

## The impact of oral health and other important factors related to preterm birth: A longitudinal study

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### Abstract

The study evaluates the impact of oral health and other important factors on preterm birth. This is a longitudinal study. In our study 108 pregnant women participated with an age range from 15 to 46+ years old. The participants were divided into the following 4 age groups: 15-25, 26-35, 36-45, and  $\geq 46$  years old. The data were entered and subsequently analyzed using (IBM, New York, USA), SPSS Statistics 23.0.

The prevailing age range of the sample was from 26 to 35 years old, respectively 39% of the participants. The data collected from the present study indicated that a large proportion of patients 68% of them had dental caries, and 61% of them had gingivitis. Overall, almost 42% of pregnant women had genital infections. Forty-one patients (38%) were obese. Out of the entire study group, the number of babies born  $< 37$  weeks of gestation was 22% of births. According to the ANOVA test, the highest probability of prematurity was found in mothers with high values of gingivitis ( $P = .001$ ; 95% CI 0.32-0.42), and mothers with genital infections ( $P = .001$ ; 95% CI 0.69-1.04). This study showed that there is a statistically significant correlation between obesity and dental caries in relation to preterm birth ( $P = .002$  in both cases).

Neglect of oral health and other important factors such as genital infections, obesity, physical and psychological violence, and marital status is the cause of the increased risk of premature births.

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### Introduction

Premature birth is a global epidemic and it is influenced by many factors.<sup>1</sup> A factor that is associated with prematurity is gum disease.<sup>2</sup> During pregnancy, the level of estrogen and progesterone in the blood increases, and this makes the walls of blood capillaries more permeable. The associations between gum diseases and preterm delivery are well-proven.<sup>3</sup> Last years, studies have been showing that poor oral hygiene can cause problems in pregnant women.<sup>4,5</sup> Based on the results from a cohort

study, conducted by Erchick DJ et al<sup>6</sup> it is demonstrated that a high risk for preterm birth exists in patients with poor oral hygiene. Presently, it is found that pregnant women are susceptible to caries and are characterized by a high prevalence of dental caries.<sup>7</sup> In addition, recurrent vomiting in pregnancy is associated with increased acidic reflux leading to dental caries.<sup>8</sup> The findings of the study carried out by Yunita Sari et al<sup>9</sup> revealed that there were strong relationships between dental caries and pregnant women. Prematurity involves also other risk factors such as obesity, infection, and inflammation, well documented in the literature.<sup>10,11</sup> Significant research has been conducted in the past to investigate the correlation between obesity and the risk of preterm birth.<sup>12,13</sup> Among other factors, unmarried status was a risk factor for preterm birth, and the social support programs for unmarried mothers

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may be significant to decrease unfavorable pregnancy outcomes.<sup>14</sup>

According to recent studies, intimate partner violence, especially physical violence could have a potential role in the preterm birth.<sup>15,16</sup>

A systematic review showed that the prevalence of moderate or late preterm birth was 84.7%, compared with 11.3% for very preterm birth and 4.1% for extremely preterm birth.<sup>17</sup> The goal of this study is to evaluate the relationship between oral health, and other important factors with preterm birth.

### Materials and methods

The current study was conducted during the period of January 2019 to December 2021 at the Gynecological Department in the Regional Hospital of Vlora, Albania. This is an observational study.

This study takes into consideration 108 pregnant women with an age range from 15 to 46+ years old. The participants were divided into the following 4 age groups: 15-25, 26-35, 36-45, and ≥ 46 years old. The patients for the study are randomly selected. The staff of the Regional Hospital, Vlora - Albania was willing to assist and give support to conduct this research.

The questionnaire included the demographic characteristics of the sample such as age, women's education level, and marital status. During the study, we received information about consulting a dentist during pregnancy, tooth brushing, using fluoridated water, dental scaling, dental caries, and gingivitis as it is shown in Table 2. Other data from the participants were taken into account such as obesity, genital infections, physical activity, and physical and psychological violence in pregnant women.

Completion of the questionnaire took almost twenty minutes. All the participants agreed to provide their informed consent. The participants had the right to withdraw at any time. The study had no dropouts. The inclusion criterion of the sample in the present survey was considered the age from 15 to 46+ years old. While the exclusion criteria were genetic predisposition, anemia, preeclampsia, and in vitro fertilization.

The questionnaire was designed based on the resolution of the Albanian National

Committee no. 9, date 11.11.2011. Also, the present study was approved by the institutional board of the University of Vlora, Albania. This original research was conducted according to the guidelines of the Helsinki statement.<sup>18</sup> Based on the Helsinki Declaration and approved by the World Medical Association the current study in which participants were pregnant women was developed based on protocols. The anonymity of the participants was preserved.

The data were entered and subsequently analyzed using (IBM, New York, USA), SPSS Statistics 23.0. Descriptive analysis was performed using percentages for qualitative variables such as age, women's education level, marital status, obesity, physical activity, genital infections, physical and psychological violence, dental caries, and gingivitis. Data were scrutinized by the Post Hoc LSD test in analysis of variance (ANOVA). The significance level ( $\alpha$ ) was set at 0.05, with a confidence interval (CI) of 95%.

### Results

The prevailing age range of the sample was from 26 to 35 years old, respectively 39% of the participants. Overall, almost 44% of pregnant women had completed at least secondary education, and 46% of the pregnant women were unmarried. [Table 1]

Age group (years old)	n	%
15-25	17	16%
26-35	42	39%
36-45	31	29%
46 and over	18	16%
<b>Women's education level</b>		
Primary education	37	34%
Secondary education	47	44%
Higher education	24	22%
<b>Marital status</b>		
Married	58	54%
Not married	50	46%

**Table 1.** Demographic characteristics of the sample.

Altogether, 38% of the participants reported that they consulted a dentist during pregnancy. At the time of the study, 55% of the participants declared that they brush their teeth only once a day, whereas 8% of them stated that they never brush their teeth. In this study, the frequency of pregnant women who did not use fluoridated water was high nearly 77%, compared with women who use fluoridated

water. We also found that 54% of the patients have performed the more than 12 months ago the dental scaling. The data collected from the present study indicated that a large proportion of patients 68% of them had dental caries, and 61% of them had gingivitis.[Table 2]

Did you consult dentist during the pregnancy	n	%
Yes	41	38%
No	67	62%
<b>Tooth brushing</b>		
Once a day	59	55%
2 times a day	25	23%
3 times a day	15	14%
Never	9	8%
<b>Use fluoridated water</b>		
Yes	25	23%
No	83	77%
<b>Your last dental scaling</b>		
< 3 months ago	31	28%
>3 months to < 6 months ago	19	18%
More than 12 months ago	58	54%
<b>Dental caries</b>		
Yes	73	68%
No	35	32%
<b>Gingivitis</b>		
Yes	66	61%
No	42	39%

**Table 2.** Oral hygiene practices and oral pathologies.

Forty-one patients (38%) were obese. Furthermore, the data showed that 42% of participants were affected by genital infections. Among the participants, 83% of them stated that they did not engage in any physical activity, while 24% of them were victims of physical and psychological violence. Out of the entire study group, the number of babies born < 37 weeks of gestation was 24 or 22% of births. [Table 3]

Obese (BMI 30-35)	n	%
Yes	41	38%
No	67	62 %
<b>Physical activity</b>		
Yes	18	17%
No	90	83%
<b>Genital infections</b>		
Yes	45	42%
No	63	58%
<b>Physical and psychological violence</b>		
Yes	26	24%
No	82	76%
<b>Preterm birth&lt; 37 week</b>		
Yes	24	22%
No	84	78%

**Table 3.**The risk factors for preterm birth.

According to the ANOVA test, the highest probability of prematurity was found in mothers with high values of gingivitis (P= .001; 95%CI

0.32-0.42), and mothers with genital infections (P= .001; 95%CI 0.69-1.04). This study showed that there is a statistically significant correlation between obesity and dental caries in relation to preterm birth (P= .002 in both cases). Furthermore, the variable that mothers have been a victim of physical and psychological violence during pregnancy (P=.005; CI 95%; 0.50-1.04) showed a statistically significant association with preterm birth. [Table 4]

Preterm birth	Risk factors	P-value	95% CI	
			Lower	Upper
	Dental caries	.002	0.44	0.63
	Gingivitis	.001	0.32	0.42
	Obesity	.002	0.15	0.77
	Genital infections	.001	0.69	1.04
	Physical and psychological violence	.005	0.50	1.04
	Marital status	.003	0.37	1.09

**Table 4.** Indicates the associations between preterm birth and risk factors.

## Discussion

In the present study, we have described several factors that are associated with premature birth in a group of pregnant Albanian women. Our results revealed that 61% of pregnant women had gingivitis and the associations between gingivitis and premature birth are indisputable. Previous studies confirms our findings.<sup>19, 20</sup>

We note that the prevalence of dental caries was present in 68% of pregnant women, and this finding is consistent with previous studies done by Erchick et al<sup>6</sup>, and Merglova et al<sup>21</sup>, who declared that the prevalence of caries was between 62 % and 66.2%.

Our findings strengthen the understanding that high levels of gingivitis and dental caries were influenced by the factors such as tooth brushing and dental scaling. It was observed that approximately 8% of the patients never brush their teeth, whereas 55% of them used to brush their teeth only once daily. An earlier study revealed strong associations between a dental cleaning and preterm birth.<sup>22</sup>

In our opinion, one serious problem in Albania that affects dental caries manifestation and gingivitis is the lack of fluoridation in the

drinking water. The observations done proved that the percentage of pregnant women receiving fluoridated water was low with only 23% of them. The results of our research are analogous to the study by Popovici et al<sup>23</sup> carried out in Romania. Based on their analysis, Agarwal et al<sup>24</sup> have reported that 27% of pregnant women never went to the dentist during pregnancy, even though more than half of this percentage declared dental problems. Our results show a high percentage (62%) than those obtained by Agarwal et al.<sup>24</sup> The present study highlights the need to be performed more examinations on oral health in pregnant women.

Further, Liu et al<sup>25</sup> and Faucher et al<sup>26</sup> observed pregnant women with a high BMI (30-35) and found positive associations between preterm birth and maternal obesity, which is in concordance with our results.

Also, genital infections are another risk factor for preterm births. Similar to the findings from Amabebe et al<sup>27</sup> and Shimaoka et al<sup>28</sup> our observed association between genital infections and preterm births was significant.

Recent studies came to the conclusion that physical and emotional violence can bring on preterm birth, and the correlation remained substantially unaltered.<sup>29-31</sup>

Study results showed that 24% of pregnant women face physical and psychological violence from their intimate partners. The women in this study stated that they were subject to insults, swearing, condescending language, physical, and psychological violence.

The current study revealed that unmarried status was strongly associated with preterm birth (P-value = .003, CI 95; 0.37-1.09). Similar results were reported in the previous study published by Masho et al<sup>32</sup>. Referring to the findings and the detailed analysis of this research can be said that among the 108 patients evaluated, 22% of them experienced preterm birth before the 37th week of pregnancy. In contrast, the results of this work are lower than the results obtained by Zeitlin et al<sup>33</sup> who found that the preterm birth rates in Belgium, Finland, and Sweden, had a high proportion (50.4 %, 62.1%, and 69.5%, respectively).

Our study has limitations including the restricted number of pregnant women, thus generalization of the results globally might be restricted. There is no information about the maternal family history of preterm births.

## Conclusions

We confirm that the patients who have risk factors such as gingivitis, dental caries, genital infections, obesity, physical and psychological violence, and marital status have a high incidence of premature births.

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## Declaration of Interest

There are no conflicts of interest.

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