Research Article

Knowledge on cervical cancer, human papilloma virus and vaccine, and attitudes towards immunisation following the introduction of vaccine to the National Immunisation Programme, Sri Lanka.

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Abstract

Background: The human papilloma virus (HPV) vaccine was introduced to the National Immunisation Programme of Sri Lanka in 2017. Although the vaccination uptake increased initially, there is no published data on the continued uptake of the vaccine. Uptake of the HPV vaccine in countries that were initially high have declined. Factors for low compliance could be poor knowledge and/or attitudes.

Objectives: The aim of this study was to ascertain knowledge of cervical cancer, HPV and its vaccine, and the attitudes towards HPV immunisation in this post-vaccination era, as well as to identify areas that need strengthening.

Methods: A cross-sectional, pre-tested questionnaire based survey of 1716 individuals over 18 years of age, from six districts in Sri Lanka, was conducted in 2019. Ethical approval was granted by the Ethics Review Committee, Faculty of Medical Sciences, University of Sri Jayewardenepura.

SPSS statistical software was used for the analysis. A cut off of 50% was considered as a satisfactory level for knowledge and attitude. The Univariate Chi square analysis was used for associations between categorical variables. Odds ratios, with 95% confidence intervals determined the size of the effect of these factors on knowledge and attitudes of the participants.

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Results: Satisfactory knowledge (50% cut off) of cervical cancer, HPV and of vaccine was detected only in 54%, 20% and 19% participants respectively. Ninety-seven percent of those who were aware of the HPV vaccine (455/471) and 89% (1527/1716) of all participants were in favour of giving the vaccine to their daughters. Factors significantly affecting overall knowledge (all three domains) were age 30-65 years (OR 2.0; 95% CI 1.1,3.3), knowing a patient with cancer (OR 2.0; 95% CI 1.5,2.7) and undergoing cervical screening (OR 3.3; 95% CI 2.3,4.7). Good knowledge of vaccine was significantly associated (OR 4.3; 95% CI 1.3,15.1) with a favourable attitude towards vaccination.

Conclusions: Despite overall poor knowledge, a favourable attitude was seen among the majority (89%) of respondents towards HPV vaccination.

Keywords: *attitudes, cervical cancer, human papilloma virus, knowledge, Sri Lanka, vaccine*

Introduction

Cervical cancer is a global problem and is the fourth most common type of cancer among women worldwide.[1] In 2018, an estimated 570,000 new cases of cervical cancer were diagnosed worldwide and 311,000 died.[1] Approximately 90% were in lower and middle income countries.[2] Sri Lanka has the lowest incidence rate in Southeast Asia, but is still above the rate needed for elimination of cervical cancer as a public health problem.[2] In Sri Lanka, cervical cancer ranks as the second most common cancer among females.[3]

Currently in Sri Lanka, Pap smear tests are recommended every five years for women between the ages of 30-65 years.[3] Despite this service being available at Well Woman Clinics countrywide, coverage was less than 40% in 2013.[4] The association of cervical cancer with the human papilloma virus (HPV) is well established and the HPV vaccine was introduced in the National Immunisation Programme (NIP) in July 2017. Two doses of the quadrivalent vaccine are given free of charge to girls between the ages of 10-11 years.[5]

Studies on knowledge, attitudes and practices regarding the HPV vaccine conducted during the post-licensing period showed that generalisation regarding knowledge and attitudes cannot be made and surveys of specific targeted populations are required.[6] Previous surveys in Sri Lanka have been on clinic attendees and were from the pre-vaccination era.[7,8]

Accordingly, the aim of this study was to assess the level of knowledge regarding cervical cancer, HPV and vaccine and attitudes towards HPV immunisation during the early stages of the HPV immunisation campaign. Findings from this study would help identify areas that still need to be addressed in the promotion of vaccination for cervical cancer.

Methods

A descriptive cross-sectional study was adopted. All districts with urban populations were randomised and two of these districts with Grama Sewa Niladhari Divisions of urban, rural and estate populations were selected. The districts of Colombo and Matara (urban populations), Ampara and Anuradhapura (rural populations) and Ratnapura and Nuwara Eliya (estate populations) were randomly selected for the survey. Men and women over 18 years were recruited following informed written consent. A stratified sampling method was used to recruit study participants. At an expected prevalence of 50% with 95% precision with a design effect of 1.3, the calculated sample size for each sector was 588 with an expected response rate of 85%. A total of 1764 participants were recruited to the study and after data cleaning for completeness, 1716 respondents were included in the analysis. The study proposal was approved by the Ethics Review Committee, Faculty of Medical Sciences, University of Sri Jayewardenepura, Sri Lanka (Application No 81/17, approved on 25/1/2018).

The questionnaire was validated by a group of public health experts representing both the ministry of health and universities. It was pre-tested among a group of study subjects from a non-participant district.

Data collection

A pre-tested interviewer-administered questionnaire was used for data collection from January to April 2019, one and half years following the introduction of the HPV vaccine to the NIP. The questionnaire consisted of four sections: (i) socio-demographic data, (ii) questions relating to knowledge on HPV (n=10), (iii) questions related to knowledge on cervical cancer (n=5), (iv) questions on knowledge (n=5) and attitudes (n=3) regarding HPV vaccine. Only those who had heard of either cervical cancer, HPV infection or the vaccine were required to respond to all questions under those sections.

Data analysis

Data were analysed using the SPSS Version 16.0 (SPSS Inc., Chicago, IL, USA) statistical software. A score of one was assigned to each 'Yes/true' answer, while 'No/false' or 'don't know/no response' replies were scored as zero. A total score for each respondent and sub-scores for each component (cervical cancer, HPV, and vaccine) were computed. A cut off of 50% was set for a satisfactory level of knowledge as well as attitude. Univariate Chi square analysis was used to investigate the associations between categorical variables. Odds ratios were calculated to determine the size of the effect of these factors on the knowledge and attitudes and were presented with 95% confidence intervals.

Results

A response rate of 80.7% was achieved; the majority were female responders (90.4%; n=1552). The mean age was 40.0 years (SD=9.6), most had been married (97.4%) and were mainly Sinhalese (76.4%) and Buddhists (71.9%). Those who had passed the Ordinary Level (O/L) examination or were educated above the level of O/L, comprised

59.2% of the sample (Table 1). Twenty-four percent of participants (n=417) knew of a relative with some type of cancer. There were 272 (15.9%) who did not know any of the three domains i.e. cervical cancer, HPV and HPV vaccine.

Knowledge regarding HPV

Only 473 (27.6%) had heard of HPV. The total score ranged from 0-10 with a mean of 1.5 (SD±2.7) and only four answered all 10 questions correctly. Of those who had heard of HPV, almost half believed that HPV could not be acquired after a single intercourse and 58.6% (277/473) did not know that males could acquire HPV. Among the participants, 46% (217/473) correctly identified the outcomes of HPV infection of which cervical cancer or cancer was the most frequently (43.3%) mentioned. Almost half of the participants were not sure or believed their daughters were not at risk of HPV infection and gave the following reasons: medications or vaccines had been given, parents did not have any infections or hereditary diseases and the child was in good health. A good level of knowledge of HPV (score ≥5 of 10) was seen in only 20.2% (346/1716) (Table 2).

Table 1. Demographic profile of participants

Demographic characteristic	Number (Total = 1716)	Percentage
Gender		
Male	164	9.6
Female	1552	90.4
Age (years)		
18-29	184	10.7
30-65	1499	87.4
>65	33	1.9
Ethnicity		
Sinhalese	1311	76.4
Tamil	310	18.1
Others	95	5.5
Religion		
Buddhist	1234	71.9
Hindu	227	13.2
Christian/Roman Catholic	172	10.0
Islam	83	4.8
Marital status		
Is/was married	1671	97.4
Never married	45	2.6
Education		
No formal schooling	34	2.0
Primary (1-5 years)	147	8.6
Secondary (6-11 years)	519	30.2
Passed GCE Ordinary Level (exam at end of 11 years of)	748	43.6
Passed GCE Advanced Level (exam at end of 13 years of schooling)	212	12.4
Vocational training or certificate holder	32	1.8
Degree or postgraduate degree holder	24	1.4

Knowledge of cervical cancer

Those who had heard of cervical cancer were more (81.5%; n=1398) than for HPV or the vaccine. However, only one fourth (382/1398) were aware that HPV infection could lead to cervical cancer. The knowledge score for cervical cancer had a mean of 2.5 (median=3; SD=1.6). All five questions were answered accurately by 140 (8.2%), while 318 (18.5%) scored zero. Most (68.8%; 962/1398) were aware that cervical cancer could be prevented but only 18.3% (n=176/962) specifically mentioned vaccines or Pap smear testing as preventive methods (Table 3)

Table 2. Knowledge of human papilloma virus

	Questions on knowledge	Yes/ true (n)	%	No/ false (n)	%	Don't know (n)	%	No response (n)	%
1	Have you heard of human papilloma virus? *(Total n=1716)*	473	27.6	1243	72.4	-	-	-	-
	Only those who said 'Yes' to Question 1 answered questions 2-7 (Total n= 473)								
2.	Can you acquire human papilloma virus after a single intercourse	91	19.2	210	44.4	146	30.9	26	5.5
3.	Can males get human papilloma virus infection?	196	41.4	154	32.6	117	24.7	6	1.3
.	Can females get human papilloma virus infection?	406	85.8	15	3.2	45	9.5	7	1.5
5.	Who is at risk of developing human papilloma virus infection?								
	Those who have sex at an early age	142	30.0	144	30.4	97	20.5	90	19.0
	Those who have multiple partners	303	64.1	44	9.3	55	11.6	71	15.0
	People who have casual sex	324	68.5	22	4.7	65	13.7	62	13.1
	Those who do not use condoms	253	53.5	36	7.6	104	22.0	80	16.9
6.	What does human papilloma virus infection cause?*	217	45.9	82	17.3	167	35.3	7	1.5
7.	Do you think your daughter/s is/are at risk of developing human papilloma virus infection?	220	46.5	168	35.5	78	16.5	7	1.5
	Why do you say 'No'? Specify	*See text*							
	Total score for knowledge of HPV *(n=1716)*								
	Good knowledge of HPV ≥ 5	346	20.2						
	Poor knowledge of HPV <5	1370	79.8						

*Mark the correct option

Eighty-four percent (n=1173) of those who had heard about cervical cancer had also heard of pap smears, majority were females (93.8%; n=1100). Among the 30-65 year old females (n=1499), 71.3% (n=1069) were aware of pap smears but only 36.2% (n=543) had undergone Pap testing. A good level of knowledge regarding cervical cancer was seen in 53.7% (n=921/1716) (Table 3).

Knowledge of HPV vaccine

Only those who were aware of the availability of HPV vaccine were asked the following questions. Hundred and twenty-five (26.5%), 338 (71.8%) and 134 (28.5%) were aware that the vaccine prevented genital warts, cervical cancer and knew the correct number of required doses respectively. Most were aware (70%; 331/471) that Pap screening should be continued following vaccination. A good knowledge score for HPV vaccine (≥ 3 of 5) was seen in 70% of those who had heard of the vaccine. However, knowledge of the vaccine was poor (8.1%; 139/1716) among majority of the population studied (Table 4; Supplementary data).

Table 3. Knowledge of cervical cancer

	Questions on knowledge	Yes/ true (n)	%	No/ false (n)	%	Don't know (n)	%	No response (n)	%
1	Have you heard of cervical cancer*? (Total n=1716)*	1398	81.5	318	18.5	-	-	-	-
	Only those who said 'Yes' to Question 1 answered Questions 2-5 (Total n=1398)								
2	Can cervical cancer be prevented?	962	68.8	146	10.4	264	18.9	26	1.9
	Only those who said 'Yes' to Question 2 answered Question 3 (Total n=962)								
3	How can cervical cancer be prevented?*	176	18.3	703	73.1	-	-	83	8.6
4	Can human papilloma virus infection cause cervical cancer? *(Total n=1398)*	382	27.3	63	4.5	810	57.9	143	10.2
5	Have you heard of Pap smears? *(Total n=1398)*	1173	83.9	210	15.0	-	-	15	1.1
	Only those who were female and had heard of pap smears were asked Question 6								
6	Have you had a Pap smear at any time? *(Total n=1100)*	562	51.1	528	48.0	4	0.4	6	0.5
	Total score for knowledge of cervical cancer *(n=1716)*								
	Good knowledge of cervical cancer ≥ 3	921	53.7						
	Poor knowledge of cervical cancer <3	795	46.3						

*Mark the correct option

Attitudes regarding HPV vaccine

Ninety-seven percent of those who were aware of HPV vaccine (455/471) and 89% (1527/1716) of all participants were in favour of giving the vaccine to their daughters. Acceptance of vaccination was high if a doctor were to recommend. Most participants (81.1%; 382/471) believed the vaccine was safe (Table 4; Supplementary data).

The few who were reluctant to vaccinate indicated the following reasons: vaccine may cause infections, do not have enough information about vaccine or disease, need to discuss with family and get consent from husband or daughter and fear that new vaccines may cause death. Consent from family members, medical guidance, guarantee that there

would be no side effects and more information about vaccine were given as factors that would help them to decide regarding vaccination. A good attitude score was seen in 97.7% (460/471) of those who were aware of the vaccine (Table 4).

Table 4. Knowledge and attitudes towards human papilloma virus vaccine

		Yes/ true (n)	%	No/ false (n)	%	Don't know (n)	%	No response (n)	%
1	Is there a vaccine to prevent human papilloma virus infection? *(Total n=1716)*	471	27.4	161	9.4	1084	63.2	-	-
Only those who said 'Yes' to Question 1 answered Questions 2-6 *(Total n=471)*									
	Questions to measure attitude								
2	Would you be willing to give this vaccine to your daughter?	455	96.6	10	2.1	6	1.3	-	-
3	If No, what is the reason for not giving the vaccine to your daughter/s? Specify	*See text*							
Even if you have not heard of human papilloma virus or the HPV vaccine *(Total n=1716)*									
4	If your doctor recommends the vaccine for your daughter, would you be willing to give it?	1527	89.0	55	3.2	134	7.8	-	-
Question 5-6 were answered only by those who said 'No' or 'Do not know' to Question 4									
5	If No, why would you not give it? Explain	*See text*							
6	What would help you to make a decision on whether to give the vaccine or not? Explain	*See text*							
Only those who said 'Yes' to Question 1 answered Questions 7-8 *(Total n=471)*									
7	Do you think this vaccine is safe?	382	81.1	6	1.3	26	5.5	57	12.1
8	If you said No explain your answer	*See text*							
	Total score for attitude towards vaccine *(n=471)*								
	Good attitude score ≥2 of 3	460	97.7						
	Poor attitude score <2 of 3	11	2.3						
	Questions on knowledge								
	Only those who said 'Yes' to Question 1 answered Questions 9-12 *(Total n=471)*								
9	Does it prevent genital warts?	125	26.5	117	24.8	167	35.5	62	13.2
10	Does it prevent cervical cancer?	338	71.8	35	7.4	42	8.9	56	11.9
11	How many doses have to be given?	134	28.5	337	71.5	-	-	-	-
12	Is it necessary to continue doing Pap smears after vaccination?	331	70.3	29	6.2	44	9.3	67	14.2
	Total score for knowledge of HPV vaccine *(n=471)*								
	Good knowledge score ≥3 of 5	332	19.3						
	Poor knowledge score <3 of 5	139	80.7						

Factors associated with overall level of knowledge

Overall, the level of knowledge of cervical cancer, HPV and vaccine was considered good if the sum of sub-scores was 10 or more (total=20). Overall scores ranged from 0-18 with a median of 3 (mean 4.1; SD=4). Only 12.8% (n=219) of the participants had good overall knowledge. Univariate associations related to overall knowledge were: 30-65 year age (OR 2.0; 95% CI 1.1,3.3; p=0.01), family member with cancer (OR 2.0; 95% CI 1.5, 2.7; p<0.001) and undergone Pap screening (OR 3.3; 95% CI 2.3,4.7; p<0.001).

Factors affecting attitudes towards vaccination

The attitude towards HPV vaccination was not associated with overall knowledge but was significantly associated with level of knowledge of cervical cancer (OR 4.9; 95% CI

1.5,16.5; p=0.005) and good knowledge of the HPV vaccine (OR 4.3. 1.3,15.1, p=0.01), among those who were aware of the vaccine (n=471) (Table 5).

Table 5. Factors associated with knowledge and attitudes

Variable		Good overall knowledge				Good attitude towards vaccine			
		Total n=1716				Total n=471			
		n (%)	OR	95% CI	*p*	n (%)	OR	95% CI	*p*
Gender									
	Male	13 (0.8)	0.6	0.3,1.0	.051	29 (6.2)	1.0	1.0,1.0	.390
	Female	206 (12.0)				431 (91.5)			
Age groups									
	30-65 years	203 (11.8)	2.0	1.1;3.3	.011	-	-	-	.258
	Other ages	16 (0.9)							
Marital status									
	Ever married	215 (12.5)	1.5	0.5,4.3	.430	453 (96.2)	6.5	0.7,57.7	.055
	Never married	4 (0.2)				7 (1.5)			
Ethnicity									
	Sinhalese	162 (9.4)	0.9	0.6,1.2	.365	337 (71.5)	1.0	0.3,3.9	.968
	Others	57 (3.3)				123 (26.1)			
Religion									
	Buddhist	152 (8.9)	0.9	0.6,1.2	.377	317 (67.3)	0.8	0.2,3.2	.787
	Others	67 (3.9)				143 (30.4)			
Education									
	Up to O/L	88 (5.1)	1.0	0.7,1.3	.844	212 (45.0)	1.0	0.3,3.4	.967
	Passed OL & above	131 (7.6)				248 (52.7)			
F/H of cancer									
	Yes	81 (4.7)	2.0	1.5;2.7	.000	132 (28.0)	0.5	0.1,1.6	.226
	No	138 (8.0)				328 (69.6)			
Knowledge of cervical cancer									
	Good	-	-	-	-	393 (83.4)	4.9	1.5,16.5	.005
	Poor					67 (14.2)			
Vaccine knowledge									
	Good	-	-	-	-	328 (69.6)	4.3	1.3,15.1	0.012
	Poor					132 (28.0)			
Pap test done (n=999)μ									
	Yes	142 (8.3)	3.3	2.3,4.7	.000	-	-	-	-

Abbreviations: CI, confidence interval; OR, odds ratio
*Only those who had heard about cervical cancer were questioned about Pap smear test. 15 missing
μ Only 30-65 year old females who had heard of cervical cancer were questioned on Pap testing

According to the response from the participants, the main sources of information on cervical cancer, HPV and vaccine were television, newspapers, Public Health Midwives and Medical Officers of Health.

Discussion

The strength of the current study was the inclusion of a large sample from the general population which is more representative of the community. Previous studies in were on clinic attendees and from the pre-vaccination era.[7,8] This is the first survey of knowledge and attitudes since the implementation of HPV immunisation in 2017.

Many did not know about HPV (28%). and knowledge was poor in this study compared to 54% primigravid women who were aware of HPV in 2013.[7] Awareness of HPV would have been expected to be higher following the introduction of the vaccine in 2017. Misconceptions such as males not being at risk for HPV and that there is no risk after a single encounter need to be addressed during health education sessions. HPV infection and the nature of its transmission make it a sensitive topic in Sri Lanka where pre-marital sex still carries a stigma.[9] The subject of sexually transmitted diseases (STDs) is currently not part of the school curriculum. Vaccination campaigns which are carried out in schools would be an ideal opportunity for introducing this subject to mature students by a medical professional.

Awareness of cervical cancer was high (81%) in this study, compared to 54% in antenatal clinic attendees in 2013.[7] However, less than one fourth were aware that HPV caused cervical cancer unlike in Malaysia where 85% of the parents knew of the association.[10] Among the targeted population of females, most (71%) were aware of Pap tests but uptake was poor (36%). Rate of undergoing Pap tests in this study population is similar to what was reported in 2015 (30-40%) and is low, similar to reports from India (29.8%; range 10%-45.2%).[11,12] The opportunity presented by the HPV vaccination programme should be utilised for promoting Pap testing among mothers of vaccinated children.

Despite promotion and education by public health workers, uptake of Pap tests in Sri Lanka is still inadequate. Awareness of Pap smear testing was 74% among females of screening age in our study, compared to 59% (25-65 year old women) five years ago.[8] It is noteworthy that a woman's awareness has repeatedly shown not to correlate with the uptake of Pap test.[8,12] In our study, 36% of the targeted females had undergone Pap tests which is the same (30-40%) as reported in 2015.[11] This is still far below the 70% acceptable level recommended by the European Council.[14]

It was surprising that only 27% were aware of the availability of the HPV vaccine at a time when the vaccine was being offered free of charge to school children. It was encouraging to note the willingness of the majority to offer this vaccine to their children despite poor awareness (89% of all participants were willing to vaccinate). The confidence that these people have in recommendations of a doctor would be the driving factor for successful coverage of this vaccination programme. However, other measures and interventions will be required to sustain continued compliance.

Vaccine acceptance in Malaysia (63%) was lower than in Sri Lanka , but knowledge regarding the vaccine was higher (62%).[10] Vaccination was a shared decision among most parents in Malaysia which was expressed by some participants in this study as well.

One and half years following introduction of the HPV vaccine to the NIP of Sri Lanka, these participants have displayed a low overall knowledge which is similar to previous studies.[7] Promotional and educational campaigns that precede the introduction of a new vaccine do not seem to have reached these study participants. As awareness of both HPV and the vaccine was poor, associations were computed for overall knowledge, which was the sum of the scores for the three domains (cervical cancer, HPV, and vaccine). Age 30-65 years (OR 2.0, 95% CI 1.1,3.3, p=0.01), family member with cancer (OR 2.0, 95% CI 1.5,2.7, p<0.001) and undergone Pap smear tests (OR 3.3, 95% CI 2.3, 4.7, p<0.001) were associated with overall knowledge. Shivanthan et al have also noted that uptake of Pap testing was significantly associated with knowing someone with cancer.[8] In addition this study has shown that the level of education is not parallel with uptake of the Pap test. This is supported by the finding that uptake was poor amongst female healthcare workers.[13,15] If both education levels and awareness do not improve the uptake of Pap testing, more active interventions are required to motivate women.

Not surprisingly, knowing more about cervical cancer and the HPV vaccine significantly influenced attitudes towards immunisation. Association of vaccine acceptance with good knowledge of HPV vaccine has been shown in a similar study in Malaysia as well.[10]

Conclusion

Despite a poor overall knowledge regarding HPV, cervical cancer and HPV vaccine, a favourable attitude was seen in the majority towards vaccination. Age range of 30-65 years, family member with any type of cancer and undergoing Pap screening were associated with overall knowledge. The attitude towards HPV vaccination was not associated with overall knowledge but was significantly associated with the level of knowledge of cervical cancer and good knowledge of the HPV vaccine in those who were aware of the existence of the vaccine.

Health education is required to improve knowledge and the motivation to increase cervical screening. Considering the conservative culture of Sri Lanka and the mode of transmission of HPV, involvement of both parents in health education campaigns is important. This would make introduction of the vaccine to males easier in the event such a decision is taken in the future.

Preferential employment of female medical professionals for educating and administering the Pap test, involvement of general practitioners, identification of eligible females at clinics and providing a letter of appointment for Pap test and self-sampling HPV tests have been proposed by others, which are worthy of consideration.[8,16,17]

Utilising the opportunity given by this new vaccination programme, mothers who have not had a Pap test should be identified and given a date to visit clinics before the second dose is to be administered. At the next vaccination date mothers who have defaulted could be identified for further motivational interventions. In addition, television and

newspapers which reach a large audience should be utilised to reinforcing this message frequently.

Declarations

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Author contributions:
KG: conceptualization, funding, designing, analysis and writing the manuscript; RB training and supervising data collectors; CS designing, analysis

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