



## IMPACT OF HEALTH EDUCATION INTERVENTION ON KNOWLEDGE AND PERCEPTION OF CERVICAL CANCER AMONG HIGH SCHOOL GIRLS IN AL-AHSA, SAUDI ARABIA

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### ABSTRACT

**Objectives:** Cervical cancer is the second most common female cancers affecting women worldwide. This study aimed to explore the impact of health education on knowledge and attitude among high school girls in Al-Ahsa, Saudi Arabia and to evaluate the retention rate of knowledge achieved by health education.

**Design and Methods:** An interventional randomized controlled trial conducted in Al-Ahsa during February 2019 to February 2020. The target population was secondary high school girls at 12<sup>th</sup> level. Two private and two public schools were selected. One private and one public school were randomly allocated for the intervention groups by simple randomization method. Three visits were conducted for the intervention groups. During first visit, health educational session was implemented and brochure was distributed, the questionnaire was administered in all visits. Two visits for the control groups, the questionnaire was administered in each visit without any intervention. SPSS was used for data analysis and Chi-square test for the association.

**Results:** A total of 276 Students at 12<sup>th</sup> level participated in the study. Both knowledge and attitude response toward cervical cancer were significantly higher in the intervention groups ( $P < 0.05$ ). No significant differences between second and third visits of the intervention groups for retained knowledge and attitude levels.

**Conclusion:** Health education needs to pay particular attention to promote the health of individuals and society.

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### INTRODUCTION

Cervical cancer is the second most common female malignancy among the top five cancers affecting women worldwide<sup>[1,5]</sup>. In 2018, the incidence rate of cervical cancer estimated around 570 000 new cases. It is the third most common leading cause of mortality worldwide. In less developed countries, more than 311,000 die from cervical cancer every year. Somehow, owing to the lack of proper screening programs<sup>[2]</sup>.

In Saudi Arabian women, cervical cancer incidence is low compared with other western women communities<sup>[3,6]</sup>. Despite that, it is the third most common gynecological malignancy with an estimated incidence rate of 1.9 cases per 100 000 women-years. More than 40% of females diagnosed with cervical cancer are at advanced stages<sup>[4]</sup>. Human papillomavirus (HPV)-16 and (HPV)-18 are the most commonly encountered oncogenic types of HPV as a cause of cervical cancer. However, data recording the prevalence and

genotypic characteristics and distribution of HPV in Saudi are still deficient<sup>[5,3]</sup>.

Infection with HPV accounts for most cervical cancer cases, and it is identified in approximately 95% of cervical cancer. HPV subtypes 16 and 18 were found in about 70% of cases. Most HPV infections are temporary and will spontaneously resolve. However, when HPV infection persists, it will result in the development of precancerous lesions and, eventually, invasive cancer in the cervix<sup>[7]</sup>.

Surgery is the primary treatment for pre-invasive and early-stage disease<sup>[8]</sup>. Once cervical cancer reaches the invasive stages, it becomes a fatal disease. Yet, among the female genital tract cancers, it is the only preventable cancer if detected earlier. Screening with Papanicolaou (Pap) smear can recognize precancerous lesions and early cervical cancer stages. Thus, pap smear allows almost 90% of cervical cancers to be identified, prevented, and managed before progression<sup>[9]</sup>. In developed countries that utilize an intensive cervical cancer screening programs using pap smear test, cervical cancer cases

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and mortality rates have been reduced by approximately 70-80%<sup>[10]</sup>.

The CDC's Advisory Committee on Immunization Practices (ACIP) recommends that the HPV vaccine should be administered to girls before starting sexual activity, preferably between 11 to 12 years. Because not all HPV carcinogenic strains are covered by the HPV vaccine, Pap smear is still recommended even for vaccinated individuals<sup>[11]</sup>.

Due to the recommended start age for cervical screening being 21 years old, we thought that high school girls would be the ideal target group for this study<sup>[12]</sup>.

Owing to the general perception of the conservative nature of Islamic societies and the sexual restrictions, this might contribute to the deficiency in paying attention to the public knowledge and attitude toward cervical cancer.

Convincing women from different backgrounds to be involved in the screening program is a challenge<sup>[13]</sup>. Various studies have demonstrated the effect of improving health education in changing public perception and behaviors<sup>[14-17]</sup>. In particular, school-based health education can play a significant role<sup>[18]</sup>. Yet, no interventional studies have been done in Saudi Arabia, and in particular in Al-Ahsa, to evaluate the effectiveness of educational programs on perception of cervical cancer. Therefore, this study aims to explore the impact of a health education on high school girls' knowledge and attitude in this regard and to evaluate the retention rate of knowledge achieved by health education. Moreover, to assess the knowledge, attitudes, and practices of cervical cancer. Eventually, aiming to raise up this concept in our community.

## MATERIALS AND METHODS

This is an interventional randomized controlled trial conducted in Al-Ahsa city, Saudi Arabia during the period of February 2019 to February 2020. The target population of the study was secondary high school girls at 12th level, studying at private or public schools. Al-Ahsa is an oasis located in the east of Saudi Arabia, with an area of 120 km<sup>2</sup> and a population of 1, 06 million<sup>[19,20]</sup>. According to the ministry of education in Al-Ahsa, 77 female high schools distributed in the area encompassing 6029 students<sup>[21]</sup>, of which a convenience sampling of four schools i.e. two private and two public have been selected from the region. One of the private and one of the public schools have been randomly allocated for intervention group and the other two for control group using a simple randomization method, tossing a coin, head for intervention and tail for control group. The high school girls were the best target group for this research, since the recommended starting age for cervical cancer screening was 21 years old<sup>[12]</sup>. Accordingly, our inclusion criteria include secondary high school girls, currently studying at 12th level in private or public schools. All females at 10th and 11th levels, teachers, principals, vice principals, and cleaning staff were excluded from the study.

Ethical approval from the institutional review board and the ministry of education was obtained, and a formal request letter was sent to each schools' principals [appendix A]. Verbal consent was taken from all participants in the study. The researchers have explained all the participants the study's purpose and ensure their data confidentiality.

A validated self-administered questionnaire has been used<sup>[22]</sup>. This questionnaire was used in a previous study<sup>[22]</sup> of the same

subject of our research for which permission from the primary author was taken [appendix B]. However, some changes were applied to the questions to make them appropriate for our sample [appendix C]. The questionnaire has three main sections: first, the participants' socio-demographic data section. Second, the knowledge and beliefs of the cervical cancer section. The third section assesses the attitude and practices toward cervical cancer.

In order to use the questionnaire on our Arabic speaker participants, it was translated to the Arabic language with the help of a certified translator office. Then, it was translated back to English to ensure lexical equivalence, reconciled, and pre-tested before administration. The validity and reliability of the Arabic questionnaire were tested by a pilot study (reliability Cronbach alpha = 0.77). Each variable in the questionnaire has been coded for easy analysis. However, the participants of the pilot study were excluded from the main study.

The primary investigators themselves collected data. The primary investigators have contacted a representative from each school "vice principal" and explained the research process. Eventually, permission was taken, and the school visits were scheduled. The study has included 276 students, 106 of them were in the intervention group while control group contains 170 students. Three visits to the intervention schools i.e., IS- A and IS-B, and two visits to the control schools i.e., CS-A and CS-B, have been carried out.

In the first visit for each intervention school, the questionnaire was administered to all the students. A health educational session about cervical cancer was then conducted, and reading materials (brochures) were distributed. Afterward, a second visit was held two weeks later, and the questionnaire was re-administered to all participants. The third visit conducted one month later to evaluate the retention rate of knowledge achieved by health educational session and the questionnaire has been re-administered for the third time. During the first visit to the control schools, the questionnaire was distributed to all participants without implementing any health educational session or providing any reading materials. Consequently, a second visit to the control schools was conducted two weeks later, and the same questionnaire was re-administered again [Figure1].

The demographic data were analyzed using descriptive statistics. However, for each item of the knowledge and attitude questionnaire, frequency distribution and percentages were presented. Association between the independent demographic variables and knowledge and attitude items was tested using the chi-square test.

Based on the sample population's average knowledge and attitude, those scoring above average were considered to have good knowledge and attitude, where those scoring below average were considered to have poor knowledge and attitude. The level of knowledge and attitude in both intervention and control group during the first and second visits were assessed and compared using the chi square test. Thereafter, the levels of Knowledge and attitude of the intervention group in the second and third visits were compared using the chi square test as well to assess the retention rate. P = 0.05 was considered statistically significant.

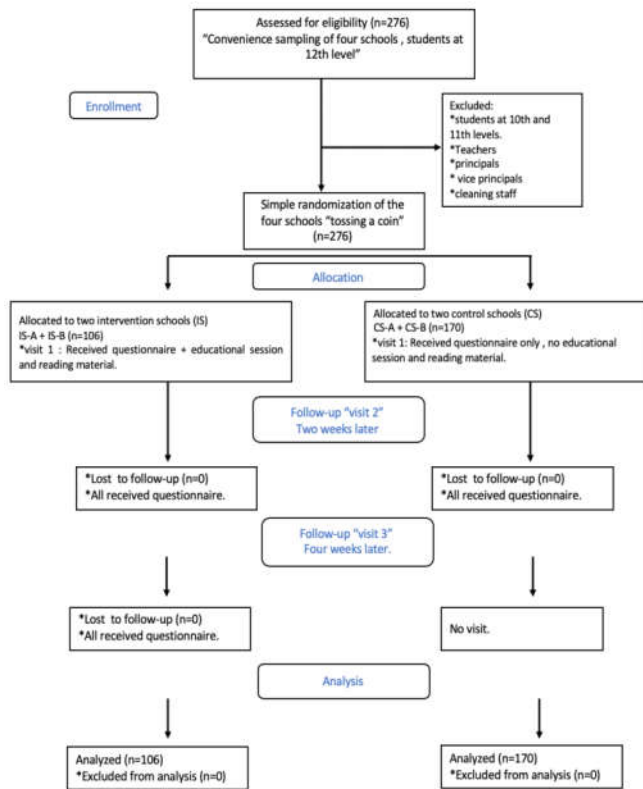


Figure 1: Consort flow chart representing recruitment, randomization and follow-up.

**RESULTS**

A total of 276 high school girls studying at the 12th level in Al-Ahsa, Saudi Arabia, consented to participate in this study. The mean standard deviation ± SD of age was 17.6 ± 0.62 years. 66.6% and 33.4% of them were studying at public or private schools, respectively. Most of the participants were Saudi (262; 94.9%) and single (255; 92.4%). The majority girls have almost same groups from 17 to 18 years (Mean=17.6±0.62). The Demographic characteristics of the participants are shown in [Table 1].

**Table 1** Demographic characteristics of participants (N=276).

Characteristics	Distribution	N (%)
Schools names	IS-A	38 (13.8)
	IS-B	68 (24.6)
	CS-A	53 (19.2)
	CS-B	117 (42.4)
School	Public	185(66.6)
	Private	91(33.4)
Marital status	Single	255(92.4)
	Married	16(5.8)
	Divorced	1(0.4)
Parity	Yes	4(1.4)
	No	270(97.8)
Nationality	Saudi	262(94.9)
	Non-Saudi	12(4.3)

\*The intervention schools (IS-A) and (IS-B).

\*The control schools (CS-A) and (CS-B).

Regarding cervical cancer knowledge in the first visit for all participants, nearly fifty percent have heard about cervical cancer. The majority of them did not know about routine cervical cancer screening (200; 72.5%), Pap smear test (258; 93.5%), and the HPV vaccine (257; 93.1%). Only 6.5% of the students have heard about the Pap smear test. Therefore, they proceed answering cervical cancer knowledge questions. [Table2,3,4].

**Table 2** General Knowledge about cervical cancer and its preventive measures in the first visit for all participants

Questions	Yes (%)	No (%)	P value
(1)Have you heard of cervical cancer?	139(50.4)	137(49.6)	0.904
(2)Have you heard about routine cervical cancer screening?	75(27.2)	200(72.5)	0.0001
(3) Do you have any Family history of cervical cancer?	6(2.2)	269(97.5)	0.0001
(4)Have you ever heard about Pap smear test?	18(6.5)	258(93.5)	0.0001
(20)Have you heard about HPV vaccine?	15(5.4)	257(93.1)	0.0001

There were significant differences in knowledge in the first visit between the participants who have heard about the Pap smear test and proceeded answering the knowledge items (18;6.5%). Out of eighteen participants, fifteen have agreed that a Pap smear is the most helpful way to help identify pre-cancer and cancer of the cervix. Thirteen participants agreed that Pap smear test aims to detect abnormal cells in the cervix, and fifteen of them have considered Pap smear test as effectively reducing the incidence and mortality of cervical cancer.

Twelve participants disagreed with the need to do a Pap smear in the future if the test result is normal. Eleven participants were indifferent about Pap smear's ability to detect precancerous cells before manifestations of cervical cancer symptoms. (Items 7,8,9,10,18;P<0.05). [Table 3].

For the participants' attitudes and practices in the first visit toward cervical cancer screening, most of the students showed positive attitudes. Though 60.9% thought that Pap smear is painful, while 78.3% felt that Pap smear procedure is unpleasant or embarrassing. Regarding the HPV vaccine, 62% will take the vaccine, and 71% would allow their children to receive the vaccine against HPV (Items 1,2,3,4,5,12,13; P<0.05) [Table5].

There were significant differences in the attitudes and practices of cervical cancer screening. 51.8% of the students would be worried if they found to have early signs of cancer (Item 11; P<0.05). While 27.5% of the participants would be afraid if something wrong was detected with a pap smear test (Item9; P<0.05).

Most of the students (47.1%) responded positively by disagreeing the item 9 (P<0.05).

Neither the participants agreed nor disagreed about unnecessary to do the Pap smear if there are no signs or symptoms (34.8%), uneasy talking about cancer (29%), and to go for screening if the Pap smear test is too expensive (Items 6,8,10; P<0.05) [Table 6].

Table (7), shows that there were no significant differences in knowledge and attitude items among all socio-demographic variables (p > 0.05).

To compare knowledge and attitude levels of the students toward cervical cancer, chi square test was used for the analysis. Regarding the knowledge level of cervical cancer during the first visit, the results showthat 75.9 % and 67.0 % of control and intervention students respectively scored below average and had poor knowledge. Yet, there were no statistically significant differences between both groups in this regard. (P value > 0.05).[Table 8].

**Table 3** General Knowledge about screening with Pap smear in the first visit for all participants

Statements	SD N (%)	D N (%)	N N (%)	A N (%)	SA N (%)	p value
(7)Pap smear is the most helpful way to detect pre-cancer and cancer of the cervix.	00	00	1(0.4)	10(3.6)	5(1.8)	0.022
(8)Pap smear is not able to detect precancerous cells before manifestations of its symptoms	00	3(1.1)	11(4)	2(0.7)	00	0.01
(9)The purpose of the Pap smear is to detect abnormal cells in the cervix	00	2(0.7)	1(0.4)	10(3.6)	3(1.1)	0.006
(10)Pap smear is considered as an effective test in reducing incidence and mortality of cervical cancer	00	00	1(0.4)	9(3.3)	6(2.2)	0.047
(11) Pap smear is able to detect all types of female genital cancer	00	3(1.1)	7(2.5)	3(1.1)	2(0.7)	0.269
(12)Pap smear is a non-invasive and relatively inexpensive method	1(0.4)	00	5(1.8)	6(2.2)	4(1.4)	0.321
(13)Women should have Pap smear since the onset of sexualactivity	1(0.4)	2(0.7)	5(1.8)	3(1.1)	5(1.8)	0.406
(14)In Pap smear, cervical cells are examined	00	00	00	11(4)	5(1.8)	0.134
(15)The perfect time to do pap smear is during the menstrual period	1(0.4)	6(2.2)	6(2.2)	3(1.1)	00	0.212
(16)A woman should not have sex 48 h before having Pap smear	00	1(0.4)	7(2.5)	6(2.2)	2(0.7)	0.09
(17) Pap smear should be discontinued after menopause	00	11(4)	5(1.8)	00	00	0.134
(18)If someone is having a normal Pap smear, she does not need to do Pap smears in the future	3(1.1)	9(3.3)	3(1.1)	1(0.4)	00	0.029
(19)There is no need to have a Pap smear if it is not offered by a doctor	5(1.8)	4(1.4)	4(1.4)	3(1.1)	00	0.919

**Table 4** The main source of information about pap smear and knowledge of screening interval among all participants in the first visit

Questions	Options	N (%)	P value
(5)Where did you hear about the Pap smear test?	Health professionals	4(1.4)	0.144
	Media	7(2.5)	
	Friends and relatives	4(1.4)	
	Books/newspapers	2(0.7)	
(6)How often do you think do you need to do Pap test?	Other	3(1.1)	0.144
	you do not have any idea	9(3.3)	
	Every 6 months	4(1.4)	
	Annually	3(1.1)	

**Table 5** General attitudes and practices in the first visit for all participants

Questions	Yes N (%)	No N (%)	p-value
(1)Will you do a Pap smear test if you reach the age of screening?	189(68.5)	86(31.2)	0.000
(2)Would you allow a male doctor to make the pap smear test for you?	153(55.4)	122(44.2)	0.062
(3)Do you have a fatalistic attitude?	101(36.6)	171(62)	0.000
(4)Is it painful to have a Pap smear?	168(60.9)	103(37.3)	0.000
(5)Having a Pap smear is unpleasant/embarrassing	216(78.3)	58(21)	0.000
(12)Would you take HPV vaccine?	171(62)	93(33.7)	0.000
(13)Would you allow your children (in future) to be vaccinated against HPV?	196(71)	77(27.9)	0.000

**Table 6** General attitudes & practices in the first visit for all participants

Statements	SD N (%)	D N (%)	N N (%)	A N (%)	SA N (%)	p value
(6)Pap smear is unnecessary if there are no signs and symptoms	26(9.4)	72(26.1)	96(34.8)	59(21.4)	21(7.6)	0.000
(7)Is it unnecessary to go only for Pap smear test?	43(15.6)	130(47.1)	69(25)	28(10.1)	5(1.8)	0.000
(8)Going for Pap smear screening is too expensive	13(4.7)	62(22.5)	151(54.7)	27(9.8)	16(5.8)	0.000
(9)I am afraid that something wrong will be detected if I go for Pap smear	34(12.3)	61(22.1)	73(26.4)	76(27.5)	31(11.2)	0.000
(10)It is not easy for me to talk about cancer?	36(13)	62(22.5)	80(29)	71(25.7)	25(9.1)	0.000
(11) I would be worried if I was found to have early signs of cancer	5(1.8)	6(2.2)	34(12.3)	87(31.5)	143(51.8)	0.000

**Table 7** The association between Knowledge, attitudes and practices of the participants towards cervical cancer screening and socio-demographic variables

Variables	Knowledge		Total	P value	Attitude		Total	P value	
	poor	Good			poor	Good			
School status	Public	128	57	185	0.082	99	86	185	0.770
		69.2%	30.8%	100.0%		53.5%	46.5%	100.0%	
	Private	72	19	91		47	44	91	
Marital Status	Single	188	67	255	0.085	137	118	255	0.259
		73.7%	26.3%	100.0%		53.7%	46.3%	100.0%	
	Married	9	7	16		6	10	16	
Parity	Divorced	0	1	1	0.307	0	1	1	0.918
		0.0%	100.0%	100.0%		0.0%	100.0%	100.0%	
	Yes	2	2	4		2	2	4	
Nationality	No	197	73	270	0.381	142	128	270	0.409
		73.0%	27.0%	100.0%		52.6%	47.4%	100.0%	
	Saudi	188	74	262		141	121	262	
	71.8%	28.2%	100.0%	53.8%	46.2%	100.0%			
	Non-Saudi	10	2	12	5	7	12		
		83.3%	16.7%	100.0%	41.7%	58.3%	100.0%		

**Table 8** Comparison of knowledge and attitudes in each group type in the first and second visits.

Visits	Participants Groups	Knowledge		Total	Chi square	P value		
		Poor	Good					
First visit	Control	129	41	170	2.593	0.107		
		75.9%	24.1%	100.0%				
	Intervention	71	35	106				
		67.0%	33.0%	100.0%				
	Control	Attitude		Total			Chi square	P value
		Poor	Good					
Second visit	Control	96	74	170	2.267	0.132		
		56.5%	43.5%	100.0%				
	Intervention	50	56	106				
		47.2%	52.8%	100.0%				
	Control	Knowledge		Total			Chi square	P value
		Poor	Good					
Second visit	Control	120	50	170	24.3	0.0001		
		70.6%	29.4%	100.0%				
	Intervention	43	63	106				
		40.6%	59.4%	100.0%				
	Control	Attitude		Total			Chi square	P value
		Poor	Good					
Second visit	Control	96	74	170	6.6	0.01		
		56.5%	43.5%	100.0%				
	Intervention	43	63	106				
		40.6%	59.4%	100.0%				

**Table 9** Comparison of knowledge and attitudes in the second and third visits among intervention groups

Intervention	Knowledge		Total	Chi square	P value
	Poor	Good			
Visit 2	43	63	106	0.94	0.333
	40.6%	59.4%	100.0%		
Visit 3	50	56	106		
	47.2%	52.8%	100.0%		
Intervention	Attitude		Total	Chi square	p value
	Poor	Good			
Visit 2	43	63	106	0.17	0.676
	40.6%	59.4%	100.0%		
Visit 3	46	60	106		
	43.4%	56.6%	100.0%		

## DISCUSSION

Cervical cancer is the third most common female malignancy in Saudi Arabia after breast and endometrial cancers. Although the available screening tools and vaccines could prevent this entity, the vast majority of our population is unaware of the cervical cancer burden and its preventive measures. Despite the limited studies conducted in Saudi Arabia assessing knowledge, awareness, and attitudes of Saudi females toward cervical cancer, a study was conducted in Riyadh, Saudi Arabia showed that majority of participants (75.2%) did not undergo the pap smear before. Although there was a lack of knowledge among participants, they exhibited a positive attitude to know more about it [10].

Another study done in Riyadh reveal that 95.7 % of 1400 health college students had a poor knowledge level about cervical cancer [23]. Furthermore, In Al-Ahsa, Saudi Arabia, a study involved 188 medical students, of them only 38.7% male and 27.2% female students were aware that vaccine is available against cervical cancer [24].

Similarly, a study carried out among 300 Bahraini women showed that, while 65% of women had heard about pap smear, only 40% of women underwent this procedure in their lifetime [22]. This unawareness is unsurprisingly demonstrated in our study which included 276 high school girls, the majority of them did not know about routine cervical cancer screening (200; 72.5%), Pap smear test (258; 93.5%), and the HPV

vaccine (257; 93.1%). We believe that the low level of awareness about cervical cancer and its preventive measures is explained mainly by the following two factors: firstly, our conservative Muslim community and its cultural and religious values might make a woman feel stigmatized to do something connected to sexual related issues and in addition to consider herself as not at risk. Further studies have to address and explore the reasons behind the lack of knowledge and the negative attitude in this regard. Secondly, and most importantly, both screening and vaccination are not well implemented in Saudi Arabia. Public health authorities as well have a considerable role to educate empower and motivate people about health prevention, and this role seems to be somehow neglected in this aspect.

Health education has been shown to be a very effective method in promoting the health of individuals and society. Our study proved that both knowledge and attitude response toward cervical cancer of the intervention groups were much higher than the control group after the health education session, and the statistical difference between the groups was significant (P<0.05).

In particular, in Saudi Arabia, an interventional randomized control trial was conducted to evaluate the impact of school-based smoking prevention. Results showed that students in the experimental group reported a significantly more negative attitude towards smoking. Smoking initiation was 3.2% in the experimental group and 8.8% in the control group (p<0.01) [14]. A further study in Gansu, China, evaluates health education's effect on knowledge and behavior toward respiratory infectious diseases (RID) among primary, middle, and high school students. Both the accuracy rate and scores of knowledge and behavior items were significantly higher in the intervention group than those in the control group (P<0.05) [15]. Therefore, we think there is a significant impact of conducting health education programs among individuals and society to further improve their overall health. There are many different ways for health education promotion that was used in previous studies.

A prospective cohort study was conducted in Leicester, United Kingdom over one year, targeting 737 Asian women. The study used different health education modes in the form of Video, leaflet, and fact sheets to determine their effect on the uptake of cervical cancer smear. The participants randomly assigned into four groups: Visited and shown Video, visited and shown a leaflet and fact sheet, leaflet and fact sheet sent by post, and the control group, which was not contacted at all. The study showed that Health education interventions increase the uptake of cervical cancer screening by pap smear among personally visited groups regardless of the health education materials used, 47% of the video group and 37% of the leaflet and fact sheet group. There was no significant difference in pap smear uptake between the group in which the leaflet and fact sheet sent by post and the control group, 11% and 5%, respectively [25].

Another study similarly used different educational modalities to enhance cervical cancer screening uptake among Chinese women living in North America in two west coast cities: Seattle, Washington, and Vancouver, British Columbia. In this randomized controlled trial, Chinese women who participated in a community-based survey have been identified and randomly assigned to three separate groups, one control, and two intervention groups. In the first intervention group, well-

trained Chinese interviewers visit participants at their homes to find out women's obstacles to participate in cervical cancer screening, give support, and provide educational materials, including videos. Women in the second intervention group received emails supplied with pamphlets, brochures, fact sheets, and videos. Those in the control group have received their usual clinical care without any intervention. The study found that women who met the interviewers and those who received the emails reported higher pap testing uptake, 39%, and 25%, respectively. On the other hand, only 15% of women in the control group showed a response<sup>[16]</sup>.

For the impact of the implemented health education in our study, those who received the intervention, which includes health education sessions and reading materials, showed a positive response in knowledge and attitudes toward cervical cancer compared with the control groups. In addition, we measured the rate of retained knowledge and attitude of the intervention groups between the second and the third visits. Although there were no significant differences between visits, they showed good knowledge and attitude scores ( $P > 0.05$ ).

Moreover, it is clearly demonstrated by our study and similar previous studies in the literature that health education promotion plays a major role in motivating individuals to participate in cervical cancer prevention programs. As a result, the Health Authority organizations in different countries should support and fund these kinds of education programs.

#### Limitations of the study

Convenience sampling of schools in this study as it was more feasible for the investigators. In addition, the participants were not representative of all high school girls in Al-Ahsa, Saudi Arabia since students from only four schools were involved.

#### CONCLUSION

In conclusion, this study found that majority of the participants were unaware of cervical cancer preventive measures; screening and vaccination, despite the positive attitude shown. The levels of knowledge and attitude of the intervention groups significantly improved after conducting the health educational sessions. This study proved the good retention rate of knowledge and attitude when assessed one month after the educational intervention.

#### Recommendations

Our study showed the need of implementing cervical cancer screening and vaccination in routine health preventive programs by health authority organizations in Saudi Arabia. Also, to consider the importance of supporting and funding health educations programs.

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#### Conflict of interest

The authors declare no conflict of interest.

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#### Ethical approval

Ethical approval from the institutional review board "letter No.1420798 dated 13/3/2019" and the ministry of education was obtained, and a formal request letter was sent to each schools' principals.

#### Consent

Verbal consent was taken from all participants in the study. The researchers have explained to all the participants the study's purpose and ensure their data confidentiality.

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