

Incidence of Cervicitis in Infertile Women : A Study in Medical Center Clinic, Makassar City, Indonesia

Kejadian Servisititis pada Wanita Infertil: Studi di Klinik Medical Center, Kota Makassar, Indonesia

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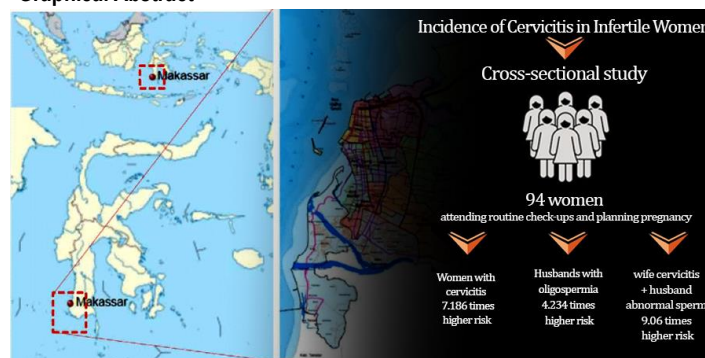
Abstract

Infertility is a significant global health concern, yet the role of cervicitis as an independent risk factor remains inadequately explored. While previous studies have investigated various causes of infertility, limited research has specifically examined the combined effect of cervicitis and sperm abnormalities on reproductive outcomes. This study aims to determine the impact of cervicitis on infertility and assess its association with sperm abnormalities among married couples seeking conception. A cross-sectional study was conducted at the Wirahusada Medical Center Clinic, Makassar, Indonesia, involving 94 married couples undergoing routine fertility assessments. Cervicitis was diagnosed through endoscopic examination, while sperm abnormalities—including oligospermia, poor motility, and abnormal morphology—were identified via semen analysis following WHO 2021 standards. The odds ratio (OR) and Chi-Square test were used to analyze the relationship between cervicitis, sperm abnormalities, and infertility. Women with cervicitis had a lower pregnancy rate (25% vs. 75%), with an infertility risk 7.186 times higher (OR = 7.186). Men with sperm abnormalities also had a higher infertility risk (OR = 4.234). The highest risk (OR = 9.060) was in couples where both partners had these conditions. This study highlights the significant impact of cervicitis on female infertility, particularly when accompanied by sperm abnormalities. These findings underscore the need for integrated reproductive health strategies, including early screening and targeted interventions, to enhance pregnancy success rates among couples facing infertility.

Abstrak

Infertilitas merupakan masalah kesehatan global yang signifikan, namun peran servisititis sebagai faktor risiko independen masih belum dieksplorasi secara memadai. Meskipun penelitian sebelumnya telah menyelidiki berbagai penyebab infertilitas, penelitian terbatas telah secara khusus meneliti efek gabungan servisititis dan kelainan sperma pada hasil reproduksi. Penelitian ini bertujuan untuk menentukan dampak servisititis terhadap infertilitas dan menilai hubungannya dengan kelainan sperma di antara pasangan suami istri yang sedang mencari pembuahan. Sebuah studi potong lintang dilakukan di Klinik Wirahusada Medical Center, Makassar, Indonesia, yang melibatkan 94 pasangan suami istri yang menjalani pemeriksaan kesuburan rutin. Servisititis didiagnosis melalui pemeriksaan endoskopi, sementara kelainan sperma - termasuk oligospermia, motilitas yang buruk, dan morfologi yang tidak normal - diidentifikasi melalui analisis air mani yang mengikuti standar WHO 2021. Rasio odds (OR) dan uji Chi-Square digunakan untuk menganalisis hubungan antara servisititis, kelainan sperma, dan infertilitas. Wanita dengan servisititis memiliki tingkat kehamilan yang lebih rendah (25% vs 75%), dengan risiko infertilitas 7,186 kali lebih tinggi (OR = 7,186). Pria dengan kelainan sperma juga memiliki risiko infertilitas yang lebih tinggi (OR = 4,234). Risiko tertinggi (OR = 9,060) terdapat pada pasangan yang kedua pasangannya memiliki kondisi ini. Penelitian ini menyoroti dampak signifikan servisititis terhadap infertilitas wanita, terutama bila disertai dengan kelainan sperma. Temuan ini menggarisbawahi perlunya strategi kesehatan reproduksi terpadu, termasuk skrining dini dan intervensi yang ditargetkan, untuk meningkatkan tingkat keberhasilan kehamilan di antara pasangan yang mengalami infertilitas.

Graphical Abstract



Keyword

female; fertility; infertility; reproductive health; uterine cervicitis

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INTRODUCTION

Cervicitis is defined as the inflammation of the cervix, which can be caused by various infectious and non-infectious agents. This condition is often characterized by a range of clinical features, including symptoms, causes, and diagnostic indicators. The primary characteristic of cervicitis is inflammation of the cervical tissue, which can be identified through clinical examination. The cervix may appear red, swollen, and may exhibit purulent discharge. In some cases, the inflammation can lead to the formation of cervical erosions or ulcers, which can complicate the clinical picture (Devi, 2024). The etiology of cervicitis is multifactorial. The most common infectious causes include sexually transmitted infections (STIs) such as *Chlamydia trachomatis* and *Neisseria gonorrhoeae*, as well as viral infections like human papillomavirus (HPV) (Chen et al., 2021; Hussain et al., 2022). Non-infectious causes can include chemical irritants, such as those found in contraceptive gels, or physical trauma to the cervix (Devi, 2024). The presence of HPV is particularly significant, as it is a major risk factor for the development of cervical cancer and can lead to chronic cervicitis (Chen et al., 2021; Hussain et al., 2022).

Patients with cervicitis may present with a variety of symptoms. Common complaints include abnormal vaginal discharge, which may be yellow or greenish, pelvic pain, and intermenstrual bleeding (Devi, 2024; Chen et al., 2021). In some cases, cervicitis may be asymptomatic, making regular screening and examination crucial for early detection (Devi, 2024). Diagnosis typically involves a combination of patient history, physical examination, and laboratory testing. A Pap smear may reveal abnormal cervical cells, while cultures or nucleic acid amplification tests can identify specific pathogens responsible for the infection (Chen et al., 2021; Hussain et al., 2022). In cases where cervicitis is suspected, a thorough evaluation for STIs is essential, particularly in sexually active individuals (Chen et al., 2021; Hussain et al., 2022).

Cervicitis, characterized by inflammation of the cervix, has significant implications for reproductive health and infertility. Its prevalence and associated conditions can lead to various reproductive health issues, including infertility, chronic pelvic pain, and increased risk of sexually transmitted infections (STIs). Cervicitis is a common condition among women of reproductive age, particularly those who are sexually active. Studies indicate that the prevalence of cervicitis can be linked to various infectious agents, with *Chlamydia trachomatis* being a notable contributor. For instance, a study in Kashmir reported a prevalence of *Chlamydia trachomatis* infection at 43% among women with mucopurulent cervicitis, highlighting the significant burden of this infection in the population (Hassan et al., 2022). Additionally, the association of cervicitis with human papillomavirus (HPV) infections, particularly high-risk strains like HPV 16 and 18, is well-documented, as these infections are prevalent in women attending cervical cancer screening programs (Sherpa et al., 2019; Zang, 2024).

The implications of cervicitis for reproductive health are profound. Chronic cervicitis can lead to pelvic inflammatory disease (PID), which is a significant risk factor for infertility. PID can cause scarring of the fallopian tubes, leading to ectopic

pregnancies or infertility due to blocked tubes (Hassan et al., 2022). Furthermore, cervicitis can exacerbate the risk of STIs, as the inflammation may disrupt the epithelial barrier of the cervix, making it easier for pathogens to ascend into the upper reproductive tract (Zuend et al., 2023). Moreover, the presence of cervicitis can complicate the management of reproductive health issues. For example, women with cervicitis may experience increased pain during intercourse, which can affect sexual health and relationships (Zuend et al., 2023). The inflammation can also lead to abnormal cervical cytology, complicating screening and early detection of cervical cancer, which is a significant concern given that cervical cancer is one of the leading causes of cancer-related morbidity and mortality among women globally (Zang, 2024).

Infertility is a critical concern associated with cervicitis. The inflammatory process can alter the cervical mucus, affecting sperm transport and viability, which is essential for conception (Hassan et al., 2022). Furthermore, the chronic nature of cervicitis can lead to persistent inflammation, which may affect the overall reproductive environment, making it less conducive to successful implantation and pregnancy (Zuend et al., 2023).

Cervicitis can significantly impact fertility by causing alterations in the cervical mucus, which plays a crucial role in sperm transport. Inflammatory changes associated with cervicitis can lead to the production of abnormal cervical mucus, which may hinder sperm motility and viability, thereby reducing the chances of conception (Nevezhkina, 2023). Moreover, chronic cervicitis can result in scarring or damage to the cervical tissue, further complicating the reproductive process (Nevezhkina, 2023). Research indicates that women with cervicitis, particularly those with a history of sexually transmitted infections (STIs) such as *Chlamydia trachomatis*, are at a higher risk for developing PID. PID can lead to tubal factor infertility due to scarring or blockage of the fallopian tubes, which is a common cause of infertility in women (Hassan et al., 2022). A study highlighted that approximately 32.5% of women with mucopurulent cervicitis tested positive for *Chlamydia*, underscoring the link between cervicitis and infertility (Hassan et al., 2022).

Chronic cervicitis is often asymptomatic, which poses a challenge for early detection and treatment (Bazzazan, 2024). The lack of symptoms can lead to delays in seeking medical care, allowing the condition to progress and potentially result in more severe reproductive health issues, including infertility (Bazzazan, 2024). Furthermore, the inflammatory environment created by cervicitis can increase susceptibility to other infections, compounding the risk of reproductive health complications (Bazzazan, 2024). The relationship between cervicitis and the risk of developing precancerous lesions or cervical cancer is also significant. Persistent inflammation can lead to dysplastic changes in cervical cells, which may necessitate more invasive treatments that could further impact fertility (Nevezhkina, 2023). For instance, women undergoing treatments for high-grade cervical lesions may face challenges related to cervical competency during pregnancy, increasing the risk of preterm birth or miscarriage (D'Amato, 2024).

Table 1
Association Between Cervicitis, Sperm Quality, and Infertility Risk

Variables	Pregnant	No Pregnant	P Value	OR
Cervical Condition				
Servicitis	6 (25%)	27 (58.7%)	0.007	7.186
Without Servicitis	18 (75%)	19 (41.3%)		
Sperm Quality				
Abnormal Sperm	6(25%)	20 (51.3%)	0.04	4.234
Normal Sperm	18(75%)	19 (48.7%)		
Combination Condition				
Cervicitis & Sperm Disorders	11 (37.9%)	46 (70.8%)	0.03	9.060
Normal	18 (62.1)	19 (29.2%)		

Despite the extensive research on infertility and its multifactorial causes, the specific role of cervicitis as an independent risk factor remains inadequately explored. Most studies have focused on sexually transmitted infections, pelvic inflammatory disease, and hormonal imbalances, but few have examined the direct impact of cervicitis on fertility outcomes, particularly in the context of male factor infertility. Additionally, limited research has investigated the combined effect of cervicitis and sperm abnormalities on reproductive success, despite evidence suggesting that cervical inflammation can alter the reproductive environment. This study aims to fill this gap by assessing the association between cervicitis and infertility while considering the compounding influence of sperm abnormalities in married couples seeking conception in Makassar, Indonesia.

METHODS

This study employed a cross-sectional design conducted at the Wirahusada Medical Center Fertility Clinic from January 2024 to November 2024. The study aimed to determine the impact of cervicitis on infertility and its association with sperm abnormalities. The target population consisted of married couples who visited the clinic for routine check-ups and planned to have children. A total of 94 married couples were included as the study sample. The sample size was determined using purposive sampling, selecting participants who met the inclusion criteria to ensure they were representative of the population under study. All participants provided written informed consent after being informed about the study's objectives, potential benefits, and risks

The inclusion criteria for the study included women who underwent at least two routine examinations, with gynecological ultrasonography results of the uterus and ovaries within normal limits. Their husbands also participated in the study through semen analysis. Exclusion criteria comprised couples where uterine abnormalities or tumours were detected or where systemic diseases such as diabetes mellitus or HIV were present. Infertility was defined as couples who had engaged in regular, unprotected sexual intercourse for one year or more without achieving pregnancy despite undergoing at least two periodic check-ups.

Cervicitis was defined as inflammation of the cervix identified through endoscopic examination, often caused by infection, and was noted for its potential impact on fertility. Abnormal sperm referred to conditions such as low sperm count (oligospermia), poor sperm motility, or abnormal sperm morphology, as determined by semen analysis conducted following WHO 2021 standards. Data were collected through structured interviews, clinical examinations, and laboratory analyses. Gynecological ultrasonography was performed by an obstetrics and gynecology specialist to ensure accuracy, while semen analysis was conducted by an andrology specialist. Demographic, reproductive, and health data were also recorded for all participants.

Statistical analysis was conducted using appropriate software to evaluate the relationships between cervicitis, sperm abnormalities, and female fertility. Chi-Square tests were used to assess associations between variables, and odds ratios (ORs) were calculated to estimate the risk of infertility. A p-value of <0.05 was considered statistically significant. Data confidentiality was maintained in adherence to ethical research guidelines. This study has received ethical approval from the Faculty of Medical and Health Science, Universitas Islam Negeri Alauddin Makassar, with number E.084/KEPK/FKIK/XI/2024.

RESULTS

The study involved 94 married couples as participants. Among them, 33 women were diagnosed with cervicitis. Additionally, 26 husbands had abnormal sperm, while 37 had normal sperm quality. In total, 9 couples had both cervicitis in the wife and abnormal sperm in the husband, 47 couples had either cervicitis or abnormal sperm, and 38 couples had no reproductive health abnormalities.

Table 1 presents the relationship between cervicitis, sperm quality, and infertility risk among married couples undergoing fertility assessments. The results indicate that women with cervicitis had a significantly lower pregnancy rate (25%) compared to those without cervicitis (75%). The infertility risk in women with cervicitis was 7.186 times higher than in those without cervicitis (p = 0.007). Similarly, sperm quality was found to have a significant association with infertility. Among husbands with abnormal sperm, the pregnancy rate was 25%,

Table 2
Comparison of Fertility Status Among Different Reproductive Health Conditions

Variables	Cervicitis + Abnormal sperm	Cervicitis/ Abnormal sperm	Normal	p-value
Fertile	4 (44.4%)	6 (12.8%)	19 (50%)	0.001
Infertile	5 (55.6%)	41 (87.2%)	19 (50%)	

whereas those with normal sperm had a 75% pregnancy rate. The odds ratio (OR) for infertility in men with abnormal sperm was 4.234 ($p = 0.04$). The highest risk was observed in couples where both the wife had cervicitis and the husband had abnormal sperm. The infertility risk in this group was 9.060 times higher than in couples without these conditions ($p = 0.03$). This suggests that the combined presence of cervicitis and sperm abnormalities substantially increases the risk of infertility.

Table 2 compares the fertility status among three groups: (1) couples where both the wife had cervicitis and the husband had abnormal sperm, (2) couples where either the wife had cervicitis or the husband had abnormal sperm, and (3) normal couples without reproductive health issues. The results show that fertility rates were lowest in couples where both partners had reproductive health issues. In this group, only 4 out of 9 couples (44.4%) achieved pregnancy, while 5 (55.6%) remained infertile. In the group where only one partner had an issue (either cervicitis or abnormal sperm), the fertility rate was even lower, with only 6 out of 47 couples (12.8%) achieving pregnancy, while 41 (87.2%) remained infertile. Meanwhile, the normal group, consisting of 38 couples, had the highest fertility rate, with 19 (50%) achieving pregnancy and 19 (50%) remaining infertile. The p -value (0.001) indicates a statistically significant difference among the groups, highlighting the critical role of both cervicitis and sperm abnormalities in infertility. These findings emphasize the importance of integrated reproductive health interventions, including early screening and targeted treatments, to improve fertility outcomes in affected couples.

DISCUSSION

The study was found that subjects with cervicitis who became pregnant were lower (6 (25%)) compared to subjects without cervicitis 18 (75%), and also subjects with cervicitis who were not pregnant (infertile) were higher than those without cervicitis. The risk of infertility in subjects with cervicitis was 7.186 times compared to those without cervicitis.

Cervicitis, an inflammation of the cervix, can also have a significant impact on fertility. This condition can disrupt the cervical mucus, making it difficult for sperm to reach and fertilize an egg. Similarly, abnormalities in sperm can inhibit the fertilization process, making it difficult to conceive. Seeking proper diagnosis and treatment for this condition is essential in increasing the chances of successful conception and a healthy pregnancy. Additionally, addressing any underlying infections or issues early can prevent further complications and improve overall reproductive well-being. By being proactive and informed about this condition, individuals can take steps to optimize their fertility and increase their chances of having children. including

bacterial infections, sexually transmitted infections, and hormonal imbalances. Cervicitis can cause inflammation of the cervix, which can affect the quality and quantity of cervical mucus, making it difficult for sperm to reach an egg. This can result in infertility or difficulty conceiving. Additionally, untreated cervicitis can increase the risk of complications during pregnancy, such as premature labor or infection. It is important for people with cervicitis to seek medical care to address the underlying cause and prevent potential negative impacts on their reproductive health (Sharkey et al., 2012).

Cervicitis can have a significant impact on fertility and pregnancy outcomes. Inflammation of the cervix can interfere with the ability of sperm to reach the egg, making it more difficult to conceive. Additionally, untreated cervicitis can increase the risk of complications during pregnancy, such as premature birth or low birth weight. It is important for people with cervicitis to seek treatment promptly and follow their healthcare provider's recommendations to minimize potential impacts on fertility and pregnancy. For example, a woman with untreated cervicitis may have difficulty conceiving because the inflammation prevents sperm from reaching the egg. If she becomes pregnant, this can increase the risk of premature birth or low birth weight for her baby. Seeking treatment and following medical advice can help prevent these complications and improve fertility outcomes (D'Amato, 2024).

In this study, it was found that the husband's subject with abnormal sperm then the wife who became pregnant was lower compared to those who were not pregnant (infertile) conversely the husband's subject with abnormal sperm with a wife who was not pregnant was higher than those without cervicitis. The risk of infertility in mothers with husbands with abnormal sperm was 7.186 times compared to those without cervicitis (Maegawa et al., 2007).

Sperm abnormalities, such as oligospermia, can have a significant impact on fertility and pregnancy outcomes. These abnormalities can include low sperm count, poor sperm motility, or abnormal sperm morphology. If left untreated, these issues can make it difficult for a couple to conceive and increase the risk of complications during pregnancy. Understanding the impact of sperm abnormalities on fertility and pregnancy outcomes is essential to taking appropriate action to address them. For example, a man with a low sperm count may have difficulty impregnating his partner, necessitating assisted reproductive technologies such as in vitro fertilization. Additionally, abnormal sperm morphology can increase the risk of genetic abnormalities in his offspring, highlighting the importance of addressing these issues before attempting to conceive (Cannarella et al., 2020).

In this study, it was found that the subjects of wives with cervicitis and husbands with abnormal sperm who became pregnant were lower than those who were not pregnant (infertile), conversely, the subjects of wives with cervicitis and husbands with abnormal sperm who were not pregnant were higher than those without cervicitis. The risk of infertility in subjects with cervicitis was 9.060 times compared to those without cervicitis. When compared to the three groups, 1. subjects with cervicitis accompanied by abnormal sperm, 2. subjects with one of the cervicitis in the wife or there was abnormal sperm in the husband and 3. normal subjects

Cervicitis can lead to sperm abnormalities and ultimately impact pregnancy outcomes is an important area of study in reproductive health. Cervicitis, an inflammation of the cervix, can disrupt the environment in which sperm must travel to reach and fertilize an egg. This disruption can cause abnormalities in sperm morphology, making fertilization more difficult. Understanding this relationship is important for couples who are having difficulty conceiving, as treating cervicitis can help improve sperm quality and increase the chances of a successful pregnancy (D'Amato, 2024).

Importance of Screening for Cervicitis in Infertile Women

Screening for cervicitis in infertile women is crucial due to its significant association with reproductive health and fertility outcomes. Cervicitis, which is the inflammation of the cervix, can be caused by various infectious agents, including sexually transmitted infections (STIs) such as Chlamydia trachomatis and Mycoplasma genitalium. These infections can lead to more severe complications, including pelvic inflammatory disease (PID), which is a known risk factor for infertility (Xin et al., 2018; Yu et al., 2023; Yousuf et al., 2022; D'Amico, 2023).

Research indicates that cervicitis can disrupt the normal cervical mucus, which plays a vital role in sperm transport and overall fertility. The presence of cervicitis may alter the cervical microbiota, leading to dysbiosis, which can further exacerbate inflammation and impair reproductive function (Graspeuntner et al., 2018; Dong et al., 2023; Moragianni et al., 2019). For instance, studies have shown that bacterial infections of the female reproductive tract, including cervicitis, are linked to infertility in many women, highlighting the importance of early detection and treatment (Xin et al., 2018; Dong et al., 2023; Moragianni et al., 2019).

Moreover, the prevalence of cervicitis among infertile women is notably high, with some studies suggesting that up to 54% of women with STIs exhibit signs of cervicitis (Khandelwal, 2023). This underscores the necessity for routine screening in this population, as untreated cervicitis can lead to chronic conditions that significantly affect fertility. For example, chronic cervicitis can result in cervical stenosis, which may obstruct sperm passage and hinder conception (Kunev, 2019; Arshad et al., 2023).

Diagnostic approaches such as transvaginal ultrasound and hysteroscopy are valuable tools in identifying cervical abnormalities that may contribute to infertility (Thaker, 2023; Khalifa et al., 2018). These methods allow for the assessment of cervical health and the identification of potential infections or

structural issues that could impede fertility. Furthermore, the use of immunohistochemical markers has been explored to enhance the diagnosis of chronic cervicitis and its implications for infertility, providing a more comprehensive understanding of the condition (Iarova, 2024; Gupta & Gupta, 2019).

Need for Addressing Male Factors in Couples' Infertility Assessments

Addressing male factors in couples' infertility assessments is essential due to the significant contribution of male infertility to overall reproductive challenges. Research indicates that male factors are responsible for approximately 30% of infertility cases and contribute to nearly 50% of all infertility diagnoses when combined with female factors (Cannarella et al., 2020; Lee et al., 2021; Pavuluri, 2024). This highlights the necessity of a comprehensive evaluation of both partners during infertility assessments, as neglecting male factors can lead to incomplete diagnoses and ineffective treatment strategies.

A large-scale study revealed that male factors were identified in 23.9% of cases, with abnormalities in semen analysis found in 22.7% of the male partners assessed (Fayyaz et al., 2020). This underscores the importance of conducting thorough semen analyses, as they are critical in identifying issues such as oligospermia, asthenozoospermia, and teratozoospermia, which are prevalent in male infertility (Castleton et al., 2022; Garg et al., 2020). Furthermore, a significant proportion of male infertility cases remain idiopathic, indicating that many underlying causes are still not well understood, necessitating further research and diagnostic efforts (Bisht et al., 2020; Pavuluri, 2024).

In addition to biological factors, lifestyle and environmental influences play a crucial role in male fertility. Factors such as smoking, obesity, and exposure to environmental toxins have been linked to decreased sperm quality and fertility (Musa, 2024; Biggs et al., 2023; Karavolos et al., 2020). Addressing these modifiable risk factors through lifestyle interventions can potentially improve fertility outcomes for men (Pavuluri, 2024; Karavolos et al., 2020).

Moreover, the psychosocial aspects of male infertility should not be overlooked. Men often experience stigma and emotional distress related to infertility, which can affect their mental health and overall well-being (Vries, 2024; Sheikh et al., 2023). This emphasizes the need for healthcare providers to adopt a holistic approach that includes psychological support for both partners during infertility treatment.

How Cervicitis May Contribute to Infertility

Cervicitis, characterized by inflammation of the cervix, can significantly contribute to infertility in women through various mechanisms. Understanding these mechanisms is crucial for addressing reproductive health issues effectively. One of the primary ways cervicitis affects fertility is through its impact on the cervical mucus. The cervical mucus plays a vital role in facilitating sperm transport during ovulation. In cases of cervicitis, the inflammation can alter the composition and viscosity of cervical mucus, making it less conducive to sperm passage (Zuend et al., 2023). This alteration can hinder sperm

motility and survival, thereby reducing the chances of fertilization. Studies have shown that inflammatory cytokines and other mediators associated with cervicitis can disrupt the normal function of the cervical mucus, leading to an unfavorable environment for sperm (Zuend et al., 2023).

Furthermore, cervicitis is often associated with infections, particularly sexually transmitted infections (STIs) such as *Chlamydia trachomatis* and *Neisseria gonorrhoeae*. These infections can lead to pelvic inflammatory disease (PID), which is a significant risk factor for infertility. PID can cause scarring and damage to the reproductive organs, including the fallopian tubes, which can result in ectopic pregnancies or infertility due to blockages. The presence of these infections can also trigger an immune response that may further exacerbate inflammation and damage to the reproductive tract (Zuend et al., 2023).

Additionally, cervicitis can influence the vaginal microbiome, which plays a critical role in maintaining reproductive health. An imbalance in the vaginal microbiota, often seen in cervicitis, can lead to dysbiosis, which has been linked to adverse reproductive outcomes. For instance, a decrease in beneficial *Lactobacillus* species and an increase in pathogenic microorganisms can contribute to inflammation and negatively affect fertility (Zuend et al., 2023). This dysbiosis can also compromise the epithelial barrier of the cervix, making it more susceptible to infections and further inflammation.

Moreover, the psychological and emotional stress associated with chronic cervicitis and its implications for fertility can also play a role in reproductive health. Women experiencing infertility often face significant emotional distress, which can impact their overall health and well-being (Sherpa et al., 2019). This stress may further complicate the physiological aspects of fertility, creating a cycle that exacerbates the challenges faced by women with cervicitis.

This study provides valuable insights into the impact of cervicitis and sperm abnormalities on infertility, offering a comprehensive analysis of their combined effects using a well-defined sample of married couples undergoing fertility assessments. The use of standardized diagnostic methods, such as endoscopic examination for cervicitis and semen analysis based on WHO 2021 criteria, strengthens the study's reliability. Additionally, the application of statistical tests, including the odds ratio and Chi-Square analysis, ensures robust data interpretation. However, the study has certain limitations, including its cross-sectional design, which restricts the ability to establish causality between cervicitis, sperm abnormalities, and infertility. Moreover, the sample size, while adequate, may not fully represent the broader population, and confounding factors such as lifestyle, hormonal imbalances, and other underlying reproductive disorders were not extensively examined. Future studies with larger, more diverse populations and longitudinal designs are needed to confirm these findings and explore additional contributing factors to infertility.

Infertility has been a concern throughout history, including in Islamic teachings. In the Qur'an, infertility is often associated with women, as seen in the stories of Prophet

Zakaria (AS) and Prophet Ibrahim (AS), whose wives were described as barren before being granted children by the will of Allah SWT. However, modern medical understanding recognizes that infertility affects both men and women. This study, which examines the relationship between cervicitis, sperm quality, and infertility, highlights the importance of addressing reproductive health issues comprehensively, integrating both medical and spiritual approaches.

Islam encourages seeking medical treatment while maintaining faith in Allah's divine will. The Qur'an illustrates how Prophet Zakaria (AS) persistently prayed for a child despite his wife's infertility, and his patience was rewarded, as stated in Surah Ali 'Imran (3:40). This teaches that believers should combine spiritual efforts, such as prayer and patience, with practical medical interventions. The study's findings, which reveal a significant link between cervicitis, sperm abnormalities, and infertility, emphasize the importance of early screening and treatment while avoiding societal stigma toward affected couples.

Islam also advocates for the pursuit of knowledge and the use of medical advancements to address health concerns. The Prophet Muhammad (SAW) stated in Hadith by Abu Dawood and Ibn Majah:

"Make use of medical treatment, for Allah has not made a disease without appointing a remedy for it, except for old age."

This aligns with the study's recommendations for comprehensive reproductive health strategies. By integrating faith and medical science, Muslim couples can navigate infertility challenges with perseverance and hope, balancing *ikhtiar* (effort) with *tawakkul* (trust in Allah).

CONCLUSIONS

This study highlights that cervicitis significantly increases the risk of female infertility, particularly when accompanied by sperm abnormalities in the male partner. Women with cervicitis had a 7.186 times higher infertility risk, while men with abnormal sperm had an OR of 4.234. The highest risk (OR = 9.060) was observed in couples where both partners had these conditions. These findings emphasize the importance of early screening, diagnosis, and targeted interventions to improve fertility outcomes. Addressing cervicitis through timely treatment and considering male factor infertility in reproductive health assessments are crucial steps in enhancing pregnancy success rates.

Healthcare professionals should prioritize early detection and management of cervicitis in reproductive-age women through routine gynecological examinations and appropriate treatment to prevent complications that may contribute to infertility. Additionally, comprehensive fertility evaluations should include both partners, ensuring that male factor infertility, particularly sperm abnormalities, is adequately assessed and managed. Pregnant women and those planning to conceive should be educated about the importance of reproductive health, including STI prevention, cervical health maintenance, and lifestyle modifications that support fertility. Public health initiatives should also promote awareness, reduce

stigma, and ensure access to fertility care in alignment with both scientific advancements and Islamic values. Future research should explore the mechanisms linking cervicitis and infertility, assess long-term reproductive outcomes, and evaluate holistic reproductive health interventions that integrate medical treatment, lifestyle factors, and spiritual well-being.

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AUTHORS' CONTRIBUTIONS

Dewi Setiawati acquired the data, reviewed and revised the manuscript, and also performed the field work. Novianeu S. Rachma wrote the manuscript, analyzed the data. All authors designed the study, formulated the concept, enrolled participants, collected data, read and approved the final manuscript.

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COMPETING INTERESTS

The author(s) declare no potential conflict of interest with respect to the research, authorship, and/or publication of this article.

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