range (Min. – Max.)	21-63
Number of children	
Mean ± SD	1.7±1.3
Range (Min. – Max.)	0-8
Age at marriage (year)	
Mean ± SD	21.6±4.3
Range (Min. – Max.)	12-43
Marriage duration (year)	
Mean ± SD	15.1±10
Range (Min. – Max.)	1-50
Marital status	
Married	336 (93.6)
Divorced/ Widow	23 (6.4)
Level of education	
Under diploma	65 (17.7)
Diploma	138 (37.5)
University	165 (44.8)
Employment status	
Employed	142 (38.7)
Housewife	228 (61.3)
Socioeconomic status	
Low	56 (15.1)
Middle	230 (62.2)
High	84 (22.7)

Data are presented as mean ± standard deviation (SD) or Range (Min. – Max.) or frequency (%).

important reason. It seems that other factors such as the high cost of vaccination and lack of sufficient access to the vaccine are other important barriers to HPV vaccination in Iran.

In the present study, 73.9% of the participants stated that they had information about the Pap smear tests, and healthcare workers were the main source of information. In the study conducted by Aldohaian et al. (2018) in Saudi Arabia, it was found that 48.7% of the participants had sufficient information about Pap smear test and health professionals were the main source of information (12). Sharifi et al. (2016) indicated 68.8% of the participants had performed Pap smear test upon the recommendation of a doctor and midwife (32), which was consistent with our study. Although most of the participants stated that they had information about the Pap smear test, the correct response rate to the questions about this issue was low. It seems that educational programs about cervical cancer screening are not sufficient and comprehensive in Iran.

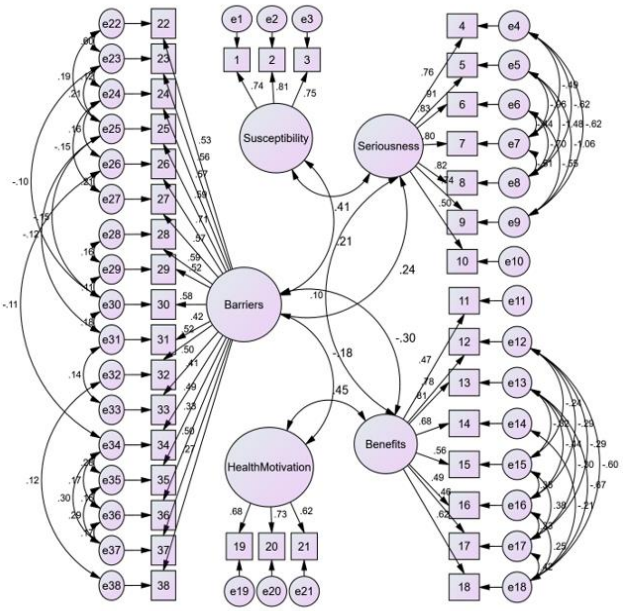

Figure 1. Confirmatory factor analysis for construct validity.

The results showed among different domains of the health belief model, the minimum mean score was related to perceived susceptibility and barriers, and the maximum mean score was related to perceived seriousness and health motivation, which was consistent with the results of other studies in this field. Mahdavifar et al. conducted a study in Bandar Abbas and reported that the mean scores of perceived susceptibility and barriers were lower than those of other components of the model (36). In the study by Aldohaian et al. in Saudi Arabia, it was found that the perceived susceptibility had the lowest score among the model domains (12). Lack of knowledge and awareness about cervical cancer among participants was the most important reason for their low susceptibility in this study. Therefore, health systems should conduct more effective educational interventions related to the risk of cervical cancer and its complications as well as screening benefits.

The results showed that older age, higher perceived seriousness, and lower perceived barriers were associated with the increased odds of undergoing Pap smear test. Our findings were similar to the results of other studies conducted based on HBM. Results of study by Miri et al. in Birjand, Iran indicated perceived benefits, perceived barriers and self-efficacy were predictors of cervical cancer screening (6). The study conducted by Mahdavifar et al. in Bandar Abbas, Iran showed that there is a significant correlation between the perceived barriers and benefits with performing a Pap smear test (36). Chisale et al. (2017) conducted a study in South Africa and found that older age, higher perceived seriousness and lower perceived barriers were the most

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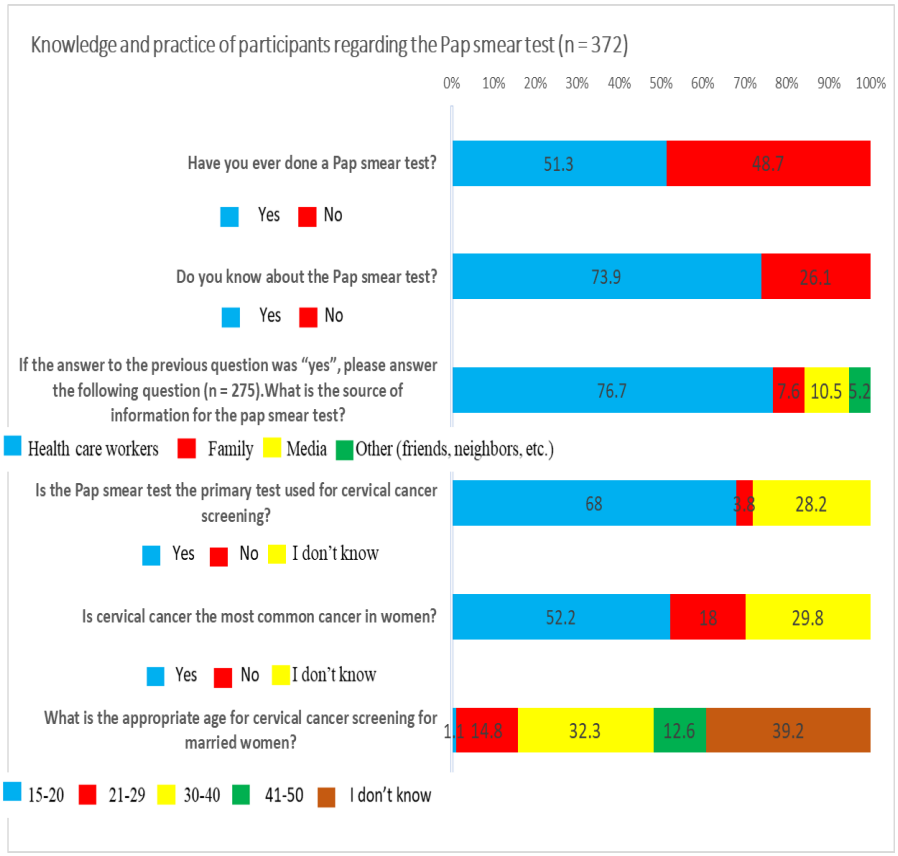

Figure 2. Knowledge and practice of participants regarding the Pap smear test (n = 372).

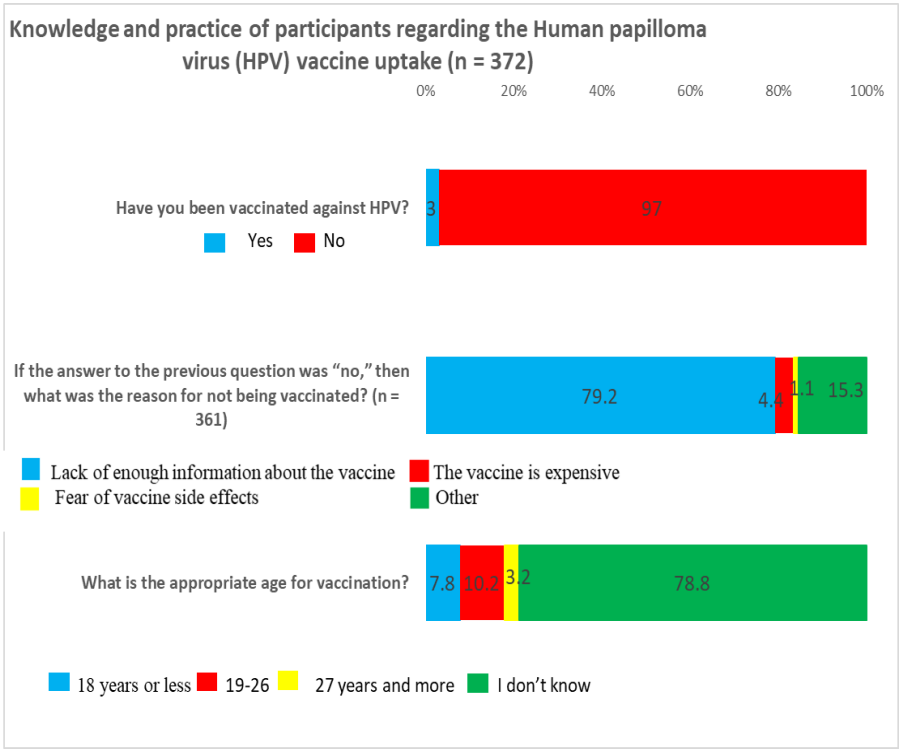

Figure 3. Knowledge and practice of participants regarding the Human papilloma virus (HPV) vaccine uptake (n = 372).

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Table 2. Health Belief Model construct scores (n = 372)

Variable	Mean ± SD	Range (Min. – Max.)
Susceptibility (to cervical cancer)	7.5±2.4	3-15
Seriousness (of cervical cancer)	22.7±6.6	7-35
Benefits (of the Pap smear test)	34.1±4.3	12-40
Health Motivation	10.8±2.4	3-15
Barriers (to undergoing a Pap smear test)	39.6±11.2	17-79

important predictors of performing Pap smear test (21). Yanikkerem et al. (2018) conducted a study in Turkey and indicated a higher level of awareness, lower perceived barriers and higher perceived benefits could increase the chance of performing Pap smear test (30). It seems that older women have a more positive attitude toward cervical cancer screening, which leads to an increased chance of having a Pap smear test. In this study, perceived barriers were identified as the most important predictors of performing Pap smear test. It seems that lack of money and time, lack of enough information and cultural problems as the most important barriers to performing cervical cancer screening.

The appropriate sample size and tools are the most important strengths of this study. Our research had weaknesses such as using convenience sampling method and selecting women from primary healthcare centers, which limited generalizability of results. It is recommended further studies be conducted in this field using a stronger sampling method based on the population to increase generalizability of results. Moreover, it is suggested to design and implement a study in this field in order to determine the frequency of HPV infection as the most important risk factor for cervical cancer in Iran.

5. CONCLUSION

This study showed that the prevalence of Pap smear test is not optimal and HPV vaccination coverage and the level of women's knowledge about cervical cancer prevention are low in the city of Kerman. Also, our findings indicated that older age, higher perceived seriousness and lower perceived barriers were associated with increased odds of performing Pap smear test and lack of knowledge was one of the most important barriers to Pap smear screening and HPV vaccination. It is recommended to design and implement interventions for increasing women's awareness of cervical cancer prevention methods. Moreover, it is suggested that Pap smear and HPV test cost be covered by the health system and HPV vaccination be included in the national vaccine program in Iran.

Table 3: Multiple logistic regression analysis for predictor variables of undergoing Pap smear test

Variables	Crude OR (95% CI)	P-value	Adjusted OR (95% CI)	P-value
Age	1.09 (1.06, 1.12)	< 0.001	1.09 (1.06, 1.12)	< 0.001
Number of children	1.32 (1.12-1.56)	0.001		
Age at marriage	1.05 (1.00-1.10)	0.046		
Marriage duration	1.06 (1.03-1.09)	< 0.001		
Educational level				
Under diploma	0.97 (0.54-1.72)	0.919		
Diploma	1.02 (0.65-1.61)	0.909		
University	1			
Socioeconomic status				
Low	0.46 (0.23-0.92)	0.028		
Middle	0.779 (0.47-1.29)	0.333		
High	1			
Employment status				
Employed	0.836 (0.54-1.27)	0.406		
Housewife	1			
Marital status				
Married	0.867 (0.37-2.03)	0.742		
Divorced/ Widow	1			
Susceptibility	1 (0.92-1.08)	0.999		
Seriousness	1.01 (0.98-1.4)	0.416	1.05 (1.01-1.10)	0.006
Benefits	1.10 (1.05-1.16)	< 0.001		
Health motivation	1.15 (1.05-1.25)	0.001		
Barriers	0.92 (0.90-0.94)	< 0.001	0.90 (0.87-0.92)	< 0.001

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Conflict of interest

The authors declare that they have no conflict of interests.

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