

Risk Factors of Cervical Cancer: A Case-Control Study

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ABSTRACT

Objective: Cervical cancer is one of the most common malignancies among women. The present study aims to assess the risk factors for cervical cancer in women aged 25-80 years.

Methods: The current study was a case-control study. In total, 75 age matched cases and 75 controls were enrolled. In case group sampling technique was total enumeration. Sampling for control group is done by purposive sampling. Women who satisfied the inclusion criteria were included in the study. A questionnaire was developed to assess the risk factors of cervical cancer among the participants. Face to Face interview were conducted with the participants. **Results:** There was a significant association ($P < 0.05$) of cervical cancer with education, place of residence, using an old cloth sanitary napkins, young age at marriage, number of husband's partners,

washing the genitalia after sexual intercourse, and availability of health services. Bathing daily and during menstruations was found to be preventive factors for cervical cancer. In logistic regression, the utilization of health services and the presence of sexually transmitted infections showed a significant association with the development of cervical cancer. **Conclusions:** The present study aimed to assess the risk factors of cervical cancer. With prior knowledge of risk factors, cervical cancer can be identified. Identification of high-risk populations and starting early screening is found to be effective in early recognition of cervical cancer.

Key words: Age, cervical cancer, human Papilloma Virus, risk factors, sexual transmitted disease, women

Introduction

Carcinoma of the cervix is one of the most common cancers among women in the world. It is most common in developing countries. Cervical cancer progresses slowly in the body.

In 2008, 275,000 deaths occurred due to cervical cancer. Of which, 88% occurred in developing countries. In Asia,

159,800 deaths occurred due to cervical cancer.^[1] The number of cervical cancer cases starts to increase among women aged 20-29 years, reaches a peak among, those aged 55-64 years, and decreases among women aged above 65 years.^[2]

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In India, one in five women is diagnosed with cervical cancer. India has the greatest load of cervical cancer patients.^[3]

The known risk factors of developing cervical cancer are human papilloma virus (HPV), low socio-economic status, smoking, marrying before age 18 years, young age at the first coitus, multiple sexual partners, multiple sexual partners of spouse, and multiple childbirths. These factors raise the risk of developing cervical cancer. It has now been proven that HPV is the major causative factor of carcinoma of the cervix. HPV types 16, 18, 31, 33, and 45 are mostly related with invasive carcinoma of the cervix. Most research studies show that an increasing number of steady partners and young age at first sexual intercourse increase the probability of developing cervical cancer.^[4] The human body is composed of millions of living cells. Normal cells develop and continuously divide to make new cells and cells die in an ordered way. Normal cells divide faster as the person grows. During the early years of a person's life, normal cells divide more rapidly to allow the person to grow. When a person becomes an adult, most cells divide only to replace dying cells. Cancer begins when cells in the body have uncontrolled growth. The cervix connects the body of the uterus to the vagina. Endocervix is the part of the cervix closest to the body of the uterus. The part of the uterus closest to the vagina is the exocervix. Cervical cancer begins in the cells lining the cervix, mainly the lower part of the uterus known as the uterine cervix. There are mainly two types of cells covering the cervix, the glandular cells and the squamous cells. These two types of cells meet at a place called the transformation zone. The location of the transformation zone changes as person's age increased, and after childbirth. Cervical cancer originates commonly in the transformation zone. Normal cells do not transform into cancer cells abruptly; the normal cells of the cervix initially become precancerous and subsequently turn cancerous.^[5] Cervical cancer is highly prevalent in the society and is the second most common cancer among women. The most propitious feature of this cancer is that it is preventable and curable in the early stages. However women lack knowledge regarding risk factors and screening for cervical cancer. Poor women and women with low socioeconomic do not undergo screening for cervical cancer (such as Pap tests). They lack awareness of these health services, while some ignore the symptoms because of shyness. Thus, they are not screened or treated adequately for cervical cancer. Therefore, there is a need to raise public awareness regarding risk factors and prevention of cervical cancer. A review of literature has found that there are insufficient data regarding the risk factors of cervical cancer in Indian settings, which Leads to lack of public awareness about its prevention and early detection.

Methods

The research approach was quantitative, and the research, design was a case-control design. An analytical study design was employed to assess the risk factors for cervical cancer in patients visiting the gynecology outpatient department (OPD) in Post Graduate Institute of Medical Education and Research (PGIMER) Chandigarh. Data was collected from 16th July-31st Aug, 2016 in Gynae OPD. In this study, the target population consisted of women between the ages of 25 and 80 years. Total of 150 participants were enrolled, including 75 cases and 75 controls; all patients who met the inclusion criteria of the study, were included, and participation was voluntary. According to the literature, the group sample size required to conduct parametric tests was reported to be at least 60. Therefore, the study was conducted with a total of 150 patients, with 75 cases and 75 controls. Inclusion Criteria for the cases were women diagnosed with cervical cancer and women willing to participate in the research study were included and those not diagnosed with any cancer taken as controls.

Sampling for cases was performed using the total enumeration technique where all members of the study population were taken as participants. All participants available in the gynecology OPD during the data collection period were included in the study. Sampling for controls was done using purposive sampling techniques in which the participants were investigated based on the judgment of the researcher.

Sample size

The sample size was 150, comprising women selected by the total enumeration technique and purposive sampling for case and control group, respectively. Totally 75 cases and 75 controls were enrolled in the present study. The inclusion criteria for cases were women diagnosed with cervical cancer and women who were willing to participate in the study. Inclusion criteria for controls were women not diagnosed with any cancer and matching with cases with respect to age.

Tool for data collection

The interview consisted of a sequence of questions for collecting information about a particular topic from respondents. Questions were asked in Hindi and included Socio-demographic proforma, personal history, menstrual history, sexual and reproductive health history, and history related to utilization of health facilities.

Method of data collection

Face-to-face interviews were conducted with participants.

Procedure of data collection

For cases, women who were diagnosed with cervical cancer and also met the inclusion criteria were enrolled in the study. For controls, women who had no history of any cancer type and who met the inclusion criteria were enrolled in the study. Interviews were conducted using the pre-prepared interview schedule. Questions were asked in Hindi, and the total duration of the interview was 35-40 min for each participant.

Data analysis

Statistical analysis was conducted using SPSS version 16.0 (SPSS Inc., Chicago, IL, USA). Data were analyzed using descriptive statistics, i.e., mean, median, mode, and standard deviation. The baseline categorical and continuous variables were compared between the groups using the Chi-square test with Yate's correction. The association of risk factors with cervical cancer was tested using the Chi-square test and multivariate analysis. Risk factors that significantly increased the probability of carcinoma of the cervix were analyzed. The association of carcinoma of the cervix with demographic variables was tested using the Chi-square test with Yate's correction.

The association of cervical cancer with personal habits, sexual and reproductive characteristics, and health service utilization was tested using the Chi-square test. Multivariate analysis was used to evaluate the association of cervical cancer with social factors, personal hygiene, utilization of Health services, and any co-morbidity. $P < 0.05$ was considered to be statistically significant.

Ethical approval

Written permission was obtained from the obstetrical and gynecology department before data collection. Approval for the research protocol was sought from the Institute Ethics Committee of Postgraduate Institute of Medical Education and Research, Chandigarh. Informed written consent was obtained from the participants involved in the study. All study participants were informed about participation in the research, objectives of the study, and time of involvement. Routine care and treatment were not interrupted while collecting data. All participants had the right to leave the study at any time. Anonymity and privacy of the participants was maintained while collecting data and reporting the study results. Care was taken to ensure that no harm or discomfort was caused to the study participant.

Results

Table 1 shows that mean age of participants in case group as well as in controls were 54.3 ± 9.8 . Majority of the

Table 1: Socio-demographic profile of the subject, $n = 150$

Variable	Case $n=75$ (%)	Control $n=75$ (%)	χ^2 , (df), P	Mean \pm SD, (range)
Age (years)				
31-40	9 (11.9)	9 (11.9)	1.1, (3),	54.3 \pm 9.8
41-50	22 (29.4)	22 (29.4)	1.0	(35-70)
51-60	29 (38.8)	29 (38.8)		
61-70	15 (19.8)	15 (19.8)		
Type of house				
Pucca	54 (72.0)	67 (89.3)	7.2, (1),	
Kacha	21 (28.0)	08 (10.7)	0.007	
Type of family				
Joint	47 (62.7)	42 (56.0)	0.7, (1),	
Nuclear	28 (37.3)	33 (44.0)	0.40	
No. of family members				
1-5				
6-10	42 (56.1)	42 (56.0)	8.3, (2),	5.6 \pm 2.8
11-15	27 (36.0)	30 (40.0)	0.75	(1-14)
	6 (7.9)	3 (4.0)		
Religion				
Hindu	55 (73.3)	45 (60.0)	5.3, (3),	
Muslim	3 (4.0)	01 (1.3)	0.15	
Sikh	17 (22.6)	29 (38.6)		
Educational status				
Illiterate	27 (36.0)	16 (21.2)	3.9, (1),	
Educated	48 (64.0)	59 (78.8)	0.04	
Place of residence				
Urban	16 (21.3)	27 (36.0)	3.9, (1),	
Rural	59 (78.7)	48 (64.0)	0.04	

participant were non working. Most of the participants from the Hindu religion. The education level differed between two groups. In case group half of the participants were educated. A difference with regard to place of residence was observed between two groups. Majority of the participant belong to rural area.

Personal habits and reproductive characteristics in the case and control groups

Table 2 depicts that majority of the participants had a history of taking daily bath. There was a significant difference between both the groups with regards to bathing habits. Out of 75 participants 18 participants had a history of Sexually Transmitted Disease (STD). Both groups differed significant with regards to STDs. There was a significant difference between the two groups in taking daily bath during menstruation. There was a significant difference between the two groups in terms of sanitary pads used during menstruation. In case group most of the participants used old cloth during menstruation. There was a significant difference between the two groups in terms of age at time of marriage. Majority of the women got married before the age of 20 years.

Health services of cases and controls

Table 3 depicts availability of health services. There was a significant difference between the case and control group

Table 2: Personal habits, menstrual and reproductive history of the case and control, *n*=150

Variable	Case <i>n</i> =75 (%)	Control <i>n</i> =75 (%)	χ^2 , (df), <i>P</i>
Bathing daily			
Yes	66 (88.0)	73 (97.3)	4.8, (1), 0.02
No	9 (12.0)	2 (2.7)	
STI*			
No	57 (76.0)	73 (97.3)	12.9, (1), 0.01#
Yes	18 (24.0)	2 (2.7)	
Genital warts (cauliflower like bumps with flat lesions)			
No	69 (92.0)	74 (98.7)	2.4, (1), 0.05#
Yes	6 (8.0)	1 (1.3)	
Bath during menstruation			
No	25 (33.3)	11 (14.7)	7.2, (1), 0.01
Yes	50 (66.7)	64 (85.3)	
Material use during menstruation			
Sanitary pad	9 (12.0)	22 (29.3)	6.9, (1), 0.01
Old cloth	66 (88.0)	53 (70.7)	
Method of washing the dirty cloth			
Soap + waterwash + sundry	35 (46.6)	19 (25.3)	9.7, (2), 0.01
Discard after single use	40 (53.4)	56 (74.7)	
Age at the time of marriage [Mean±SD, (range)]	17.4±3.9, (8-29)	18.6±3.8, (8-30)	
10-20	59 (78.8)	55 (73.3)	32.0, (1), 0.04
21-30	16 (21.2)	20 (26.7)	
Washing genitalia after sexual intercourse			
No	35 (46.7)	22 (29.3)	4.8, (1), 0.02
Yes	40 (53.3)	53 (70.7)	
Husband has sexual partners other than subject			
Yes	11 (14.7)	2 (2.7)	5.4, (1), 0.02#
No	64 (85.3)	73 (97.3)	

*STI: Sexually transmitted disease; #Yate's correction

Table 3: Health services of the case and control, *n*=150

Variable	Case <i>n</i> =75(%)	Control <i>n</i> =75(%)	χ^2 , (df), <i>P</i>
Health facility within 5 km of your locality			
No	36 (48.0)	20 (26.7)	7.3, (1), 0.01
Yes	39 (52.0)	55 (73.3)	
Whether Availed of health services			
Never	68 (90.7)	46 (61.3)	17.6, (1), 0.01
Availed	7 (9.3)	29 (38.7)	
Attended any screening camp related to cervical cancer			
No	55 (73.3)	42 (56.0)	4.9, (1), 0.02
Yes	20 (26.7)	33 (44.0)	
Heard about Pap test			
No	59 (78.7)	69 (92.0)	5.3, (1), 0.02
Yes	16 (21.3)	6 (8.0)	

with regard to availability of health services. In the case groups, 68 (90.7%) participants never availed any health services. In the control group, 46 (61.3%) participants never availed health services whereas 29 (38.7%) did. Among the 75 participants in the case group, 20 (26.7%) attended a camp related to cervical cancer screening and 55 (73.3%) women did not attend any screening camp. Only 16 (20.0%) participants went for diagnostic evaluation, such as Pap test. There was a significant difference between case and control groups regarding the Pap smear test.

Association of risk factors with cervical cancer

Table 4 describes that univariate analysis was performed to estimate odds ratio. In univariate analysis, predictive

factors such as social factor, personal hygiene, utilization of health services, and co-morbidities were analyzed. odds ratio is higher for women who were less educated than the women who were educated which means women with less education have more probability to get cervical cancer. The odds ratio was higher for women who lived in a mud house for women who lived in a pucca house. Women living in mud houses had a twofold increased risk of cervical cancer. All variables except utilization of health services and presence of STIs were comparable. This shows that the odds ratio was higher among women who never availed health services than among women who did. Participants who never availed health services had fourfold increased risk of cervical cancer. The presence of STIs was significantly

Table 4 Association of risk factors with cervix cancer

Factors	Variables	Predictor	P	Odd ratio	95% confidence interval for odd ratio	
					Lower	Upper
Social factors	Education	Illiterate	0.503	1.379	0.539	3.533
		Educated			Ref ^a	
	Type of house	Kacha	0.185	2.140	0.694	6.594
		Pucca			Ref ^a	
Residence	Rural	0.558	0.720	0.239	2.166	
	Urban			Ref ^a		
Personal hygiene	Bath history	No	0.549	1.849	0.247	13.824
		Yes			Ref ^a	
	Bath during menstruation	No	0.112	2.290	0.824	6.365
		Yes			Ref ^a	
	Material used during menstruation	Old cloth	0.350	0.554	0.160	1.912
		Sanitary pad			Ref ^a	
	Wash the genital area after sexual intercourse	No	0.761	1.145	0.479	2.736
		Yes			Ref ^a	
Utilization of health services	Health facility	No	0.635	1.255	0.492	3.197
		Yes			Ref ^a	
	Have you utilized any health services	Never	0.016	4.260	1.313	13.816
		Availed			Ref ^a	
Screening related to cervical cancer	No	0.378	1.536	0.591	3.990	
	Yes			Ref ^a		
Co-morbidities	STI	Yes	0.044	0.152	0.024	0.953
		No			Ref ^a	
	Genital warts	Yes	0.807	1.396	0.095	20.438
		No			Ref ^a	

associated with cervical cancer ($P = 0.004$), but the odds ratio was less than one. Participants who reported a history of genital warts had 1.5 fold increased risk as compared to women who had no history of genital warts. Table 4 also shows that illiterate participants, women who lived in mud houses and rural areas, women who used old cloth during menstruation, women who never utilized health services, and women with a history of STDs and genital warts had high chances of Cervical cancer.

Discussion

In this study, we identified lack of lack of education, not maintaining personal hygiene, using old cloth repeatedly, place of residence, early age of marriage, not washing genitalia after sexual intercourse, increased number of husband's sexual partners, history of sexually transmitted disease (STIs) and genital warts, and lack of knowledge about screening for carcinoma of the cervix, as risk factors for cervical cancer.

In this study, education was identified as one of the risk factors for cervical cancer. This finding is comparable to another case control study which was conducted by Shield TS *et al.* on the women exposed to oncogenic types of human papillomavirus. Result had shown that little education, less income and history of unclear genital

infection increase the risk of carcinoma of cervix.^[6] This finding is also comparable to another study conducted by Tbeu PM *et al.* on attitude and knowledge of cervical cancer. Result showed uneducated, housewives, and women who delivered first child before the age of 20 years were associated ($P < 0.005$) with cervical cancer.^[7]

This finding is also comparable to that of Cuzick *et al.* who studied cervical cancer and result shows that women with age at first intercourse ≤ 20 years, increased number of partners, increased use of contraceptives and education as the risk factors for developing cervical cancer.^[8] In the present study, most of the participants were from rural areas, which could have influenced the educational status of participants. In rural areas, women have a lower education level and illiteracy is high. Thus, women have comparatively less knowledge about cervical cancer as they cannot read and write. Furthermore if women have probable sign of cervical cancer, they may not visit the hospital because of many issues like poverty, poor socio-economic status, lack of transportation facilities and financial problems etc.

In this study not maintaining personal hygiene and increased use of old cloth during menstruation are risk factors for cervical cancer. This data is comparable to study conducted by Thakur *et al.* on risk factors for carcinoma of

the cervix. Result showed that illiteracy, low socioeconomic status, early initiation of menstruation, i.e., age <13 years, marriage before the age of 18 years, first child before the age of 19 years, more number of children, less than a 2 year spacing between children, not maintaining genital hygiene, menstrual hygiene, duration of marriage more than 20 years, use of contraceptives, multiple sexual partners of both study participants and spouses, genital infection, and smoking as associated risk factors for carcinoma of the cervix.^[9] This may be due to the fact that most women with cervical cancer are from a low socioeconomic group and may find using sanitary napkins a financial burden. Programs for supplying free or low cost sanitary pads to all menstruating women should be encouraged at the village level.

In this study, place of residence in a rural area was associated as a risk factor for carcinoma of the cervix. This finding is comparable to that from a study conducted by Geetha *et al.* on sexual risk for cervical carcinoma. Results revealed that age, marital status, high school education, place of residence, use of oral contraceptives, HIV infection, and lack of awareness of Pap smear screening and vaccination were associated with risk of cervical cancer.^[10] This could be due to poverty, low socioeconomic status, and non-availability of health services in rural areas at early stages of the disease.

A study conducted by Mhaske *et al.* on cervical cancer risk showed that 86.4% of the women were married before 17 years of age.^[11] In the present study, early age of marriage was also positively associated with cervical cancer. This finding is comparable to that from another case-control study conducted by Capalash and sobit on awareness of carcinoma of the cervix. The result showed that young age at marriage, low socioeconomic status, and parity were associated with cervical cancer.^[12]

A study conducted by Khalaf *et al.* on the association of early marriage and socio-medical characteristics with cervical Pap smear results showed that abnormal Pap smears were detected in women who married at ≤ 18 years of age. Marriage at an early age was significantly connected with abnormal Pap smear results.^[13]

In this study, another associated factor was increased number of sexual partners. Increasing number of sexual partners of spouses was positively associated with risk of carcinoma of the cervix. This finding is also comparable to that from a study conducted by Stefani *et al.* on diet and cervical cancer. The result from that study revealed that young age at first intercourse, increased number of sexual partners, multiparity, and consumption of red meat were positively associated with cervical cancer.^[14]

Our finding is comparable to those from a study conducted by Pitts *et al.* on HPV infections and risk of cancer of the cervix, which assessed the women's knowledge

about cervical cancer, dysplasia, and HPV. Results showed that women had no knowledge about the risk factors for carcinoma of the cervix and no knowledge about HPV. Thus, it is necessary to provide knowledge on risk factors which are associated with cervical cancer.^[15] These data are comparable to those from several studies which have also shown that lack of knowledge on the participants of screening for cervical cancer is associated with increasing risk of cervical cancer.

In this study another risk factor was lack of knowledge about screening for cervical cancer. This finding is comparable to that from a study conducted in Malaysian women aged 21-56 years to examine the knowledge and awareness of prevention of and screening for cancer of the cervix. The study showed that women lacked awareness about carcinoma of the cervix and about the Papanicolaou smear. Many women had no knowledge about the meaning of an abnormal cervical smear and the need for early detection of cervical cancer.^[16] This data is also comparable to study conducted by Kumar H *et al.* to assess the knowledge and screening for carcinoma of cervix in women show that maximum of the women have very little knowledge on cancer of cervix and screening of carcinoma of cervix (85.5%). Of a total of 83 patients, only 6 subjects had undergone screening for carcinoma of cervix.^[17]

In the present study, STI and genital warts were also factors that contributed to the development of cervical cancer. These data are comparable to those from a study conducted by Chichareon *et al.* to explore the risk in context to HPV. The result showed education, increasing number of sexual partners, venereal disease history, use of hormonal contraceptives for more than four years, and still smoking as the risk factors for cervical cancer.^[18] This finding is also comparable to that from a study conducted by Misra *et al.* on risk-factors and strategies for control of cervical cancer. The results show that high age and parity were the main factors in the development of carcinoma of the cervix. HPV, sexually transmitted disease, and herpes simplex virus were mostly associated with squamous intraepithelial lesion cases.^[19] STI can occur due to poor personal and genital hygiene. Widespread use of old clothes repeatedly during menstruation can also increase the risk of infection in women.

Implications

The study generated empirical evidence in the current setting regarding risk factors for carcinoma of the cervix. There is needed to make a strict policy for the women to undergo screening for cervical cancer at particular age. Future recommendations of the present study are to organize awareness campaign so that public can be aware about the risk factors of cervical cancer.

Conclusion

Carcinoma of the cervix is a common malignancy among women of developing countries. In the present study, significant association of cervical cancer was found with illiteracy, not maintaining personal hygiene, residence in rural area, increased use of old cloth, marriage at an early age, mode of delivery, not washing genitalia after sexual intercourse, number of husband's sexual partners, history of STI and genital warts, and lack of knowledge about screening for cervical cancer. Bathing daily and bathing during menstruation show significant association with prevention of cervical cancer. In multivariate analysis, STI lack of availability of health services showed significant association with cervical cancer. Women were not screened for carcinoma of the cervix, and they were not aware about basic facts and risk factors of cervical cancer. Similar to other cancers, this cancer can be detected at an early stage if it is diagnosed early and prompt treatment is provided to women. With prior assessment, we can identify the risk factors at early stages and prompt treatment can be started.

Therefore, it is important to educate women about risk factors of cervical cancer. Proper diagnosis and early treatment are imperative to stop the progression of cancer. There is a need to make the general population aware about the risk factors of cervical cancer, and proper screening should be done to prevent the development of cervical cancer. Proper campaign and programs should be organized in rural areas toward the same end.

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Conflicts of interest

There are no conflicts of interest.

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