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Knowledge, attitude, and practice on HPV vaccination among pre-university female students

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ABSTRACT

Background: Despite the availability of the HPV vaccine in our country, the mortality secondary to cervical cancer is still high as not many are interested in vaccinating the at-risk population. Hence, a study was conducted to identify the knowledge, attitude, and practice of the Human papilloma virus (HPV) vaccination in pre-university female students.

Materials and Methods: A cross-sectional study was conducted in the Tumkur district of India amongst female students studying in pre-university colleges.

Results: A total of 271 female students were included in the study. The mean knowledge score of the study population was 5.6/17 and only 169 (62%) students were aware of the effects of HPV. A total of 144 (53%) study participants were willing to take HPV vaccination if provided but $1/3^{rd}$ of them backed out after knowing the cost of vaccination. The study participants from the urban area had more knowledge about the effects of HPV (118/160 vs. 51/111; p <0.0001) than those from the rural area but there was no difference between them regarding attitude and practice toward HPV infection and its vaccination.

Conclusion: The study population was found to have poor knowledge about HPV infection and HPV vaccination. Only 53% of study participants were willing to take HPV vaccination if provided but $1/3^{rd}$ of them backed out after knowing the cost of vaccination. The urban group was more knowledgeable than the rural group but both groups had a similar attitude and practice toward HPV infection and its vaccination.

1. Introduction

Human Papilloma Viruses (HPV) are double-stranded DNA viruses with a great affinity for the squamous epithelium of the genital tract.[1] The prevalence of HPV infection varies from 2 to 44% amongst women and is the most common sexually transmitted disease in adolescents and young women.[2] These viruses are responsible for 99% of cervical cancers and 90% of genital warts worldwide.[3,4] Cervical cancer is the second most common malignancy in women in India with an annual crude incidence rate of 14.9 per one lakh women population.[5,6] Carcinoma cervix accounts for more than 5,00,000 cases and 3,00,000 mortality worldwide which makes it a major global disease of concern.[7]

When administered in girls of 15 to 26 years of age, the HPV vaccination is effective against high-grade cervical lesions. The clinical protection and protective antibody titer were sustained over eight to 10 years.[8] Despite the availability of the HPV vaccine in our country, mortality secondary to cervical cancer is still high. The cost of the

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vaccine, safety concerns, limited knowledge, acceptance, and lack of awareness are the major barriers to HPV vaccine administration in India.[9] Hence, a study was conducted to identify the knowledge, attitude, and practice of the HPV vaccine in pre-university female students. The study also included a comparison between the female students in the urban area to that in the rural area as we know that the economic level, cultural practices, and physical environment affect the attitudes and beliefs of people regarding disease prevention, pathogenesis, and treatment.[10]

2. Materials and Methods

A cross-sectional study was conducted in the Tumkur district of India amongst female students studying in pre-university colleges. Ethical committee approval was obtained from Institute Ethics Committee. A few colleges were selected randomly in urban and rural areas of the Tumkur district. Permission was obtained from the Principals of respective institutes and consent was obtained from the study participants. A pretested questionnaire was shared with the female students and was collected back after it was filled by them. Utmost care was taken to protect the identity of the study participants.

The data collected included demographic factors such as age, class of study, education qualification of parents, socio-economic status, religion, and persons living in the same house. Clinical history such as the family history of malignancy, menstrual hygiene, premarital sex, knowledge, attitude, and practice about HPV was also collected.

The Socioeconomic status was classified based on the revised BG Prasad classification based on the current Consumer Price Index for Industrial Workers (CPI-IW) compiled and released by the Ministry of Labour and Employment, Government of India.[11] Parents' occupations were classified based on the National classification of occupations 2015 compiled and released by the Ministry of Labour and Employment (Government of India) and the Labour Bureau of Government of India.[12,13]

There were 17 questions to assess the knowledge and eight questions to assess the attitude/practice towards HPV infection. The knowledge was further assessed by scoring "one" for each correct response and was further analyzed. The knowledge scores less than 50% were considered "poor", 50-75% as "moderate" and ≥76% as "good". The urban and rural groups were further compared based on their knowledge and attitude toward HPV infection and its vaccination.

2.1. Sample size calculation

The sample size of 271 was calculated using OpenEpi (Version 3) open-source calculator-SSPropor after considering the incidence of HPV infection as 22.8% based on a study by Liu XX et al.[14] The precision was assumed to be 0.05 with a design effect of 1.

2.2. Statistical analysis

All the data collected were compiled and entered into a Microsoft Excel worksheet. The data were analyzed using IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp. Descriptive parameters were expressed in number, percentage, mean and standard deviation. A chi-square or Fischer's exact test was used to find an association between the attributes. The difference between the groups was considered significant when the "p" value was <0.05 with a 95% confidence interval.

3. Results

A total of 271 female students were included in the study. Twenty-seven (10%) study participants belonged to 1^{st} pre-university while 244 (90%) belonged to 2^{nd} pre-university year. Two-hundred-and-fifty-eight (95%) of the study population was 16 to 17 years of age. The study group included 160 (59%) urban students and 111 (41%) rural students. One-hundred-and-twenty-four (46%) students' fathers were educated up to high school or lower while 136 (50%) mothers were educated up to high school or lower (Table 1). One hundred and twelve (41%) fathers belonged to clerical/shop/farm work group while only 20 (7%) were unskilled workers. One-hundred-and-thirty (48%) mothers' of study participants belonged to semi- or professional jobs while 34% were unemployed. One-hundred-and-fifty-eight (58%) study participants belonged to the upper class (Table 2).

Two-hundred-and-forty-nine (92%) of the study participants were Hindus. Two-hundred-and-twenty-eight (84%) study participants were living with their parents. Eleven (4%) study participants had a family history of cancer. Two-hundred-and-sixty-one (96%) students were using sanitary napkins during menstruation while only 10 (4%) were using cloth during menstruation. Three (1%) had a history of pre-marital sex (Table 3).

Internet (14%) was the commonest source of information about HPV followed by newspapers (13%). The other sources of information included doctors (10%), television (7%), text book (7%), friends (6%), parents (4%), and radio (2%). A total of 169 (62%) students were aware of the effects of HPV while only 12% were aware of the mode of HPV transmission. Only 16% of the study participants were aware of the symptoms of HPV infection and only 34% of the study participants were aware of HPV vaccination (Table 4). A total of 144 (53%) study participants were willing to take HPV vaccination if provided but $1/3^{rd}$ of them backed out after knowing the cost of vaccination (Table 5). The mean knowledge score was 5.6/17. Overall 224 (83%) study participants had poor knowledge about HPV infection (Table 6).

Table 1: Socio-demographic profile of the study participants (Part-1)

Parameters	Total n (%)	Rural n (%)	Urban n (%)	'p' value
Father's Qualification				
Illiterate	25 (9)	20 (18)	5 (3)	
Primary School	8 (3)	7 (6)	1 (1)	
Middle School	24 (9)	19 (17)	5 (3)	
High School	67 (25)	35 (32)	32 (20)	<0.001*
Intermediate/ Diploma	54 (20)	14 (13)	40 (25)	
Graduate	68 (25)	15 (14)	53 (33)	
Professional Degree	25 (9)	1 (1)	24 (15)	
Mother's Qualification				
Illiterate	7 (3)	5 (5)	2 (1)	
Primary School	10 (4)	8 (7)	2 (1)	
Middle School	20 (7)	18 (16)	2 (1)	
High School	99 (37)	42 (38)	57 (36)	<0.001*
Intermediate/ Diploma	55 (20)	14 (13)	41 (26)	
Graduate	67 (25)	21 (19)	46 (29)	
Professional Degree	13 (5)	3 (3)	10 (6)	

*Yateschi-square test

Table 2: Socio-demographic profile of the study participants (Part-2)

Parameters	Total n (%)	Rural n (%)	Urban n (%)	'p' value
Father's Occupation				
Unskilled Worker	20 (7)	17 (15)	3 (2)	
Semiskilled Worker	4 (2)	3 (3)	1 (1)	
Skilled Worker	23 (9)	7 (6)	16 (10)	<0.001*
Clerical/Shop/Farm	112 (41)	64 (58)	48 (30)	
Semi-Profession	66 (24)	17 (15)	49 (31)	
Professional	46 (17)	3 (3)	43 (27)	
Mother's Occupation				
Unemployed	93 (34)	43 (39)	50 (31)	
Unskilled Worker	12 (4)	10 (9)	2 (1)	
Semiskilled Worker	8 (3)	3 (3)	5 (3)	
Skilled Worker	4 (2)	1 (1)	3 (2)	<0.001*
Clerical/Shop/Farm	24 (9)	17 (15)	7 (4)	
Semi-Profession	125 (46)	36 (32)	89 (56)	
Professional	5 (2)	1 (1)	4 (3)	
Socio-Economic Status				
I (Upper Class)	158 (58)	57 (51)	101 (63)	
II (Upper Middle Class)	18 (7)	12 (11)	6 (4)	
III (Middle Class)	24 (9)	4 (4)	20 (13)	<0.001*
IV (Lower Middle Class)	39 (14)	19 (17)	20 (13)	
V (Lower Class)	32 (12)	19 (17)	13 (8)	

*Yateschi-square test

There was no age difference between the urban and the rural groups. The parents of the urban group were more educated than those of the rural group (Table 1). Most of the parents of the urban population were either professionals or semi-professionals while most of the parents of the rural population were clerical, shop, or farm workers (Table 2). The families in the urban group belonged to higher socio-economic status than those in the rural group (Table 2). There was no difference in family history, menstrual hygiene, or religion between the urban and rural groups (Table 3). The study participants from the urban area had more knowledge about the effects of HPV (118/160 vs. 51/111; p <0.0001) than those from the rural area but there was no difference between them regarding the knowledge of the mode of transmission of HPV. The urban group had more knowledge about the symptoms of HPV infection (32/160 vs. 11/111; p=0.009), the availability of HPV vaccine (66/160 vs. 25/111; p=0.001), and the ideal age group for HPV vaccination (90/160 vs. 33/111; p <0.0001) compared to the rural group (Table 4). There was no difference between the urban and the rural group in terms of attitude and practice toward HPV infection

Table 3: Characteristics and Family history of study subjects

Parameters	Total n (%)	Rural n (%)	n (%) Urban	'p' value
		Religion		
Hindu	249 (92)	104 (94)	145 (91)	
Muslim	20 (7)	7 (6)	13 (8)	0.84*
Christian	2 (1)	0 (0)	2 (1)	
		Presently Staying with		
Parents	228 (84)	89 (80)	139 (87)	
Joint Family	32 (12)	17 (15)	15 (9)	
Friends	2 (1)	0 (0)	2 (1)	0.38*
Relatives	6 (2)	2 (2)	4 (3)	
Staying Single	3 (1)	3 (3)	0 (0)	
		Menstrual hygiene		
Sanitary pads	261 (96)	104 (94)	157 (98)	0.1Ď
Home cloth	10 (4)	7 (6)	3 (2)	
Family history of cancer	11 (4)	2 (2)	9 (6)	0.21Ď
Premarital sex	3 (1)	0 (0)	3 (2)	0.28Ď

*Yates chi-square test; ĎFischer's exact test

Table 4: Knowledge assessment and comparison among the study subjects

Knowledge Assessment	Total n (%)	Rural n (%)	Urban n (%)	p-value
What does HPV cause?	169 (62)	51 (46)	118 (74)	< 0.00001*
How is HPV transmitted?	32 (12)	10 (9)	22 (14)	0.234*
Who can be infected with HPV?	162 (60)	64 (58)	98 (61)	0.555*
Do you think condoms protect against HPV infection?	68 (25)	16 (14)	52 (33)	0.001*
What may be the symptoms of HPV infection	43 (16)	11 (10)	32 (20)	0.025*
Can HPV be cured by taking antibiotics?	64 (24)	28 (25)	36 (23)	0.603*
Do you think all HPV-infected people develop cancer?	77 (28)	22 (20)	55 (34)	0.009*
Where do you think cervical cancer is common, rural or urban?	126 (47)	51 (46)	75 (47)	0.881*
PAP test is for screening of HPV infection?	19 (7)	8 (7)	11 (7)	0.912*
Is HPV infection common?	63 (23)	42 (38)	21 (13)	< 0.00001*
Are you aware of the HPV vaccine?	91 (34)	25 (23)	66 (41)	0.001*
Do you think the HPV vaccine is available in India?	147 (54)	57 (51)	90 (56)	0.424*
Do you believe vaccination against HPV is helpful?	187 (69)	71 (64)	116 (73)	0.136*
What is the ideal age group for HPV Vaccination?	123 (45)	33 (30)	90 (56)	< 0.00001*
Who should be vaccinated against HPV?	44 (16)	16 (14)	28 (18)	0.497*
Does the HPV vaccine help treat patients infected with HPV?	21 (8)	6 (5)	15 (9)	0.230*
Can HPV spread from Mother to Baby?	127 (47)	47 (42)	80 (50)	0.215*

*Yateschi-square test

and its vaccination (Table 5). The overall knowledge score was better in the urban group compared to the rural group (Table 6).

4. Discussion

Cervical cancer is one of the leading causes of cancer-related deaths in women globally with more than a quarter occurring in developing countries.[15] One in 53 Indian women are prone to develop cervical cancer in their lifetime.[15] HPV is responsible for 99% of cervical cancers and is also responsible for anal cancer, genital warts, and other genital diseases.[3,4,16] Early age at first sexual intercourse, early age at marriage, early age at first full-term pregnancy, long-term use of hormonal contraceptives, and multiple pregnancies are responsible for the progression of HPV infection to neoplastic cervical lesions in India.[10] These neoplastic lesions and the presence of high-risk HPV

Table 5: Attitude & Practice assessment and comparison among the study subjects

Attitude Assessment	Total n (%)	Rural n (%)	Urban n (%)	p-value
If provided, will you take HPV vaccination?	144 (53)	58 (52)	86 (54)	0.810*
Do you think your family members will agree to vaccinate children?	104 (38)	49 (44)	55 (34)	0.103*
Are you willing to approximately 10,000 rupees for the full course of HPV vaccination?	93 (34)	32 (30)	61 (38)	0.112*
Do you think white discharge per vagina be examined and treated?	98 (36)	45 (41)	53 (33)	0.211*
Do you think HPV vaccination should be included in routine vaccination programs?	114 (42)	45 (41)	69 (43)	0.674*
Practice assessment				
Have you received an HPV vaccination?	17 (6)	10 (9)	7 (4)	0.121*
Will you recommend others to be vaccinated against HPV?	166 (61)	63 (57)	103 (64)	0.204*
Once vaccinated is it necessary to screen that person?	80 (30)	39 (35)	41 (26)	0.091*

*Yateschi-square test

Table 6: Knowledge score

Cut Off Scores	Knowledge Status	Rural n (%)	Urban n (%)	Total n (%)	p-value
< 50 %	Poor	103 (93)	121 (75)	224 (83)	
50 - 75 %	Moderate	7 (6)	39 (25)	46 (17)	<0.01*
76 - 100 %	Good	1 (1)	0	1 (0.4)	

*Yateschi-square test

strains in India are responsible for the increased incidence of cervical malignancy in India.[10]

Amongst the 170 strains of HPV, 40 strains are transmitted sexually.[17] A few reports predict that more than 75% of sexually active individuals will be infected with HPV in their lifetime.[17,18] HPV types 6 and 11 are associated with 90% of genital warts while types 16 and 18 are associated with a majority of cervical and anal malignancy.[10]

There are three vaccines available against HPV, namely, Gardasil, Gardasil 9, and Cervarix. All three vaccines are safe and more than 90% effective.[19,20] Because of the poor response from the at-risk individuals, the vaccine didn't produce its potential health impact in India.[10] The possible reasons were the cost of the vaccine, misinformation about the HPV vaccine, limited knowledge, acceptance, socio-demographic factors, cultural belief, and lack of awareness.[9] This led to the suspension of HPV vaccination in India but sooner reapproved based on the effect of the vaccine in developed countries.[10] At present, the Indian Academy of Pediatrics recommends HPV vaccination with 2 doses at 0 and 6 months to girls between 9 and 14 years; and three doses at 0, 1, and 6 months to girls above 15 years.[21]

The study evaluated the knowledge of HPV & HPV Vaccination in at-risk population and their attitude/practice in Tumkur district, Karnataka state, India. Around 62% of the study population was aware of the effects of HPV but only 34% were aware of HPV vaccination. Only 14% were aware of the symptoms of HPV. The overall knowledge score was only 5.6/17. The studies in various developing countries showed similar results. A study by Liu Y et al found that the at-risk population had low-moderate knowledge (3.78/8) about HPV and its vaccination.[16] Similar findings were noted in other countries such as Khan TM et al in Pakistan and Dany M et al in Lebanon who found that 57% and 37% of knowledge in the at-risk population.[22,23] Even in Singapore, the students' median knowledge score was only 7/14.[24]

The Internet followed by newspapers was the most common source of information in our study population. The poor knowledge of these at-risk population can be increased by the government by promoting the HPV vaccination on social media and in newspapers. Health education plays an important role in promoting vaccination, especially by doctors or health authorities. Hence, schools and colleges should organize health education sessions in coordination with the health department to promote HPV vaccination. Government can also promote vaccination by including health education in textbooks.

Around 53% of our study population showed interest in HPV vaccination but $1/3^{rd}$ of them backed out after knowing the cost of vaccination. So, the government should include HPV vaccination under National Immunization Programme.

The urban group fared better than the rural population in knowledge about HPV. The urban group was also found to be more educated and belonged to a higher socioeconomic

status which would have helped them know more about HPV. This is similar to other studies such as Hussain S et al.[25] A study by Degarege et al found that the knowledge about HPV and its vaccine was higher amongst the parents of urban areas compared to rural areas.[10] This could be because of a higher rate of formal education in urban areas compared to rural areas.[26] Also, the higher literacy rates, the presence of more healthcare facilities, radio, television, and internet are also responsible for higher knowledge in urban areas compared to rural areas.[26] But the attitude and practices were found to be the same in both urban and rural groups.

Increasing the awareness and knowledge about HPV infection and vaccination against it will promote the acceptability of HPV vaccination in at-risk population and their parents.[27] So, promoting health education about HPV infection and including HPV vaccination in the national immunization schedule will help reduce the incidence of HPV infection and cervical cancer. Some states in India such as Delhi and Punjab have already included HPV vaccination in their state immunization programme.[28,29]

5. Conclusion

The study population was found to have poor knowledge about HPV infection and HPV vaccination. Only 53% of study participants were willing to take HPV vaccination if provided but $1/3^{rd}$ of them backed out after knowing the cost of vaccination. The overall knowledge score was better in the urban group compared to the rural group but there was no difference between them regarding attitude and practice toward HPV infection and its vaccination.

6. Author Contributions

Conceptualization: RHK, SR, VR. Data curation: RHK, SR. Formal analysis: SR, VR. Funding acquisition: None. Methodology: RHK, SR, VR. Project administration: RHK, SR, VR. Visualization: RHK, SR, VR. Writing - original draft: VR. Writing - review & editing: RHK, SR.

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None.

8. Conflict of Interest

None.

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