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The Association Between Age and Parity with the Incidence of Cervical Cancer: A Case-Control Study

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ABSTRACT

Background: Cervical cancer is one of the leading causes of mortality among women worldwide and ranks second in Indonesia after breast cancer. Data from Dr. H. Abdul Moeloek General Hospital in 2024 recorded 255 hospitalized patients diagnosed with cervical cancer, equivalent to approximately 0.57% of total visits. Risk factors associated with cervical cancer incidence include age and parity, which may influence susceptibility to persistent HPV infection and cervical cell changes.
Methods: This study employed a quantitative case-control design. The study population consisted of all 255 inpatients diagnosed with cervical cancer in 2024. A total of 192 respondents were selected using random sampling, comprising 96 cases (with cervical cancer) and 96 controls (without cervical cancer). Data were analyzed using univariate and bivariate methods with the Chi-Square test.
Results: The Chi Square test results show a significant relationship between age and cervical cancer incidence (p=0.001; OR=44.922), as well as a relationship between parity and cervical cancer incidence (p=0.001; OR=103.400). Women who are older and have higher parity are at greater risk of developing cervical cancer than those who are at lower risk.
Conclusion: There is a significant association between age <20/>35 years and grandmultiparity with the incidence of cervical cancer. Women of reproductive age are advised to increase their awareness of early detection through regular IVA (Visual Inspection with Acetic Acid) or Pap smear examinations at least every 3 years. Health workers are expected to strengthen health promotion programs on healthy reproductive age and safe number of births in order to reduce the incidence of cervical cancer.

INTRODUCTION

Cervical cancer is a malignant growth originating from the cervix, most often caused by persistent infection with high-risk Human Papillomavirus (HPV), particularly types 16 and 18 (Burd, 2023). Globally, cervical cancer ranks as the fourth most common cancer among women after breast, colorectal, and lung cancers, with more than 500,000 new cases and over 300,000 deaths annually (Ekawati, Listiani, Idaiani, Thobari, & Hafidz, 2024). It is estimated that nine out of ten deaths occur in low- and middle-income countries, where access to HPV vaccination and early detection programs remains limited (Khabibah, Adyani, & Rahmawati, 2022). In Indonesia, cervical cancer is the second most common cancer among women after breast cancer, contributing significantly to maternal morbidity and mortality (Sulistyawati, Faizah, & Kurniawati, 2020). However, in developing countries, including Indonesia, many women still face barriers to prevention and treatment (Gravitt, Paul, Katki, Vendantham, & Ramakrishna,

2010). These barriers include low awareness, which reduces HPV vaccine uptake and contributes to an increase in cervical cancer incidence each year (Rio & Sri Tyas Suci, 2017).

Several risk factors have been identified as contributors to cervical cancer, including early sexual activity, multiple sexual partners, smoking, long-term use of oral contraceptives, low socioeconomic status, poor hygiene, and reproductive history (Putri, Ningsih, Pramono, & Nurdiati, 2016). Among reproductive factors, age and parity are considered particularly influential. Women under 20 years of age are biologically immature, with cervical tissue that is more susceptible to trauma and HPV infection. Conversely, women over 35 years experience decreased immunity and physiological aging of the cervix, increasing vulnerability to persistent HPV infection and malignant transformation. Similarly, high parity (≥5) exposes the cervix to repeated trauma during childbirth, chronic inflammation, and prolonged hormonal exposure, all of which increase the risk of cervical neoplasia (Wanda, Oktavia, & Yusefni, 2018).

Previous studies support the association between reproductive factors and cervical cancer (Sigalingging, Lubis, & Andayani, 2021) reported that age is a significant risk factor for cervical cancer among women in Indonesia. Although cases are increasingly found in younger women, the peak incidence remains among women aged 40–45 years. Women under 35 years who are sexually active are also vulnerable due to reduced immunity against HPV infection. Since HPV is primarily transmitted through sexual contact, sexually active women remain at risk for infection. Consistent with (Biostatistik, Kesehatan, & Ramadhaningtyas, 2020), grandmultiparity is associated with reduced ability of the cervix to maintain the transformation zone against HPV infection. During pregnancy, immunosuppression occurs, along with hormonal and physiological changes, increasing susceptibility to HPV infection (Nida Mayrita & Handayani, 2018).

Therefore, women who have given birth more than three times are strongly advised to undergo regular cervical cancer screening. According to the World Health Organization (WHO), in 2020 there were an estimated 604,000 new cases and 342,000 deaths (56.62%) due to cervical cancer worldwide, with most cases occurring in low- and middle-income countries(Astri Nadia Hidayat, Novita Ariani, 2021). (Globocan, 2024), Cervical cancer caused 348,874 deaths and 662,301 new cases. In Indonesia, it is the second leading cause of cancer death among women (Liu et al., 2024). National cancer registry data also indicate that cervical cancer remains a major contributor to cancer-related mortality among Indonesian women, with thousands of new cases reported annually. In Lampung Province, 169,922 women aged 30–50 underwent VIA screening in 2022, with 532 testing positive (Ge'e, Lebuan, & Purwarini, 2021) .

Preliminary survey data from Dr. H. Abdul Moeloek General Hospital in Bandar Lampung recorded 255 inpatients diagnosed with cervical cancer in 2024, representing 0.57% of total hospital visits (Dinas Kesehatan Pemerintah Kota Bandar Lampung, 2021) This rising trend reflects an ongoing public health challenge regarding cervical cancer in Lampung Province. Based on this background, this study was conducted to determine the association between age and parity with the incidence of cervical cancer in the Obstetrics Polyclinic of Dr. H. Abdul Moeloek General Hospital, Bandar Lampung.

METHODS

This study is a quantitative analytical observational study with a case-control design. It was conducted at the Obstetrics Polyclinic of Dr. H. Abdul Moeloek General Hospital, Bandar Lampung, in 2024. The study population consisted of 255 inpatients diagnosed with cervical cancer in 2024. A total of 192 respondents were randomly selected, consisting of 96 cases (patients with cervical cancer confirmed by anatomical pathology examination results, confirmed by an OB-GYN, and registered in the obstetrics and gynecology outpatient clinic medical records) and 96 controls (patients without cervical cancer confirmed by anatomical pathology examination results, confirmed by an OB-GYN, and registered in the obstetrics and gynecology outpatient clinic medical records). The independent variables in this study were age and parity, while the dependent variable was the incidence of cervical cancer (Prasasty & Legiran, 2023).

The World Health Organization, a specialized agency of the United Nations that oversees global health, was founded in 1948 with the goal of ensuring the highest health standards for everyone in the world.(WHO, 2015) Data collection was conducted from obstetric clinic medical records by looking at age and cervical cancer risk category data if the age was <20 or >35 years, and no cervical cancer risk if the age was between 20-35 years. As for parity, the cervical cancer risk category includes grand multiparity (≥5), while those not at risk for cervical cancer include parity (multiparity or 2-4 and primiparity or 1).(Husnah, 2018).

The sampling procedure was carried out using the Simple Random Sampling method, often known as Random Sampling. This is a sampling technique in which every individual in the population has an equal chance of being selected as part of the sample. Simple random sampling is a basic form that is often used as a foundation for developing more complex sampling methods. Stratification analysis is used to divide data or populations into groups (strata) based on specific characteristics in order to analyze patterns or relationships between variables in greater depth, often to control for confounding factors. Univariate analysis was used to describe respondent characteristics, while bivariate analysis was performed using the Chi-Square test (Arieska & Herdiani, 2018) . The alternative hypothesis (Ha) was accepted if the p-value was <0.05, indicating a statistically significant association between the studied variables (Subhaktiyasa, 2024). This study received ethical approval from the Malahayati University Health Research Ethics Committee with approval number 4856/EC/KEP-UNMAL/V/2024, valid from May 27, 2025 to May 27, 2026. This study also obtained ethical approval from the Health Research Ethics Committee of Dr. H. Abdul Moeloek Provincial General Hospital, Lampung, with approval number 535/KEPK-RSUDAM/VI/2025, valid from June 19, 2025, to June 19, 2026.

RESULTS

This study employed a case-control design conducted at the Obstetrics Polyclinic of Dr. H. Abdul Moeloek General Hospital, Bandar Lampung, in 2024. Out of a total of 255 recorded cervical cancer patients, 192 respondents were selected as the sample using random sampling techniques, consisting of 96 cases (with cervical cancer) and 96 controls (without cervical cancer).

Descriptive Statistic

Table 1 summarises the basic characteristics of the study participants. The age category is considered at risk if the age is <20 years and >35 years and not at risk if the age is 20-35 years, and the parity category is primipara if the participant has given birth once, multipara if the participant has given birth more than twice, and grandemultipara if the participant has given birth more than four times (Monica Trifitriana, Rizal Sanif, & Syarif Husin, 2021). The basic characteristics between the experimental and control groups were comparable .

Primary Outcome Measures

Table 2 explains the main results, which show a significant relationship between age and the incidence of cervical cancer (p=0.001<0.05) OR 44.9 and parity and the incidence of cervical cancer (p=0.001<0.05) OR 103.4. This proves that age and high parity increase the likelihood of cervical cancer.

Secondary Outcome Measures

In addition to the main findings, this study also evaluated the frequency distribution of age and parity among respondents. The analysis showed that most cervical cancer cases were found in the 40–49 year age group, while the control group was more prevalent among women under 35 years. In terms of parity, the majority of respondents in the case group had high parity (≥5), whereas the control group was more dominant in the low parity category (1-4). These findings reinforce the main results, indicating that advanced age and grandmultiparity contribute to an increased risk of cervical cancer. Moreover, this distribution pattern is consistent with epidemiological theory, which states that women of advanced reproductive age with a history of

grandmultiple childbirths are more vulnerable to pathological changes in the cervix that may develop into cancer.

Subgroup Analysis

To explore potential variations in the study population, subgroup analyses were conducted based on the age and parity of respondents. Table 1 shows the results of the subgroup analysis, which indicate that the risk of cervical cancer increases significantly in women aged ≥40 years compared to those under 35 years of age. In addition, respondents with parity ≥5 showed a much higher odds ratio compared to those with parity 1-4.

The statistically significant differences observed, particularly in the subgroup of women aged 40–49 years and those with parity ≥5, indicate that women with these characteristics are the population most vulnerable to cervical cancer. These findings highlight the importance of targeted interventions, such as expanding the coverage of VIA/Pap smear screening and strengthening reproductive health education, especially for middle-aged women with a history of multiple births.

Tabel 1. Distribution of Cervical Cancer by Age and Parity

Variables	Cervical Cancer		Non Cervical Cancer	
	n	%	n	%
Age (Year)				
<20	23	23.9	10	10.4
20-35	6	6.2	70	72.9
>35	67	69.7	16	16.6
Parity				
1	1	1.04	30	
2-4	4	4.17	40	31.2
≥5	91	94.8	26	41.6

Based on Table 1, it was found that in the age category, there were 23 (23.9%) cases of cervical cancer and 10 (10.4%) cases of non-cervical cancer in the under-20 age group, while in the 20-35 age group, there were 6 (6.2%) cases of cervical cancer and 70 (72.9%) cases of non-cervical cancer. while in the age group >35 years, there were 67 (69.7%) with cervical cancer and 16 (16.6%) without cervical cancer.

In the parity category, it was found that 1 (1.04%) of those with parity 1 had cervical cancer and 30 (31.2%) did not have cervical cancer. For those with parity 2-4, 4 (4.17%) had cervical cancer and 40 (41.6%) did not have cervical cancer. while for parity ≥5, there were 91 (94.8%) with cervical cancer and 26 (27%) without cervical cancer.

Table 2. Characteristics of Respondents

Variables	Cervical Cancer		Non Cervical Cancer	
	n(96)	%(100)	n(96)	% (100)
Age				
At risk (<20 yeıars and >35 yeıars)	90	93.8	26	27.1
Not at risk(20–35 yeıars)	6	6.2	70	72.9
Parity				
Not at risk (Primi/Multiparity)	5	5.2	70	72.9
At risk (Grandmultiparity)	91	94.8	26	27.1

Based on Table 2, it can be seen that there were 96 control groups (Non Cervical Cancer) and 96 case groups (Cervical Cancer). Most respondents were in the at-risk age category (<20 years and >35 years), with a total of 116 respondents (60.4%), while respondents in the non-at-risk age category (20–35 years) numbered 76 respondents (39.6%). Most respondents also had

grandmultiparity (≥5), with 117 respondents (60.9%), while primi/multiparity (1-4) was found in 75 respondents (39.1%). These findings indicate that most women in the study sample were in the reproductive risk group and had high parity.

Table 3. The Association Between Age and Parity with the Incidence of Cervical Cancer

Variable	Cervical Cancer		Non Cervical Cancer		P Value	OR (95%CI)
	n(96)	%(100)	n(96)	% (100)		
Age						
At risk (<20 years and >35 years)	90	93.8	26	27.1	<0.001	44.9(18.9
Not at risk(20–35 years)	6	6.2	70	72.9		43-106.526)
Parity						
Not at risk (Primi/Multiparity)	5	5.2	70	72.9	<0.001	103.4(23.
At risk (Grandmultiparity)	91	94.8	26	27.1		880-447.716)

Based on Table 3, Respondents in the non-risk age group (20–35 years) who had cervical cancer numbered 6 respondents (6.2%), compared to 70 respondents (72.9%) in the control group. Statistical analysis showed a p-value of 0.001 (<0.05) with an Odds Ratio (OR) of 44.9, indicating that women in the high-risk age group were 44 times more likely to develop cervical cancer than those in the non-risk age group. Regarding parity, there were 91 respondents (94.8%) with high-risk parity (≥5) who had cervical cancer, while in the control group there were only 26 respondents (27.1%). Respondents with non-risk parity primi/multiparity (1–4) who had cervical cancer numbered 5 respondents (5.2%), compared to 70 respondents (72.9%) in the control group. The Chi-Square test showed a p-value of 0.001 (<0.05) with an OR of 103.4, indicating that grandmultiparous women had a 103 times higher risk of developing cervical cancer compared to primi/multiparous women.

DISCUSSION

Interpretation of Key Findings

Analysis shows that women aged <20/≥35 years have a higher risk of developing cervical cancer compared to those under 35 years of age (p=0.001; OR=44.922). Similarly, parity ≥5 was also found to significantly increase the risk of cervical cancer (p=0.001; OR=103.400). The increased risk in the older age group and women with high parity indicates the role of biological factors, such as unsafe sexual behavior, hormonal changes, decreased immunity, and repeated cervical trauma due to childbirth, which facilitate the transformation of abnormal cells into cancer (Idris et al., 2020). These results are consistent with previous studies by (Zeta, Oktarlina, Ramdini, & Wardhana, 2023), which reported that advanced age and high parity are major risk factors for cervical cancer. Specifically, our study contributes to the existing body of evidence by emphasizing that the risk associated with high parity is far greater (OR >100) than that of age, thereby reinforcing the notion that grandmultiparity exerts a dominant influence on the development of cervical cancer (Rio & Sri Tyas Suci, 2017).

Comparison with Previous Studies

Comparing our findings with previous studies is important to strengthen the context. A study by (Lestari & Hidayat, 2019)in Korea found that having more than five childbirths was strongly associated with cervical intraepithelial neoplasia (CIN), which is consistent with our results. Similarly, a study by (Jaelani, Kurniati, Rokhanawati, & Yogyakarta, 2021) that age >20/>35 years and grandmultiparity were dominant factors among cervical cancer patients. However, there is a disparity with the study by (Sudartinah, Mediastuti, & Kasjono, 2022) which emphasized that early sexual activity had a stronger influence than parity. These differences may be attributed to variations in population characteristics, cultural factors, as well as differences in data collection methods (Kusika & Sakti, 2025) This highlights the need for further research involving more diverse populations and study designs to reconcile conflicting findings in the

literature.

Implications for Public Health

The implications of this study extend to public health, particularly in efforts to prevent cervical cancer. The finding that grandmultiparity and advanced age are strongly associated with cervical cancer underscores the need to strengthen early detection programs through VIA and Pap smear screening for women aged ≥35 years, especially those with a history of ≥3 childbirths (Vieira et al., 2024). In addition, reproductive health education and limiting the number of births through family planning programs can serve as effective strategies to reduce risk. These findings are consistent with the objectives of the WHO's Global Strategy to Accelerate the Elimination of Cervical Cancer as a Public Health Problem, which targets 70% cervical cancer screening coverage among women aged 35–45 years. Thus, the results of this study are relevant not only at the local level but also in alignment with global health initiatives.

Limitations and Cautions

Despite providing meaningful contributions, this study has several limitations. First, the use of a case-control design limits the interpretation of causality, meaning that the associations found do not necessarily imply direct cause-and-effect relationships. Second, the data were obtained from a single referral hospital (Dinas Kesehatan Pemerintah Kota Bandar Lampung, 2021), which restricts the generalizability of the findings to broader populations. In addition, other potential risk factors such as sexual behavior, history of hormonal contraceptive use, socioeconomic status, and personal hygiene were not explored in depth in this study. These limitations may affect the comprehensiveness of the risk factor analysis for cervical cancer.

Recommendations for Future Research

Based on the results of this study, future research is recommended to more comprehensively investigate other risk factors beyond age and parity, such as contraceptive use, history of sexually transmitted infections, and smoking habits. Studies employing a prospective cohort design could help strengthen causal evidence. Furthermore, involving multi-center populations from various regions in Indonesia would enhance the external validity of the findings. Exploration of preventive aspects, such as the effectiveness of HPV vaccination programs and the implementation of mass screening, is also essential to provide a more comprehensive understanding of cervical cancer control strategies at both national and global levels.

CONCLUSION

This study highlights cervical cancer as one of the major health problems affecting women by providing valuable insights into the relationship between age and parity with its incidence. The analysis shows that women aged ≥35 years and those with parity ≥5 have a significantly higher risk and association with developing cervical cancer compared to younger women and those with lower parity. These findings reinforce the existing literature, supporting the prioritization of screening for women aged ≥35 years and women who have given birth more than once, with confirmation in analyses adjusted for HPV and sexual behavior, and emphasizing the importance of reproductive demographic factors in cervical cancer prevention. The results of this study have important implications for healthcare practice, particularly in increasing early detection efforts through VIA and Pap smear screening in high-risk women, as well as strengthening family planning programs to reduce high parity rates. In addition, this study also emphasizes the need for ongoing public education, especially for women of reproductive age, regarding cervical cancer risk factors.

For Healthcare Facilities: Primary health centers and hospitals are expected to be more proactive in promoting early detection of cervical cancer, especially for women aged ≥35 years with grandmultiparity, so they can be better prepared and take active steps in maintaining reproductive health.

For Future Researchers: It is recommended that future studies expand the scope of

variables, such as contraceptive history, socioeconomic status, sexual behavior, and smoking habits, and employ a cohort study design to strengthen causal evidence.

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