Tabari Biomedical Student Research Journal

OPEN ACCESS

REVIEW: A Systematic Review on Interventions Affecting Parents' Knowledge and Attitudes about HPV Vaccine

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ARTICLE INFO

Submitted: 18 Jun 2022
Accepted: 10 Sep 2022
Published: 11 Dec 2022

Keywords:
Attitude;
HPV;
Knowledge;
Parents;
Vaccine

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Citation:
Hamzehgardashi Z, Keshavarz Z, Fakhri M, Nasiri M, Hoseinnezhad SZ, Shasti L. A Systematic Review on Interventions Affecting Parents' Knowledge and Attitudes about HPV Vaccine. Tabari Biomed Stu Res J. 2022;4(4):36-47.

doi 10.32598/tbsrj.v4i4.10521

ABSTRACT

Introduction: HPV is one of the most common sexually transmitted infections. The Gardasil vaccine can act as a prophylactic against the virus. Since parents are very important in adolescents 'decisions, this study is a review of interventions affecting parents' knowledge and attitudes about HPV vaccine through a systematic review method.

Material and Methods: This study was conducted in 2022 with steps, designing a study question, identifying related studies from 2005 to 2022. Selecting studies out of 818 studies, 10 articles were selected to announce the results and then the data were classified. The relevant search was performed in the available databases. The keywords were selected based on the mesh according to the text.

Results: A total of 10 experimental and quasi-experimental studies were reviewed. The results of these studies were divided into four categories according to the type of intervention and the statistical population in the intervention group located in each study: face-to-face group education, virtual group education, community-based education, and intervention based on health belief model. Eight studies were conducted in the face-to-face and virtual group education category. In the community-based education category, the interventions were performed virtually and there is a study. The other category, which was related to the health belief model, also changed the knowledge and attitude of parents.

Conclusion: The results showed that interventions for parents are effective in vaccination and changes in knowledge and attitude. Therefore, it is recommended that different methods of educational intervention be used to encourage parents to get the HPV vaccine for their adolescents.

Introduction

Human papillomavirus (HPV) is the most common sexually transmitted infection around the world (1). Although most types of infections are transient and go away on their own, but, some of them may persist and lead to serious consequences such as cervical cancer and anogenital warts (2). HPVs are classified into low-risk and high-risk groups according to their type of oncogenic pathogenesis. The most common low-risk types are HPV 6, 11 and the high-risk types are HPV 16, 18, both

of which, in the high-risk group, lead to cancers of the cervix, vagina, anus, vulva, and penis in men, throat, Mouth and possibly skin and lungs (3-6). The virus is prevalent among young and sexually active people. Approximately 75 to 80% of sexually active people become infected with the virus (6). HPV infects 14 million people each year, most of them adolescents (7). The global prevalence of HPV in women is estimated at 11.7% with normal cytological findings (8). Also, the prevalence of this virus among healthy Iranian women is 9.4% and in women with cervical infection is about 38.6% (9). 5% of the world's cancer burden is estimated to be HPV (11, 10). The World Health Organization also estimates that, by 2030, worldwide, cervical cancer will cause 474,000 women deaths per year, 95% of which will be in low- and middle-income countries (12, 13). Although cervical cancer is preventable, more than 500,000 women worldwide are diagnosed with the disease each year, and more than 250,000 women die. The death rate of this type of cancer in Iran is 370 people per year. The incidence of this disease in Iran is 1.78 per 100,000 women (14), which is a huge statistic that indicates the lack of awareness of adolescents and women about the dangers of this disease. Prevention is the most effective and cost-effective mechanism for reducing the prevalence of HPV infection (14). There are several ways to prevent getting the virus. Restraint, not having sex with multiple partners, using condoms are some of the things that can be used to prevent getting the virus. However, it should be noted that none of these ways are definitive and only reduce the risk of disease. One way to prevent the first level is to use the HPV vaccine. It is now possible to prevent HPV by immunizing adolescents and young adults against high-risk types of HPV by vaccination (12). One of the factors influencing adolescents' use of HPV vaccine is their parents (15). Parental permission is required to achieve a high rate of vaccination (16). Lack of parental knowledge and information about HPV is a common reason for not vaccinating their children (17). Parents' attitudes toward vaccines depend on their knowledge of the seriousness of the disease, their understanding of vaccines, and having a health care provider as a source of information (19, 18). In most cases, the decision to vaccinate adolescents is made by the parents. Therefore, the decision to approve HPV vaccination is related to the attitude and awareness of the parent (20). According to the searches, parent-based interventions have been performed to change their knowledge and attitudes about HPV vaccine. Examination of these interventions shows the effect of education on raising awareness about HPV and the vaccine. Also, in some studies, the intervention has ultimately led to an increase in the decision to inject the HPV vaccine. So that this decision was three times more in the parents who were educated than in the group without education (21). In another study, the effect of educational intervention on fathers' intention to vaccinate their daughters showed that educating fathers will increase father participation in family decisions, especially daughter vaccination, and this intervention will increase the chances of daughters being vaccinated (22). Another study found that the effect of educating parents on the risks and benefits of HPV vaccine is high in their awareness, which increases their awareness to make informed decisions about the types of vaccines that can have a profound effect on their child health (16). Systematic review studies are designed to enable researchers, managers, and policymakers to use this type of study to examine the effects of health interventions and to make informed decisions. A systematic review study is considered as one of the ways to overcome inconsistencies. Because it brings together a collection of related research and allows readers to simultaneously consider the results of multiple studies on a subject and be able to make better decisions (24). Despite the great importance of HPV vaccine in the health of adolescent girls and boys, the promotion of community health, the high efficiency of studies in answering the questions raised in

the clinic, as well as conducting a study with systematic review design and collecting studies and classifying them in one study it received less attention. Given the available resources, a systematic review study has not yet been conducted to review interventions affecting parents' knowledge and attitudes about the HPV vaccine in a systematic manner. Therefore, due to the information gap in this field, the present study was conducted to review interventions affecting parents' knowledge and attitudes about HPV vaccine.

Methods

Information resources

This study was of a systematic review. The research community included all scholarly articles, interventions in the field of knowledge, parents' attitudes towards the use of HPV vaccine in the world, which are indexed in one of the databases. Researchers searched the International Information Databases of Web of Science, Scopus, PubMed, EMBASE, and the Cochrane library, as well as Persian-language databases such as the Mag-Iran Database, the Scientific Information Database, the Scientific Information Database, Iran Information Technology (Iran Doc), and the Barakat Knowledge Broadcasting System (Iran MEDEX), as well as the Iranian Registry of Clinical Trials (IRCT). All articles were reviewed by two independent researchers at the time of search. Also, in case of any disagreement, the final decision was made by the third researcher.

To find related articles in English-language databases, keywords were selected based on Mesh and pop included «Knowledge», «Gardasil» and "Clinical trial" and "Intervention study" combined with Boolean and "OR" operators. Keywords used for searching in Persian sites, including the combination of the following terms in both singular and plural forms: "adolescent", "adult", "knowledge", "Gardasil", "attitude", "awareness", "papilloma virus vaccine", "parents", "educational intervention". In order to preserve all valuable data, no time limit was considered and all relevant articles published up to March 30, 2022 were evaluated. In order to achieve the maximum degree of comprehensiveness of the search, all final articles related to the topic under consideration were manually selected by hand in order to find other possible sources.

(Knowledge OR Science OR wisdom OR learning OR scholarship OR lore OR kenning) AND (attitude OR theory) AND interventions AND vaccine AND genital warts AND papilloma virus AND information AND knowledge AND effective factors AND (Gardasil OR HPV vaccines OR Papillomavirus vaccines) AND (Clinical trial OR Intervention study) AND (Parents OR mothers OR fathers).

Study selection

The steps in this process were as follows: 818 articles were extracted and entered into EndNote software by first searching databases related to other sources, and then 796 duplicate articles were removed using this software and the title of the abstract was reviewed for 232 articles. Then, 212 articles were deleted due to irrelevance for the purpose of research and then, the full text of the remaining articles from the previous stages was read and finally 10 articles were selected to be presented in the results. In order to reduce the bias in the selection of the study, the two authors separately selected 10 articles that were eligible for the study. The selection and quality of articles were reviewed using the relevant Quality Assessment Tool (Cochrane), and the method of discussion to reach out to the public and the external arbitrator in case of any discrepancy in the scores was announced. Finally, in case of non-entry of articles, the reasons were recorded (23-25). Endnote information resource management software was used to organize the studies. Inclusion criteria included articles published in English and Persian in the form of randomized, non-randomized clinical trials, as well as quasi-experimental articles comparing the results of previous and subsequent research units. The

educational interventions were designed to enhance parents 'knowledge and writing, and ultimately, the outcome of the study was measured by measuring adolescents' knowledge and attitudes about the HPV vaccine. Review articles and letters to the editor were not selected due to the lack of use of primary data. The exclusion criteria from the present study were due to the lack of access to the full text of the article. After careful study of the titles and abstracts of the articles that met the inclusion criteria by the researcher, a large number of them were omitted because they were not relevant to the purpose of the study. A bibliography of articles was also searched to ensure the complete recovery of all documents. After completing the article search, 10 final articles were selected based on the flowchart (***Figure 1***).

Quality assessment

To evaluate the quality of articles, the studies included in the systematic study in terms of selection bias (random sequence generation and allocation concealment), implementation bias (participant cursing and exemplary evaluators), scrutiny (analysis) post-randomization study, selective report bias, consequences, and other biases were investigated. For this purpose, the Risk of bias tool of the Cochrane group was used (1). Based on these tools, article quality was obtained in three categories: "High", "Low" and "Unclear". ***Table 1*** shows the quality assessment of the articles (23-25).

Data Extraction

Finally, to extract data from the text of these articles, two researchers by using a research form, extracted independently information such as the characteristics of all articles, the location of the research, the number of samples and the type of work involved in the research group, with the knowledge and attitude of parents in the use of HPV vaccine and the authors' conclusions were (***Table 2***).

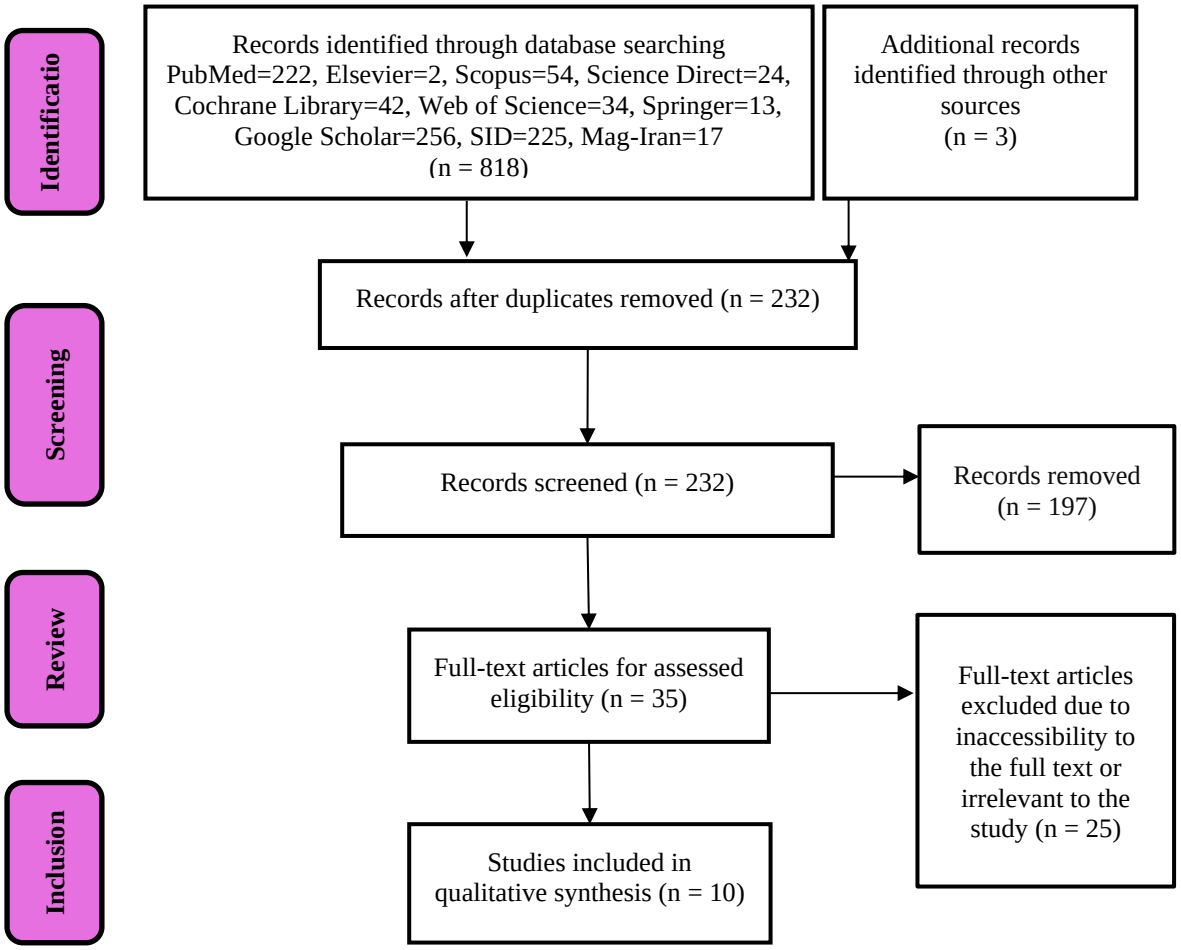

Figure 1. The process of selecting and reviewing relevant studies

Results

Participants

Participants in all studies were parents. The age range of the participants was 34-50 years and their adolescents were from 9 to 24 years old. In this part, according to the intervention in their research and the statistical population, the studies were divided into four categories: face-to-face group education, virtual group education, community-based education, and intervention based on the health belief model.

Intervention based on health belief model

According to Kessel and Cobb, a health behavior is a behavior that is performed with the aim of preventing a disease (26). According to Matarazzo, such behaviors reduce behavioral pathogens and increase behavioral immunogens (27). The variables that affect the acceptance of health behaviors are social context, symptom perception, emotional states and health-related beliefs (28). The Health Belief Model was proposed by Becker and Mayman in 1974. These authors formulated this model, however, around the 1950s, a group of social psychologists in North America had already formulated the first hypotheses and used them to justify public non-participation in early detection and disease prevention programs (29). This model shows that a person's tendency to adopt a health behavior is determined by two factors: perceived disease susceptibility and perceived severity of disease outcome (30). In this study, the intervention in an article was based on the HBM model. Krawczyk et al. Showed that after the educational intervention, the knowledge score relative to the HPV vaccine in the intervention group increased significantly compared to the two control groups, but the effect of these interventions was less (31). Krawczyk et al. also stated that people's beliefs and attitudes have changed after educational intervention, and that the desire to get vaccinated in these people has increased over time (31). Although there was an increase in parents' knowledge scores and attitudes after the educational intervention, but this was not the difference between the parents. And the knowledge that "HPV vaccine can prevent cervical cancer" was significantly associated with the intention of HPV vaccination in parents (31).

Community-based education

An educational program that is done in the context of society and outside the third level and specialized levels is called community-based education. In this study, the intervention in an article was based on a community-based learning model. Spleen et al., In their study, concluded that with the intervention of education through community-based education, the level of knowledge and awareness of parents about the HPV vaccine increases significantly after the intervention compared to the previous one (32). They found that, after the educational intervention, 2.8% of the people were familiar with the HPV vaccine and had information about it, and about 2.8% of the people after the intervention, compared to the control group (2.7%) had a positive attitude towards the vaccine and were inclined to carry out the vaccination (32).

Virtual group training

Training courses are available in the form of video conferencing and live lectures on cyberspace, and all the rules of group training that are implemented virtually in them are called virtual group training. Learners participate in discussions, publish their opinions and are redirected to hyperlinks to other pages. It means that learners sit at home and have easy access to educational articles, pamphlets, and content, without having to leave home and go to school (33). The interventions were presented in two articles in the form of virtual group training. In a quasi-experimental study by Dempsey et al., an educational intervention via Facebook showed that an oral cancer prevention training program could be effective. Also, the method of discussion via Facebook was more effective than face-to-face discussion; Knowledge and attitudes toward HPV

vaccine have increased significantly over time (33). Dempsey et al., in their study, showed that 1.5% of people after the intervention were inclined to get the HPV vaccine; Knowledge and attitudes toward papilloma virus, HPV vaccine and cervical cancer were significantly higher in the immediate case group after the intervention. However, one year after the intervention, the effectiveness of the intervention decreased, but remained (33). Miyoshi et al. went on a good web-based study. After the study, they showed a significant increase in knowledge and a positive attitude towards the vaccine after the intervention in the parents (34).

Face-to-face group training

The group training method is a training that is measured and regular on a specific topic that is the common goal of the participants. This method is applicable to classes with a population of 6 to 20 people. Group teaching method is a method that gives participants the opportunity to share their thoughts, ideas and experiences with others and to express their thoughts with reasons (35, 36). Face-to-face group training was performed in six studies. In a study by Kennedy et al., providing an educational booklet to individuals and conducting a pre-test before reading the booklet led to an increase in the level of knowledge and awareness about the HPV vaccine (37). Sitaresmi et al., in their study, presented a standard training booklet to the intervention group and a standard training booklet, along with numerical statistics on the risk of cervical cancer, and the effects of HPV vaccination. There was no significant difference between the case and the control group, but their knowledge of the risk increases relative to HPV in the case group (36). Dixon et al. Reported that knowledge and attitudes toward HPV vaccination increased in both intervention groups. However, the group of individuals who received the formatted messages about the costs of not performing the treatment (vaccination); Ratio to the group that received the formatted messages about the benefits of the behavior; They paid more attention to health education and were more concerned about their sexual health (38). In a study by Cox et al., the findings showed that girls who had watched the educational film, relative to those who did not observe, they had a significant positive attitude and intended to vaccinate (39). Kepka et al. concluded that over time, the web-based educational intervention group had significantly more knowledge and a more positive attitude toward the HPV vaccine. There were also gender differences in response to the intervention; as the increase in awareness and knowledge of HPV was greater in men; however, changes in attitudes toward vaccination were greater in women (35). In a clinical trial of mothers with their daughters, Obulaney et al. found that providing educational intervention for parents with their children could change their attitudes and knowledge and be effective in vaccinating them (40).

Discussion

The present study aimed to investigate the effects of educational interventions on parents' knowledge and attitudes about human papillomavirus vaccine in a systematic manner. The findings of the present study showed that the educational interventions were based on the HBM model, community-based interventions and other educational interventions. The health belief model is a common pattern for conducting health interventions (26). This model has been frequently used to study health behaviors, design, educational intervention, and evaluate them, especially in the areas of reproductive health programs such as AIDS prevention programs, promoting condom use, adolescent health, and so on. The results of the present review study showed that all types of educational interventions based on the HBM model led to an increase in knowledge, attitudes, or both in relation to the HPV vaccine. And as the individual's knowledge and attitudes increase and the sensitivity, benefits, and barriers perceived by individuals increase, the last structure of this

Table 1. Risk assessment of the included studies

1st author (Reference no.)	Adequate sequence generation (Selection Bias)	Allocation concealment (Selection Bias)	Blinding of participants and personnel (Performance Bias)	Blinding of outcome assessment (Detection Bias)	Incomplete outcome data addressed (Attrition Bias)	Selective reporting for all outcomes Reporting Bias	Other risk of bias
Dempsey (33)	H	H	H	H	L	UN	L
Miyoshi (34)	L	H	H	L	L	UN	L
Spleen (32)	L	L	H	L	L	UN	UN
Kepka (35)	H	H	H	H	L	UN	UN
Krawczyk (31)	H	H	H	H	L	UN	L
Sitaresmi (36)	H	H	H	H	L	UN	L
Kennedy (37)	H	H	H	H	L	UN	L
Dixon (38)	H	L	H	H	L	UN	L
Cox (39)	L	L	H	L	L	UN	L
Obulaney (40)	L	L	H	L	L	UN	L

L: low risk of bias; UN: unclear risk of bias H: high risk of bias

Table 2. Studies related to the knowledge and attitude of adolescent parents regarding HPV vaccine

1st author	Country	Type of study	Sample size	Intervention	Examined variables	Tool	Findings
Cox (39)	America	Clinical trial	471	Education	Mothers of teenage girls 11 to 17 years old	Researcher made	The first variable was the intention of mothers to receive the HPV vaccine, which increased significantly Secondary variable: mothers' perceptions of the risks of HPV increased significantly
Dempsey (33)	Washington	semi experimental	1600	Presence	The parents had children aged 8 to 12	Researcher made	Parental information about HPV and Gardasil vaccine has increased significantly
Miyoshi (34)	Japan	semi experimental	1648	Web-based training	Fathers of teenage girls 13 to 18	Researcher made	The percentage of fathers' chances of getting their daughters vaccinated and their understanding and information increased significantly
Spleen (32)	America	Clinical trial	117	Web-based training	Parents of girls 9 to 17 years old	Vaccine Attitude Questionnaire	Attitudes of girls' parents towards HPV vaccine changed by 35% and became positive, and their intention to get vaccinated also increased significantly.
Kepka (35)	Spain	semi experimental	88	Community-based education	Parents of girls 9 to 17 years old	HPV	The intention of parents to get vaccinated also increased significantly in them
Obulaney (40)	Texas	Clinical trial	41	Education	Mothers and their daughters (9 to 18 years old)	Researcher made	The knowledge and intent of their mothers and daughters had changed significantly
Dixon (38)	India	Clinical trial	537	Presence	Parents of teenagers 11 to 18 years old	Researcher made	The intention of parents to get vaccinated also increased significantly in them
Kennedy (37)	America	semi experimental	411	Education	Parents of girls 11 to 18 years old	Researcher made	The knowledge, attitude and intention of trained parents were significantly increased in relation to the HPV vaccine
Sitaresmi (36)	Indonesia	semi experimental	506	Presence	Adolescent parents 11 to 12 years old	Researcher made	Parents' awareness, knowledge and understanding of the HPV vaccine has increased and their acceptance for the vaccine has increased.
Krawczyk (31)	Canada	semi experimental	774	Education	Parents of girls 9 to 10 years old	Researcher made	Knowledge score to HPV vaccine was significantly increased in the intervention group compared to the control group

model, the intention to do so in these individuals, increases with time (31). In Krawczyk et al.'s study, it was reported that in both sexes, knowledge, writing, and intent to vaccinate increased after the intervention. But girls were more afraid of pain during vaccination than boys, a fear that could not be alleviated even with education (31). Therefore, HPV education should be gender-based and start at the elementary level for parents; It can be taught to both sexes with parents that HPV is a concern for both women and men, and this training leads to increased awareness and prevention of HPV (30). Also, in the present systematic review study, it was shown that in all related studies, educational interventions in the form of community-based education led to an increase in the level of knowledge, awareness, attitude towards HPV vaccine and the tendency to inject it. In fact, because of the proven effect of community-based education on adolescent sexual behavior, community-based education has been proposed as an effective method for intervention programs to prevent sexually transmitted infections (STIs) with young people; because in community-based education, the presentation of an educational intervention program is done by equal people (38-34).

Community-based education typically includes training and supporting members of a particular group to change members of the same group. Community-based education is often used to bring about changes in knowledge, attitudes, beliefs, and behaviors at the individual level. However, based on the results of a systematic review study aimed at investigating the effect of community-based education on adolescent health promotion in parents, it was concluded that community-based education, knowledge, writing, self-directed adolescents and health behaviors It improves and, as a result, promotes health in them (32). Therefore, due to the presence of parents in the community, easy transfer of information between parents, improvement of communication skills and self-confidence in adolescents as well as low cost and simplicity of this method, this method can be used in health education (adolescents). 33). The results of this review study indicate that, in all relevant studies, educational interventions lead to an increase in the level of knowledge, awareness, writing about the HPV vaccine and the individual's desire to be vaccinated. In fact, the Cervical Cancer Prevention and HPV Vaccine Curriculum was an appropriate tool to meet the basic needs of adolescents, and the promotion of HPV vaccination should be influenced by parental education (33). School is considered as one of the social, adolescent and environmental environments for the implementation of interventions, health and parental gatherings, and educational interventions can be effective in promoting adolescent sexual health and fertility (34). In all studies with different training methods in person or in absentia (virtual), showed that the score of knowledge and attitude towards HPV vaccine and cervical cancer in the intervention group immediately after the intervention was significantly higher. But after one year of the intervention, the effectiveness of the intervention decreases, but still remains (35). It seems that the lack of improvement in health education over a period of one year can be the reason for the decrease in the effectiveness of the intervention. Therefore, it is recommended that short-distance training courses be offered at the school in the presence of parents to ensure the continued effectiveness of ongoing health interventions. Some researchers have achieved this by presenting a standard training booklet to the control group and providing a standard training booklet with numerical statistics on the risks of cervical cancer and the effects of HPV vaccination. Knowledge and writing about vaccine did not differ significantly between the intervention and control groups. But their knowledge of the risk increases relative to HPV in the case group; That is, the knowledge of individuals in the group about the risks of the disease increased (36). Studies have shown that people with a lower level of health literacy

and have little information about the risk of disease, are more vulnerable and their improvement in health literacy is a prerequisite for their informed decision-making in prevention and vaccination (37). Increasing people's knowledge about cervical cancer and the fear of developing it alone can be an important reason for using the HPV vaccine in adolescence (38).

Conclusion

A variety of educational interventions such as the HBM model, the educational model, and community-based interventions can lead to an increase in parents' knowledge and attitudes toward the HPV vaccine. Due to the effectiveness of educational interventions based on the model of health belief and a variety of educational methods and community-based interventions to increase parental knowledge and writing is recommended. This method of interventions for parents should be used to perform vaccinations and increase the safety and health of the community.

Acknowledgments

This project has been done with the financial support of Mazandaran University of Medical Sciences (project code: IR.MAZUMS.REC. 1401.121). The researchers thank the Student Research Committee of Mazandaran University of Medical Sciences for supporting this project.

Conflicts of interest

Authors declare no conflict of interests.

Authors' contributions

All authors have intellectually committed to the study design and process. The final manuscript was revised and accepted by all authors.

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