RESEARCH COMMUNICATION

Awareness of Cervical Cancer Among Female Students of Premier Colleges in Kolkata, India

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Abstract

In the absence of any nationwide cervical screening program, cancer of cervix remains a major public health problem for India. We here assessed knowledge levels of female college students about cervical cancer, its risk factors, the human papillomavirus (HPV) etiologic agent and Pap (Papanicolaou) smear testing for screening. We conducted a questionnaire survey of the students (N=630), aged 17 to 24 years, in Kolkata, India. Only 20% correctly identified cervix cancer as the most prevalent female cancer in India, while 43% were aware of the ages of occurrence. Though 41% thought sexual activity to be associated with cervical cancer, its risk factors, like, 'smoking', 'having multiple sex partners', 'cervical infections', 'early onset of sexual intercourse', 'multiple parity' were recognized by 29%, 3%, 4%, 13% and 15%, respectively. The terms 'Pap test' and HPV had been heard by 11% and 15 % of the students, respectively, and 75% of the students desired to have protective vaccination. Bivariate analysis revealed that educational stream, standard of the college and family size were significantly associated with knowledge levels. Additionally, multivariate regression analysis indicated city students were more knowledgeable than those from outside the city. It is imperative that women gather adequate knowledge on cervical cancer for the success of any program to control the disease. Wide and effective spreading of awareness about the disease among women must form an integral part of public health policy of government.

Keywords: Cancer awareness - cervical cancer - college students - Indian women

Asian Pacific J Cancer Prev, **11**, 1085-1090

Introduction

Cervical cancer is a serious public health problem. Globally, every year around 500,000 women develop cervical cancer and almost 274,000 of them die from the disease (WHO, PATH, and the United Nations Population Fund, 2009). It is the second most common cancer in women worldwide and the most common in women of under-developed and developing countries which bear more than 80% (WHO, 2010) of the global burden of the disease. This reflects the lack of effective control measures in these countries.

Cervical cancer is the single largest killer of middle-aged women in India. The incidence of cervical cancer per 100, 000 Indian women of all ages varied between 30.0 and 44.9 (WHO, 2010). India bears about one fifth of the world's burden of cervical cancer (Shanta, 2003). More than 100,000 new cases are detected in India per year and the disease causes almost 20 percent of all female deaths in India (Shanta, 2003). About 75-80 % of the cases are reported in advanced stage (National Cancer Registry Programme, 2006). The menace of cervical cancer is still haunting India in-spite of this being a preventable disease.

The key to reducing cervical cancer morbidity and mortality is early detection and treatment of cervical precancerous lesions. Population-based screening program utilizing exfoliative cervical cytology, the Papanicolaou (Pap) test, has reduced the cervical cancer morbidity and mortality in developed countries (Canavan and Doshi, 2000; Peto et al., 2004). Screening test for cervical infection of human papillomavirus (HPV), the primary cause of cervix cancer, has proved to be more effective (Free et al., 1991). Recently developed prophylactic vaccines to HPV have the potential to protect new generations of girls.

Despite being effective most of the women in developing and under-developed countries do not have access to Pap (Papanicolou) smear screening. In India also, both early detection and screening remains a major area of concern to the health workers in the absence of screening facilities coupled with poor literacy and low level of awareness amongst Indian women. This ultimately becomes a hindrance towards formulation of an exhaustive policy to tackle the menace of cervical cancer.

The success and benefit of a public health program to control and prevent cervical cancer will depend to a great extent on the level of awareness of the potential beneficiaries about different basic aspects of the disease. Various studies (Price et al., 1996; Ralston et al., 2003; Sankaranarayanan et al., 2009) have been undertaken to assess women's awareness and knowledge level about cervical cancer. However, currently, scanty information

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is available on knowledge base of the Indian women on cancer of the uterine cervix.

The aim of this study was to explore knowledge and awareness of the students of four elite women's colleges in Kolkata about cervical cancer. Additionally, we attempted to identify and analyze a probable relationship between the overall knowledge level and a few sociodemographic parameters.

The outcome measurement of this short study may provide inputs towards designing suitable Information, Education and Communication (IEC) strategies to inform and educate the women on prevention of cervical cancer and thus augment the national cancer control program.

Materials and Methods

We approached students of four women's colleges from different locations in the city of Kolkata, India, to participate in this survey work. As the selected colleges were from distinct places, participants were expected to be proper representative samples of women college-goers in the city. First, permission to approach the students was obtained from the participating college authorities after explaining the aims and objectives of the study. Later informed consent was obtained from each of the students who participated in our study.

To evaluate different aspects of basic knowledge and awareness on uterine cervix cancer, the 578 graduate and 52 post-graduate students was offered a structured questionnaire during September 15 to November 15, 2009 to collect information. All the students answered the questionnaire voluntarily and independently at their own college campus.

First part of the questionnaire was to collect information on age, study-stream, level of study, place of permanent residence, family income and family size. The remaining part contained questions on most prevalent cancer type among the Indian women, usual age of occurrence of cervical cancer, risk factors for it, role of sexual activity in causing the cancer, whether heard of Pap Smear Test and HPV. The questions were developed based on previously established facts for cervical cancer (Brinton et al., 1989; Parazzini et al., 1989; Brinton, 1992; Holly, 1996). In most of the questions 'yes', 'no', or appropriate multiple choices were given as answers.

The qualitative responses to the six queries on (i) most prevalent cancer type among Indian women, (ii) average age of occurrence of cervical cancer in India, (iii) three major risk factors for cervical cancer, (iv) whether sexual activity poses any risk for cervical cancer, (v) whether ever heard about (a) Pap smear test and (b) HPV, were converted into numerical scores. A measure of knowledge on cervical cancer was then derived in terms of the sum of these individual scores and we called this '*tscore*'. Such a definition allowed us to ascertain the awareness level of individual girl students in a scale of '0' to '15' with the average knowledge level being '8' and variance '21.25'.

Anticipating that there may be significant differences in the level of awareness between the students from Kolkata city and from the suburbs, the students were sub-divided into two broad categories namely, 'metro' and 'non-metro' on the basis of their permanent residence in Kolkata and outside the municipal corporation area of the city of Kolkata.

Results

Table 1 describes sociodemographic characteristics of the 630 participating students. Mean age was 19.9 (s d 1.2) years, 92% followed graduate study, 8% were from post-graduate classes, 34% were from 'science' stream, 66% from 'non-science' (arts and commerce) stream, 73% were residents of the city of Kolkata, 27% from the nearby suburbs and none were married. The family income data was not disclosed by 143 (22.7%) students. Among those who offered the income data 59% had family income under 120000 INR (approximately 2400 USD) a year. While the mean (± s d) family size for each of the students was 4.3 (±1.8), a majority (68%) of them came from families with more than 3 members.

Knowledge level of the students about cervical cancer and related information is depicted in Table 2. That cervix cancer is most prevalent type of female cancer among Indian women was correctly responded by only 20% of the students and significantly (p-value < 0.005) more by the students of science than by those from the non-science stream. But there was no significant difference in this knowledge between the students from Kolkata and from outside Kolkata.

Overall 43% of the students were aware about the age of occurrence of cervix cancer in the Indian women. However, the awareness level was not much different between the students following the two educational streams (science and non-science).

The students had very low level of knowledge about the risk factors for cervical cancer (Table 2). Knowledge was least (3%) for 'multiple sex partners' as a risk factor followed by that (4%) for 'other cervical infections'. The largest proportion (29%) of the students recognized smoking as a risk factor compared to their correct responses for the other risk factors evaluated. Out of the total participants 41% responded that sexual activity may be involved with etiology of cervical cancer. Proportion of the students who have ever heard of 'Pap smear test' and HPV were 11% and 15 % respectively. Three-fourths 75% (472 out of 630) of the students expressed their desire to get vaccinated to protect themselves from cervical cancer.

Table 1. Sociodemographic Characteristics of the Students (n=630)

Characteristics	Classification	Number (%)
Educational Stream	Science	215 (34)
	Non-science	415 (66)
Educational level	Undergraduate	578 (92)
	Postgraduate	52 (8)
Permanent residence	Kolkata	462 (73)
	Outside Kolkata	168 (27)
Age	≤ 20	444 (70)
	> 20	186 (30)
Family Income[a] (n = 487)	≤ INR120,000	287 (59)
	> INR120,000	200 (41)
Family size	≤ 3	202 (32)
	> 3	428 (68)

Table 2. Knowledge level on cervical cancer and related information

Knowledge about	Answer	Number (%)
Most prevalent type of cancer among Indian women	Correct	123 (20)
	Incorrect	507 (80)
Usual age of occurrence	Correct	269 (43)
	Incorrect	361 (57)
Risk factors mentioned	Having sex with multiple partners	17 (3)*
	Marriage at an early age	80 (13)
	Having multiple pregnancies	93 (15)
	Using contraceptives Smoking	74 (12)
	Having infections in cervix	181 (29)
	Personal hygiene	24 (4)
	Nutrition	87 (14)
		74 (12)
Sexual activity as risk factor	Yes	258 (41)
	No	372 (59)
Aware of Pap Smear Test	Yes	67 (11)
	No	563 (89)
Aware of Human papillomavirus (HPV)	Yes	93 (15)
	No	537 (85)

*Numbers and percentages in parenthesis indicate those who considered the corresponding items in second column a risk factor

Table 3 reveals the scenario of knowledge level of the students about different aspects of cervix cancer. The distribution of '*tscore*' turned out to be highly positively skewed (Figure 1) with the mean a meager 2.92. Nearly one-fifth of the participants had no knowledge on cervical cancer and the knowledge level of more than 98% of them was far below the 'average' (9). Thus, the standard t-test obviously led to the rejection of the null-hypothesis ($p<0.05$). A maximum value of 12 for the knowledge score was observed for one girl student only.

In order to investigate the reason for such low knowledge level, tests were conducted for possible association between the level of awareness (with 'tscore' as a representative) and each of the five independent classificatory variables, namely, educational stream, standard of college, place of residence, age and family size. The family income of the participants might have some bearing on their knowledge level. Since only 487 respondents offered to divulge their family income, an analysis in this regard was not attempted.

Bivariate analysis of the data using chi-square test revealed (Table 4) that educational stream, standard of the college of study and family size were significantly associated with knowledge level. Association with residential status and age of the students were found to be not significant. Taking a cue from the results of the chi-square test, multivariate regression analysis was done for assessing effect of the independent variables on knowledge level. We defined a variable, *'eduscore'* by assigning more weight to science stream and postgraduate level and minimum score assigned to non-science undergraduate students. Similarly, the resident students from metro area were ranked higher than their non-metro counterparts. Although 'college' showed a significant association with knowledge in bivariate analysis it was not considered for multivariate analysis as objective criteria for ranking the colleges were not readily available.

Table 3. Measure of Knowledge Level

tscore	Number (%)	Median	Mean	Range	Std. dev	Skewness
0	124 (20)					
1-3	305 (48)					
4-6	144 (23)	2.00	2.77	12	2.43	0.897
7-9	50 (8)					
10-12	7 (1)					

Table 4. Association between Knowledge Score and Classificatory Variables

Variable	χ^2 value	p-value	Odds-ratio
Educational Stream	6.19	0.013	1.52
College	8.49	0.036	
Place of residence	0.82	0.370	
Age	0.14	0.707	
Family size	5.46	0.019	1.49

Dependent variable: tscore

The regression model was found to be significant

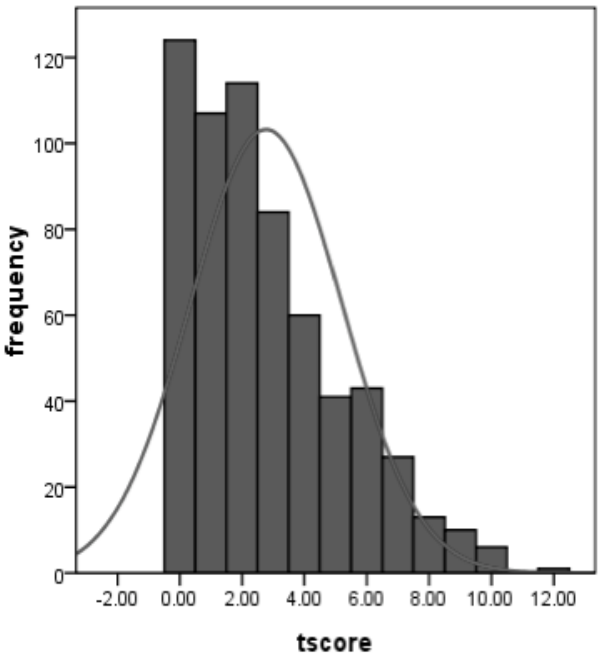

Figure 1. Histogram of 'tscore' Vis-a-vis Normal Curve

Table 5. Results of Multiple Regression Analysis

Model Summary – multiple linear regression				
Independent variables	Correlation (r)	β-Coefficients	t	p-value
(Constant)	--	3.029		
Eduscore	0.104	0.280	2.963	0.003
Place of residence	0.049	0.522	2.164	0.031
Family size	-0.062	-0.078	1.385	0.167
Age	-0.014	-0.059	0.672	0.502

(p=0.01). Although, the variability explained by the predictor variables was not very high, the variables *'eduscore'* and place of residence were found to be significant predictors (p-value <0.05) (Table 5). Thus, results clearly indicated that the students from the science disciplines and those from metro area were significantly better in respect of awareness about cervical cancer.

Discussion

Our study revealed a low level of knowledge of the graduate and postgraduate students of some leading women's colleges of Kolkata, the second largest city in India, about cervical cancer, the most prevalent type of female cancer in the country. Most of the risk factors for cervix cancer were recognized by much less than 50% of our study participants. One-fifth (20%) of them were ignorant about it as revealed by knowledge level of almost all of them (98%) being far below the 'average' 'tscore' of 9.

However, our analysis showed that the students from the science disciplines and those from the city had significantly better awareness level about cervical cancer. Poor knowledge and awareness of cervical cancer among women of different demographic and other characteristics has been reported from many countries (Lambert, 2001; Ralston et al., 2003; Peter and Navkiran, 2009; Wong et al., 2009). In our study 41% students were aware of a link between sexual activity and cervical cancer. Better awareness (38.4%) of the link was also demonstrated by college students aged 18 to 35 years in Ghana (Peter and Navkiran, 2009).

Out of all our student respondents 13%, 15%, 29% respectively could identify early onset of sexual intercourse, parity and cigarette smoking as risk factors of cervical cancer. In a Malaysian study, women aged 21-56 years could not identify any of these risk factors (Wong et al., 2009) and the college students in Ghana had very low (1%) awareness of the link between smoking and cervical cancer (Peter and Navkiran, 2009).

A Korean survey (Oh et al., 2010) found 31.5% women aged more than 20 years to know that sexually transmitted infections (STIs) can cause cervix cancer. However, very few (4%) of our study students aged 17-24 years had such knowledge. Studies in Asian countries also reported low knowledge levels of public on etiologic involvement of STIs and HPV in cervical cancer (Dinh et al., 2007; Lee et al., 2007).

Personal hygiene and nutrition were linked with cervical cancer by 14% and 12% of our study respondents respectively. Some of the women respondents of a previous study (Wong et al., 2009) also believed that failure to maintain hygiene or "dirtiness" and certain types of food were factors for cervical cancer development.

Although very few of the participants (a mere 11%) in our study had ever heard of 'Pap smear test', it is interesting to note that the students from non-science background were more informed on this aspect than those from science stream. However, even though a small number of them (15%) were familiar with HPV, the students of science were ahead of the non-science group in having any information on HPV. Most women recruited from a gynecology clinic in Kolkata, India, reported "limited" to "no" knowledge of cervical cancer (84%) and the Pap test (95%) (Roy and Tang, 2008).

A large number of the students in our study have neither heard of Pap test nor of HPV, the single most important etiologic factor for cervical cancer. This concurred with the findings of other studies. A survey from United States (US) reported (Lambert, 2001) 40% of American women aged 18-75 years to have heard of HPV. None of the Malaysian women respondents (Wong et al., 2009) aged 21-56 years had heard of HPV. A study (Peter and Navkiran, 2009) among college students aged 18-35 years in Ghana noted very low awareness (7.9%) of the link between HPV and cervical cancer. Only 19.0% of adult Korean women reported to know that HPV infection was a risk factor for cervical cancer (Oh et al., 2010). In yet another Korean study a mere 9.5% of female high school and university students reported that they had ever heard of HPV (Han et al., 2007).

Low levels of knowledge on HPV and cervical cancer was reported among undergraduate and graduate college women aged 18 to 30 years in US (Ingledue, Cottrell and Bernard, 2004). Another study in US found 21.5% of the college women to have never heard of HPV (Lopez and McMahan, 2007). Even sexually active college women of America lacked awareness of HPV (Vail-Smith and White, 1992). Racial differences in HPV knowledge has been reported among US rural ethnic (29% in Blacks and 42% in Whites) populations also (Cates et al., 2009). A study from United Kingdom and another from US revealed that 69.4% and 63% of the women participants respectively had never heard of HPV (Yacobi et al., 1999; Phillips et al., 2003). Further, a review of several studies from different countries reported that overall, general public has low level knowledge of HPV infection (Klug et al., 2008). A recent qualitative study (Bingham et al., 2009) reported low level of knowledge on HPV and cervical cancer among children, parents, teachers, community leaders, and even health service providers of four developing countries (India, Peru, Uganda, and Vietnam).

The results of our study and that from other studies too suggest that despite the advent of vaccines to prevent HPV and the impact of cervical cancer deaths, especially in developing countries, like India, there has not been any major improvement in HPV awareness in college women.

The low level of knowledge of cervical cancer of the girl students of leading colleges of Kolkata, a metropolitan city, as in our study, indicates that the larger population of less educated women is in greater lack of awareness. During this survey we accessed a population that has

not been widely studied and our observations leads to conclude that the absence of an active national cervical screening and awareness program has resulted in the lack of basic knowledge about important risk factors for cervix cancer even among the literate population of college women.

There are few potential limitations of our study. We focused on girl students of leading women's colleges in the city and do not know how the response might have come from the girls of co-educational colleges or from rural colleges. Findings of the present study could not be generalized to the larger Indian women population or to a population outside of the colleges owing to the small sample size of a priority population. The strength of our study lies in the selection of the study population i.e. college girls, as they are the most important source of information carriers and dissemination.

Unless and until the Indian women gather enough knowledge and awareness on cervical cancer, it would never be possible to accomplish the mission of National Cancer Control Programme. There is need for a countrywide strong knowledge base about cervical cancer so that general public can easily identify the early symptoms of the disease and take preventive measures.

Acknowledgements

We thank profusely all students who took part in this survey work. All participating college administrations, principals and teachers deserve special thanks for taking an interest in this study. This work was supported by the Department of Microbiology, Lady Brabourne College, Kolkata.

References

Bingham A, Drake JK, LaMontagne DS (2009). Sociocultural issues in the introduction of human papillomavirus vaccine in low-resource settings. *Arch Pediatr Adolesc Med*, **163**, 455-61.

Brinton LA (1992). Epidemiology of cervical cancer-overview. *IARC Sci Publ*, **119**, 3-23.

Brinton LA, Reeves WC, Brenes MM, et al (1989). Parity as a risk factor for cervical cancer. *Am J Epidemiol*, **130**, 486-96.

Canavan TP, Doshi NR (2000). "Cervical cancer.". *Am Fam Physician*, **61**, 1369-76.

Cates JR, Brewer NT, Fazekas KI, et al (2009). Racial differences in HPV knowledge, HPV vaccine acceptability, and related beliefs among rural, southern women. *J Rural Hlth*, **25**, 93-7.

Dinh TA, Rosenthal SL, Doan ED, et al (2007). Attitudes of mothers in Da Nang, Vietnam toward a human papillomavirus vaccine. *J Adolesc Hlth*, **40**, 559-63.

Free K, Roberts S, Bourne R, et al (1991). Cancer of the cervix: Old and young, now and then. *Gynecol Oncol*, **43**, 129-36.

Han YJ, Lee SR, Kang EJ, et al (2007). Knowledge regarding cervical cancer, human papillomavirus and future acceptance of vaccination among girls in their late teens in Korea. *Korean J Obstet Gynecol*, **50**, 1090-9.

Holly EA (1996). Cervical intraepithelial neoplasia, cervical cancer and HPV. *Annu Rev Public Hlth*, **17**, 69-84.

Ingledue K, Cottrell R, Bernard A (2004). College women's knowledge, perceptions, and preventive behaviors regarding human papillomavirus infection and cervical cancer. *Am J Hlth Studies*, **19**, 28-34.

Oh JK, Lim MK, Yun EH, Lee EH, Shin HR (2010). Awareness of and attitude towards human papillomavirus infection and vaccination for cervical cancer prevention among adult males and females in Korea: A nationwide interview survey. *Vaccine*, **28**, 1854-60.

Klug SJ, Hukelmann M, Blettner M (2008). Knowledge about infection with human papillomavirus: A systematic review. *Prev Med*, **46**, 87-98.

Lambert EC (2001). College students' knowledge of human papillomavirus and effectiveness of a brief educational intervention. *J Am Board Fam Prac*, **14**, 178-83.

Lee PW, Kwan TT, Tam KF, et al (2007). Beliefs about cervical cancer and human papillomavirus (HPV) and acceptability of HPV vaccination among Chinese women in Hong Kong. *Prev Med*, **45**, 130-4.

Lopez R, McMahan S (2007). College women's perception and knowledge of human papillomavirus (HPV) and cervical cancer. *Californian J Hlth Promotion*, **5**, 12-25.

National Cancer Registry Programme (2006). An overview. *Indian Council Med Res, New Delhi*.

Parazzini F, La Vecchia C, Negri E et al (1989). Reproductive factors and the risk of invasive and intraepithelial cervical neoplasia. *Br J Cancer*, **59**, 805-9.

Peter NA, Navkiran KS (2009). Cervical cancer screening among college students in Ghana: Knowledge and health beliefs. *Int J Gynecol Cancer*, **19**, 412-6.

Peto J, Gilham C, Fletcher O, et al (2004). The cervical cancer epidemic that screening has prevented in the UK. *Lancet*, **364**, 249-56.

Phillips Z, Johnson S, Avis M, et al (2003). Human papillomavirus and the value of screening: Young women's knowledge of cervical cancer. *Hlth Edu Res*, **18**, 318-28.

Price JH, Easton AN, Telljohann SK, et al (1996). Perceptions of cervical cancer and pap smear screening behaviour by women's sexual orientation. *J Com Hlth*, **21**, 89-105.

Ralston DJ, Taylor VM., Yasui Y et al (2003). Knowledge of cervical cancer risk factors among Chinese immigrants in Seattle. *J Com Hlth*, **28**, 41-57.

Roy B, Tang TS (2008). Cervical cancer screening in Kolkata, India: Beliefs and predictors of cervical cancer screening among women attending a women's health clinic in Kolkata, India. *J Cancer Educ*, **23**, 253-59.

Sankaranarayanan R, Nene BM, Shastri SS, et al (2009). HPV screening for cervical cancer in rural India. *N Engl J Med*, **360**, 1385-94.

Shanta V. Perspectives in cervical cancer prevention in India, (2003). The international network for cancer treatment and research.

Vail-Smith K, White D (1992). Risk level, knowledge, and preventive behavior for human papillomaviruses among sexually active college women. *J Am College Hlth*, **40**, 227-30.

World Health Organization (WHO), PATH, and the United nations population fund (2009). Cervical cancer, human papillomavirus (HPV), and HPV vaccines: Key points for policymakers and health professionals. Geneva, CH: WHO; 2007. Available at: www.who.int/reproductive-health/publications/cervical_cancer_keypoints/cerv_cancer_hpv_keypts.pdf. Accessed February 4.

World Health Organization (WHO) (2010). Human papillomavirus infection and cervical cancer. Available at: www.who.int/vaccine_research/diseases/hpv. Accessed February 21.

Wong LP, Wong YL, Low WY, et al (2009). Knowledge and awareness of cervical cancer and screening among Malaysian

women who have never had a Pap smear: A qualitative study. *Singapore Med J*, 50, 49-53.

Yacobi, E, Tennant C, Ferrante J, et al (1999). University students' knowledge and awareness of HPV. *Preventive Med*, **28**, 535-41.