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Oral Candida Infection's Pregnant Women: Use of anti-fungal drugs and Impact on Embryo Health

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Abstract

Oral Candida infection is a common condition during pregnancy that can affect both the mother and the developing fetus. Changes in body pH and hormonal fluctuations can promote the growth and colonization of Candida species, leading to infection and potential adverse effects on pregnancy. The purpose of this review is to discuss the prevalence, risk factors, and management of oral Candida infection in pregnant women, as well as to emphasize preventive measures to protect maternal and fetal health. A literature-based assessment of Candida species in pregnancy revealed that the prevalence of oral yeast colonization during early gestation was 16.7% among pregnant women, compared to 6.7% in non-pregnant controls; however, the difference was not statistically significant (P = 0.424). Appropriate preventive and management strategies are essential to control oral Candida infection during pregnancy and reduce its negative impact on both the mother and fetus. Maintaining the body's pH balance and initiating prompt treatment play a crucial role in preventing complications and ensuring healthy pregnancy outcomes.

Keywords: Oral Candida Infection; Pregnancy; pH imbalance; Antifungal therapy; Maternal–fetal health

1. Introduction

Maintaining health is a fundamental responsibility for every individual, including the maintenance and care of oral and dental health. However, dental and oral diseases remain prevalent among the majority of Indonesia's population, thus requiring effective strategies to reduce their incidence. The risk of developing dental and oral diseases can occur in all individuals, including pregnant women. Pregnancy is a condition that induces various physiological changes in women, even in those who are otherwise healthy. Moreover, pregnancy has significant effects on oral health due to hormonal fluctuations [1].

Hormonal changes during pregnancy can make the gums more sensitive and susceptible to bacterial infections, leading to oral health problems such as gingivitis and periodontitis. These conditions arise as a result of metabolic changes, altered immune responses, and hormonal variations. The interaction among these factors may indirectly cause several oral manifestations in pregnant women, including *Candida albicans* infection [2].

Candida is a type of fungus capable of causing infections in the human body. The most common species, *Candida albicans*, belongs to the *Candida* genus and is a normal component of the oral microflora, with about 30–50% of individuals acting as carriers. Pregnant women are more vulnerable to opportunistic infections and diseases that may affect both maternal and fetal health. During pregnancy, oral candidiasis is often associated with excessive glycogen production, leading to a more alkaline oral environment that promotes microbial growth [3]. Early diagnosis or prevention of *Candida* infection in pregnant women is essential for maintaining the health of both mother and child.

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This study aims to isolate, identify, and evaluate the risk of candidiasis during pregnancy and to assess the role of *Candida* species in pregnant and non-pregnant women without oral lesions [4]. Candidiasis lesions can develop in any area of the oral cavity, but the most common sites are the buccal mucosa, buccal folds, oropharynx, and tongue. Chronic candidiasis that remains untreated may progress to leukoplakic candidiasis, a premalignant condition that can develop into squamous cell carcinoma. Moreover, candidiasis may become systemic through lymphatic dissemination, affecting vital organs such as the kidneys, lungs, brain, and blood vessels, which can be fatal.

The management of candidiasis depends on its underlying cause and may involve local or systemic therapy. This is consistent with the study by Mardelita S. (2017), which found that many pregnant women experience oral and dental health problems due to inadequate knowledge of proper oral hygiene during pregnancy [5].

Antifungal drugs are used to treat *Candida albicans* infections. However, existing antifungal agents are often toxic and not widely available over the counter [6]. Repeated use of antifungal drugs may suppress the immune system, especially in patients using them prophylactically. Furthermore, antifungal medications are generally expensive, less accessible, and sometimes less effective in treating *Candida albicans* infections, particularly in pregnant women. Antifungal agents are a subgroup of antibiotics that inhibit or kill fungal growth, while antibiotics are chemical substances derived from various microorganisms that can inhibit microbial growth at low concentrations (Jawetz et al., 1994). The use of antifungal drugs during pregnancy must be approached with caution due to potential effects on fetal health.

2. Material and methods

This article was developed as a narrative review based on relevant scientific literature related to oral *Candida* infection in pregnant women, antifungal treatment, and its potential effects on embryonic health. A comprehensive literature search was performed through online databases including PubMed, ScienceDirect, and Google Scholar. The search used the keywords *"oral candidiasis," "Candida albicans," "pregnancy," "antifungal drugs,"* and *"embryo health."*

The inclusion criteria consisted of scientific articles published between 2003 and 2021, written in English or Indonesian, and focused on the prevalence, risk factors, treatment, and implications of oral *Candida* infection during pregnancy. Articles that were not directly related to oral *Candida*, lacked full-text access, or were purely animal studies without clinical relevance were excluded.

All relevant studies were read in full, and their findings were summarized descriptively. Information was extracted regarding sample size, infection prevalence, diagnostic methods, and drug effects reported by the original studies. The data were then synthesized narratively to identify patterns in prevalence, common risk factors, and possible effects of antifungal drugs on embryonic development.

3. Results and discussion

3.1. Prevalence of Oral Candida Infection in Pregnant and Non-Pregnant Women

Based on the reviewed studies, the prevalence of *Candida* species was evaluated in thirty pregnant women across three trimesters and thirty non-pregnant women serving as controls. Oral swab samples were collected once from all participants, and none exhibited clinical signs of candidiasis. A comparison was made between pregnant and non-pregnant women based on the presence of positive growth on Sabouraud Dextrose Agar (SDA).

Table 1 Prevalence of Oral *Candida* Infection in Pregnant and Non-Pregnant Women During the First Trimester

Variable	**Trimester I**		**Total**	**Fisher's Exact Test (p-value) and Significance**
	Candida Absent	*Candida* Present		
Pregnancy Status: No	28	2	30	0.424 and Not significant
(%)	93.3	6.7	100.0	
Pregnancy Status: Yes	25	5	30	

(%)	83.3	16.7	100.0		
Total	53	7	60		
(%)	88.3	11.7	100.0		

Among pregnant women, 16.7% (5 out of 30 cases) showed positive fungal growth during the first trimester, while 83.3% (25 out of 30) tested negative. In the non-pregnant control group, positive growth was observed in 6.7% (2 out of 30) of participants, while 93.3% (28 out of 30) were negative. According to Fisher's exact test, the prevalence of oral fungal infection was higher among pregnant women compared to non-pregnant women; however, the difference was not statistically significant (P = 0.424) [1].

3.2. Risk Factors for Oral Candida Infection in Pregnant Women

Oral candidiasis is a relatively common condition during pregnancy, influenced by various physiological and environmental factors. Several risk factors may increase the likelihood of *Candida* infection in the oral cavity of pregnant women [2].

3.2.1. Hormonal Changes

During pregnancy, significant hormonal fluctuations occur, particularly elevated levels of estrogen and progesterone. These hormonal shifts can disrupt the normal microbial balance in the oral cavity, leading to the overgrowth of *Candida* and an increased risk of infection [3].

3.2.2. Immune Deficiency

Pregnant women tend to have a relatively suppressed immune system as the body prioritizes fetal development, which weakens the ability to control fungal proliferation [4].

3.2.3. Environmental Factors

Poor oral hygiene, the use of unclean dentures or orthodontic appliances, and excessive antibiotic use can create a favorable environment for *Candida* growth [5].

3.2.4. Gestational Diabetes

Pregnant women with gestational diabetes often exhibit elevated blood glucose levels, which promote *Candida* proliferation and increase infection risk [6].

3.2.5. Use of Antifungal and Antibiotic Drugs

The administration of antifungal or antibiotic medications during pregnancy may disrupt the balance of normal oral microflora, promoting *Candida* overgrowth [7].

3.2.6. Psychological Factors

Stress, anxiety, and emotional fluctuations associated with pregnancy can alter the microbial equilibrium in the oral cavity and indirectly promote *Candida* infection [7].

3.3. Impact of Candida Infection on Pregnancy

Candida infection during pregnancy may cause discomfort and, in some cases, lead to complications affecting both maternal and fetal health [2].

- Discomfort and Symptomatic Disturbances: Burning sensations, pain, and taste disturbances may cause difficulty in eating or drinking comfortably, which may compromise adequate nutritional intake [3].
- Spread to the Genital Area: Infection can extend to the genital region, resulting in vulvovaginal candidiasis that causes itching, inflammation, and abnormal vaginal discharge [4].
- Pregnancy Complications: Untreated or recurrent *Candida* infections during pregnancy may increase the risk of complications such as preeclampsia, preterm birth, and low birth weight [5].
- Transmission to the Newborn: During delivery, maternal *Candida* infection can be transmitted to the newborn, leading to oral thrush or fungal skin infections [6].

- Postpartum Complications: Persistent *Candida* infection can delay postpartum recovery, causing nipple discomfort, mastitis, or other breastfeeding-related problems [7].

3.4. Use of Antifungal Drugs in Oral Candida Treatment

Antifungal agents are the main therapeutic approach for managing *Candida* infections [3].

- Topical Antifungal Drugs: Miconazole oral gel and nystatin are commonly used for mild infections [4].
- Systemic Antifungal Drugs: Fluconazole, itraconazole, or amphotericin B are prescribed for systemic or recurrent infections [5].
- Combination Therapy: In certain cases, topical and systemic antifungal drugs are used together to enhance efficacy and reduce resistance [6].
- Medical Supervision: All antifungal therapy should be performed under medical supervision to minimize fetal risk and monitor treatment response [7].

3.5. Potential Effects of Antifungal Drugs on Embryonic Health

The use of antifungal drugs during pregnancy raises concerns due to their potential impact on embryonic development [4].

- Risk of Congenital Malformations: Azole-class drugs such as fluconazole and itraconazole have been associated with congenital malformations when used during the first trimester [5].
- Impact on Fetal Growth and Development: Some systemic antifungals may cause intrauterine growth restriction (IUGR) and low birth weight [6].
- Reproductive Toxicity: Certain antifungal drugs may affect reproductive development, including genital abnormalities and reduced fertility in offspring [7].
- Long-Term Effects: Exposure during pregnancy may lead to neurobehavioral and reproductive disorders or organ dysfunction later in life [7].

Candida infection during pregnancy is a significant clinical concern due to its potential impact on the health and development of the embryo. This fungal infection may cause a range of discomforting symptoms, including a burning sensation, altered taste, or abnormal discharge in the oral cavity or genital area. Antifungal treatment is often required to manage these infections; however, the use of antifungal agents in pregnant women carries potential implications for embryonic health that must be carefully considered.

Several studies have reported that the use of certain antifungal medications during the first trimester of pregnancy may increase the risk of congenital malformations in the fetus. In particular, antifungal agents belonging to the azole group, such as fluconazole and itraconazole, have been associated with higher incidences of cardiac, skeletal, and craniofacial abnormalities. Although human data remain limited and further research is needed, the administration of these drugs during early pregnancy should be approached with caution.

In addition to teratogenic effects, some antifungal agents have been linked to impaired embryonic growth and development. Systemic antifungal use has been associated with intrauterine growth restriction (IUGR) and low birth weight. Experimental animal studies also support the possibility that certain antifungal drugs may interfere with the development of fetal organs and physiological systems.

Clinical decision-making regarding antifungal therapy in pregnancy must always be based on a careful evaluation of potential benefits and risks, in consultation with qualified healthcare professionals. Factors such as the type of drug, dosage, duration of therapy, gestational age, and maternal health condition must be considered individually. Topical antifungal agents such as miconazole oral gel or nystatin are generally recommended as first-line treatments for mild oral or genital *Candida* infections in pregnant women.

For more severe or persistent infections, systemic antifungal therapy may be necessary. However, the choice of systemic agents should be made cautiously, considering drug safety profiles and appropriate dosing. Fluconazole remains one of the most commonly used systemic antifungal drugs, but its use in pregnancy requires individualized assessment of potential risks and therapeutic benefits. In certain cases, a combination of topical and systemic antifungal therapy may be indicated to achieve better treatment outcomes.

In addition to pharmacological therapy, maintaining good hygiene, preserving the normal oral and genital microbiota, and avoiding risk factors that promote *Candida* overgrowth are essential preventive measures. Healthy lifestyle practices, such as proper personal hygiene, avoiding tight clothing, and keeping the genital area dry, can help reduce infection risk and the need for antifungal medications.

Strict medical supervision is required throughout antifungal therapy during pregnancy. Patients experiencing side effects or inadequate response to treatment should seek medical consultation for appropriate therapeutic adjustments. Furthermore, additional research is needed to better understand the potential embryotoxic effects of antifungal agents in humans and to develop more specific and safer treatment guidelines for managing *Candida* infections during pregnancy.

4. Conclusion

In conclusion, the use of antifungal agents for treating *Candida* infections in pregnant women should be carefully evaluated by weighing the potential benefits and risks for both the mother and the developing embryo. Maintaining good personal hygiene and adopting a healthy lifestyle are essential preventive measures to reduce the risk of *Candida* infection and minimize the need for antifungal medication during pregnancy.

Compliance with ethical standards

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Conflict of interest

The authors declare no conflict of interest.

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