



EVALUATION OF THE OPPORTUNITIES FOR PREVENTION OF THE PERIODONTAL DISEASES AMONG THE PREGNANT WOMEN IN TBILISI

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| Veriko Tevzadze | MD, PHD (s) University Of Georgia, School Of Health Sciences |
| Ketevan Nanobashvili | MD, PHD, University Of Georgia, School Of Health Sciences |
| Elza Nikoleishvili | MD, PHD, University Of Georgia, School Of Health Sciences |

ABSTRACT **Task:** Although the periodontal inflammatory diseases are very often during the pregnancy, little is known about the risk-factors that increase the frequency of periodontal disease incidence and affect its development during the pregnancy. This descriptive study assesses the prevalence of the periodontal diseases among the pregnant women in Tbilisi, the impact of their socio-economic status, hygiene habits and level of knowledge to their periodontal status.

Methods: This was an observational, cross-sectional study conducted among pregnant women. The respondents were distributed by Gynecological Centers and districts in Tbilisi. The survey was conducted at 24 Gynecological Centers. The target group of the study were 385 pregnant women aged 18 to 45 actually living in Tbilisi. The tool used in this study is a Structured Electronic Questionnaire. The oral health of the target group representatives was assessed by periodontal indexes, the CPITN-index and OHI-Jack R. Vermillion's oral hygiene index. Data entry and statistical analysis was carried out using a statistical program SPSS 23.0.

Results: The current pregnancy for most of respondents 37,9%(146) is the second, 50,6%(195) of the pregnant women are in the second trimester of the pregnancy, 47,8%(184) of the respondents are the bachelors' student or have completed a bachelor's stage of study. Due to the employment status, 39,5%(152) of them are housewives, and 64,2%(247) evaluate their economical condition as satisfactory; 30,9%(119) of the respondents have dental insurance and only 56,9(45)% uses this insurance for this purpose. 74,5%(287) of the pregnant women addresses the dentist only in case of pain or discomfort, 70,3%(270) of them have bleeding gums, 63,6%(245) of them feel pain or discomfort in the oral cavity and 59,7(230) of them have a swelling/pain in their gums. Only 11,7%(45) of gynecologists recommend their patients to plan a visit to the dentist. Pregnant women's awareness about the safety of dental manipulations is also quite low and it is 29,1%(112).

The statistical testing of the difference due to the qualitative variables was carried out using the Pearson's chi-square method; index of signification (p), which was less than 0,05, at (p<0,05) was considered as statistically significant.

KEYWORDS : Pregnancy, Periodontal diseases, Prevention, Tbilisi

Introduction:

Periodontal inflammatory diseases are the most common among the dental diseases and the microbes play a main etiological role in their development. However, these diseases are multifactorial, and various local and general factors affect their origin and development. (Tonetti MS, Jepsen S, Jin L, Otomo-Corgel J. 2017); (Daniel Kandelman, Sophie Arpin, Ramon J Baez, Pierre C Baehni, Poul E Petersen.2012); (Eija Könönen, Mervi Gursøy, and Ulvi Kahraman Gursøy.2019)

The pain, discomfort and tooth loss caused by the periodontal disease lead to the functional and aesthetic disorders and prevents human's healthy integration into society. The relationship between the oral health of the pregnant woman and normal growth and development of fetus is also very important. Gingivitis of pregnant women is the most common problem in the gestational period, according to some studies, it is revealed in 40% of pregnant women, while other studies name 100%. (Marin C, Segura-Egea JJ, Martínez-Sahuquillo A, Bullón P. 2005); (Oral care in pregnancy Zeynep Yenen, and Tijen Ataçağ. 2019)

The pregnancy causes physiological changes, including the hormones. During the pregnancy, a reversible light inflammation of the gums occurs, called "gingivitis of pregnant women". The untreated gingivitis can lead to periodontitis in 30-100% of the pregnant women, which affect from 5% to 20% of the pregnant women. (Muwazi L, Rwenyonyi CM, Nkamba M, Kutesa A, Kagawa M, Mugenyi G. 2014); (Morelli EL, Broadbent JM, Leichter JW, Thomson WM. 2018); (Monika Pandey, Mradula Chauhan, and Shally Awasthi. 2017); (Panayiotis Kouis, Paraskevi Kinni, Angelos Rigas.2018); (Zeba Jafri, Ashu Bhardwaj, Madhuri Sawai, and Nishat Sultan. 2016)

In 1996 Offenbacher presented a hypothesis that periodontal diseases may be a potential risk factor for premature birth. After that Michael Kerry and others in 2020-2021 presented a retrospective and connected studies in the Republic Rwanda and Romania present, which once again proves existence of this relationship. (Moneet Walia and Navdeep Saini. Offenbacher S, Lief S, Boggess KA, Murtha AP. 2016); (Yang, Irene RN Hu, Yi-Juan. 2016); (Corwin EJ, Hogue CJ, Pearce B. 2017); (Michael S. Kerr, Stephen Rulisa, Harlan Shiau. 2021); (A Roman, F Ticala, A Soanca, A Ciurea. 2020)

In 1891 (Miller WD. 1891) Miller published the Focal Infection Theory. He considered that periodontal infection is a bacterial reservoir that can worsen a systemic diseases. (Malvin E Ring. 2002). The endotoxins, obtained as a result of gram-negative bacterial infections, that contribute to the creation of the cytokine and prostaglandin (Interleukins (ILs) 1β (IL- 1β), IL-6, and tumor necrosis - factor α), stimulate the childbirth, while pro-inflammatory mediators can pass the placental barrier and cause a fetal intoxication that leads to premature birth and birth of low weight newborn. High concentration of cytokines among the pregnant women causes the damage to the uterine membrane, which in turn, leads to premature birth. (Sizzle F. Vanterpool, Kathleen Tomsin, Leticia Reyes. 2016); (Mradula Chauhan, and Shally Awasthi.2017); (Shinwan Kany, Jan Tilmann Vollrath. 2019).

The potential pathological mechanisms of periopathogens, especially p.gingivali and f.nuceatum are also studied by other authors. For example, p.gingivalis can infect the syncytiotrophoblast, chorionic trophoblasts, decidual cells and contribute to inflammation process by toll-like receptors (Gürsoy M, Pajukanta R, Sorsa T, Könönen E 2010); (Peter Chung, Rochelle Dumm, Nishant Joshi, Yiping W Han.2010); (J. Katz, K.T. Shiverick, T.A. Brown.2013)

Many infections undergo the screening (cytomegalovirus infection, simple herpes virus infection, hepatitis B, hepatitis C, Hepatitis B with streptococcus infection, listeriosis) during the pregnancy period (antenatal surveillance program. 2018) and very little attention is paid to the periodontal inflammation.

Material and Methods:

This descriptive study was carried out in order to assess the spread of the periodontal disease among the pregnant women, the impact of their socio-economic status, hygiene habits and the level of knowledge to the pregnant women periodontal status. The target group of the study were 385 pregnant women aged 18 to 45 actually living in Tbilisi. The respondents were distributed by Gynecological Centers and districts in Tbilisi. The survey was conducted at 24 Gynecological Centers. The tool used in this study is a Structured Electronic Questionnaire, which does not contradict the ethical principles of the study and is approved by the Council for the Ethical Issues of Biomedical Research. Information obtained from the questionnaire includes the following:

information about the pregnancy (number of the pregnancy, the trimester, process of the pregnancy), the level of awareness of the oral health condition during the pregnancy, the general health condition (existence of the chronic diseases), condition of the socioeconomical condition (education, employment, financial situation, social support), medical insurance and availability of the dental service, questions describing the dental behaviors (oral care practice, frequency of the visits to the dentist).

The questionnaire is attached by the purpose of the survey, the method of the survey and a written consent sheet for participation in the survey. After getting acquainted, the respondents signed a written consent and filled out a questionnaire and then their oral cavity was examined. The oral health of the target group representatives was assessed by periodontal indexes, the CPITN-index, which is used in determination of the need of treatment of periodontal inflammation, destruction of plaque, stone, and OHI-Jack R. Vermillion's oral hygiene index, which determines the level of hygiene. The target group of the study were 385 pregnant women aged 18 to 45 actually living in Tbilisi. Data entry and statistical analysis was carried out using a statistical program SPSS 23.0.

The statistical testing of the difference due to the qualitative variables was carried out using the Pearson's chi-square method; index of signification (p), which was less than 0,05, at (p<0,05) was considered as statistically significant.

Results and Discussion:

The current pregnancy for most of respondents 37,9%(146) is the second, for 32,7(126)% of the pregnant women the current pregnancy is the first, and for 22,1%(85) of the pregnant women the current pregnancy is the third (Diagram N1). 50,6%(195) of the respondents were in the second trimester of the pregnancy as of the date of survey, 17,4%(67) of the respondents were in the first trimester of the pregnancy, and 31,9%(123) were in the third trimester of the pregnancy (Diagram N2)

Diagram 1. Number of pregnancy

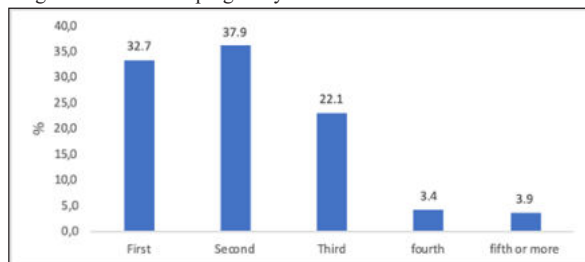
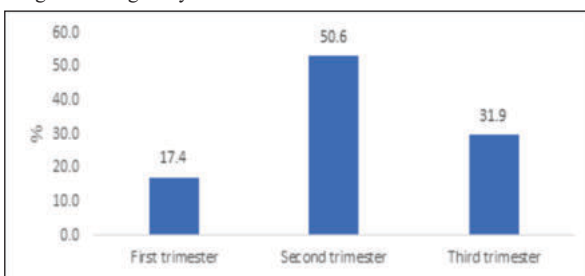
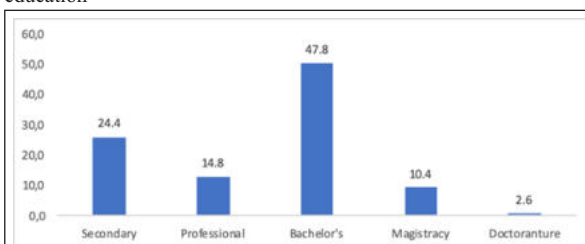


Diagram 2. Pregnancy trimester



A half of the respondents 47,8%(184) participating in the survey are bachelors' student or have completed the bachelor's stage of study. 24,4%(94) of them have a secondary education, 14,8%(57) have professional education and the smallest is a number of the respondents 2,6%(10) with master's and doctoral level of education (Diagram N3).

Diagram 3. Distribution of the respondents due to the levels of education



Due to the employment status, 39,5%(152) of the respondents are the housewives. 24,7%(95) of them are employed in the state sector. 22,9%(88) are self-employed and 10,1%(39) of them are employed in the state structures. (Diagram N4), the respondents evaluated their economical condition on a 5-point scale. Most of them evaluate their economical condition as satisfactory 64,2%(247), 16,9%(65) as average, and 16,1%(62) as bad. (Diagram N5)

Diagram 4. Distribution of the respondents due to the employment status

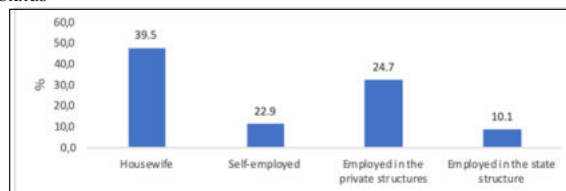
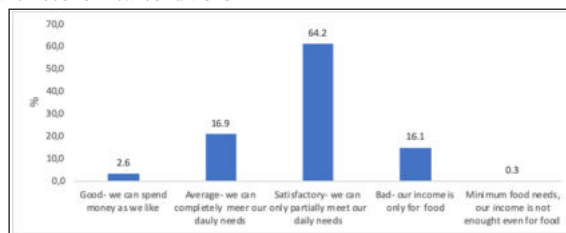
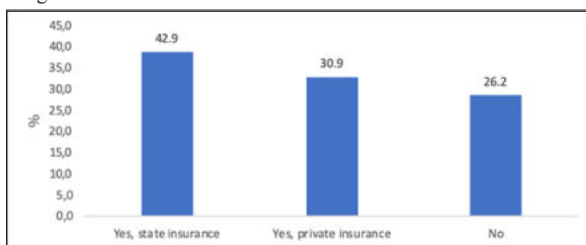


Diagram 5. Distribution of the respondents due to the evaluation of their economical conditions



30,9%(119) of the respondents have private insurance, 42,9% (165) of them have state insurance, which does not include a dentist service and 26,2% (101) has no insurance at all (Diagram N6)

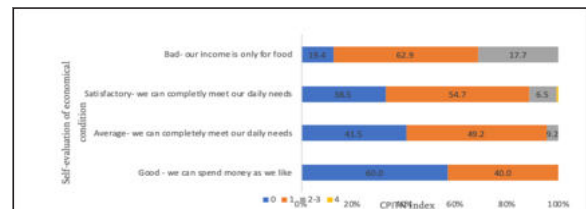
Diagram 6. Health insurance



The correlative analysis showed that there is a moderate positive correlation between the financial condition and oral hygiene and such correlation is statistically significant. It means that if the respondent evaluates his financial condition as bad, then the oral hygiene index is higher. (Spearman's rho=0.372, P<0.001)

We received the similar results in the correlation analysis between the financial condition evaluation and the CPITN index. There is a positive relatively weak correlation even between these two variables and relations between these variables are statistically significant (Spearman's rho=0,254, P<0,001) (Diagram N7).

Diagram 7. Distribution of respondents due to economic situation evaluation



Main reason for the visit to the dentist for 74,5%(287) of the pregnant women is an emergency/acute condition of their oral health, only 7,8%(30) of them sometimes visit a dentist for the purpose of prophylactic control (Diagram N8). 23,9%(92) of women have been to the dentists during the last 6 months, 25,2%(97) during the last period from 6 months to 1 year, and 26,8%(103) of them have been at the dentists during the period of last 1-3 years, and 19%(73) more than 3 years ago (Diagram N9).

Diagram 8. Frequency of the visit to the dentists

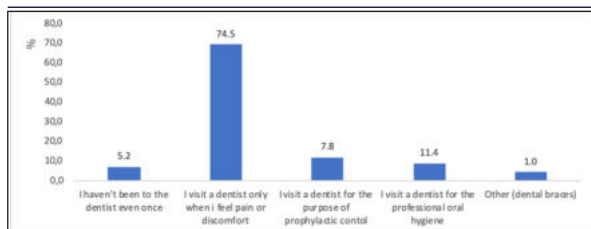
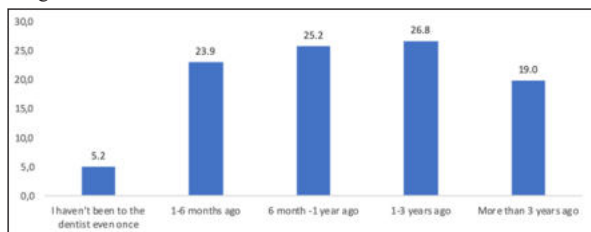


Diagram 9. Last visit to the dentists



47,8%(200) of the respondents note that they do not need to visit a dentist, 33,5%(129) note their socio-economic problems, and 14,5%(56) note that they are scared (Diagram N10). According to the survey only 11,7%(45) of gynecologists recommend their patients to plan a visit to the dentist. (Diagram N11).

Diagram 10. Reason for non-regular visits to the dentist

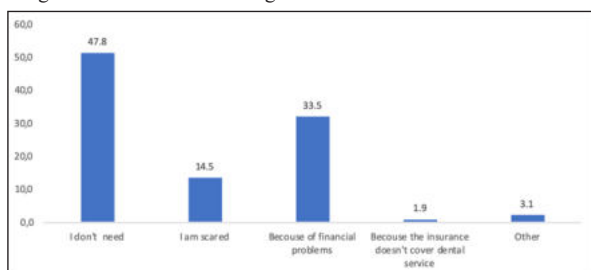
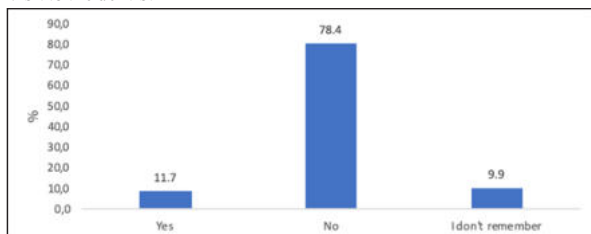


Diagram 11. Recommendations issued by the gynecologists for the visit to the dentist



According to our study most of the pregnant women 31,4%(121) mistakenly believe that X-ray examination of teeth, 61%(235) of responders don't know X-ray examination is safe or not, 60,8%(234) of responders don't know local anesthesia is safe or dangerous (diagram N12). The various types of changes occur in the oral cavity during the pregnancy, which can be associated with inflammatory diseases of periodontal tissue. According to the study results, 70,3%(270) of the pregnant women have a bleeding gums, 66,5% of them have the oral pain/discomfort and 59,7%(230) of them have a swelling of the gums/pain of the teeth, 38,7%(149) of them have an increased sensitivity to the cold food/drinks. The increased sensitivity to hot food/drinks is relatively rare symptom(Diagram N13).

Diagram 12. Awareness of the pregnant women about safety of the dental manipulations

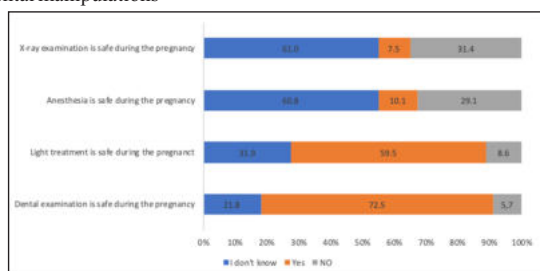
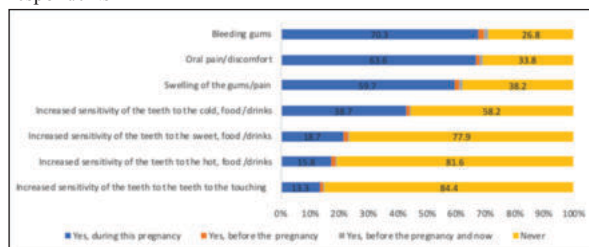


Diagram 13. Self-assessment of the oral health status by the respondents



Conclusion

As the results of our study show the periodontal diseases is distinguished by high prevalence among the pregnant women in Tbilisi. 70,3% of the pregnant women have bleeding gums, 63,6% of them feel a pain/discomfort in the oral cavity and 59,7% of them have a swelling/pain in their gums. Also, variety of risk factors were revealed, such as: poor socio-economic condition, lack availability to the dental service, low frequency of the visits to the dentist, low level of the awareness about the oral health importance during the pregnancy, which increases the risk of spread of the disease and affects development of the disease. Therefore, it is important to carry out the screening of the periodontal inflammatory diseases in order to avoid the threats caused by the periodontal diseases.

REFERENCES:

- Antenatal surveillance program. (2018) <https://nha.gov.ge/cc/dedata-da-bavshvta-jamrtelob>
- Chauhan M., Awasthi S. (2017) Interplay of cytokines in preterm birth Monika Pandey. *Indian J Med Res* 146(3):316–327. doi: 10.4103/ijmr.IJMR_1624_14.
- Corwin E.J., Hogue C.J., Pearce B., Cherie C.H., Read T.D., Mulle J., Dunlop A.L. (2017). Protocol for the Emory University African American vaginal, oral, and gut microbiome in pregnancy cohort study. *BMC Pregnancy Childbirth*. 17, 161 <https://doi.org/10.1186/s12884-017-1357-x>.
- FDI World Dental Federation. (2017). Tonetti MS, Jepsen S, Jin L, Otomo-Corgel J. Impact of the global burden of periodontal diseases on health, nutrition and wellbeing of mankind: A call for global action. *J Clin Periodontol*.
- Fardini Y., Chung P., Dumm R., Joshi N., Han Y.W. (2010) Transmission of diverse oral bacteria to murine placenta: evidence for the oral microbiome as a potential source of intrauterine infection. *Infect Immun* 78(4): 1789–1796. doi: 10.1128/IAI.01395-09.
- Jafri Z., Bhardwaj A., Sawai M, Sultan N. (2015) Influence of female sex hormones on periodontium: A case series. *J Nat Sci Biol Med* 6(Suppl 1): S146–S149. doi: 10.4103/0976-9668.166124.
- Katz J., Chegini N., Shiverick K. T., Lamont R. J. (2009) Localization of P. gingivalis in preterm delivery placenta. *J Dent Res*. 88(6):575-8. doi: 10.1177/002203450938032.
- Kandelman D., Arpin S, Baez R. J, Baehni P.C., Petersen P.E..(2012) Oral health care systems in developing and developed countries. *Periodontol* 60(1):98-109. doi: 10.1111/j.1600-0757.2011.00427.x.
- Kouis P, Kinni P., Rigas A., Papadouri T., Panayiotis K. Theodorou M. (2018) Maternal socioeconomic factors and the risk of premature birth and low birth weight in Cyprus: a case-control study Paraskevi Stylianou-Riga. *Reprod Health* . 2018 Sep 19;15(1):157. doi: 10.1186/s12978-018-0603-7.
- Könönen E., Gursoy M, Gursoy U.K. (2019) Periodontitis: A Multifaceted Disease of Tooth-Supporting Tissues. *J Clin Med* 31;8(8):1135. doi: 10.3390/jcm8081135.
- Li H, Wang J, Wu L, Lou J., Liang X., Xiao B., Zhu Y. (2018) The impacts of delivery mode on infant's oral microflora. *Sci Rep* 8, 11938. <https://doi.org/10.1038/s41598-018-30397-7>
- Marin C., Segura-Egea J.J., Martínez-Sahuquillo A., Bullón P. (2005) Correlation between infant birth weight and mother's periodontal status. *J Clin Periodontol* <https://doi.org/10.1111/j.1600-051X.2005.00661.x>
- Muwazi L., Rwonyonyi C.M., Nkamba M., Kutesa A., Kagawa M., Mugenyi G., Kwizera G., Okullo I. (2014) Periodontal conditions, low birth weight and preterm birth among postpartum mothers in two tertiary health facilities in Uganda. *BMC Oral Health* 28;14:42. doi: 10.1186/1472-6831-14-42.
- Mathew RJ, Bose A, Prasad JH, Muliyil JP, Singh D. (2014). Maternal periodontal disease as a significant risk factor for low birth weight in pregnant women attending a secondary care hospital in South India: a case-control study. *Indian J Dent Res*. 25:742–7. <https://doi.org/10.4103/0970-9290.152184>.
- Morelli E.L., Broadbent J.M., Leichter J.W., Thomson W.M. (2018). Pregnancy, parity and periodontal disease. *Aust Dent J* <https://doi.org/10.1111/adj.12623>.
- Periodontal Disease and Pregnancy Outcomes: Time to Move On? Sindhuk. Srinivas, M.D., MScEcorresponding author and Samuel Parry, M.D.2012<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3270055/>.
- Relationship between preterm birth and post-partum periodontal maternal status: a hospital-based Romanian study C Micu , A Roman , F Ticala, A Soanca, A Ciurea, A Objelean, M Iancu, D Muresan, G V Caracostea.2020 <https://pubmed.ncbi.nlm.nih.gov/32274638>.
- Riewe S.D., Mans J.J., Hirano T, Katz J, Shiverick K.T., Brown T.A., Lamont R.J. (2010) Human trophoblast responses to Porphyromonas gingivalis infection *Molecular Oral Microbiology*, 01 25(4):252-259 DOI: 10.1111/j.2041-1014.2010.00573.x PMID: 20618699 PMCID: PMC3665294.
- Ring M.E. (2002). W.D. Miller The pioneer who laid the foundation for modern dental research. *N Y State Dent J* 68(2):34-7. PMID: 11898270.
- Sree G. N., Jayasheela M., Vinayaka A.M., Gayathri G.V., Mehta D. S. (2020) Knowledge and Awareness among Gynecologists in Davangere about the Association between Periodontal Disease and Pregnancy Outcomes and Referral Pattern of Pregnant Woman to Periodontists - A Cross Sectional Survey *International Journal of Health Sciences and Research* Vol.10; Issue: 8; https://www.ijhsr.org/IJHSR_Vol.10_Issue.8_Aug2020/30.pdf.
- Vanterpool S.F., Tomlin K., Reyes L., Zimmermann L.J., Kramer B.W., Been J.V. (2016) Risk of adverse pregnancy outcomes in women with periodontal disease and the

- effectiveness of interventions in decreasing this risk: protocol for systematic overview of systematic reviews Sizzle. Syst Rev.5: 16. doi: 10.1186/s13643-016-0195-7.
22. Vollrath J.T., Relja B. (2019) Cytokines in Inflammatory Disease Shinwan Kany. *Int J Mol Sci* 28;20(23):6008. doi: 10.3390/ijms20236008.
 23. Walia M., Saini N. (2015) Relationship between periodontal diseases and preterm birth: Recent epidemiological and biological data. *Int J Appl Basic Med Res* 5(1): 2–6. doi: 10.4103/2229-516X.149217.
 24. Yenen Z., Ataçağ T. (2019). Oral care in pregnancy. *J Turk Ger Gynecol Assoc.* 20(4): 264–268. doi: 10.4274/jtgga.galenos.2018.2018.0139.
 25. Yang L., Hu, Y.J., Corwin E.J., Dunlop A.L. (2016). Exploring the maternal and infant Oral Microbioms. *J Perinat Neonatal Nurs.* 34(3):211-221. doi: 10.1097/JPN.0000000000000494.