Original Research Article

ASSOCIATION OF RISK FACTORS WITH CERVICAL CANCER- A CASE CONTROL STUDY

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ABSTRACT

Background: Cervical cancer remains a major public health challenge in India despite being preventable through screening and HPV vaccination. It is the second most common cancer among women worldwide, with high burden in low and middle-income countries. Identifying risk factors are critical for prevention and control in resource-limited settings. The present study aims to study the association of socio-demographic, reproductive and behavioural risk factors with cervical cancer among women attending a tertiary care hospital in Western Maharashtra.

Materials and Methods: A hospital-based age-matched case–control study was conducted from July 2023 to June 2024, including 100 histo-pathology confirmed cervical cancer cases and 100 age-matched controls with negative Pap smears. Data on was collected by face-to-face interview on socio-demographic, reproductive sexual and hygiene-related factors were collected using a pretested questionnaire. Associations were analysed using odds ratios (OR) with 95% CI ($p<0.005$) and multivariate logistic regression for control of confounders.

Results: Significant risk factors identified included early age at first pregnancy (<20 years) (AOR = 3.82, p = 0.051), high parity (>3) (AOR = 8.83, p < 0.001), history of miscarriage (AOR = 3.63, p = 0.003), promiscuity (AOR = 5.54, p = 0.038) and use of old cloth during menstruation (AOR = 0.37, p = 0.035). On univariate analysis, rural residence (OR = 1.90), illiteracy (OR = 2.78), early marriage (<18 years, OR = 8.04), poor genital hygiene (OR = 1.8), and tobacco chewing (OR = 3.86) were also significant.

Conclusion: Cervical cancer is significantly associated with preventable and modifiable risk factors, particularly early pregnancy, multiparity, poor menstrual hygiene, miscarriages and sexual behaviour. These findings indicate that socio-behavioural and reproductive factors strongly influence cervical cancer risk. Strengthening reproductive health education, delaying age at marriage and childbirth, promoting hygienic menstrual practices and raising awareness on safe sexual behaviour and tobacco cessation are essential preventive strategies.

Keywords: Cervical cancer, genital hygiene, miscarriages, parity, promiscuity, pap smear.

INTRODUCTION

Chronic non - communicable diseases have come into the lime light with the growing control over communicable diseases due to development in immunization and surveillance activities.[1] Out of the non-communicable diseases, cancers have become major public health concern over the world.[2]

Globally, Cervical cancer ranks next to breast cancer with estimated 6,60,000 new cases in 2022, of which 94% (3,50,000) deaths occurred in low and middle-income countries and represented as major global health challenge.[3,4] In India one in five women diagnosed with cervical cancer die every seven minutes accounting for more than 200 deaths every

day.[5,6] In 2016, the burden of cervical cancer in Maharashtra is 240.7 DALYs per 100,000 women.[7] Aetiology of cervical cancer is multifactorial. Many epidemiological studies showed that human papilloma virus is an important risk factor present in 99.7% of invasive cervical cancers.[8,9] There are more than 100 types of human papilloma viruses, out of which HPV16 and HPV18 contributed mainly for the occurrence of cervical cancer and its precursor lesions.[10,11] Young Women in their late teens and early 20s are more likely to contract HPV infections due to the initiation of early sexual activity. HPV alone is not sufficient for the development of cervical cancer. Several other hosts related factors or exposures like Low socio-economic status, young age at first coitus, multiparity (>3), multiple sexual partners etc play a significant role in development of cervical cancer.[12] Cervical cancer is most commonly diagnosed in women between the ages of 35 and 44 years.[13]

Despite being preventable, cervical cancer remains a significant public health challenge. Organized screening and HPV vaccination have led to marked declines in incidence and mortality in high-income countries but progress has been slower in low- and middle-income countries.[14]

Therefore, there is a need to raise public awareness regarding risk factors in the prevention of cervical cancer. Many literatures have found that, there is 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.

The present study aimed to find out the various risk factors of cervical cancer among patients attending the tertiary care hospital.

MATERIALS AND METHODS

Hospital-based case–control study was conducted at a government hospital in western Maharashtra from July 1st 2023 to June 30th 2024. Cases comprised females diagnosed with cervical cancer, confirmed by Pap smear. Controls were age matched females without cervical cancer, enrolled only after a negative smear from non-gynaecological departments. A total of 200 participants were enrolled, 100 in cases group and 100 in controls group.

Participants were selected using purposive sampling. Data were collected using a predesigned, pretested questionnaire that recorded the data of socio-demographic details such as age, type of family (nuclear/joint), area of residence (urban/rural), education, occupation, and socio-economic status. Information on reproductive risk factors included age at marriage, age at first pregnancy, number of marriages, parity, genital hygiene practices and history of genital infections or warts (self or spouse) were also recorded. Additional variables studied are number of lifetime sexual partners, nature of sexual relationships (monogamous/polygamous), contraceptive use, tobacco usage and alcohol consumption etc.

Data were entered into Microsoft Excel and analysed using Open Epi software version 3.01. Odds ratios (ORs) with 95% confidence intervals (CI) were calculated to quantify risk. A p-value of less than 0.05 was considered statistically significant. Significant variables from the univariate analysis were further subjected to multivariate logistic regression using Jamovi software to control for confounders. The final results were interpreted with the existing scientific evidence used with relevance to public health planning and cervical cancer prevention strategies.

Ethical approval for the study was obtained from the Institutional Review Board prior after submitting the synopsis and addressing all queries. Written informed consent was obtained from all participants before enrolment into the study.

RESULTS

In the present study, the mean age of participants enrolled were 53.3 ± 9.5 years. Total of 200 patients were included in the study, out of which 100 were cases and 100 were controls. Out of these participants 39% belong to 51-60 years of age group, 30% to 41-50 years of age group, 20% to 61-70 years of age group and 11% were from 31-40years of age group. The controls were matched with age appropriate to the cases.
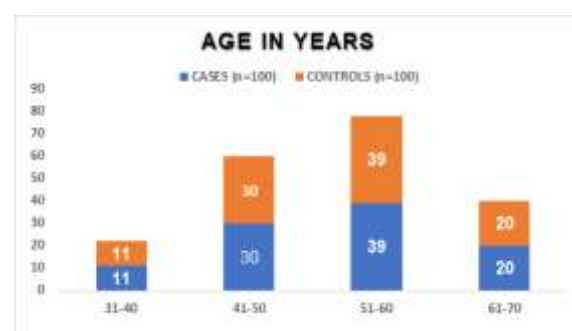

Figure 1: Age wise distribution of participants

Table 1: Univariate logistic regression on various risk factors for cervical cancer

Variable	Category	Cases	Controls	odds ratio	P value
Socio demographic factors					
Residence	Rural	78	65	1.903	0.041*
	Urban	22	35	-	-
Type of house	kaccha	28	11	3.129	0.002*
	Pucca	72	89	-	-
Religion	Hindu	72	70	1.102	0.755
	Muslim & Other	28	30	-	-
Education	Illiterate	78	56	2.78	0.009*

	Literate	22	44	-	-
Marital status	Married	84	77	1.56	0.212
	Widowed	16	23	-	-
Type of family	Joint	63	56	1.33	0.315
	Nuclear	37	44	-	-
Socio-economic status	IV & V	92	91	1.137	0.79
	III	08	09	-	-
Reproductive and sexual history					
Age at marriage	10-20	72	24	8.04	<0.0001*
	21-30	28	76	-	-
Age at first pregnancy	10-20	41	17	3.372	0.0018*
	21-30	59	83	-	-
Parity	<2	10	38	-	-
	>3	90	62	5.469	0.0003
Miscarriage	At least once	34	12	3.7	0.0002*
	None	66	88	-	-
Promiscuity	Yes	13	02	7.262	0.003*
	No	87	98	-	-
Genital warts	Yes	08	02	4.234	0.0515
	No	92	98	-	-
Contraceptives	oc pills & IUCD	05	02	2.579	0.2492
	Tubectomy	95	98	-	-
Tobacco addiction	Yes	17	05	3.867	0.006*
	No	83	95	-	-
Hygiene Practices					
Daily bathing	No	12	03	4.409	0.015*
	Yes	88	97	-	-
Genital washing after sexual intercourse	No	66	51	1.8	0.031*
	Yes	34	49	-	-
Bathing during menstruation	No	34	15	2.919	0.001*
	Yes	66	85	-	-
Material used during menstruation	Old cloth	88	70	3.125	0.001*
	Sanitary napkins	12	30	-	-

The analysis of various risk factors among women with cervical cancer revealed the following: A majority (78%) belonged to a rural background and 72% were Hindu by religion. Most participants (78%) were illiterate, and 84% were married. Living arrangements showed that 63% resided in joint families. Socioeconomic distribution indicated that 92% were from lower socioeconomic status (Class IV and V).[15]

Regarding reproductive factors, 41% had experienced pregnancy before the age of 20 years, while 72% had married before 20 years of age. A large proportion (90%) of women had more than three pregnancies, and 34% reported at least one miscarriage during their lifetime. Nearly 13% had more than one sexual partner and 8% presented with genital warts.

Personal hygiene practices were suboptimal in several participants: 12% reported no daily bathing,

66% did not wash the genital area after sexual intercourse, and 34% did not bathe during menstruation. The use of unhygienic menstrual practices was also noted, with 88% reporting use of cloth during menstruation. Additionally, 17% of women reported tobacco addiction.
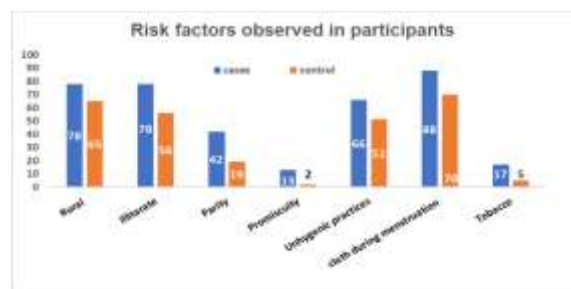

Figure 2: Showing various risk factors observed in participants

Table 2: Multivariate logistic regression applied on significant variables

Predictor	Univariate OR (95% CI) P Value	Multivariate OR (95%CI) P Value
Age at marriage	8.042 (4.306– 15.4) < 0.0001	0.7987 (0.2862 – 2.229) 0.668
Age at 1st pregnancy	3.808 (1.658 – 9.462) 0.001	3.8282 (0.9920 – 14.774) 0.051*
Parity	5.469 (2.587 – 12.32) 0.0003	8.8311(3.0915– 25.227) <0.001*
Abortions	3.7 (1.829 – 8.05) 0.0002	3.63346 (1.5416 – 8.569) 0.003*
Promiscuity	7.262 (1.796 – 48.65) 0.003	5.5429 (1.0996 – 27.940) 0.038*
Genital wash after sexual intercourse	1.8 (1.052 – 3.31) 0.03135	1.8300 (0.8800 – 3.806) 0.106
Material used during menstruation	3.125 (1.508– 6.758) 0.001	0.3722 (0.1487 – 0.932) 0.035*
Tobacco consumption	3.867 (1.415 – 12.19) 0.006	2.0961 (0.6132 – 7.165) 0.238

In the above [Table 2], multivariate logistic regression analysis, after adjusting for other variables, statistically significant predictors of

cervical cancer included: age at first pregnancy (less than 18 years) (AOR = 3.8282, p = 0.051), parity (more than 3) (AOR = 8.83, p < 0.001), abortions

(more than 1) (AOR = 3.63, p = 0.003), material used during menstruation (use of old cloth) (AOR = 0.37, p = 0.035) and promiscuity (more than 1partner) (AOR = 5.54, p = 0.038).

However, age at marriage and tobacco consumption did not retain statistical significance in the multivariate model, suggesting that their associations in univariate analysis may have been confounded by other factors. On the other hand, even though the material used during menstruation had turned out to be significant in the multivariate but loss of its risk association, possibly due to confounding with other factors.

DISCUSSION

Several socio-demographic and reproductive factors were significantly associated with cervical cancer.

Women from rural backgrounds (78%, OR1.6, p<0.05) and those with lower education (OR 2.78, p<0.05) had higher risk. These findings are consistent with other studies,[3,16-18] where lack of awareness, poor access to screening and lower health-seeking behaviour played an important role in these groups for vulnerability.

Early age at marriage (<18 years) showed a strong association (72%, OR 8.04, p<0.05), while early first pregnancy (<20 years) increased risk threefold (41%; OR 3.37, p<0.05). Similar findings were reported by,[19-21] where early marriage and childbirth had led to premature onset of sexual activity, prolonged exposure to HPV and an immature cervix more susceptible to infection.

High parity (≥3 children) was strongly associated (p<0.05), supported by other literatures,[22,23] indicating that repeated cervical trauma, hormonal changes and prolonged HPV persistence may contribute to malignant transformation. Miscarriage (34%, OR 3.7, p<0.05) also emerged significant, possibly due to cervical injury and unsafe reproductive practices, finding supported by.[22]

History of multiple sexual partners (self or spouse) (13% OR 7.26, p<0.05) was a major risk factor, in line with,[3,22] as it increases chances of high-risk HPV exposure. Poor genital hygiene—lack of post-coital washing (OR 1.8, p<0.05) and use of old cloth during menstruation (OR 3.12, p<0.05) were significant and similar with.[18,19] Reuse of unclean material and absence of hygienic practices likely sustain chronic genital infections, a known precursor for cervical dysplasia.

Tobacco chewing (OR 3.86, p<0.05) was significantly associated, consistent with,[22] highlighting its carcinogenic role, local immune suppression and co-factors that accelerate HPV-mediated oncogenesis.

Overall, findings early marriage, early pregnancy, high parity, miscarriage, multiple sexual partners, poor hygiene, tobacco use, low education, and rural residence are major modifiable risk factors. Differences across studies may reflect sociocultural variations, reporting bias or study design. Strengthening reproductive health education, delaying marriage and childbirth, promoting safe menstrual hygiene, and tobacco cessation remain crucial preventive strategies to reduce the cervical cancer burden.

CONCLUSION

Similar to other cancers, cervical cancer can also be detected at an early stage by simple test of pap smear. Therefore, it is important to educate women about risk factors of cervical cancer, its diagnosis and early treatment are imperative to stop the progression of cancer. Proper screening should be done to prevent the development of cervical cancer. Proper campaigns and programs should be organized should be organized for the women residing in rural areas.

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