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EFFECTIVENESS OF HEALTH EDUCATION PROGRAM ON KNOWLEDGE AND ATTITUDE OF HUMAN PAPILLOMA-VIRUS VACCINE IN FEMALE ADOLESCENT STUDENTS IN NORTH-EAST MALAYSIA.

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ABSTRACT

Introduction: In Malaysia, cervical cancer ranks as the second most frequent cancer among women after breast cancer. Our National school-based Human Papillomavirus (HPV) prophylaxis vaccination programme was started in 2010 for girls aged 13 years. However, no standardised education module has been provided. **Methods:** This was a prospective open, non-randomised controlled interventional study among female students in two secondary schools in Kota Bharu, Kelantan. The intervention group received a health education programme regarding HPV vaccination and cervical cancer. The control group received the standard education materials. A self-administered validated questionnaire was used to evaluate the effectiveness of the health education programme in terms of knowledge and attitude at the baseline and post-intervention at 3 months. Data were analysed using SPSS version 22. **Results:** Mean knowledge percentage score within each group based on the time at baseline and post-intervention at 3 months shows that the mean difference was 12.23 (95% CI: 16.48, 7.98) for the intervention group and 3.80 (95% CI: 0.77, 6.83) for the control group. The mean difference between groups at baseline and post-intervention at 3 months was statistically significant for knowledge ($P=0.001$). The mean attitude percentage scores at baseline and 3 months post-intervention were unchanged for both groups and the mean difference between the two groups were not statistically significant at 3 months post-intervention ($p=0.870$). **Conclusion:** The health programme effectively increased the knowledge on HPV vaccination and cervical cancer, although the attitude score did not change. This new health education programme could become a standard education programme for the health staff and paramedics to deliver during an HPV vaccination campaign.

Keywords: Attitude, Cervical cancer, Health education, Human papilloma virus, Intervention, Knowledge, Vaccination.

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Keywords: Attitude, Cervical cancer, Health education, Human papilloma virus, Intervention, Knowledge, Vaccination.

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INTRODUCTION

Worldwide, cervical cancer poses a significant health problem and is one of the most common cancers among women. In Malaysia, it is the second most frequent cancer after breast

cancer in women aged 15 to 44 years.¹ Malaysia's population has around 12 million women aged 15 years and older, and this group has a risk of developing cervical cancer.¹

In the past few decades, cervical cancer prevention is more focused on secondary prevention via Pap smear screening among adult women. However, with the establishment of the causative role of cervical cancer and the increasing rate of Human Papilloma-virus (HPV) infection among young females, Malaysia started to implement a free HPV vaccination programme in 2010, and in 2012, the policy was extended to other eligible women.¹

The highest rates of vaccine coverage were evident when vaccination is delivered through school-based programmes such as those conducted in Spain and Scotland.² Besides strengthening the strategies for cervical cancer prevention through HPV vaccination and cervical cancer screening, the public, specifically adolescents, should know that other risk factors such as smoking, early sexual activities, multiple sexual partners and having HIV contribute to cervical cancer development and progression. However, studies worldwide showed that the public, including adolescents, has insufficient knowledge regarding cervical cancer and its prevention.³⁻⁴ Lack of knowledge about HPV prevalence and its prevention might affect the adolescents' future health practices including adolescent sexual behaviour, condom use and their future participation in cervical cancer screening.⁴⁻⁵ Therefore, education can be regarded as one of the initial strategies to increase the adolescents' understanding of HPV infections, to correct the misconception about HPV vaccination and to provide important information to the adolescents as they are the prime candidates for this programme, which resulted in a positive impact on the uptake of the HPV vaccine.

Although school-based programmes have contributed to the uptake of the HPV vaccination, multiple surveys that were conducted in Malaysia and other countries demonstrated that the public, including the adolescents, has a low level of understanding regarding HPV vaccination, cervical cancer and its prevention.^{4,6} Hence, the study aimed to assess the effectiveness the health education in improving the understanding and attitude toward HPV vaccination and cervical cancer in general.

MATERIALS AND METHODS

Setting, design and study population

This study was an open, prospective non-randomised interventional study with a control arm, conducted between April and August 2015, using multi-stage cluster sampling among female students in two secondary schools in Kota Bharu, Kelantan. The sample size was calculated using a t-test with paired sample formula. The reference for the difference of 2 in mean for knowledge score on HPV vaccination was based on a previous study done by Kwan *et al.*⁷ After considering the non-response rate of 20% and multiplying with 2 for cluster effect, the calculated sample size was 103 per group.

This study involved students from two government schools that were in Kota Bharu district of Kelantan. The schools were matched by profile, students' population and age composition with almost similar characteristics in terms of their students' achievements and social backgrounds. Students from Sekolah Menengah Pengkalan Chepa were chosen to be the interventional group only by chance as the school was the first to approve for the study to be conducted there. Students from Sekolah Menengah Kebangsaan Penampang were used as controls subsequently. Study inclusion criteria were all girls in Secondary 1, 2 and 4 of selected schools with written informed consent from parents.

Exclusion criteria were those who were illiterate and whose parents did not given consent to participate in the study.

A multi-stage cluster sampling method was implemented to select respondents, from the first three secondary levels, namely, secondary 1, 2 and 4 (non-exam year). From each of these secondary levels, three classes were selected via systematic random sampling. Then, parental consent and youth assent forms were distributed to the students with a brief explanation regarding the study by the investigator. All students from each selected class were invited to voluntarily participate and those who consented were included in the study.

Research tools

A newly constructed and validated self-administered questionnaire that comprises three sections included socio-demographic, knowledge and attitude was utilised. Socio-demographic data consisted of eight questions. The questions on knowledge and attitude on HPV vaccination were designed based on several studies, as well as from promotion and education materials regarding HPV vaccination by the Ministry of Health.⁷⁻¹⁰

The knowledge domain consists of 23 items. It was calculated using the percentage score. One mark was given for a correct answer and 0 marks for the wrong and do-not-know answers. The attitude domain consists of 12 items. The scores objectively assessed using a five-point Likert scale: 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree and 5 = strongly agree. The first five questions used reverse scoring.

The health education module was a modified interactive concept.^{7, 9, 11} The content validation was conducted by a panel consisting of an Obstetrician and Gynaecologist, a Family Medicine Specialist and a medical education officer. The modules comprised of

health talks, video presentations, flip charts and pamphlets.

Data collection and procedure

Students were divided into two groups using systematic random sampling. Each group consisted of 32–34 students. The programme was held in their school by a trained health educator. After the students have submitted their consent forms signed by their parents', they then completed the pre-test questionnaire, with assistance from the trained health educator. This procedure took 15-20 minutes. After all the questionnaires have been collected, the students stayed in the room for the programme, which was delivered in Malay language.

The control group received pamphlets on HPV vaccination and cervical cancer, which were standard materials given by the healthcare provider during the scheduled HPV vaccination. Then, the information inside the pamphlets was discussed with them, which was followed by a question-and-answer session for approximately 15 min.

The intervention group received a didactic presentation using a health education module, consisting of the same pamphlets, health talks, video presentations and small group discussions with flip charts ([Appendix i](#)). Additional information regarding safe sexual practices was added.

Post-test questionnaires were distributed to respondents after 3 months. The respondents were given clear instructions regarding self-administered questionnaires that were to be submitted within a day to their respective teachers. [Figure 1](#) illustrates the flow chart.

The students in the control group were given the same education programme and materials as in the intervention group after completion of study data collection. A debrief session with the respondents, re-

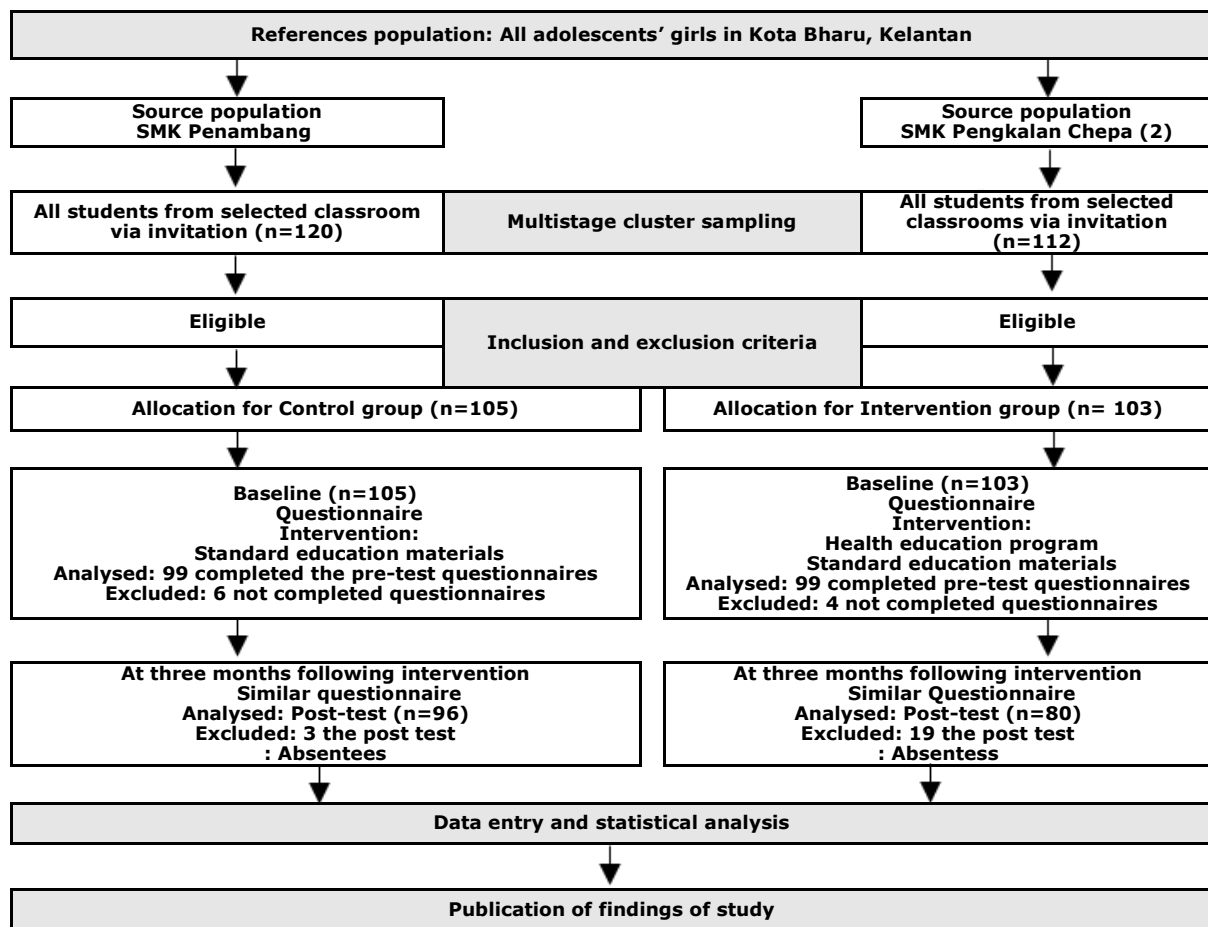


Figure 1: Study flow chart.

searcher team and the school's counsellor was held after the programme to discuss concerns arising from the study.

Data analysis

Statistical Package for Social Sciences Inc., Chicago Illinois (SPSS), version 22, was used for data analysis. Data were presented as mean $\pm$ standard deviation (SD). Repetitive measure analysis of variance (ANOVA) was used to compare the knowledge and attitude scores between the intervention and control groups at baseline and again at 3 months post-intervention. $P < 0.05$ was taken as statistical significance.

RESULTS

A total of 198 female students were recruited at the start of the study but only 176 completed the 3 months post-test evaluation,

giving a study response rate of 88.8%. The majority of the participants were Malays (99%) and have an almost equal distribution of three age groups. There was a significant difference in paternal education levels between the control and intervention groups (Table I: $p = 0.038$), with over 72.8% of fathers of students in the control group achieving secondary and higher education compared to only 58.5% of fathers in the intervention group. Table I summarises the socio-demographic characteristics and baseline knowledge and source of information on HPV vaccine, of both control and intervention groups. More than 73% of students have heard of HPV vaccines at baseline despite over 97.5% already had their HPV vaccines. However, only 8% of students in the control group have heard about Pap smear before and all students in the intervention group did not have prior knowledge of Pap smear. Ma-

Table I: Socio-demographic characteristics and information background and source of information about HPV vaccination of the respondents in the control (N=99) and intervention group (N=99).

Variables	Control group [n (%)]	Intervention group [n (%)]	p-value
Secondary level (Age in years)			
1 (13)	33 (33.3)	34 (34.3)	0.899 ^c
2 (14)	32 (32.3)	34 (34.3)	
4 (16)	34 (34.3)	31 (31.3)	
Paternal education level			
Tertiary	10 (10.1)	15 (15.1)	0.038 ^c
Secondary	62 (62.7)	43 (43.4)	
Don't know	27 (27.3)	41 (41.4)	
Maternal education level			
Tertiary	9 (9.1)	14 (14.1)	0.050 ^c
Secondary	68 (68.6)	51 (51.5)	
Don't know	22 (22.2)	34 (34.3)	
Family history of cervical cancer			
Yes	1 (1.0)	1 (1.0)	0.424 ^d
No	77 (77.8)	69 (69.7)	
Don't know	22 (21.2)	29 (29.3)	
Information background and source of information about HPV vaccination			
Have you ever heard about HPV vaccination?			
Yes	83(83.8)	62 (62.6)	
No	16(16.2)	37(37.4)	
Have you heard about Pap smear before?			
Yes	8(8.1)	0	
No	91(91.9)	99(100)	
Source of information ^a	Control (n=83)	Intervention (n=88)	
Teacher only	4 (4.8)	3 (3.4)	
Health staff only	52 (62.6)	18 (20.4)	
Parent only	3 (3.6)	0 (0.0)	
Both teachers and friends	1 (1.2)	3 (3.4)	
Health staff and mass media	1 (1.2)	3 (3.4)	
Parents and mass media	1 (1.2)	1 (1.1)	
Teachers and health staff	18 (21.7)	19 (21.6)	
All	0 (1.0)	4 (4.5)	
Teacher, health staff and mass media	2 (2.4)	5 (5.7)	
Health staff and parents	0 (0.0)	4 (4.5)	
Teacher, health staff and parent.	1 (1.2)	1 (1.1)	

^cchi square test^dindependent t-test^aoverlapping between subcategories

majority of students reported that they received their information on HPV vaccines from sources such as teachers and healthcare staffs with parents being a very poor source of information.

Mean knowledge percentage score

At the baseline (N = 198), the overall mean knowledge percentage score for the whole

group was 46.11 ± 17.41 (Range: 0.0 to 86.9). There was no significant difference in the mean baseline knowledge percentage score between the two groups, with the intervention group mean score of 44.9 ± 18.66 and the control group mean score of 47.2 ± 15.29 (Table II: $p = 0.805$). The mean knowledge score 3 months following the educational intervention and after adjusting for

Table II: Comparison of knowledge percentage score between the control and intervention group.

Groups	N	Descriptive Mean ^a (SD ^b)		EMM ^c (95% CI ^d)		F stat ^e (df) ^f	p-value ^g
		Baseline	Three month	Baseline	Three months		
Intervention	80	44.9 (18.66)	57.1 (15.47)	47.3 (41.52,49.02)	57.6 (49.12,60.71)	10.787 (1,172)	0.001
Control	96	47.2 (15.29)	51.04 (12.86)	46.9 (45.51,50.31)	50.63 (47.81,53.47)		

^aDescriptive mean^bStandard deviation^cEstimated marginal mean^dConfidence interval^eF statistic^fDegree of freedom^gGroup-time interaction of repeated measure analysis of variance (Model assumption met). Adjusted for parental education status

parental education status, was significantly different between the control group (mean difference of 3.80 [95% CI: 0.77,6.83]) and interventional group (mean difference of 12.23 [95% CI:16.48,7.98]) (Table II: $p = 0.001$).

Mean attitude percentage score

At the baseline (N = 198), the overall mean attitude percentage score of the whole group was 68.12 ± 9.96 (Range: 35.42 to 87.5). There was no significant difference in the mean baseline attitude percentage score between the two groups, with the intervention group mean score of 70.28 ± 10.52 (Range: 35.4 to 87.5) and the control group mean score of 66.4 ± 9.28 (Range: 20.83 to 87.50) (Table III: $p = 0.805$).

t 3 months following the educational intervention, the mean attitude percentage scores for both groups remained fairly static and did not show any improvements. For the intervention group, the mean score was

70.21 ± 10.56 and the control group was 66.41 ± 11.39 at 3 months. After adjusting for parental education status, the repetitive measures ANOVA analysis did not show any significant differences between the two groups (Table III: $p=0.870$).

DISCUSSION

This study found a significant improvement in knowledge score in the intervention group 3 months after the health education programme intervention. In Malaysia, although the government has already provided the manual of the HPV programme, the materials, content and delivery methods depend on the initiatives of the health providers who run the national HPV programme in schools.¹⁰

This newly modified and structured health education programme, in combination with interactive health education tools, manages to provide a better understanding of HPV vaccination and cervical cancer. In this

Table III: Comparison of attitude percentage score between the control and intervention groups.

Groups	N	Descriptive Mean ^a (SD ^b)		EMM ^c (95% CI ^d)		F stat ^e (df) ^f	p-value ^g
		Baseline	Three month	Baseline	Three months		
Intervention	80	70.3 (10.52)	70.2 (10.56)	70.5 (68.32,72.70)	70.3 (67.81,72.76)	0.027 (1,172)	0.870
Control	96	66.4 (9.28)	66.4 (11.39)	66.2 (64.23,68.21)	66.3 (64.09,68.59)		

^aDescriptive mean^bStandard deviation^cEstimated marginal mean^dConfidence interval^eF statistic^fDegree of freedom^gGroup-time interaction of repeated measure analysis of variance (Model assumption met). Adjusted for parental education status

study, multiple techniques of teaching were applied to deliver the contents of the education module effectively to the participants. First, it was done in an informative group lecture, in which around 32–34 students were included in a group. The effectiveness of the group teaching approach is consistent with a study by Chang *et al.*, which demonstrated the improvement of 7.2% of the students in the pre-test to 59% of the students who have knowledge about the relation of HPV and cervical cancer in the post-test evaluation given 1 h after the group lecture.¹² Second, the health talk conducted in a small group of 32–34 students, were further subdivided into smaller groups of 5–6 students for discussion using flip charts, which help to develop an interactive, friendly, innovative and positive discussion between students and teachers as supported by a study by Annamalai *et al.*, among the first-year medical students.¹³

In the present study, at the baseline, the mean knowledge score from both groups was 46.1% with no significant difference between the groups. The knowledge assessment was based on three answers (i.e. 'true', 'false' or 'don't know' as answer), which were about HPV itself and vaccination as the major topic, followed by cervical cancer and Pap smear. The mean percentage score in our study was higher than in the study in Hong Kong with a mean of 5.70 ± 3.21 with maximum scores of 17.⁷ In the Hong Kong study, the students were not vaccinated yet as their country was at an early stage of HPV vaccination implementation.⁷ In comparison to our study, a higher proportion of our students have already been vaccinated which suggested that their baseline knowledge were higher having been already exposed to the vaccination programme prior to the participating in this study.

Regarding the attitude toward HPV vaccination among adolescents, no significant difference was observed in group time inter-

action of attitude scores. Using repeated measures ANOVA, the estimated marginal mean percentage score was 70.5% to 70.3% in the intervention group and an increment of 0.1% from 66.2% in the control group over time. These findings are consistent with a study in local schools in England by Carolan *et al.* (2018) on vaccination intervention, showing limited effectiveness in improving attitude.¹⁴ Several studies in England and China have investigated the effectiveness of educational intervention of varying periods, using various methods and also found difficulty in improving the attitude change of the adolescents aiming at similar goals.^{14,15}

In our study, most of the parents from both groups had formal education up to the secondary level. The category of the education level used is standardised, following the International Standard Classification of Education, which was adopted formally by UNESCO, Malaysia.¹⁶ The percentage of parental education level up to secondary level was higher in the control group than in the intervention group. We also found that the HPV vaccination and Pap smear awareness were better in the control group. Moreover, the baseline mean knowledge percentage score was slightly higher in the control group than in the intervention group although it was not statistically significant.

The finding in the present study was slightly different from that of a study conducted in Sarawak, in which only 53.3% of fathers and 61.9% of mothers had at least primary education.⁸ This is mostly related to the education facilities and affordability with the improving socio-economy of our general population. They also found that Malay students had higher socioeconomic status and had higher cervical cancer knowledge.

As expected only 4% of them had heard about Pap smear before the intervention. This may indicate that the vaccination

programme has not been fully utilised to educate students on cervical cancer prevention, which is considered a missed opportunity. The HPV vaccination programme is perhaps the best avenue for health workers to utilise for the education of cancer prevention.

Our study revealed that the role of health staff in the national HPV vaccination programme is very significant in delivering the message about the HPV vaccination. From the control and intervention groups, 62.6% and 20.4%, respectively, received information mostly from the health staff. The influential group and nearest sources to the adolescents might be the main contributors of information. However, in the present study, mass media (8.2%) and parents (6.8%) were not the main sources of information. However, by the time the adolescents' transition into a higher education environment, these sources of information would change according to the availability of the resources. As reported in a study among university students in Malaysia, their main sources of information are newspapers and television among other media.¹⁷

Our findings were different from that reported by two earlier studies conducted before the introduction of the national HPV programme, in which one study involved eight schools in Kuala Lumpur in 2009 reported that the main sources of information were contributed by the internet (64.4%), followed by books and magazines (54.0%) and healthcare professionals (52.9%). A similar study conducted in two secondary schools in Sarawak, however reported that the main sources of cervical cancer information were their parents (25.9%), followed by the mass media.^{3,8} The difference between these studies is due to less publicity regarding cervical cancer and its prevention in rural states such as Sarawak compared with Kuala Lumpur.

Our present findings were comparable

with those reported in a systematic review from a developing country, i.e. Africa, where despite the low knowledge on vaccination, high levels of acceptability (range 59%–100%) of adolescent HPV vaccination were observed among adolescents, parents and teachers.¹⁸¹⁹ There are several other factors to determine and influence parental acceptance of HPV vaccination. A study conducted in Indonesia revealed that age, beliefs regarding cervical cancer and attitudes towards vaccination, in general, were significantly associated with HPV vaccination acceptance.²⁴ The positive attitude of the parents on HPV vaccination, specifically in Kelantan and generally in Malaysia, has ensured a good uptake of HPV vaccination. Therefore, besides providing information, further study and intervention must focus more on the beliefs and attitudes to ensure the sustainability of good parental acceptance.

STUDY LIMITATIONS

There are several limitations in our study. First, this is a non-randomised prospective controlled intervention study which is open to selection bias as shown in Table I where there was a significant difference in formal education level of the parents of the participating students. This selection bias has also resulted in a disproportionately higher percentage of Malay students. Hence, the results of this study can give more insight into the knowledge and attitude of Malay students regarding cervical cancer prevention and has determined the effectiveness of our intervention among this ethnic group but it is not generalizable to other ethnic community.

Secondly, the selected population of students are very specific in that majority were Malays and has had HPV vaccination already. The latter indicates that the group has already been previously exposed to some form of HPV vaccination programme prior to receiving their vaccination, which is supported by the high baseline knowledge level. Be-

cause of this also, the effectiveness of the intervention programme may have been partly attenuated and may have been much more effective in a naïve population of female students who have not been vaccinated yet. Despite this, we were still able to show some degree of effectiveness as the degree of improvement in knowledge level was significantly higher in the intervention group who started off at a lower baseline knowledge level compared to controls. Finally the attitude among adolescents did significantly change throughout the study period in both the control and intervention groups. This might be due to the limited time frame, which allows only one intervention and evaluation throughout the study period. The methods that we used in the intervention might not be suitable for tackling the attitude of the current generation of adolescents.

For future studies, we suggest that repeated education intervention in phases with more interactive delivery methods that relate to the current generation of adolescents, especially with the use of social media or digital technology, should be implemented.¹⁴ Involvement of other stakeholders in health education such as non-governmental organisations and shared experience sessions by cervical cancer survivors through video presentations or live dialogues during the HPV health education programme could be more practical and significant in elucidating the seriousness of cervical cancer and influence adolescents' values, beliefs, attitude and motivation towards the issue.

CONCLUSION

A school-based approach is an effective health education intervention for improving knowledge of HPV vaccination among secondary female adolescents. The programme should be structured, consistent and practical and should be supplemented with additional educational sessions with longer duration or

higher frequency. This approach is effective among female adolescent students who have already been vaccinated as shown in this study and its effectiveness should be applicable to those who have not had the HPV vaccination yet. It should be focusing on not only knowledge but also values and beliefs of the adolescents.

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STATEMENT OF DISCLOSURES OF CONFLICT OF INTEREST

My co-authors and I declare no conflicts of interest.

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Appendix i: Health education program for intervention group.

Objectives	Contents	Method	Materials	Duration (minutes)
Develop rapport	Ice-breaking session	Ice-breaking session	Ice-breaking session	3-5
Pre-test assessment	Questionnaires (48 items)	Questionnaires (48 items)	Questionnaires (48 items)	15-20
Empower Knowledge	Education on HPV natural history, transmission, HPV-related cancers, prevention via HPV vaccination and process of vaccine action.	Health talk with PowerPoint presentation Flip-chart with small group discussion, and questions-and-answers session Video of animated Pap smear procedure	LCD, Laptop with power point presentation, flip chart	40
	Education on Pap smear's importance and procedure.	Health talk with PowerPoint presentation Flip-chart with small group discussion, and questions-and-answers session Video of animated Pap smear procedure	LCD, Laptop with power point presentation, flip chart	40
	Education on cervical cancer with anatomy of reproductive system, features of HPV-related cancers	Health talk with PowerPoint presentation Flip-chart with small group discussion, and questions-and-answers session Video of animated Pap smear procedure	LCD, Laptop with power point presentation, flip chart	40
Attitude	Motivating students to promote HPV vaccination to eligible women.	Health talk with PowerPoint presentation Flip-chart with small group discussion, and questions-and-answers session Video of animated Pap smear procedure	LCD, Laptop with power point presentation, flip chart	40
	Encouraging students to practice safe sexual practices and to do Pap smear in future	Health talk with PowerPoint presentation Flip-chart with small group discussion, and questions-and-answers session Video of animated Pap smear procedure	LCD, Laptop with power point presentation, flip chart	40
	Motivating to promote Pap smear to eligible family members	Health talk with PowerPoint presentation Flip-chart with small group discussion, and questions-and-answers session Video of animated Pap smear procedure	LCD, Laptop with power point presentation, flip chart	40
Distribution of standard health education module Pamphlets	Distribution of standard health education module Pamphlets	Distribution of standard health education module Pamphlets	Distribution of standard health education module Pamphlets	Distribution of standard health education module Pamphlets