ONLINE FIRST

This is a provisional PDF only. Copyedited and fully formatted version will be made available soon.

POLISH GYNECOLOGY

GINEKOLOGIA POLSKA

ORGAN POLSKIEGO TOWARZYSTWA GINEKOLOGICZNEGO
THE OFFICIAL JOURNAL OF THE POLISH GYNECOLOGICAL SOCIETY

ISSN: 0017-0011

e-ISSN: 2543-6767

Streptococcus mutans in the oral cavity as a risk factor for threatened miscarriage

Authors: Hanna I. Klimek, Hanna Moczulska, Piotr Sieroszewski

DOI: 10.5603/gpl.94849

Article type: Research paper

Submitted: 2023-03-26

Accepted: 2023-04-19

Published online: 2023-08-09

ORIGINAL PAPER / OBSTETRICS

Streptococcus mutans in the oral cavity as a risk factor for threatened miscarriage

Hanna I. Klimek, Hanna Moczulska, Piotr Sieroszewski

Medical University of Lodz, Poland

Corresponding author:
Hanna I. Klimek
Medical University of Lodz, al. Tadeusza Kosciuszki 4, 90–419 Lodz, Poland
e-mail: hanna.i.klimek@gmail.com

ABSTRACT

Objectives: The aim of this study was to investigate the bacterial colonization of the oral and vaginal ecosystem in pregnant women during the first trimester of pregnancy.

Material and methods: We analyzed 162 pregnant women, (99 women with threatened abortion and 63 women with healthy pregnancies). We collected oral and vaginal swabs, using PCR analysis to assess the presence of various bacteria (*S. mutans*, *E. faecalis*, *E. coli*, *Lactobacillus acidophilus, Prevotella intermedia, Gardnerella vaginalis, S. agalactiae*).

Results: Results showed that the presence of *Streptococcus mutans* in the oral cavity was significantly more common in women with threatened abortion compared to those with healthy pregnancies ($p = 0.046$). The presence of Lactobacillus acidophilus in the vagina was significantly more common in women with healthy pregnancies ($p = 0.041$).

Conclusions: Our study suggests that the presence of *Streptococcus mutans* in the oral cavity may be a risk factor for threatened abortion.

Key words: miscarriage; periodontal disease; pregnancy; *Streptococcus mutans*

INTRODUCTION

The presence of *Streptococcus mutans* in the oral cavity of a pregnant woman may be a risk factor for miscarriage. We observed that *Streptococcus mutans* is significantly more widespread in the oral cavity of women with threatened abortion than in those undergoing a healthy pregnancy.

Objectives

The aim of this study was to investigate the bacterial colonization of the oral and vaginal ecosystem in pregnant women during the first trimester of pregnancy.

MATERIAL AND METHODS

We analyse the oral and vaginal bacterial flora of pregnant women in the Polish population during the first trimester of pregnancy. A total of 162 Caucasian women in their first trimester of pregnancy were qualified for the study. The study group was formed of 99 women in their first trimester of pregnancy, *i.e.*, before the 15th week of pregnancy, with a potential miscarriage (bleeding, abdominal pains); they were referred from the Department of Fetal Medicine and Gynecology, Medical University of Lodz. In addition, a comparison group was formed of sixty-three pregnant women under the care of an Outpatient Clinic, who were experiencing a normal first-trimester pregnancy. For the examination, vaginal and oral swabs were collected. Using PCR analysis, the presence of the following bacteria was assessed: *Streptococcus mutans*, *Enterococcus faecalis*, *Escherichia coli*, *Lactobacillus acidophilus*, *Prevotella intermedia*, *Gardnerella vaginalis*, *Streptococcus agalactiae*. Table 1 shows the distribution of patients and test results.

Table 1. Distribution of patients and test results

ORAL CAVITY

	Examined group n = 99	Comparison group n = 63	p value
Lactobacillus acidophilus	39 (0.398)	25 (0.391)	0.926
Gardnerella vaginalis	11 (0.112)	5 (0.078)	0.480
Escherichia coli	3 (0.031)	0 (0.000)	0.160
Enterococcus faecalis	0 (0.000)	1 (0.016)	0.214
Streptococcus mutans	**53 (0.535)**	**24 (0.375)**	**0.046**
Streptococcus agalactiae	10 (0.101)	7 (0.111)	0.839
Prevotella intermedia	6 (0.061)	4 (0.063)	0.974

VAGINA

	Examined group n = 99	Comparison group n = 63	p value
Lactobacillus acidophilus	**61 (0.629)**	**50 (0.781)**	**0.041**
Gardnerella vaginalis	26 (0.265)	19 (0.297)	0.663
Eschericha coli	4 (0.412)	3 (0.469)	0.865
Enterococcus faecalis	13 (0.131)	13 (0.203)	0.224
Streptococcus mutans	0 (0.000)	1 (0.016)	0.215
Streptocuccus agalactiae	8 (0.081)	7 (0.109)	0.541
Prevotella intermedia	0 (0.000)	0 (0.000)	

RESULTS

Cases with threatened miscarriage and the control group presented a similar mean duration of pregnancy at the time of inclusion in the study: 9.4 weeks (p = 0.86). The examined groups were also comparable in terms of age and education. Pregnant women with symptoms of threatened miscarriage tended to have a higher BMI (24.9 vs 23.8 kg/m^2 p = 0.03). The patients with symptoms of threatened miscarriage were more likely to have experienced previous miscarriages and a greater number of pregnancies and were more likely to have used progesterone derivatives to a greater degree. We found that the presence of *Lactobacillus acidophilus* in the vagina was observed significantly more frequently in the group of healthy pregnancies (p = 0.041). In our study significantly higher incidence of *Streptococcus mutans* was found in the oral cavity in the group of patients with a risk of miscarriage (p = 0.046). However, the analysed population was comparable in terms of the number of multiple births, manner of completion of previous pregnancies, consumption of legal stimulants such as coffee and tobacco, and identified sources of infection.

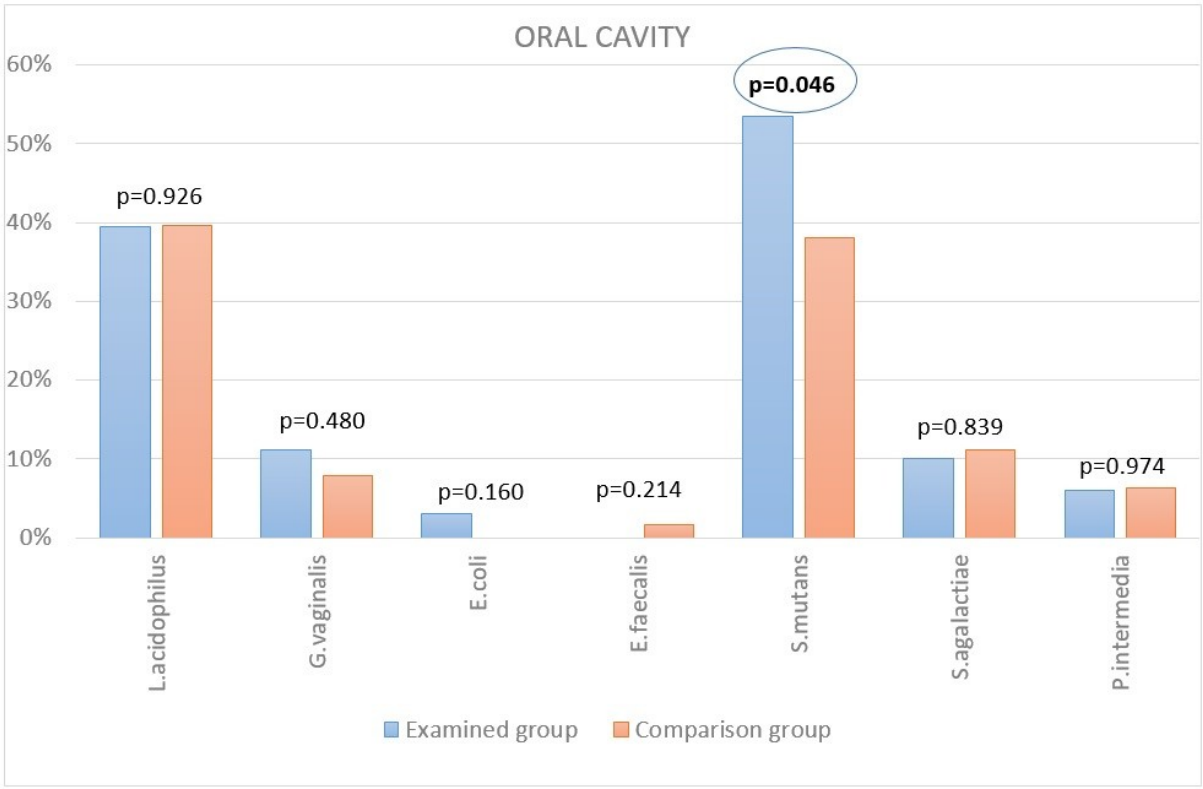

Figure 1. Distribution of patients and test results — oral cavity

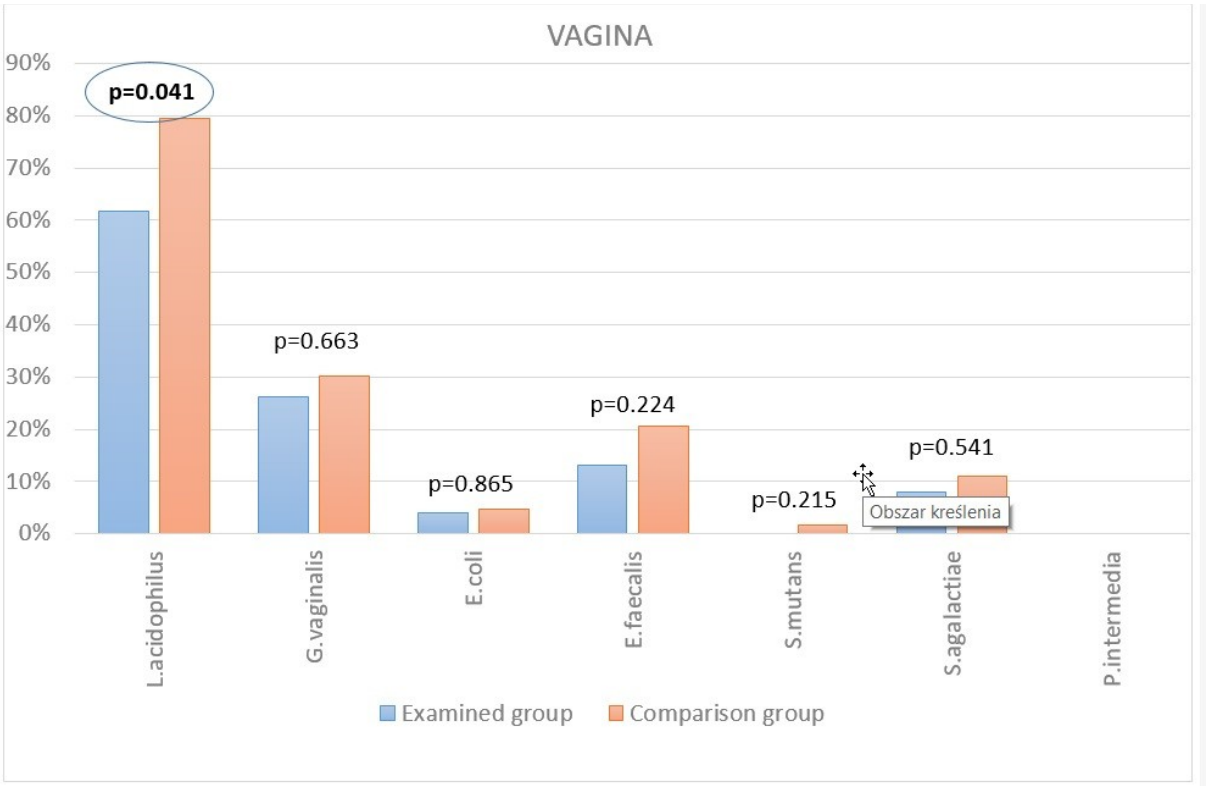

Figure 2. Distribution of patients and test results — vagina

DISCUSSION

In all healthy women, including pregnant women, the dominant bacterial strains in the vaginal ecosystem are those of the Lactobacillus species and they play a key role in protection against infections of the female genital tract. In our studies, we also found a significant dominance of Lactobacillus acidophilus in the vagina of healthy pregnant women. It has already been observed in previous studies by other researchers. Jiao et al. [1] demonstrated that *Lactobacillus* and *Gardnerella* were significantly decreased in recurrent miscarriage patients compared to healthy control group. Studies made so far generally investigated the relationship between periodontal disease and adverse pregnancy outcomes such as preterm deliveries [2–4].

The presence of *Streptococcus mutans* in oral cavity has not been described as a risk factor for miscarriage so far. Our research showed however that significantly higher incidence of *S.mutans* was found in the oral cavity patients with a risk of miscarriage. The oral health condition of a pregnant woman can have a significant impact on the entire course of her pregnancy. Our work focused on the study of the presence of bacterial strains in the vagina and in the oral cavity of pregnant women. Other papers on the topic have focused on different aspects, such as the relationship between *S. mutans* and periodontal disease or the relationship between S. mutans and inflammation of the vagina. Only a few researchers have compared the ecosystems of the oral cavity and vagina among pregnant women. An assessment of various caries risk factors in pregnant and non-pregnant women indicated that pregnant women are more prone to dental caries [5]. *Streptococcus mutans, Lactobacillus acidophilus, and Prevotella intermedia* are primarily responsible for the development of dental caries [6]. It has also been found that pregnant women with complications during pregnancy were more likely to suffer from severe gingivitis and require more frequent dental treatment than those with a physiological pregnancy [7, 8].

CONCLUSIONS

Our work focuses on a specific population of Eastern European pregnant women at risk of miscarriage and was conducted on a relatively large group, which increases the power of inference. Some other similar work has focused on smaller groups or even individual cases. To conclude, the occurrence of *Streptococcus mutans* in the oral cavity may be a risk factor for threatened miscarriage, it is advisable to further study the association of this bacterial strain with the aetiology of miscarriages.

Article informations and declarations

Conflict of interest

The authors of the paper have no financial interests or other affiliations with companies or products that could influence the research results or interpretation of the data. The authors have not received any financial or other contributions from companies or organizations that could influence the work.

REFERENCES

1. Jiao X, Zhang L, Du D, et al. Alteration of vaginal microbiota in patients with recurrent miscarriage. J Obstet Gynaecol. 2022; 42(2): 248–255, doi: 10.1080/01443615.2021.1904851, indexed in Pubmed: 34020581.

2. Parihar AS, Katoch V, Rajguru SA, et al. Periodontal Disease: A Possible Risk-Factor for Adverse Pregnancy Outcome. J Int Oral Health. 2015; 7(7): 137–142, indexed in Pubmed: 26229389.

3. Igari K, Kudo T, Toyofuku T, et al. Association between periodontitis and the development of systemic diseases. Oral Biology and Dentistry. 2014; 2(1): 4, doi: 10.7243/2053-5775-2-4.

4. Pretorius C, Jagatt A, Lamont RF. The relationship between periodontal disease, bacterial vaginosis, and preterm birth. J Perinat Med. 2007; 35(2): 93–99, doi: 10.1515/JPM.2007.039, indexed in Pubmed: 17343541.

5. Kamate WI, Vibhute NA, Baad RK. Estimation of DMFT, Salivary Streptococcus Mutans Count, Flow Rate, Ph, and Salivary Total Calcium Content in Pregnant and Non-Pregnant Women: A Prospective Study. J Clin Diagn Res. 2017; 11(4): ZC147–ZC151, doi: 10.7860/JCDR/2017/24965.9516, indexed in Pubmed: 28571283.

6. Takahashi N, Nyvad B. Caries ecology revisited: microbial dynamics and the caries process. Caries Res. 2008; 42(6): 409–418, doi: 10.1159/000159604, indexed in Pubmed: 18832827.

7. Chaloupka P, Korečko V, Turek J, et al. [Oral health status of women with normal and high-risk pregnancies]. Ceska Gynekol. 2014; 79(1): 29–33, indexed in Pubmed: 24635362.

8. Merglova V, Hecova H, Stehlikova J, et al. Oral health status of women with high-risk pregnancies. Biomed Pap Med Fac Univ Palacky Olomouc Czech Repub. 2012; 156(4): 337–341, doi: 10.5507/bp.2012.045, indexed in Pubmed: 23073528.