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Usia, Indeks Massa Tubuh, dan Riwayat Medis sebagai Determinan Infertilitas pada Wanita Usia Subur

Age, BMI, and Medical History as Determinants of Infertility in Women of Reproductive Age

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ABSTRACT/ABSTRAK

Infertility is a complex, multifactorial condition influenced by various biological and lifestyle-related risk factors. This study aimed to examine the association between age, body mass index (BMI), and medical history with infertility among women of reproductive age. A cross-sectional analytical study was conducted among 180 women of reproductive age attending primary and secondary healthcare facilities in Yogyakarta and Central Java. Data were collected through structured interviews, anthropometric assessments, and medical record verification. Variables included age, BMI, relevant reproductive medical history (e.g., PCOS, thyroid disorders, endometriosis), and fertility status. Bivariate analyses and binary logistic regression were employed to identify significant predictors of infertility. The prevalence of infertility was 38.9%, with primary infertility comprising 62.9% of cases. Age ≥35 years (OR = 4.71; 95% CI: 2.10–10.57), abnormal BMI (OR = 3.97; 95% CI: 1.81–8.71), and reproductive-related illnesses (OR = 4.23; 95% CI: 1.97–9.08) were independently and significantly associated with infertility (p < 0.001 for all). These factors impair fertility through mechanisms involving hormonal dysregulation, metabolic imbalance, and chronic inflammation. Advanced maternal age, BMI deviations, and reproductive comorbidities are critical determinants of infertility among women of reproductive age. This study underscores the urgency of individualized fertility care within reproductive health strategies. Longitudinal and biomarker-based studies are recommended to further elucidate causal pathways and incorporate male infertility parameters.

Keywords: *infertility, reproductive age, BMI, age, polycystic ovary syndrome, risk factors, primary care*

Infertilitas merupakan kondisi yang kompleks dan multifaktorial, dipengaruhi oleh berbagai faktor risiko biologis dan gaya hidup. Penelitian ini bertujuan untuk menganalisis hubungan antara usia, indeks massa tubuh (IMT), dan riwayat medis dengan kejadian infertilitas pada wanita usia subur. Penelitian analitik dengan desain potong lintang ini dilakukan pada 180 wanita usia subur yang berkunjung ke fasilitas pelayanan kesehatan primer dan sekunder di Yogyakarta dan Jawa Tengah. Data dikumpulkan melalui wawancara terstruktur, pengukuran antropometri, dan verifikasi rekam medis. Variabel yang diteliti meliputi usia, IMT, riwayat medis reproduksi yang relevan (seperti PCOS, gangguan tiroid, endometriosis), serta status fertilitas. Analisis bivariat dan regresi logistik biner digunakan untuk mengidentifikasi prediktor signifikan infertilitas. Prevalensi infertilitas ditemukan sebesar 38,9%, dengan infertilitas primer mencapai 62,9% dari seluruh kasus. Usia ≥35 tahun (OR = 4,71; 95% CI: 2,10–10,57), IMT tidak normal (OR = 3,97; 95% CI: 1,81–8,71), dan penyakit reproduksi terkait (OR = 4,23; 95% CI: 1,97–9,08) berhubungan secara independen dan signifikan dengan infertilitas (p < 0,001 untuk semua). Faktor-faktor tersebut memengaruhi kesuburan melalui mekanisme disfungsi hormonal, ketidakseimbangan metabolik, dan peradangan kronis. Usia maternal lanjut, penyimpangan IMT, serta komorbiditas reproduksi merupakan determinan penting infertilitas pada wanita usia subur. Penelitian ini menegaskan urgensi perawatan fertilitas yang bersifat individual dalam strategi Kesehatan reproduksi. Penelitian longitudinal dan berbasis biomarker direkomendasikan untuk memperjelas jalur kausal serta mempertimbangkan parameter infertilitas pada pria.

Kata kunci: infertilitas, usia reproduksi, BMI, usia, sindrom ovarium polikistik, faktor risiko, perawatan primer

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INTRODUCTION

Infertility is a pressing global health concern, affecting approximately 15% of women of reproductive age worldwide and contributing to significant psychological, social, and economic burdens, particularly in developing countries where childbearing is closely tied to social identity and marital stability (Vander Borght and Wyns, 2018). In Indonesia, the prevalence of infertility among women of reproductive age is estimated to be between 10% and 12%, reflecting a growing trend associated with shifting sociodemographic patterns, including delayed childbearing, rising rates of non-communicable diseases, and increasing prevalence of overweight and obesity (Guyansyah et al., 2021; Wahyuni et al., 2022). Despite the multifactorial etiology of infertility, emerging evidence emphasizes the critical roles of modifiable and non-modifiable risk factors specifically, age, body mass index (BMI), and pre-existing health conditions in determining reproductive outcomes (Rafael et al., 2023; Tang et al., 2023).

Age remains one of the most influential and irreversible factors in female fertility, with a marked decline in fecundity observed after the age of 35 due to diminished ovarian reserve and reduced oocyte quality (Moosazadeh et al., 2025; Obasi et al., 2022). Underweight and overweight has been linked to ovulatory dysfunction, hormonal imbalance, and reduced implantation rates, underscoring the importance of optimal nutritional and metabolic status in reproductive health (Marinelli et al., 2022; Tang et al., 2023). Chronic diseases such as polycystic ovary syndrome (PCOS), diabetes mellitus, thyroid disorders, and pelvic inflammatory disease have been consistently associated with subfertility through complex endocrine and inflammatory pathways (Pirotta et al., 2020; Salmanov et al., 2022; Zhang et al., 2021). In Indonesia and many other low- and middle-income countries, there remains a paucity of population-based studies that holistically examine the interplay between these factors within the context of women of reproductive age(Guyansyah et al., 2021; Legese et al., 2023).

This study distinguishes itself through its comprehensive evaluation of the combined effects of age, BMI, and medical history on infertility incidence among women of reproductive age, an area that remains insufficiently examined in the existing literature, particularly within Southeast Asian populations possessing distinct cultural, nutritional, and epidemiological characteristics. Previous studies that have mainly considered these risk factors separately, this study aims to model their interactive effects, providing a more comprehensive approach to infertility risk stratification (Guyansyah et al., 2021; Vander Borght and Wyns, 2018; Wen and Li, 2023). The findings are anticipated to inform the development of targeted screening protocols, preventive measures, and public health initiatives designed to reduce infertility risk among vulnerable groups (Wang and Zhou, 2025).

The primary objective of this study is to analyze the roles of age, BMI, and disease history in the occurrence of infertility among women of reproductive age, with a specific focus on their individual and combined predictive capacities. The study seeks to contribute to a more nuanced and context-specific framework for infertility prevention and management, ultimately improving reproductive health outcomes and reducing the burden of involuntary childlessness in the population.

MATERIAL AND METHOD

Study Design

This study employed an analytical observational design with a cross-sectional approach to evaluate the association between age, body mass index (BMI), and medical history with the incidence of infertility among couples of reproductive ages. The cross-sectional design was chosen for its ability to simultaneously assess the relationships between independent and dependent variables at a single point in time, making it efficient in terms of both time and resources particularly relevant for population-based reproductive health studies.

Population and Sample

The study population consisted of all reproductive-age couples (RACs) who sought care at selected primary and secondary healthcare facilities in the Yogyakarta and Central Java regions during the data collection period. The sample was recruited using purposive sampling, ensuring that participants met the inclusion criteria relevant to the study objectives. The minimum sample size was calculated using the single population proportion formula as described by Lemeshow et al. (1990) with a 95% confidence level, a 5% margin of error, and an estimated infertility prevalence of 12%. Based on these parameters, the minimum required sample was 150 couples. To enhance statistical power, the final sample size was increased to 180 couples. Inclusion criteria comprised reproductive-age couples who had been married for at least one year, engaged in regular unprotected sexual intercourse, and consented to participate by signing an informed consent form. Exclusion criteria included couples with a history of sterilization procedures, reproductive impairment due to trauma or major surgery, or those unable to provide complete data or with significant communication difficulties.

Research Procedure

The study was initiated following ethical approval from the Institutional Review Board (IRB) and official permission from the participating healthcare institutions. Data collection was conducted at selected primary and secondary healthcare facilities in Yogyakarta and Central Java from March to August 2024. Upon approval, site-level orientation was conducted for healthcare personnel, followed by the phased recruitment of participants. Participant eligibility was assessed through preliminary interviews and, where available, review of medical records. Eligible participants received detailed explanations regarding the study's aims, benefits, risks, and their rights, followed by voluntary signing of the informed consent form. Data collection was conducted via structured interviews using a validated and reliable questionnaire, along with anthropometric measurements. Interviews were administered by the principal investigator or trained enumerators to ensure consistency and accuracy. Collected data included demographic characteristics (age), BMI, medical history, and fertility status. Age was recorded based on official documentation and expressed in years. BMI was calculated from calibrated digital scales and stadiometers using the formula: body weight (kg) divided by height squared (m^2).

Medical history was explored using both closed- and open-ended questions targeting prior diagnoses of conditions known to affect fertility, including polycystic ovary syndrome (PCOS), type 1 and 2 diabetes mellitus, thyroid disorders (e.g., hypothyroidism or hyperthyroidism), endometriosis, reproductive tract infections, sexually transmitted diseases (e.g., chlamydia, gonorrhea), and past reproductive surgeries such as myomectomy,

laparoscopy, or vasectomy. When available, responses were corroborated with medical records or diagnostic test results; in the absence of such documents, responses were verified through cross-checking and clarification to ensure internal consistency. Fertility status was determined based on the clinical definition of infertility failure to achieve pregnancy after at least 12 months of regular, unprotected intercourse. Assessment was made through questions regarding duration of marriage, frequency of sexual intercourse, contraceptive history, pregnancy history, and any prior diagnosis of infertility by healthcare professionals. Based on this information, infertility was classified as either primary (never achieved pregnancy) or secondary (previous pregnancy followed by inability to conceive again after a defined period). All data were reviewed and verified daily by the field coordinator to ensure completeness, consistency, and accuracy prior to statistical processing.

Research Instruments

The main instrument used in this study was a structured questionnaire developed based on literature review and WHO guidelines on infertility risk factors. Content validity was reviewed by a panel of experts, and reliability testing was conducted on 30 participants, yielding Cronbach's alpha coefficients >0.7 across all scale items. Anthropometric data were collected using standardized digital weighing scales and stadiometers, while medical history was verified through medical records or cross-validated self-reports.

Data Analysis

Data were analyzed using the latest version of SPSS. Univariate analysis was performed to describe respondent characteristics. Bivariate analyses using chi-square tests and independent t-tests were conducted to examine the associations between independent variables (age, BMI, medical history) and infertility status. Multivariate analysis using binary logistic regression was then performed to identify the most significant determinants of infertility, with a p-value < 0.05 considered statistically significant. Potential interaction effects between variables were also explored to assess possible synergistic impacts on infertility risk.

RESULT

This study involved 180 women of reproductive age who met the inclusion and exclusion criteria. Based on the collected data, the overall prevalence of infertility among respondents was 38.9% (n = 70), with 62.9% classified as primary infertility and 37.1% as secondary infertility. Descriptive analysis was first conducted to illustrate the frequency distribution of respondent characteristics, followed by bivariate analysis using chi-square tests and independent t-tests to examine the relationship between the independent variables (age, BMI, and medical history) and infertility status.

The frequency distribution of respondent characteristics provides a comprehensive overview of the demographic and clinical profile of the study population. A total of 180 women of reproductive age participated in the study. In terms of age, a slight majority of participants (58.3%) were under 35 years old, while 41.7% were aged 35 years or older. This age stratification is critical, as advancing maternal age is widely associated with declining fertility due to physiological reductions in ovarian reserve and oocyte quality. Regarding body mass index (BMI), only 40.0% of respondents had a normal BMI (18.5–24.9 kg/m^2). A substantial proportion exhibited deviations from the normal range: 20.0% were underweight (<18.5

kg/m^2), 26.7% were overweight (25.0–29.9 kg/m^2), and 13.3% were classified as obese (≥30 kg/m^2). These findings suggest that 60.0% of participants were at nutritional or metabolic extremes, which could influence reproductive function. Undernutrition and overnutrition have been shown to adversely affect hormonal balance, ovulatory cycles, and gamete quality, underscoring the need to address BMI optimization in reproductive health interventions (Okonofua et al., 2022; Pirotta et al., 2020).

Table 1. Frequency Distribution of Respondent Characteristics

Characteristic	Category	n	%
Age	< 35 years	105	58.3
	≥ 35 years	75	41.7
BMI	Normal (18.5–24.9 kg/m^2)	72	40.0
	Underweight (<18.5 kg/m^2)	36	20.0
	Overweight (25–29.9 kg/m^2)	48	26.7
	Obese (≥30 kg/m^2)	24	13.3
Medical History	None	92	51.1
	Present (≥1 relevant condition)	88	48.9
Infertility Status	Fertile	110	61.1
	Infertile	70	38.9

Source: Primary Data, 2025

With respect to medical history, 48.9% of participants reported having at least one reproductive-related medical condition, such as PCOS, thyroid disorders, diabetes, endometriosis, or prior reproductive tract infections. The near equal split between those with and without such medical histories emphasizes the prevalence of chronic reproductive health issues in this population and highlights the need for integrated care approaches (Aghaei et al., 2023; Lee et al., 2024). In terms of fertility status, 38.9% of participants met the clinical criteria for infertility, while 61.1% were classified as fertile. This relatively high prevalence of infertility within the sample underscores the relevance and urgency of investigating contributing factors. The balance of fertility status, BMI categories, and presence of reproductive-related diseases provides a rich foundation for analyzing the multifactorial determinants of infertility(Ji et al., 2023; Wen and Li, 2023). The respondent profile illustrates the presence of diverse risk factors related to age, nutritional status, and medical history within this population. This heterogeneity enables robust bivariate and multivariate analyses and enhances the generalizability of findings to wider reproductive health contexts, particularly in settings with similar demographic and epidemiological characteristics (Soria-Contreras et al., 2022; Zhu et al., 2022).

Out of the 180 respondents, 88 individuals (48.9%) reported having a medical history known to impact fertility. Among the reported conditions, polycystic ovary syndrome (PCOS) was the most prevalent, accounting for 31.8% of cases. This finding aligns with existing literature indicating the high prevalence of PCOS among reproductive-age women with ovulatory dysfunction. Thyroid disorders (20.5%) and endometriosis (13.6%) were also notable, given that both conditions are known to disrupt hormonal regulation and impair the implantation process.

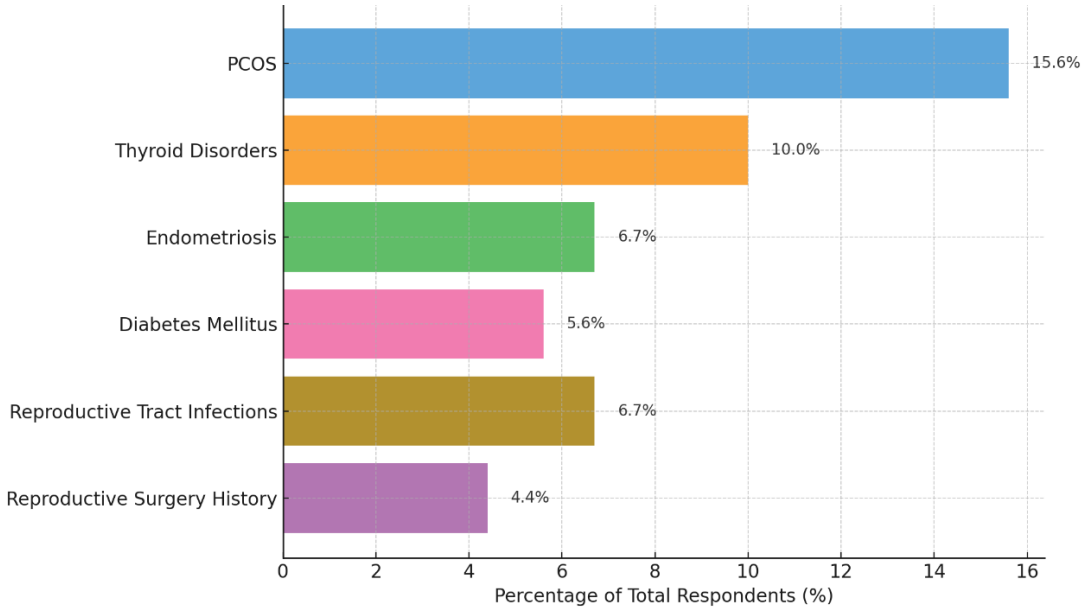

Figure 1. Distribution of Reproductive Related Medical History

Reproductive tract infections, including poorly managed sexually transmitted infections, contributed to 13.6% of cases and were identified as a major factor in tubal infertility. History of reproductive surgeries such as laparoscopy and myomectomy was reported by 9.1% of respondents. These procedures may influence fertility by altering the anatomical integrity of the reproductive organs. These findings underscore the need for comprehensive screening for underlying medical conditions that may contribute to infertility, particularly among women aged ≥35 years and/or those with abnormal BMI. Early identification and management of such conditions could significantly reduce the burden of infertility in the reproductive-age population (Behboudi-Gandevani et al., 2021; Negdel et al., 2021).

Table 2. Association of Age, BMI, and Medical History with Infertility

Variable	Infertile (n = 70)	Fertile (n = 110)	*p-Value*
Age ≥ 35 years	45 (64.3%)	30 (27.3%)	<0.001 *
Abnormal BMI	52 (74.3%)	36 (32.7%)	<0.001 *
Medical history (+)	50 (71.4%)	38 (34.5%)	<0.001 *

**Chi-square test; significance at p < 0.05*

Source: Primary Data (Processed), 2025

The bivariate analysis revealed significant associations between age, BMI, and medical history with infertility among women of reproductive age. Most respondents with infertility were aged ≥35 years (64.3%), significantly higher than the proportion in the fertile group (27.3%) ($p < 0.001$). This finding aligns with well-established physiological aging theories, indicating that decreased ovarian reserve and oocyte quality with increasing age contribute to reduced fertility. Furthermore, an abnormal BMI whether underweight, overweight, or obese was observed in 74.3% of infertile respondents, in contrast to only 32.7% among fertile individuals ($p < 0.001$). Both extremes of weight are known to disrupt ovulatory function and hormonal balance, which in turn impairs fertility potential. This result underscores the importance of optimal nutritional status in maintaining reproductive health (Erdoğan et al., 2023; Martín-Manchado et al., 2024).

Medical history also demonstrated a strong association with infertility. Among infertile participants, 71.4% had at least one clinically recognized reproductive-related medical condition, such as polycystic ovary syndrome (PCOS), diabetes, thyroid disorders, endometriosis, or reproductive tract infections (Pirotta et al., 2020). A total of 34.5% of fertile individuals reported similar histories ($p < 0.001$), indicating that chronic health conditions involving the endocrine or reproductive systems represent significant risk factors for infertility. These results indicate that being ≥35 years old, having an abnormal BMI, and having a relevant medical history are all statistically significant contributors to infertility (Aghaei et al., 2023). These findings emphasize the need for a comprehensive and preventive approach to reproductive health services, including early screening of risk factors and lifestyle-based interventions to reduce the burden of infertility among women of reproductive age (Carson and Kallen, 2021; Deepak Kumar et al., 2023).

Table 3. Logistic Regression Results for Predictors of Infertility

Variable	B	SE	OR (95% CI)	p-value
Age ≥ 35 years	1.55	0.41	4.71 (2.10–10.57)	<0.001 *
Abnormal BMI	1.38	0.40	3.97 (1.81–8.71)	<0.001 *
Reproductive-related illness	1.44	0.38	4.23 (1.97–9.08)	<0.001 *

**Significance at p < 0.05; OR = Odds Ratio; CI = Confidence Interval; SE = Standard Error*
Source: Primary Data (Processed), 2025

The logistic regression model demonstrated that all three independent variables significantly increased the odds of infertility. Participants aged ≥35 years were 4.71 times more likely to experience infertility than those under 35 years (OR = 4.71; 95% CI: 2.10–10.57; $p < 0.001$), controlling for BMI and medical history. This finding reinforces the biological role of reproductive aging and its impact on oocyte viability and implantation capacity. Abnormal BMI, whether underweight, overweight or obese, was also a significant predictor (OR = 3.97; 95% CI: 1.81–8.71; $p < 0.001$). This highlights the importance of metabolic and endocrine regulation in ovulatory function and overall reproductive capacity.

Participants with a history of reproductive related illness were 4.23 times more likely to be infertile than those with no such history (OR = 4.23; 95% CI: 1.97–9.08; $p < 0.001$). These conditions, including PCOS, thyroid disorders, diabetes, and endometriosis, are known to disrupt hormonal homeostasis, ovulation, and reproductive tract integrity, thus increasing the risk of infertility. The logistic model was statistically significant and demonstrated good model fit. The three predictors age, BMI, and medical history can be considered robust independent risk factors for infertility in this population and serve as essential targets for early screening and intervention strategies in reproductive health programs (Jung et al., 2021; Soria-Contreras et al., 2022).

DISCUSSION

This study confirms that age ≥35 years, abnormal body mass index (BMI), and a history of reproductive-related medical conditions are key determinants of infertility among women of reproductive age. Physiologically, these three factors not only contribute independently but also exhibit interrelated mechanisms that synergistically impair reproductive function through neuroendocrine, metabolic, and immunoinflammatory pathways. A comprehensive

understanding of the pathophysiological mechanisms underlying each factor is essential for elucidating the development of infertility and for guiding more targeted diagnostic and therapeutic strategies (M Ban, 2025; M Moosazadeh, 2025).

Age is widely recognized as the strongest non-modifiable predictor of fertility decline. Ovarian aging begins in the late twenties and accelerates significantly after age 35. The depletion of follicular reserves, coupled with increased resistance to follicle-stimulating hormone (FSH), leads to disruptions in follicular maturation. Histologically, oocytes in older women exhibit DNA damage accumulation, mitochondrial dysfunction, and abnormal spindle formation, all of which contribute to increased aneuploidy and miscarriage risk (Harris et al., 2023; Mahmood et al., 2022). Clinically, women aged 38 years presenting with unexplained primary infertility often exhibit low Anti-Müllerian Hormone (AMH) levels and a suboptimal ovarian response to stimulation, reflecting a reproductive biological age older than their chronological age. Aging also affects endometrial quality, responsiveness to estrogen and progesterone declines, impairing the processes of decidualization and embryo implantation. Age-related immunological changes increase uterine Natural Killer (NK) cell activity and proinflammatory cytokine levels, creating a hostile intrauterine environment for embryo implantation (Marti-Garcia et al., 2024; Pathare et al., 2023).

Abnormal BMI, underweight or overweight, obese, adversely impacts the hypothalamic pituitary gonadal (HPG) axis. In obese individuals, excess adipose tissue increases leptin and resistin production, which interferes with GnRH (gonadotropin-releasing hormone) secretion and disrupts luteinizing hormone (LH) and FSH balance (Durmus et al., 2017; Saadia, 2020). Hyperinsulinemia, commonly observed in obesity, stimulates ovarian androgen production, contributing to hyperandrogenism and chronic anovulation, as seen in polycystic ovary syndrome (PCOS) (Chappell et al., 2022; Ding et al., 2021). Obese women with anovulatory infertility often present with elevated basal insulin and abnormal LH/FSH ratios. Severely low body weight can reduce leptin levels below the threshold required for normal neuroendocrine function. Leptin serves as a positive energy signal to the hypothalamus, and its deficiency can lead to functional hypothalamic hypogonadism, characterized by amenorrhea and suppressed gonadotropin levels. In cases of athletic amenorrhea or eating disorders, low BMI is directly correlated with HPG axis suppression and primary infertility (Shi et al., 2021).

A history of reproductive-related illnesses also plays a crucial role in fertility impairment through both direct and systemic mechanisms. PCOS, is a complex endocrine-metabolic disorder characterized by hyperandrogenism, ovulatory dysfunction, and insulin resistance. Its pathophysiology involves heightened CYP17A1 enzyme activity in the ovaries, disrupting dominant follicle selection and leading to chronic anovulation (Xu et al., 2021). Elevated androgen levels further compromise endometrial receptivity, impairing implantation readiness (Berga, 2021). Thyroid dysfunction, particularly hypothyroidism, alters basal metabolic rate, increases prolactin secretion, and reduces sex hormone-binding globulin (SHBG) levels (Medenica et al., 2022). Elevated prolactin, secondary to primary hypothyroidism, inhibits GnRH secretion and disrupts ovulation. Studies have shown that TSH levels above 4.5 mIU/L are associated with reduced fertility and delayed conception (Mahboobifard et al., 2022; Wall et al., 2023). Endometriosis, a chronic inflammatory disease, is marked by ectopic endometrial tissue growth. These lesions release prostaglandins and proinflammatory cytokines, creating a pelvic microenvironment that is toxic to both oocytes

and spermatozoa. Resultant adhesions impair gamete transport and fertilization. In moderate to severe cases, structural damage to the fallopian tubes and ovaries significantly increases the risk of secondary infertility (Armanini et al., 2022; Ojo et al., 2023). Sexually transmitted infections such as chlamydia and gonorrhea may lead to pelvic inflammatory disease (PID), resulting in tubal obstruction (Bai et al., 2022; Khalafalla et al., 2023). Pathologically, these infections induce fibrosis and occlusion of the fallopian tubes, one of the leading causes of tubal-factor infertility. Laparoscopic studies on women with secondary infertility and a history of PID have revealed tuboperitoneal damage in more than 70% of cases (Kristensen et al., 2025; Wei et al., 2025).

The clinical and practical implications of these findings are significant. Early identification of reproductive age, nutritional status, and medical history related to reproductive function is essential in infertility management. This study supports the integration of risk-based fertility services, particularly at the primary care level. Women aged >35 years with abnormal BMI and/or reproductive-related illnesses should be managed more proactively, including hormonal profiling, pelvic imaging, and early referral to tertiary fertility services rather than waiting a full year of unsuccessful conception. Transdisciplinary approach involving physicians, nutritionists, and endocrinologists is required to optimize metabolic and hormonal conditions in affected individuals.

The interplay between age, body mass index, and reproductive medical conditions represents a complex but interdependent network influencing female fertility. Advanced maternal age exacerbates physiological decline, abnormal BMI alters hormonal and metabolic balance, and reproductive disorders further disrupt ovulatory and implantation processes. These factors form a synergistic triad that determines infertility risk among women of reproductive age, underscoring the need for integrated and individualized reproductive health interventions.

CONCLUSION AND RECOMMENDATION

This study demonstrates that age ≥35 years, abnormal body mass index (BMI), and a history of reproductive-related medical conditions are significant independent predictors of infertility among women of reproductive age. These findings reinforce the understanding that infertility is a multifactorial and interrelated condition, involving disruptions in neuroendocrine, metabolic, and immunological pathways. Women of advanced reproductive age, those with BMI outside the normal range (both underweight and obese), and those with a history of conditions such as polycystic ovary syndrome (PCOS), thyroid disorders, endometriosis, or reproductive tract infections are at considerably higher risk of infertility. Early screening and more integrated risk-based interventions are essential, particularly within primary healthcare settings. This study has several limitations. Its cross-sectional design limits the ability to draw causal inferences. Medical history data were self-reported, which may introduce recall bias. Male partner factors, which also significantly contribute to infertility, were not assessed in this study.

Future research is recommended to employ longitudinal designs, incorporate biomarker validation, and include male infertility parameters to achieve a more comprehensive understanding. Fertility care programs should adopt individualized risk assessment strategies

based on age, BMI, and medical history to support more targeted clinical decision-making, especially in resource limited settings.

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