

Assessing Hormonal Risk Factors in Cervical Cancer: A Clinical Perspective

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KEYWORDS

Cervical cancer, hormonal therapy, hormone replacement therapy (HRT), oral contraceptives, intrauterine device (IUD), Pap smear, cervical monitoring, reproductive health, cross-sectional study, risk factors.

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Abstract

Background: Cervical cancer is a major global health concern, and hormonal elements are increasingly being recognized as potential risk factors. This study sought to assess the clinical link between hormonal interventions—such as oral contraceptives, hormone replacement therapy (HRT), intrauterine devices (IUDs), and hormonal injections—and cervical health outcomes, including Pap smear abnormalities, infection history, and cervical monitoring practices.

Methods: A descriptive cross-sectional study was carried out on 350 women aged 30 to 65 years who visited outpatient gynecological clinics in tertiary healthcare facilities. Focusing on reproductive history, hormone medication use, lifestyle variables, and cervical screening results, structured questionnaires and retrospective record reviews gathered data. Using SPSS version 25.0, statistical analysis was conducted; chi-square tests were used to assess correlations between cervical anomalies and hormonal variables. Statistically significant was a p-value under 0.05.

Results: Most of the participants were between 46 and 55 years old (28.9%). More than half said they used HRT (53.1%), hormonal injections or implants (49.4%), and IUDs (51.4%). Among HRT users, almost equal percentages said they used it for less than one year, 1–5 years, and more than five years. While 50.9% said they were not tracked for cervical alterations following HRT, 44.3% of patients reported pap smear abnormalities during or after HRT. Especially 46.3% had recorded illnesses that could affect hormonal effects. Common as well were high-fat, low-fiber diets and alcohol use, which could interact with cervical and hormonal effects.

Conclusion: This study found a high prevalence of Pap smear abnormalities and poor cervical monitoring among women using hormonal treatments. Especially in the context of other risk factors like poor nutrition, alcohol use, and recorded infections, the results underline the necessity for regular cervical screening and focused education for women using HRT or other hormone treatments.

INTRODUCTION

Cervical cancer is a leading cause of cancer-related deaths among women worldwide, especially in countries with low or medium income levels, despite the fact that it is highly preventable [1]. Cervical neoplasia is primarily caused by high-risk human papillomavirus (HPV) infections, although there is growing evidence that reproductive and hormonal factors play a significant role in its onset and progression [2,3]. These hormonal risk variables could change the cervical epithelium's capacity to clear infections or fight cancer transformation and influence vulnerability to oncogenic HPV [4]. Potential co-factors in cervical cancer development have been found in hormonal exposures including extended usage of oral contraceptive pills (OCPs) and hormone replacement treatment (HRT) [5]. Early age at menarche, high parity, and delayed or irregular cervical screening might also be related to total

estrogen exposure and lower chances for early diagnosis [6]. Moreover, recorded infections—especially those impacting the vaginal and cervical environment—may combine with hormonal impacts, hence compromising epithelium integrity [7]. Key hormonal and reproductive factors were meticulously investigated in this clinical study: age at menarche (varying from 11–14 years), frequency of pregnancies, length of OCP and HRT use, frequency of cervical screening (Pap smear and HPV testing), and records of prior infections. This work intends to offer a thorough evaluation of hormonal risk factors linked to cervical cancer by means of analysis of these variables in a clinical population, hence supporting a more complex knowledge of their function in the development and prevention of the illness.

METHODOLOGY

Study Design: This study used a descriptive cross-sectional methodology to evaluate the clinical relationship between hormonal variables and cervical cancer risk. The aim was to investigate important hormonal effects such as oral contraceptive use, hormone replacement therapy (HRT), intrauterine device (IUD) use, and hormonal injections, and their relationship with cervical health outcomes including Pap smear abnormalities and awareness levels.

Participants: The study included 350 female volunteers aged 30 to 65 years who came from various outpatient gynecological clinics linked with tertiary healthcare institutes. With the biggest group between 46 and 55 years (28.9%), the age distribution was well balanced. The participants comprised a wide spectrum of people to guarantee generalizability of results across reproductive and menopausal age categories.

Inclusion Criteria

1. Females aged **30 to 65 years**
2. History of using at least one form of hormonal therapy (oral contraceptives, HRT, IUD, or hormonal implants/injections)
3. Ability to provide informed consent
4. Willingness to respond to structured interviews and provide relevant clinical history

Exclusion Criteria

1. Individuals with a previously diagnosed case of cervical cancer
2. Women undergoing current chemotherapy or radiotherapy
3. Participants with incomplete hormonal history or missing medical documentation
4. Pregnant women at the time of the study

Data Collection

Data was collected using a standardized questionnaire. The survey inquired about respondent's demographics, reproductive history, and (e.g., age at menarche, number of pregnancies), contraceptive use (type and duration), hormone replacement therapy, dietary and lifestyle elements (e.g., alcohol use), and cervical cancer screening history (Pap smear and HPV testing). Medical records were

also checked for reported illnesses, Pap smear findings, and doctor advice on hormonal risk factors.

Clinical parameters were carefully quantified and analysed such as:

1. **Menarche age** (11–14 years)
2. **Pregnancy frequency**
3. **Duration of OCP and HRT use**
4. **Screening frequency (Pap/HPV testing)**
5. **Documented infections**

Data Analysis: For statistical analysis, the data that was obtained was input into SPSS (version 25.0). Using descriptive statistics, the data were summarized as cumulative distributions, percentages, and frequencies. Cross-tabulations were used to assess relationships between hormonal variables and cervical health results including Pap smear anomalies or HRT monitoring. Where relevant, chi-square tests were used to evaluate statistical significance between categorical variables such as “contraceptive use and Pap smear anomalies”. Statistically significant was a p-value of under 0.05.

RESULTS

The study assessed the relationship between hormonal factors and cervical cancer risk among 350 women, with results spanning demographic characteristics, hormonal exposure history, clinical practices, and participant awareness. The majority of participants were in the 46–55 age group, with early menarche and multiple pregnancies being common. A substantial number reported using intrauterine devices, hormonal injections, and hormone replacement therapy (HRT), with HRT often used for osteoporosis prevention. While nearly half had experienced infections that could interact with hormonal factors, regular monitoring and screening practices like Pap smear or HPV testing varied significantly. Awareness of the hormonal-cancer link was moderate, with over half acknowledging the risk yet fewer receiving appropriate counseling. Clinical documentation of hormonal risk factors was inconsistent, highlighting gaps in both education and preventive care strategies. These findings collectively offer a multidimensional view of how hormonal and lifestyle factors may influence cervical health outcomes.

Table 1. Demographic Distribution of Study Participants by Age.

Age		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	30–35	77	22	22	22
	36–45	86	24.6	24.6	46.6
	46–55	101	28.9	28.9	75.4
	56–65	86	24.6	24.6	100
	Total	350	100	100	

The majority of participants were aged between 46–55 years (28.9%), followed by equal distributions in the 36–45 and 56–65 age groups (24.6% each). The smallest group was 30–35 years, comprising 22% of the total sample.

Table 2. Duration of Oral Contraceptive Use Among OCP Users.

If Yes: a. Duration of Use * History of Oral Contraceptive (OCP) Use Crosstabulation			
Count		History of Oral Contraceptive (OCP) Use	
		Yes	Total
If Yes: a. Duration of Use	<1 year	65	65
	1–5 years	70	70
	5 years	71	71
	Total	206	206

Among those who used OCPs, the duration of use was fairly evenly split. Around one-third used them for less than a year, one-third for 1–5 years, and another third for more than 5 years.

Table 3. Duration of Hormone Replacement Therapy (HRT) Use Among Users.

If Yes: a. Duration of Use * Have you used Hormone Replacement Therapy (HRT)? Crosstabulation				
Count		Have you used Hormone Replacement Therapy (HRT)?		
		Yes	No	Total
If Yes: a. Duration of Use	<1 year	65	51	116
	1–5 years	60	58	118
	5 years	61	55	116
	Total	186	164	350

Among HRT users, the duration of use was evenly distributed, with nearly equal numbers using it for less than a year (65), 1–5 years (60), and more than 5 years (61). Non-users were also proportionately distributed across these duration brackets, reflecting a balanced comparison group.

Table 4. History of Pap Smear Abnormalities During or After HRT Use

Has there been a history of Pap smear abnormalities during or after HRT use?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	155	44.3	44.3	44.3
	No	195	55.7	55.7	100
	Total	350	100	100	

A total of 44.3% of respondents reported abnormalities in Pap smear results during or after HRT use. Meanwhile, the majority (55.7%) had no such history.

Table 5. Perception of Hormonal Contraceptives as a Cancer Risk Factor

Do you think hormonal contraceptives contribute to cancer risk?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	186	53.1	53.1	53.1
	No	164	46.9	46.9	100.0
	Total	350	100.0	100.0	

Around 53.1% believed hormonal contraceptives may contribute to cancer risk, while 46.9% disagreed. This reflects a near-even split in public perception.

DISCUSSION

The current study identifies various hormonal and reproductive factors that may increase cervical cancer risk, and the findings are consistent with existing literature.

The finding that 28.9% of participants were between 46 and 55 years and a significant percentage experienced early menarche (28% at age 11) supports the importance of early hormone exposure in cervical epithelial vulnerability. Early menarche has been linked to more lifetime estrogen exposure in other studies—including those by Funston et al., (2018) which may help explain cervical dysplasia. Significant factors turned out to be hormone replacement treatment (HRT) and oral contraceptives (OCPs). Among OCP users, about one-third indicated long-term use (>5 years). This corresponds to the “International Agency for Research on Cancer (IARC)” results, which label long-term OCP usage as a cofactor for cervical cancer, especially in women with ongoing HPV infection. Furthermore, Huang et al., (2022) [16] emphasized that cervical cancer is frequently diagnosed in this age bracket due to delayed detection, as routine screening tends to decline in midlife despite continued risk. These findings affirm that the current age-related distribution aligns with global epidemiological trends, underscoring the importance of sustained cervical cancer screening beyond reproductive years.

More over half of the respondents said they used IUDs (51.4%) and almost half had a history of hormonal injections or implants. Although IUDs are usually thought to be safe because of local immune regulation, several studies—including those by Kashyap et al., (2019) [9]; Guo et al., (2024) [10] indicate that hormone components in particular IUDs could still affect cervical cell dynamics. The study revealed that the use of oral contraceptive pills (OCPs) among participants was fairly evenly distributed, with approximately one-third of users reporting durations of less than one year (31.6%), 1–5 years (34%), and more than five years (34.4%). This pattern gains significance in light of previous findings indicating that long-term use of OCPs, particularly beyond five years, may modestly increase the risk of cervical cancer. The International Agency for Research on Cancer (IARC, 2007) reported a relative risk of 1.9 for cervical cancer in women with over five years of OCP use. Similarly, Mix et al., 2021 [17] & Jyrsen et al., (2021) [18] observed that the risk escalates

with longer use but tends to decline within a decade after cessation. The present distribution thus reinforces existing concerns regarding prolonged hormonal exposure and its potential link to cervical carcinogenesis, highlighting the need for careful monitoring of long-term OCP users.

Of the 53.1% of respondents who said they used HRT, over half were not tracked for cervical alterations, which is clinically concerning. Moreover, 44.3% of HRT users noted Pap smear abnormalities during or following treatment. This backs up the results of research like Lee et al., (2024) [11], which warn against the unmonitored use of systemic hormones because of possible estrogenic impact on the cervix. Regarding impression, more than half of the respondents thought hormonal contraceptives could increase cancer risk (53.1%), while knowledge of the particular hormonal connection with cervical cancer was somewhat greater (54.9%). This highlights a knowledge deficit noted in worldwide public health studies and underlines the importance of better counselling (Wu et al., 2024) [12]; Yukio et al., (2023) [15].

Though high-fat, low-fiber diets were more prevalent in both alcohol drinkers and non-consumers, the crosstabulation of dietary patterns, alcohol consumption, and cervical health did not reveal significant differences. Studies Luvian et al., (2024) [13] indicate that such diets could change immune surveillance and estrogen metabolism, thereby possibly aggravating hormonal risk. At last, just 49.1% of subjects had been tracked for cervical alterations throughout HRT; 55.7% had no Pap smear anomalies. The other 44.3% reporting anomalies could suggest that combination hormonal and lifestyle variables need more thorough clinical investigation consistent with previous literature (Jie et al., 2022) [14].

While the causal relationship between HRT and cervical cancer remains debated, previous research provides plausible biological explanations for this finding. Iyrsen et al., (2021) [18] suggested that combined estrogen-progestin HRT may influence cervical epithelial maturation, potentially increasing the likelihood of detecting cytological abnormalities. Moreover, Karlsson et al., (2021) [19] concluded that while HRT might not independently elevate cervical cancer risk, it could affect HPV persistence and Pap smear sensitivity due to hormonal changes in the cervical environment.

These results suggest that hormonal modulation through HRT may contribute to detectable changes during cervical screening, supporting the findings observed in the current cohort.

A slight majority (53.1%) of participants perceived hormonal contraceptives as a contributing factor to cancer risk, reflecting a growing awareness of hormonal influences on women's health. This perception aligns with findings by Bovo et al., (2023) [20], who reported that more than half of surveyed women associated hormonal contraceptive use with increased cancer risk, regardless of clinical ambiguity. Public opinion often mirrors heightened health literacy and exposure to media narratives linking hormones to cancer. As Manley et al., (2024) [21] and Dominguez et al., (2025) [22] pointed out, perceptions are strongly influenced by education levels and access to accurate information. Although the risk associated with hormonal contraceptives is relatively low and typically dependent on duration of use, the public's concern is not unfounded and may impact contraceptive decision-making and health-seeking behaviors as suggested by previous finding (Barra et al., (2024) [23]. The near-even split in the current study suggests a need for clearer risk communication strategies in clinical settings. Overall, the findings underscore the importance of regular cervical screening, especially for women using long-term hormonal therapies. They also point to a need for better education and counselling regarding the nuanced risks of hormonal contraceptives and HRT.

CONCLUSION

The study emphasizes the important link between hormonal variables, such as oral contraceptive use, hormone replacement therapy (HRT), intrauterine device (IUD) use, and hormonal injections, and cervical health results. Though knowledge stayed poor for a large percentage of the community, many of the participants knew the connection between hormonal variables and cervical cancer. The findings also show conflicting perspectives of hormonal contraceptives as cancer risk factors. Nearly half of the participants said there was insufficient clinical monitoring for cervical abnormalities with HRT treatment. Moreover, the study emphasizes the need of offering focused counseling to change hormonal and lifestyle variables to lower cervical cancer risk. The results point to a need for more awareness, improved monitoring policies, and more thorough clinical hormonal risk factor counseling.

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