

Effectiveness of health education programme: Level of knowledge about prevention of cervical cancer among Saudi female healthcare students

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Abstract

Objective: To evaluate the effectiveness of health education programme on the knowledge of human papilloma virus among female medical students.

Methods: This quasi-experimental study was conducted in 2014 at the Princess Nourah bint Abulrahman University, Riyadh, Saudi Arabia, and comprised female medical students. An intervention programme was implemented in the form of lectures, videos, posters, etc. on human papillomavirus. SPSS 20 was used for data analysis.

Results: There were 535 participants in the study. Their mean age was 20.3±1.3 years. After the intervention, there was a significant increase in the level of knowledge. Of all, 495(92%) students recognised avoidance of sexually transmitted disease, vaccination and screening as effective preventive measures. In comparison to pre-intervention results, significantly higher percentage of students defined risk factors: sexually transmitted disease 392(73.3%) versus 329(61.8%), and human papillomavirus 293(54.8%) versus 151(28.4%). Knowledge regarding sensitivity, 280(52.3%) after the campaign versus 160(30.1%) before, and time to perform Pap smear, 229(42.8%) versus 113(21.1%), increased significantly ($p < 0.05$).

Conclusion: Health education programme was effective in improving the level of knowledge on human papillomavirus.

Keywords: Cancer cervix, Knowledge, Intervention, HPV vaccine acceptance, Health education. (JPMA 67: 513; 2017)

Introduction

Cervical cancer (CaCx) is a potentially preventable disease as cytological screening using Pap smear helps to detect this disease in early stages.¹ A declining trend (65%) in the incidence of invasive carcinoma of the cervix uteri has been documented in the United States and other European countries during the last three decades owing to the widespread introduction of Pap smear as a sensitive screening tool.^{2,3}

On the contrary, the prevalence of this cancer is increasing in developing countries due to lack of knowledge, mistrust of healthcare system and high cost of vaccine.⁴ Although CaCx is not a major contributor of public health problems affecting females in the Kingdom of Saudi Arabia (KSA), cases are diagnosed at an advanced stage that require extensive chemo-irradiation leading to disabilities and hazards to individuals' health in addition

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to financial burden on the health system.^{5,6} The difference between KSA and Western countries is lack of integration of Pap smear in the health care system, low level of community awareness on cervical cancer and low level of education among women, resulting in delayed diagnosis of CaCx. A study in Iran confirmed the importance of awareness programmes among the community.⁷

It is important to perceive if the students have accurate knowledge and beliefs regarding this public health problem so that they can provide reliable information that will lead to health gains.⁸ The results of pre-intervention phase of this study revealed knowledge deficits, in addition to misinformation and confusion about Pap smear and human papillomavirus (HPV) vaccine. Overall, about 95% of the study sample had poor level of knowledge.⁹ Similar studies in KSA have also reported poor knowledge among medical students and non-gynaecological physicians.¹⁰⁻¹²

Health education programmes are effective for all levels of prevention, including primary, secondary and tertiary.¹³ In consequence, they reduce risky behaviour, encourage adoption of healthy lifestyle and promote effective utilisation of health services. Such programmes are effectively applied for prevention of infectious.¹⁴⁻¹⁸ as well as for non-infectious and behavioural diseases

including cancer.¹⁹⁻²¹ It has been estimated that about 80% of cardiovascular diseases and type 2 diabetes,²² and 43% of cancers could be prevented by health education programmes.²³⁻²⁵

This study involved students from different colleges assuming that 'intervention programmes' conducted in educational settings can target large number of students and ensures optimal utilisation of resources at a fairly lower cost as compared to other settings. Moreover, their role in disseminating knowledge to families and friends is more influential than students from non-health background. The assessment of intervention programmes is an integral part to evaluate the efficacy of the study. The current study was conducted to evaluate the impact of a multidirectional health education programme on the level of retained knowledge about cervical cancer after six months from the implementation of the programme activities, and to compare students' acceptance of HPV vaccine before and after the educational programme.

Subjects and Methods

This quasi-experimental, pre- and post-intervention study was conducted in 2014 at Princess Nourahbint Abdulrahman University (PNU), Riyadh, Saudi Arabia, and comprised female medical students. Data of the pre-intervention phase was published earlier.⁹ In this study an educational programme was introduced and its impact was evaluated among matched pairs of students who participated in the pre-intervention knowledge assessment phase, attended all the programme intervention modalities and filled the post-intervention assessment questionnaire.

Previous literature showed the prevalence of knowledge regarding HPV among Saudi population at around 5%.⁹ So with confidence interval (CI) of 95% and desired precision of $\pm 5\%$, the minimum required sample size was 350 participants. We increased the sample size to compensate for any missing data or unforeseen faults that might occur during data entry. Students who gave their consent to participate in the study and filled in the questionnaire completely were included. Non-probability convenience sampling technique was adopted. The study was approved by the institutional ethics committee.

Before starting the intervention, the investigators confirmed from the dean of PNU's every college that no educational programme had been given to the students, so at the end of analysis, the researchers were confident that any percentage rise in the knowledge was solely due to their health education programme and not due to other curricular activities.

A multidirectional unified intervention programme was

designed by the investigators to meet students' needs as based on the analysis of the pre-intervention phase.⁷ Programme activities were introduced in two weeks, and was conducted in five stations; each situated in a participating college (pharmacy, nursing, health and rehabilitation, medicine and dental). The activities were introduced in three modalities including active participation of students and passive implementation of educational materials on screens, posters and boards. The health education topics covered the following items: risk factors of cervical cancer, clinical presentation, oncogenic strains of HPV and detailed information about HPV vaccines and Pap smear.

Unified interactive series of lectures using audio visual aids such as Microsoft PowerPoint, video films, charts and posters led by experienced faculty were conducted in each college. Each lecture lasted for one hour and followed by 15 minutes of active discussion. The time schedules were set appropriately to maximise the number of attendees and students were notified through e-mails, short message service (SMS) and advertisement in each college.

Peer education interactive programme was introduced for two weeks. Volunteer students known for their leadership and good communication skills were invited to participate in the programme. Participants were oriented about their role to deliver effective educational messages to their colleagues and were trained by the research coordinator in each college to present the required information using verbal messages, pamphlets, videos and posters. During the interactive sessions, prize-winning quizzes were conducted where small items with information relevant to the topic were distributed. The authors monitored the programme activities on a daily basis to ensure the quality and to maintain good level of enthusiasm all through the programme. At the end of the programme, certificate of participation and symbolic prizes were distributed to all volunteers.

Passive health education messages through screens, posters and display boards were introduced for two weeks in each college and in the main entrance of the health colleges.

To assess retention of knowledge, the programme was evaluated six months after its implementation using the same pre-intervention self-administered questionnaire.⁹ The outcome of the health education programme was evaluated on four end points: clinical presentation of cervical cancer; risk factors; pap smear, safety, frequency and sensitivity to detect early cytological changes; and HPV strains and HPV vaccine including its efficacy, age of

recommendation and acceptance.

Statistical analysis was done by using SPSS 20. Descriptive analysis was done by calculating and comparing percentages of knowledge variables before and after health education campaigns. Inferential analysis was done by applying chi-square test. This test was used to compare paired responses of pre- and post-educational campaign. P-value of less than 0.05 was considered statistically significant.

Results

Of the 535 participants, 261(48.8%) were from the pharmacy college, 137(25.6%) from the nursing college, 91(17%) from medicine and 43(8%) from the dental college. The overall mean age was 20.3 ± 1.3 years. From the medical and nursing colleges, only 1st and 2nd year students were enrolled in this study because clinical subjects start from the 3rd year and that could act as confounder.

Students from all years participated in the study from pharmacy and dental colleges; the highest participation was from the first year, i.e. 259(48.4%) whilst the least were from the fifth year, i.e. 35(6.5%). The socio-demographic details of participants were published in the previous phase of the study.

Overall, the effectiveness of the intervention programme on most of the items was positive. After the programme,

410(76.6%) students identified CaCx as a preventable disease as compared to 269(50.3%) before the campaign ($p < 0.01$). Besides, 495(92.5%) students recognised vaccination, avoidance of sexually transmitted diseases(STDs), screening and early detection as effective preventive measures from CaCx after the campaign compared to 472(88.2%) before the campaign ($p = 0.02$). Significantly higher percentage of students correctly defined various risk factors of CaCx, especially STD 392(73.3%) after the campaign versus 329(61.8%) after the campaign, acquired immune deficiency syndrome (AIDS) 348(65%) versus 258(48.2%), and HPV 293(54.8%) versus 151(28.4%) ($p < 0.01$ for all).

Regarding clinical presentation of cervical cancer, many symptoms were increasingly considered significant including irregular vaginal bleeding (%rise: 16.8), vaginal discharge (%rise: 35.3), post-coital bleeding (% rise: 61.8) and pelvic pain (% rise: 4.5). The maximum percent of increase from pre-intervention data was for asymptomatic presentation and post-coital bleeding (82.39% and 61.8% respectively).

Regarding knowledge of Pap smear as a screening tool, 280(52.3%) students agreed that it was a sensitive test for early detection of CaCx as compared to 160(30%) prior to the campaign ($p < 0.01$). Moreover, 186(34.8%) participants after the campaign recognised that the test was not painful compared to 93(17.4%) before ($p < 0.01$). After the campaign, 291(54.4%) students agreed that one-

Table-1: Impact of educational programme on knowledge about cervical cancer among Saudi students from Health Colleges.

Variables for knowledge on Cervical Cancer	Before campaign n (%)	After campaign n (%)	%rise	p-value
1. Preventable disease	269 (50.3)	410 (76.6)	52.3	<0.01
2. Preventable through vaccination, avoidance of STD, screening and early detection	472 (88.2)	495 (92.5)	4.9	0.02
Risk Factors:				
3. AIDS	258(48.2)	348 (65.0)	34.9	<0.01
4. HPV	151 (28.4)	293 (54.8)	93	<0.01
5. STD	329 (61.8)	392 (73.3)	18.6	<0.01
Symptoms:				
6. Irregular vaginal bleeding	308 (57.6)	360 (67.3)	16.8	<0.01
7. Vaginal discharge	179 (33.7)	244 (45.6)	35.3	<0.01
8. Post coital bleeding	116 (21.7)	188 (35.1)	61.8	<0.01
9. Pelvic pain	227 (42.4)	237 (44.3)	4.5	0.5
10. Asymptomatic	36(6.7)	118 (22.1)	82.39	<0.01
Pap Smear:				
11. Sensitive for early detection	160 (30.1)	280 (52.3)	73.8	<0.01
12. Not painful	93 (17.4)	186 (34.8)	100	<0.01
13. No serious complications	157 (29.3)	268 (50.1)	71	<0.01
14. Most appropriate time to have it is every three years after marriage	113 (21.1)	229 (42.8)	99	<0.01

STD: Sexually transmitted diseases

AIDS: Acquired immune deficiency syndrome

HPV: Human papillomavirus.

Table-2: Knowledge on HPV Vaccine.

Variables on HPV Vaccine	Before campaign n (%)	After campaign n (%)	%rise	p-value
1. Vaccine against cervical cancer contains HPV	73 (13.6)	199 (37.2)	173.5	<0.01
2. The vaccine is protective against genital warts	36 (6.7)	74 (13.8)	106	<0.01
3. The most appropriate age to get the vaccine is 12-25 years	53 (9.9)	134 (25.0)	152.5	<0.01

HPV: Human papillomavirus.

Table-3: Effect of the educational programme on acceptance and barriers of HPV vaccine among Saudi students from Health Colleges.

Variables	Before campaign n (%)	After campaign n (%)	%rise	p-value
Appropriate place to get vaccinated				
1. Hospital	434 (81.1)	443 (82.8)	2	0.2
2. Health centre	38 (7.3)	53 (9.9)	2	0.2
3. Private clinic	5 (0.9)	17 (3.2)	3	0.05
4. Do not know	58 (10.8)	22 (4.1)	-2	0.05
Acceptable vaccine cost				
1. Less than 100SR	194 (36.3)	231 (43.2)	2	0.08
2. 100-300 SR	234 (43.7)	224 (41.9)	1	0.07
3. Up to 500 SR	57 (10.7)	56 (10.5)	1	0.08
4. More than 500 SR	26 (4.9)	24 (4.5)	-0.9	0.08
Reasons behind refusal to be vaccinated				
1. Being afraid of the vaccine injection	130 (24.3)	74 (13.8)	-1	<0.01
2. Being worried about side effects	281 (52.5)	156 (29.2)	-1	<0.01
3. The vaccine might be unaffordable	73 (13.6)	36 (6.7)	-0.5	<0.01
4. Family refusal	43 (8.0)	32 (6.0)	-0.9	0.22
5. She does not believe in the effect of vaccination	34 (6.4)	23 (4.3)	-0.8	<0.01

HPV: Human papillomavirus

SR: Saudi Riyal.

time Pap smear testing was not enough, 268(50.1%) said it had no serious complications and 229(42.8%) agreed that Pap smear should be done every 3 years after marriage (Table-1).

After the intervention, 199(37.2%) students recognised that vaccine against cervical cancer contains HPV vaccine compared to 73(13.6%) students before the intervention. Moreover, 74(13.8%) recognised HPV vaccine's efficacy against genital warts after the campaign as compared to 36(6.7%) before the programme. Similarly, 134(25%) students agreed after the intervention that the most appropriate age to get the vaccine was 12 to 25 years; this number was 53(9.9%) before (Table-2).

After the intervention programme, 443(82.8%) students preferred to have the vaccine in hospitals compared to 434(81.1%) before the campaign ($p=0.2$). The number of students who preferred the private clinics as venue for vaccination was 17(3.2%) after the campaign compared to 5(0.9%) before ($p=0.05$). Vaccine cost remained an

important issue in determining its acceptance where 455(85%) students assumed that the reasonable cost of vaccine should not exceed 300 Saudi riyals as compared to 428(80%) before. The number of participants who accepted the vaccine cost above 500 riyals was 26(4.9%) before the intervention versus 24(4.5%) post-intervention ($p=0.08$).

Concerning barriers for HPV vaccination, 281(52.5%) cited side effects, followed by fear of injection 130(24.3%) before the programme. The number was 156(29.2%) and 74(13.8%), respectively, after the programme ($p<0.01$). Before the intervention, 34(6.4%) students did not believe in the efficacy of the vaccine compared to 23(4.3%) after the campaign ($p<0.01$) (Table-3).

Discussion

The results of the present study revealed a significant improvement of knowledge in all items related to preventive measures, risk factors and clinical presentation of cervical cancer and its recognition as a preventable

disease. Consequently, a great majority of students identified the different effective measures of prevention from this disease including vaccination, avoidance of STDs and early detection by screening. This was consistent with a study conducted in India in which the mean post-test knowledge score of women was significantly higher (65%) than their mean pre-test score indicating the efficacy of the programme in improving the knowledge.²⁶

Regarding risk factors, our results demonstrated that the level of knowledge had changed significantly where more than 50% students confirmed that HPV, AIDS, immune-compromised states and STDs are risk factors. For the other factors (perianal warts, smoking, obesity and old age) more than 1/3rd of students responded correctly. This variability could be attributed to the strength of messages delivered by the educational modalities. It is worth mentioning that the percent change in the level of knowledge was the maximum for the HPV being a risk factor for CaCx (93%). In the intervention programme, there were plenty of videos highlighting the causal relation between HPV and CaCx. It has been reported that multiple media health education based on movies demonstrated more impressive results,²⁷ since it might be more interesting and attracts the attention of participants all through the session.

As for knowledge about clinical presentation, it increased significantly after exposure to intervention. A substantial percentage of students were aware about early symptoms, including irregular vaginal bleeding, vaginal discharge and post coital bleeding. Also, it is important to note that about one-fifth of the students realised that the disease could be asymptomatic compared to only 6.7% before the educational programme. In confirmation to this study, women assigned to reading messages related to risk factors, signs and symptoms of CaCx demonstrated an increase in their level of knowledge.²⁸

Exposure to the educational programme significantly modified students' knowledge about Pap smear as a screening test and the percent change in the level of awareness was the most impressive among all the other components of our programme. Dissemination of this information in the community would increase the uptake of Pap smear as a tool for early detection by the target population. In agreement with our results, several studies confirmed the significant impact of educational programme to raise awareness about Pap smear as a result of recently introduced educational modalities as mobile phones and media.^{27,29,30} The value of Pap smear was emphasised in several studies such that the ongoing

downward trend of CaCx is mainly attributed to the wide introduction of Pap smear.²

In our study, pre-intervention data indicated that knowledge about HPV vaccine regarding the appropriate age of vaccination and its efficacy was very poor as compared to other items (13.6%) and remained least among all other items six months after the intervention. A study conducted in Abu Dhabi, the United Arab Emirates (UAE), revealed that despite free administration of HPV vaccine for all school girls entering grade 11 as a school-based vaccination programme offered by the government, only 29% women knew about HPV vaccine. This emphasises the crucial role of public awareness campaigns and workshops in educating the females about this preventable disease.³¹ In contrast, multiple media health education based on a movie in Nigeria raised the level of awareness about CaCx and screening to 100%.²⁷ The difference between our study and the Nigerian study are due to multiple factors, including study setting, educational level of participants, cultural factors, differences in the study design, small sample size, shorter follow-up period and variations in the intervention modalities. Therefore, despite the significant impact of the educational programme on the percent change of knowledge, the low proportion of students demonstrating appropriate knowledge about HPV vaccine after intervention calls for national awareness campaigns in KSA.

Regarding vaccine acceptance, the educational programme obviously ameliorated the main domains of barriers, including fear of injection, vaccine side effects, cost and logistic barriers as lack of time. A comparable study in Malaysia documented that the highest factors influencing vaccine acceptance were safety (84%), risks (55%), effectiveness (55%), and 'halal-ness' of vaccine (36%).³² This study highlighted that vaccine cost is an important issue for its acceptance as only a minority of students were willing to get the vaccine at a cost higher than 500 riyals (4.5% versus 4.9%). Even in developed countries, vaccine cost remains an important barrier for HPV vaccination.³³

In our study, although fear of side effects dropped from 52.5% to 29.2%, this percentage is considerably high as it represents students from health background. Previous studies confirmed that fear of injections was considered an important barrier for prevention.³⁴⁻³⁶ Finally, promotion programmes which mitigate barriers to accept HPV vaccination are crucial to increase vaccine uptake³⁷ since perceived barriers are key factors which determine changes in health behaviours.²⁸

The large sample size, and appropriate follow-up period (six months) to evaluate the impact of intervention on retention of knowledge were some of the strengths of the current study. In addition, data was analysed on matched pairs which ensured the validity of the study results.

However, the study had its limitations as well. The study was conducted in one university and on female students only. There was also unequal number of participants from health colleges as from College of Medicine and Dentistry the sample only included juniors (1st and 2nd year students).

Conclusion

The effectiveness of the health education programme demonstrated significant change in the level of knowledge for almost all items. However, the percent change in the level of knowledge was variable indicating an overall moderate effect. Further research is needed to determine the timing, intensity and duration of interventions in addition to using additional modalities as mobile and internet services in order to get better outcomes.

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References

- Jemal A, Center MM, DeSantis C, Ward EM. Global patterns cancer incidence and mortality rates and trends. *Cancer Epidemiol Biomarkers Prev* 2010; 19: 1893-907.
- Adegoke O, Kulasingam S, Virnig B. Cervical Cancer Trends in the United States: A 35-Year Population-Based Analysis. *J Womens Health (Larchmt)* 2012; 21: 1031-7.
- Tiro JA, Meissner HI, Kobrin S, Chollette V. What do women in the U.S. know about human papillomavirus and cervical cancer? *Cancer Epidemiol Biomarkers Prev* 2007 16: 288-94.
- Marek E, Dergez T, Rebek-Nagy G, Szilard I, Kiss I, Ember I, et al. Effect of an educational intervention on Hungarian adolescents' awareness, beliefs and attitudes on the prevention of cervical cancer. *Vaccine* 2012; 30: 6824-32.
- El-Dosoky M, Ismail N, Dagastani M. preinvasive cervical carcinoma in Saudi Arabia. *Lancet* 1995 ; 345: 650
- Manji M. Cervical cancer screening program in Saudi Arabia action is overdue. *Ann Saudi Med* 2000; 20: 355-7.
- Behnamfar F, Azadehrah M. Factors associated with delayed diagnosis of cervical cancer in Iran: a study in Isfahan city. *Asian Pac J Cancer Prev* 2015; 16: 635-9
- Medeiros R, Ramada D. Knowledge differences between male and female university students about Human Papilloma Virus (HPV) and cervical cancer: Implications for health strategies and vaccination. *Vaccine* 2011; 29: 153-60
- Al-Shaikh GK, Almussaed, EM, Fayed AA, Khan FH, Syed, SB, Al-Tamimi, TN, et al. Knowledge of Saudi female university students regarding cervical cancer and acceptance of the human papilloma virus vaccine. *Saudi Med J* 2014; 35: 1223-30.
- Sait KH. Knowledge, attitudes, and practices regarding cervical cancer screening among physicians in the Western Region of Saudi Arabia. *Saudi Med J* 2011; 32: 1155-60.
- Al-Darwish AA, Al-Naim AF, Al-Mulhim KS, Al-Otaibi NK, Morsi MS, Aleem AM. Knowledge about Cervical Cancer Early Warning Signs and Symptoms, Risk Factors and Vaccination among Students at a Medical School in Al-Ahsa, Kingdom of Saudi Arabia. *Asian Pac J Cancer Prev* 2014; 15: 2529-32.
- Aiello AE, Coulborn RM, Perez V, Larson EL. Effect of hand hygiene on infectious disease risk in the community setting: a meta-analysis. *Am J Public Health* 2008; 98: 1372-81.
- Tones K. Why theorise? Ideology in health education. *Health Educ J* 1990; 49: 2-6.
- Ghosh SK, Patil RR, Tiwari S, Dash AP. A community-based health education program for bio-environmental control of malaria through folk theatre (Kalajatha) in rural India. *Malaria J* 2006 ; 5: 123
- Manabe T, Pham TP, Vu VC, Takasaki J, Dinh TT, Nguyen TM, et al. Impact of educational intervention concerning awareness and behaviors relating to avian influenza (H5N1) in a high-risk population in Vietnam. *PLoS One* 2011; 6: e23711.
- Amoran OE, Fatugase KO, Fatugase OM, Alausa KO. Impact of health education intervention on insecticide treated nets uptake among nursing mothers in rural communities in Nigeria. *BMC Res Notes* 2012; 5: 444.
- Bieri FA, Gray DJ, Raso G, Li YS, McManus DP. A systematic review of preventive health educational videos targeting infectious diseases in school children. *Am J Trop Med Hyg* 2012; 87: 972-8
- Gao X, Wu Y, Zhang Y, Zhang N, Tang J, Qiu J, et al. Effectiveness of school-based education on HIV/AIDS knowledge, attitude, and behavior among secondary school students in Wuhan, China. *PLoS One* 2012; 7: e44881.
- Ennis M, Thain J, Boggild M, Baker GA, Young CA. A randomized controlled trial of a health promotion education programme for people with multiple sclerosis. *Clin Rehab* 2006; 20: 783-92.
- Anderson B, Naish W. Bladder cancer and smoking. Part 4: efficacy of health promotion. *Br J Nurs* 2008; 17: 1340-4.
- Allen C. Supporting effective lifestyle behavior change interventions. *Nurs Standard* 2014; 28: 51-8.
- World Health Organization. 2008-2013 Action Plan for the Global Strategy for the Prevention and Control of Non-communicable Diseases. [online] [cited 2015 Aug 20]. Available from: URL: <http://www.who.int/nmh/publications/9789241597418/en/>
- Parkin DM, Boyd L, Walker LC. The fraction of cancer attributable to lifestyle and environmental factors in the UK in 2010. *Br J Cancer* 2011; 105: S2, S77-S81.
- Royal College of Nursing. Going Upstream: Nursing's Contribution to Public Health. Prevent, Promote and Protect. [online] [cited 2015 Aug 20]. Available from: URL: https://www2.rcn.org.uk/__data/assets/pdf_file/0007/433699/004203.pdf
- Royal College of General Practitioners. Royal College of General Practitioners Curriculum. The Clinical Example on Healthy People: Promoting Health and Preventing Disease. [online] [cited 2015 Aug 20]. Available from: URL: http://www.gmc-uk.org/3_01_Healthy_people_May_2014.pdf_56884806.pdf

26. Mary B, D'Sa JL. Evaluation of an educational program on cervical cancer for rural women in Mangalore, Southern India. *Asia Pac J Cancer Prev* 2014 ;15: 6603-8.
 27. Abiodun OA, Olu-Abiodun OO, Sofunsa JO. Impact of health education intervention on knowledge and perception of cervical cancer and cervical screening uptake among adult women in rural communities in Nigeria. *BMC Public Health* 2014; 14: 814.
 28. Grenda MA, Shepherd MA, Lustria ML. Increasing human papilloma virus vaccine acceptability by tailoring messages to young adult women's perceived barriers. *Sex Transm Dis* 2013 ; 40: 401-5.
 29. Williams JH, Carter SM, Rychetnik L. information provision in cervical screening in Australia. *Med J Aust* 2014; 201: 295-7.
 30. Lee HY, Koopmeiners JS, Rhee TG, Raveis VH, Ahluwalia JS. Mobile phone text messaging intervention for cervical cancer screening: changes in knowledge and behavior pre-post intervention. *J Med Internet Res* 2014 ;16: e196.
 31. Ortashi O, Raheel H, Shalal M. Awareness and knowledge about Human Papillomavirus infection and vaccination among women in UAE. *Asian Pac J Cancer Prev* 2013 ; 14: 6077-80.
 32. Zaridah S. A review of cervical cancer research in Malaysia. *Med J Malaysia* 2014; 69: 33-41.
 33. Masi CM, Blackman DJ, Peek ME. Interventions to enhance breast cancer screening, diagnosis, and treatment among racial and ethnic minority women. *Med Care Res Rev* 2007; 64: 195S-242S.
 34. Kollar LM, Kahn JA. Education about human papillomavirus and human papillomavirus vaccines in adolescents. *Adolesc Pediatr Gynecol* 2008; 20: 479-83.
 35. Marek E, Dergez T, Rebek-Nagy G, Kricskovics A, Kovacs K, Bozsa S, et al. Adolescents' awareness of HPV infections and attitudes towards HPV vaccination 3 years following the introduction of the HPV vaccine in Hungary. *Vaccine* 2011; 29: 8591-8.
 36. Hilton S, Smith E. 'I thought cancer was one of those random things. I didn't know cancer could be caught: adolescent girls' understandings and experiences of the HPV programme in the UK. *Vaccine* 2011; 29: 4409-15.
 37. Newman PA, Logie CH, Doukas N. HPV vaccine acceptability among men: a systematic review and meta-analysis. *Sex Transm Infect* 2013; 89: 568-74.
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