

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

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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.

Keywords: miscarriage; periodontal disease; pregnancy; *Streptococcus mutans*

Ginekologia Polska 2024; 95, 2: 123–125

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.

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

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Received: 26.03.2023 Accepted: 19.04.2023 Early publication date: 9.08.2023

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Table 1. Distribution of patients and test results			
Oral cavity	Examined group n = 99	Comparison group n = 63	p value
<i>Lactobacillus acidophilus</i>	39 (0.398)	25 (0.391)	0.926
<i>Gardnerella vaginalis</i>	11 (0.112)	5 (0.078)	0.480
<i>Escherichia coli</i>	3 (0.031)	0 (0.000)	0.160
<i>Enterococcus faecalis</i>	0 (0.000)	1 (0.016)	0.214
<i>Streptococcus mutans</i>	53 (0.535)	24 (0.375)	0.046
<i>Streptococcus agalactiae</i>	10 (0.101)	7 (0.111)	0.839
<i>Prevotella intermedia</i>	6 (0.061)	4 (0.063)	0.974
Vagina	Examined group n = 99	Comparison group n = 63	p value
<i>Lactobacillus acidophilus</i>	61 (0.629)	50 (0.781)	0.041
<i>Gardnerella vaginalis</i>	26 (0.265)	19 (0.297)	0.663
<i>Escherichia coli</i>	4 (0.412)	3 (0.469)	0.865
<i>Enterococcus faecalis</i>	13 (0.131)	13 (0.203)	0.224
<i>Streptococcus mutans</i>	0 (0.000)	1 (0.016)	0.215
<i>Streptococcus agalactiae</i>	8 (0.081)	7 (0.109)	0.541
<i>Prevotella intermedia</i>	0 (0.000)	0 (0.000)	

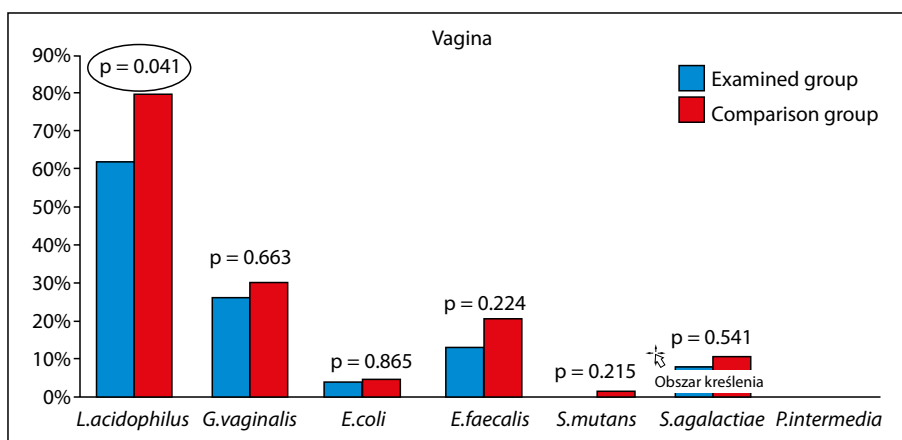


Figure 1. Distribution of patients and test results — vagina

miscarriage tended to have a higher BMI (24.9 vs 23.8 kg/m² 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) (Fig. 1). 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) (Fig. 2). 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.

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

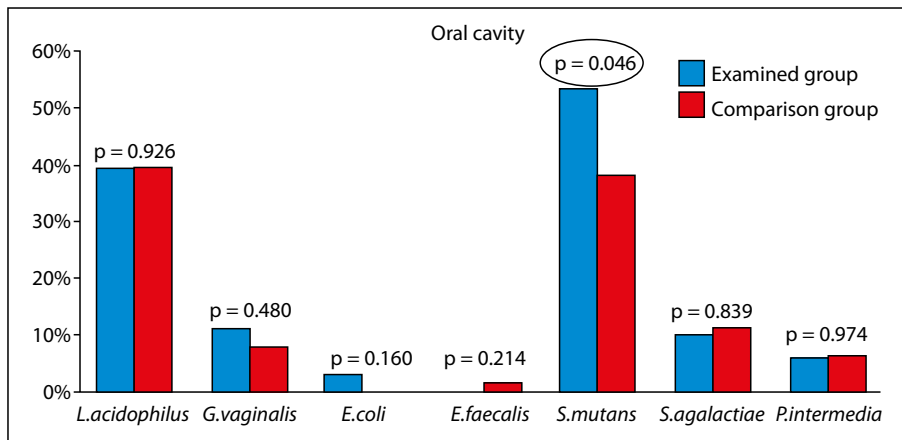


Figure 2. Distribution of patients and test results — oral cavity

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 information 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.

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