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Implications of Eikenella corrodens in adverse pregnancy outcomes: The role of dental professionals – A narrative review

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ABSTRACT

This review elaborates on the mechanisms by which *E. corrodens* leads to APOs with a special emphasis on the role of dental professionals in their prevention. The analysis is based on open-access articles from PubMed, SCOPUS, WebofScience, and Google Scholar published in the English language without any restriction for the time of publication. A search was performed using the keywords 'Eikenella corrodens' and 'Pregnancy' to identify relevant open-access articles in PubMed, SCOPUS, WebofScience, and Google Scholar databases with full text available in the English language without any restriction for the time of publication *Eikenella corrodens* is a commensal bacterium usually found in the upper respiratory tract, mucosal surfaces like gastrointestinal and genitourinary tract as well as in the human dental plaque. The physiological alterations in pregnancy or lesions such as pregnancy-related gingivitis and pyogenic granuloma render the body susceptible to transient bacteremia. The hematogenous spread of *E. corrodens* is associated with several adverse pregnancy outcomes that lead to high morbidity and mortality rates for mothers as well as neonates.

Keywords: *Eikenella Corrodens; Pregnancy; Gingivitis; Periodontitis; Bacteremia*

1. INTRODUCTION

The human body experiences rapid transient alterations during pregnancy as a consequence of abrupt hormonal surges.[1] These alterations may dynamically affect various physiological systems and organs. The orofacial region witnesses a myriad of problems commonly including gingivitis, gingival hyperplasia, pyogenic granuloma, and salivary changes along with increased facial pigmentation.[2,3] Pyogenic granuloma, also termed "pregnancy tumors" or granuloma gravidarum, is one of

the most common oral manifestations of hormonal alterations in pregnancy with prevalence rates reported to be as high as ranging from 40 to 75%.[4,5]

Pregnancy tumors can cause bleeding gums, and the exposed blood vessels can serve as an entry point for bacteria to invade the body fluid and enter the hosts' systemic circulation. Coupled with the lowered body immunity during pregnancy, these events lead to a surge in the number of rapidly dividing bacteria in the bloodstream.[6] The resultant bacteremia may give rise to various adverse pregnancy outcomes (APOs) by virtue of the ability of certain species of bacteria to cross the placental barrier and harm the developing fetus.[7] These APOs include neonatal septicemia, chorioamnionitis, amniotic fluid infection syndrome, neonatal mortality, preterm labor, perinatal infection and congenital sepsis.[8,9]

Various pathogenic bacterial species present in the oral cavity may contribute to this phenomenon including Capnocytophaga, Fusobacterium nucleatum, Tennerella forsythia, Eikenella corrodens, Treponema denticola, Prevotella intermedia, Porphyromonas gingivalis, Aggregatibacter Actinomycetemcomitans (Figure 1).[10] While majority of these species belong to the orange and red complex and are thus, noted in advanced stages of periodontal diseases, the green complex species, Capnocytophaga and Eikenella, are predominant in the initial stages of gingivitis.[11-13] The species contribute to inflammation-mediated damage at a much early stage. The emphasis of researchers has mostly been on the more destructive orange and red complex bacteria rather than the green complex. The fact that the latter can lead to APOs at initial or milder levels of gingival diseases cannot be overlooked.[14] Thus, active vigilance against the initiator species is to be maintained to enable the progression of disease or development of APOs.

Figures Legends:

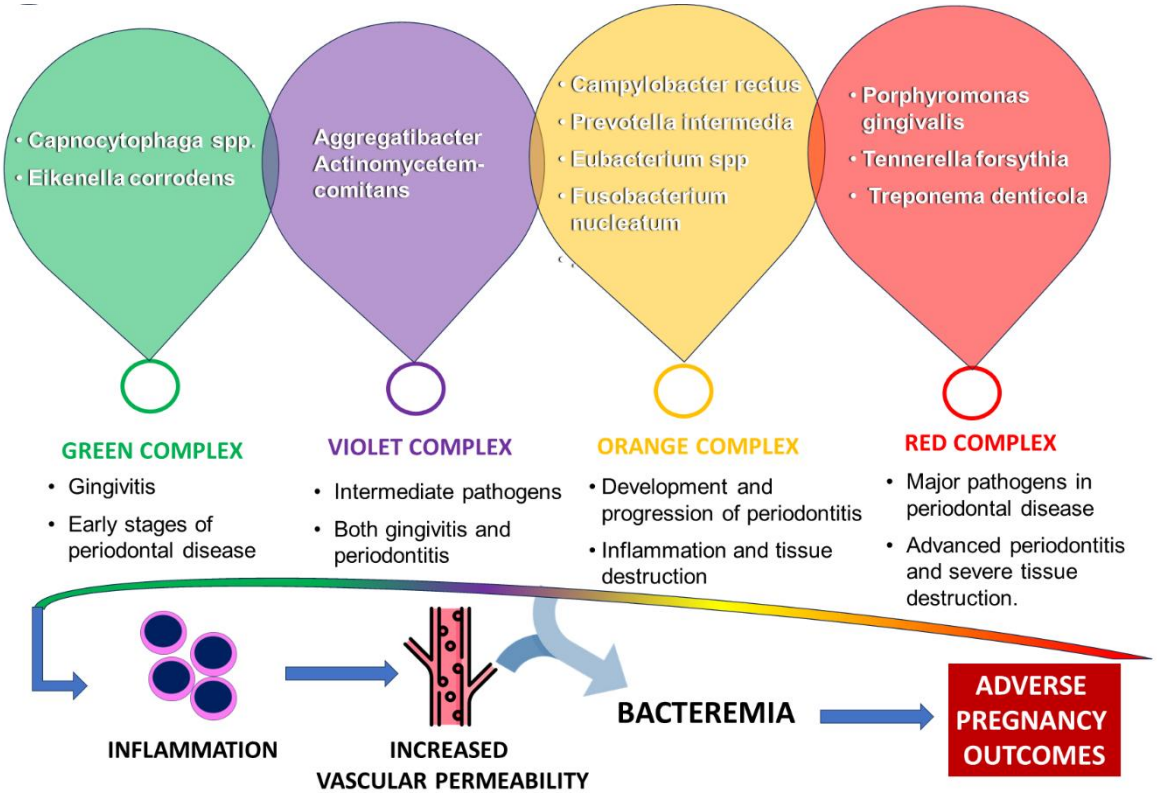

Figure 1: Different pathogens in dental plaque leading to adverse pregnancy outcomes

Even so, only scant data is available about these microorganisms and their relation to APOs.[7] Medical professionals should have adequate knowledge about the microorganisms that may cause harm to the developing fetus so that they can provide necessary medical care to pregnant women. Similarly, dentists can provide timely dental care to pregnant women to prevent the harmful effects of the early-stage plaque bacteria like *E. corrodens.* Dental professionals play a key role in this regard, as they are at the forefront when the individual's oral hygiene is concerned and thus, they need to have a sound understanding of this aspect of APOs. In this context, the present article focuses on elaborating the complex interplay between *E. corrodens* and APOs aiming to bridge the gap between existing data on *E. corrodens*-related APOs and the information available to prevent the harm that may come to the mother or fetus.

2. METHODOLOGY

A literature search was performed using the keywords 'Eikenella corrodens' and 'Pregnancy' to identify relevant open-access articles in PubMed, SCOPUS, WebofScience, and Google Scholar databases with full text available in the English language without any restriction for the time of publication. Relevant cross-references of interest were also identified from the full texts. The literature available in these articles was reviewed by three authors and the essential information was recorded as bullet points in an MS Word document. The data was structured and re-arranged according to different sub-topics and then drafted in the form of a manuscript text by the three authors, the peculiars of which were then reviewed by two subject experts.

3. PREGNANCY-RELATED PHYSIOLOGICAL AND MICROFLORA ALTERATIONS

Pregnancy is a dynamic state marked by numerous physiological and hematological changes. Various lesions occur during pregnancy due to changes in the levels of estrogen and progesterone, changes in the oral microbiome, and pregnancy-related physiologic immunodeficiency, all of which lead to a significant exacerbation of the pre-existing gingivitis.[2,3] Evolutionarily, it is preferable for inflammatory immune responses to be suppressed during pregnancy in order to prevent the possibility of fetal rejection.[15,16] The production of inflammatory cytokines and the activity of natural killer cells, inflammatory macrophages, and T-helper cells decrease during pregnancy.[17]

Leukocytosis is a common feature seen during pregnancy, which occurs as a response to microbial infections.[18] A pregnant woman's differential count frequently shows neutrophils as the commonest leukocyte present. There is impaired neutrophil apoptosis and toxic granulation in the pregnant female's neutrophil cytoplasm.[19] This causes a decrease in neutrophil chemotaxis and phagocytic activity, which is aided by inhibitory factors found in pregnant women's serum, which results in a reduction in neutrophil count and phagocytosis. This leads to a decline in the defence mechanisms of the body of a pregnant female and a concomitant increase in the virulence of the bacteria.

Consequently, various infections or inflammatory lesions may develop, with pregnancy gingivitis and pyogenic granuloma being the commonest ones among the oral lesions.[3] Studies have found the presence of gingivitis invariably in all women between the third and the eighth month of their pregnancy, with a steady decline after delivery.[20-22] Current literature states that most clinical symptoms associated with pregnancy gingivitis comprising gingival bleeding, tenderness and aesthetic problems are usually mild.[23] At times, lesions rich in vascularity such as pyogenic granuloma can cause profuse bleeding for prolonged periods or aggravation of symptoms which may, in turn, even force early induction of labor.[24,25] While the bleeding and symptoms may resolve after the delivery, the pre-term termination of pregnancy may have several other adverse effects on the child as well as the mother.[26,27]

Persistent gingivitis may lead to periodontitis characterized by aggressive destruction of the bone and soft tissues surrounding the teeth. Probing depths increase as the gingival inflammation increases in pregnancy. This is due to the movement of the gingival margin in a coronal direction because of inflammation-induced swelling of the gingiva.[28] The problem gets further aggravated by the buildup of subgingival calculus which is inaccessible to regular cleaning aids. The subsequent section describes *E. corrodens*, which is a green complex bacterium, seen in early stages of gingivitis, and its relation to APOs.

4. EIKENELLA CORRODENS

E. corrodens is a commensal bacterium of the oral cavity; however, its counts are significantly elevated in gingivitis and pregnancy due to the mechanisms described above.[29] It is a fastidious, facultative, anaerobic, gram-negative bacillus that is endogenous to the upper respiratory tract, mucosal surfaces of the gastrointestinal and genitourinary tracts, and human dental plaque.[30,31] *E. corrodens* grows slowly in blood agar or chocolate agar under aerobic conditions requiring a temperature of 35-37°C and 5% carbon dioxide for optimum growth.[31] The colonies are small and greyish (older colonies may turn light yellow), and they emit a bleach-like odour. A characteristic phenomenon of formation of pits on the agar plates when the bacteria is cultured has notoriously earned its name "corroding" bacteria.[32]

The organism is susceptible to fluoroquinolones, azithromycin, ampicillin, ureidopenicillins, second and third-generation cephalosporins, and tetracyclines.[33,34] On the other hand, resistance to clindamycin, erythromycin, metronidazole and aminoglycosides has been observed.[35] Infections caused due to *E. corrodens* have a slow or a languid course, usually taking more than a week from the time of injury to show any clinical manifestations of disease. The bacteria is also associated with meningitis, endocarditis, head and neck infections, intra-abdominal infections and gynecological infections.[36-38] Apart from causing upper respiratory tract infections and other head, face, and neck infections, it has been linked to a number of gynecological and pregnancy-related conditions.[39]

Spread of *E. corrodens* is primarily through the genitourinary tract, although another likely mode of spread is through the blood.[40] This aspect of its spread is relevant to the oral cavity, especially when the vascular permeability is increased due to pregnancy and gingivitis. Most important clinical manifestation in gingivitis is bleeding from gums, and this can serve as an entry point for bacteria into systemic circulation. Such dissemination of bacteria from the oral cavity to other organ systems usually leads to bacteremia. Bacteremia frequently occurs following dental procedures such as extractions, scaling and root planing as well as periodontal surgeries.[41] E. corrodens is amongst the microflorae that have the ability to cross the

placental barrier and harm developing fetuses, as well as result in a variety of APOs.[39]

5. THE RUINOUS ROLE OF *E. CORRODENS* IN PREGNANCY

E. corrodens has been implicated as the causative agent in chorioamnionitis of the placenta resulting in preterm labour.[42] The presence of oral pathogens in the placenta may be normal, although the quantity of some oral pathogens is greatly influenced by the periodontal health of the mother.[43] Early-stage periodontitis caused by *E. corrodens* evokes the release of inflammatory mediator Prostaglandin E_2 (PGE_2), which is a potential mediator in the pathogenesis of periodontitis (Figure 2). It has been demonstrated that the levels of PGE_2 are elevated in patients with periodontitis as compared to healthy individuals.[44] A possible link between women with preterm low birth weight pregnancy outcomes with higher levels of PGE_2 has been established owing to the tendency of latter to cause smooth muscle contractions.[41,45] Thus, it can be hypothesized that elevated levels of PGE_2 owing to the gingival and peridoontal diseases caused by E. corrodens during pregnancy can induce preterm labor thereby resulting in preterm low birth weight pregnancy outcomes.

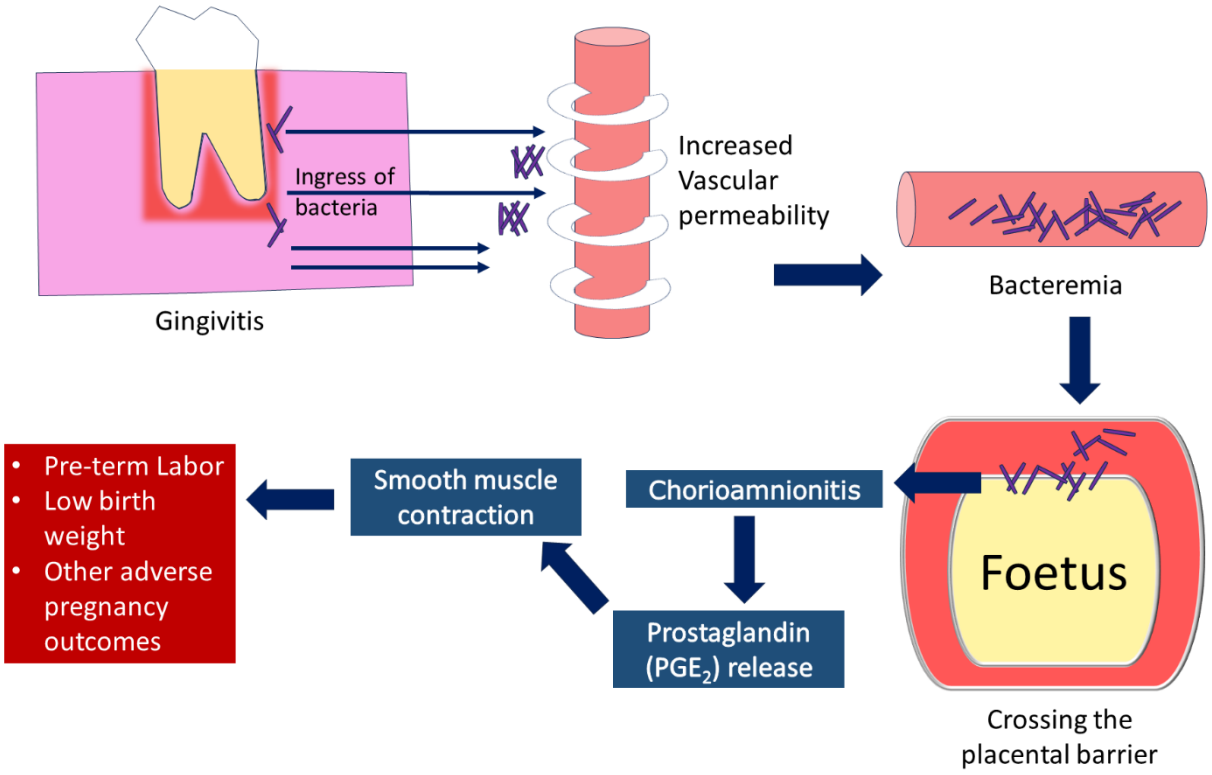

Figure 2: Probable Mechanism of Action of *E. corrodens* Associated Pregnancy Outcomes

Antibiotics such as ampicillin are generally administered after the rupture of chorioamniotic sac and the onset of premature labor.[46] There is a drastic drop in the bacterial count leading to negative culturing results of the sample collected, owing to its susceptibility to the drugs.[47] Therefore, detecting the organism in the neonates or the mother, and implicating its causative role in the APO becomes unlikely. This complicates the diagnostic process and is a cause of grave concern for clinicians.

6. ROLE OF HEALTHCARE PROFESSIONALS

It has been established that preterm births, low birth weights, and other APOs are linked to the poor dental health of pregnant women.[48] It is important to understand the attitude of pregnant women towards dental care so that oral health promotion programs may be targeted in the right direction to avoid pregnancy-related gingivitis and periodontitis by early diagnosis and treatment. Women should undergo a dental checkup before their pregnancy so that dentists can assess their oral health conditions and inform the female patients about anticipated changes in their oral tissues, particularly gingiva. The dental practitioners can also instruct the patients on preventive measures to be taken and put into practice in order to avoid oral health-related issues during their pregnancy.[49]

Pregnancy alone is not a reason to postpone routine dental therapy and treatments. To avoid the development of gingivitis, expectant mothers should be advised and educated by a dental expert on the importance of maintaining good oral health. Patients should also be informed about the precautions that must be followed before and after labor to avoid complications.

The California Dental Association Foundation in collaboration with The American College of Obstetrician and Gynaecologists have produced a guideline in 2010, stating "prevention, diagnosis and treatment of oral diseases, including, needing dental radiographs and use of local anesthesia, is highly beneficial and can be undertaken during pregnancy without additional fetal and maternal risk when compared to the risk of not providing care".[50]

Pregnant women are often warned, and are thus, equipped to handle bacterial infections stemming from the genitourinary or gastrointestinal tract, sites where *E. corrodens* is commonly detected. However, pregnant women are rarely informed about the risks associated with *E. corrodens* present in the dental plaque. Nutritional counseling as well as plaque-control measures should be incorporated and reinforced in a preventive periodontal health program for pregnant women. Increased tendency for gingival inflammation during pregnancy should be highlighted to the expectant parents, in hopes of incorporating healthy oral hygiene habits in the mother. Scaling and root planning should be performed whenever necessary during pregnancy.

Numerous non-modifiable factors like genetic predisposition, age or history of unassociated ailments can unfortunately be instrumental in APOs. Health care professionals can positively influence the outcome of a pregnancy by monitoring modifiable factors, such as the level of dental care provided and observed during pregnancy.[51] According to a study that looked at seven eligible controlled randomized trials, scaling and/or root planing during pregnancy significantly reduced preterm birth rates.[52] This solidifies the importance of advocating for dental care to improve pregnancy outcomes.

7. CHAIRSIDE TESTS AVAILABLE

MyPerioPath®

To identify the kind and quantity of important bacteria causing periodontal illnesses, MyPerioPath® examines saliva samples.[53] It allows for the individualization of periodontal therapy by identifying mouth infections early. It measures the bacterial load to identify high risk pathogens like *A. actinomycetemcomitans*, *P. gingivalis*, *T. forsythia*, and *T. denticola*. Moderate risk pathogens like *Eubacterium nodatum*, *Fusobacterium nucleatum*, *P. intermedia*, *Campylobacter rectus*, *Parvimonas micros*, and low risk pathogens like *E. corrodens* and *Capnocytophaga sputigena* can also be detected.

OMNIgene

OMNIgene, a genetic nucleic acid probe, has created species-specific DNA probe assays for eight periodontal diseases using the concepts of genetic engineering (*P.gingivalis*, *P.intermedia*, *A.actinomycetemcomitans*, *F.nucleatum*, *E.corrodens*, *C.rectus*, *T.forsythia*, *T.denticola*).[54,55] Samples of the subgingival plaque are taken from the patients and mailed for analysis. Results are delivered by phone, fax, or mail to the practitioner.

8. PATHWAY FOR FURTHER RESEARCH

There is a dearth of clinical studies to establish an accurate and significant pathogenesis behind the effects of *E. corrodens* on pregnancy and APOs. Spread of *E. corrodens* from oral sources such as dental plaque or gingival fluid has not been given its due importance and doing so is essential because dental plaque is a risk factor that can be modified and can be effectively controlled. There exists a multitude of opportunities for clinical research, to test and detect the strains associated with infection caused by *E. corrodens*, and whether the strains are antibiotic sensitive or resistant.

9. CONCLUSION

Pregnancy-related gingival and peridoontal diseases can lead to elevated levels of *E. corrodens* in the bloodstream. The resultant APOs as a consequence of bacteremia is a matter of grave concern. While the APOs cannot be treated, tackling the oral diseases is definitely possible. Dentists can play an extremely vital role in controlling mortality associated with preterm low birth weight pregnancy outcomes. Dental and other health care professionals should consistently educate pregnant women about the significance of maintaining oral health.

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REFERENCES

[1] Kazma JM, van den Anker J, Allegaert K, Dallmann A, Ahmadzia HK. Anatomical and physiological alterations of pregnancy. J Pharmacokinet Pharmacodyn. 2020;47(4):271-85.

[2] Perwez E, Sachdeva S, Khan A, Mallick R. Dental Health Concerns in Pregnancy: Need for a Collaborative Management Approach. Br J Med Health Res. 2020;7(10).

[3] Kumar V, Sharma S, Sheikh B. Oral Health during Pregnancy. Infections and Pregnancy 2022 Mar 26 (pp. 475-490). Singapore: Springer Singapore.

[4] Gul A, Shahzad M, Abbasi AR, Shaikh TH, Khan TA, Jalbani B. Outcome of surgical excision for managing the oral pyogenic granuloma. J Pharm Res Int. 2021;33(32A):127-33.

[5] Naz S, Naeem S, Rehman A, Jadoon Z, Khan N, Saad AB. Clinico-pathological Spectrum of Pyogenic Granuloma in Patients Presenting at Ayub Teaching Hospital, Abbottabad. Pak J Med Health Sci. 2023;17(08):29-.

[6] Lohiya DV, Mehendale AM, Lohiya DV, Lahoti HS, Agrawal VN, Lahoti H. Effects of Periodontitis on Major Organ Systems. Cureus. 2023;15(9).

[7] Xu B, Han YW. Oral bacteria, oral health, and adverse pregnancy outcomes. Periodontol 2000. 2022;89(1):181-9.

[8] Blauvelt CA, Nguyen KC, Cassidy AG, Gaw SL. Perinatal outcomes among patients with sepsis during pregnancy. JAMA Netw Open. 2021;4(9):e2124109-.

[9] Bobetsis YA, Graziani F, Gürsoy M, Madianos PN. Periodontal disease and adverse pregnancy outcomes. Periodontol 2000. 2020;83(1):154-74.

[10] Abdulkareem AA, Al-Taweel FB, Al-Sharqi AJ, Gul SS, Sha A, Chapple IL. Current concepts in the pathogenesis of periodontitis: from symbiosis to dysbiosis. J Oral Microbiol. 2023;15(1):2197779.

[11] Gambin DJ, Vitali FC, De Carli JP, Mazzon RR, Gomes BP, Duque TM, et al. Prevalence of red and orange microbial complexes in endodontic-periodontal lesions: A systematic review and meta-analysis. Clin Oral Investig. 2021:1-4.

[12] Wirth R, Maróti G, Lipták L, Mester M, Al Ayoubi A, Pap B, et al. Microbiomes in supragingival biofilms and saliva of adolescents with gingivitis and gingival health. Oral Dis. 2022;28(7):2000-14.

[13] Iniesta M, Chamorro C, Ambrosio N, Marín MJ, Sanz M, Herrera D. Subgingival microbiome in periodontal health, gingivitis and different stages of periodontitis. J Clin Periodontol. 2023;50(7):905-20.

[14] Andonova I, Iliev V. Oral anaerobic microflora and pregnancy complication. Open Access Maced J Med Sci. 2021;9(B):1681-5.

[15] Mincheva-Nilsson L. Immunosuppressive protein signatures carried by syncytiotrophoblast-derived exosomes and their role in human pregnancy. Front Immunol. 2021;12:717884.

[16] Nguyen LM, Omage JI, Noble K, McNew KL, Moore DJ, Aronoff DM, et al. Group B streptococcal infection of the genitourinary tract in pregnant and non-pregnant patients with diabetes mellitus: An immunocompromised host or something more?. Am J Reprod Immunol. 2021;86(6):e13501.

[17] Zhang X, Wei H. Role of decidual natural killer cells in human pregnancy and related pregnancy complications. Front Immunol. 2021;12:728291.

[18] Azab AE, Albasha MO, Jbireal JM, El Hemady SY. Haematological Changes during Pregnancy: Insight into Anaemia, Leukocytosis, and Thrombocytopenia. East Afr Scholars J Med Sci. 2020;3(5):185-92.

[19] Bert S, Ward EJ, Nadkarni S. Neutrophils in pregnancy: New insights into innate and adaptive immune regulation. Immunology. 2021;164(4):665-76.

[20] Geurs NC, Jeffcoat MK, Tanna N, Geisinger ML, Parry S, Biggio JR, et al. A Randomized Controlled Clinical Trial of Prenatal Oral Hygiene Education in Pregnancy-Associated Gingivitis. J Midwifery Womens Health. 2023;68(4):507-16.

[21] Kaura MA, Bawa HM, Ekuase E, Bamgbose BO. Oral hygiene level and prevalence of gingivitis amongst pregnant women in a Nigerian teaching hospital. J Dentomaxillofac Sci. 2021;6(1):10-6.

[22] Vivian GA, Beatriz QP. Gingival Manifestations in Pregnant Patients and How they Affect the Psychology in the Third Trimester of Pregnancy. J ReAttach Therapy Dev Divers. 2023 ;6(9(S2)):408-16.

[23] Gare J, Kanoute A, Orsini G, Gonçalves LS, Ali Alshehri F, Bourgeois D, et al. Prevalence, severity of extension, and risk factors of gingivitis in a 3-month pregnant population: a multicenter cross-sectional study. J Clin Med. 2023;12(9):3349.

[24] Jadhav AN, Shushma G, Siddiqui UH, Sharma M, Shaikh YI, Tarte PR. Protocol for management of pregnant patients requiring emergency minor oral surgical procedures: a prospective study in 52 patients. J Korean Assoc Oral Maxillofac Surg. 2023 Feb 2;49(1):21.

[25] Kumar V, Sharma S, Sheikh B. Oral Health during Pregnancy. InInfections and Pregnancy 2022 Mar 26 (pp. 475-490). Singapore: Springer Singapore.

[26] Ermatov NJ, Bobomurodov TA, Sagdullaeva MA. Hygiene analysis of risk factors affecting the growth and development of pre-term children. Art of Medicine. Int Med Sci J. 2022 Nov 11;2(3).

[27] Shavazi NN. Management of pregnant women from a high risk group with threat and premature labor. Prevention of intra-perinatal outcomes. J Adv Med Dent Sci Res. 2021 Jun 1;9(6):10-20.

[28] Novák T, Németh GL, Kozinszky Z, Zsoldiné Urbán E, Gorzó I, Radnai M. Could Poor Periodontal Status be a Warning Sign for Worse Pregnancy Outcome?. Oral Health Prev Dent. 2020;18(2):165-70.

[29] Mesa F, Pozo E, Blanc V, Puertas A, Bravo M, O'Valle F. Are periodontal bacterial profiles and placental inflammatory infiltrate in pregnancy related to birth outcomes?. J Periodontol. 2013 Sep;84(9):1327-36.

[30] Patrick S, Duerden BI. Non-Sporing Gram-Negative Anaerobes. Principles and practice of clinical bacteriology. 2006 Jan 20:541-56.

[31] Li L, Shi YB, Weng XB. Eikenella corrodens infections in human: Reports of six cases and review of literatures. J Clin Lab Anal. 2022 Feb;36(2):e24230.

[32] Bernard KA, Burdz T, Wiebe D, Bernier AM. Description of Eikenella halliae sp. nov. and Eikenella longinqua sp. nov., derived from human clinical materials, emendation of Eikenella exigua Stormo et al. 2019 and emendation of the genus Eikenella to include species which are strict anaerobes. Int J Syst Evol Microbiol. 2020 May;70(5):3167-78.

[33] Rodríguez-Rojas L, Suarez-López A, Cantón R, Ruiz-Garbajosa P. Eikenella corrodens causing deep-seated infections. Six-year experience in a University Hospital in Madrid. Enferm Infecc Microbiol Clin. 2020 Feb 1;38(2):76-8.

[34] Udaka T, Hiraki N, Shiomori T, Miyamoto H, Fujimura T, Inaba T, et al. Eikenella corrodens in head and neck infections. J Infect. 2007 Apr 1;54(4):343-8.

[35] Penton III M, Oraa SS, Abdelhemid A, Otto C, Hammerschlag MR. Head and neck infections in children due to Eikenella corrodens: Report of three cases and review of literature. Int J Pediatr Otorhinolaryngol. 2020 Nov 1;138:110287.

[36] Khan A, Kamal R, Suleman B, Nizamuddin S. An Unusual Case of Subcutaneous Arm Abscess Caused by Eikenella corrodens and Streptococcus intermedius. Infectious Dis J Pak. 2021;30(3):86-8.

[37] Kim YK, Han MS, Yang SI, Yun KW, Han DH, Kim JY, et al. Epidural Abscess Caused by Eikenella corrodens in a Previously Healthy Child. Pediatr Infect Vaccine. 2019 Aug 1;26(2):112-7.

[38] Revest M, Egmann G, Cattoir V, Tattevin P. HACEK endocarditis: state-of-the-art. Expert Rev Anti Infect Ther. 2016 May 3;14(5):523-30.

[39] Garnier F, Masson G, Bedu A, Masson P, Decroisette E, Guigonis V, et al. Maternofetal infections due to Eikenella corrodens. J Med Microbiol. 2009;58(2):273–5.

[40] Al Saleemi W, Al Balushi A, AlAzri A, Al Shaaibi M, Al-Jardani A, Al Rashdi A, et al. Eikenella Corrodens, Fusobacterium Nucleatum and Parvimonas Micra: A Case of Polymicrobial Brain Abscess. Am J Med Case Rep. 2024 Mar 17;12(3):42-5.

[41] Waghmare AS, Vhanmane PB, Savitha B, Chawla RL, Bagde HS. Bacteremia following scaling and root planing: A clinico-microbiological study. J Indian Soc Periodontol. 2013;17(6):725–30.

[42] Garvey A, Powell J, Murphy B, O'Connell N, Imcha M, Philip RK. Youngest survivor of perinatal infection by Eikenella corrodens: case analysis and literature review highlighting the merits of placental swab culture. New Microbes New Infect. 2018;21:81–5.

[43] Faupel-Badger JM, Hsieh CC, Troisi R, Lagiou P, Potischman N. Plasma volume expansion in pregnancy: Implications for biomarkers in population studies. Cancer Epidemiol Biomarkers Prev. 2007;16(9):1720–3.

[44] Jang H, Patoine A, Wu TT, Castillo DA, Xiao J. Oral microflora and pregnancy: a systematic review and meta-analysis. Sci Rep. 2021;11:1-31.

[45] Kostadinov S, Pinar H. Amniotic Fluid Infection Syndrome and Neonatal Mortality Caused by Eikenella corrodens. Pediatr Dev Pathol. 2005;8(4):489–92.

[46] Esteves JS. Premature Rupture of Membranes. Perinatology: Evidence-Based Best Practices in Perinatal

Medicine. 2022:635-46.

[47] Li L, Xu L, Zhu R, Song J, Wang X. Effect of prior receipt of antibiotics on the pathogen distribution: a retrospective observational cohort study on 27,792 patients. BMC Infect Dis. 2020 Dec;20:1-0.

[48] Padilla-Cáceres T, Arbildo-Vega HI, Caballero-Apaza L, Cruzado-Oliva F, Mamani-Cori V, Cervantes-Alagón S, et al. Association between the risk of preterm birth and low birth weight with periodontal disease in pregnant women: an umbrella review. Dent J (Basel). 2023 Mar 7;11(3):74.

[49] Blanc V, O'Valle F, Pozo E, Puertas A, León R, Mesa F. Oral bacteria in placental tissues: increased molecular detection in pregnant periodontitis patients. Oral Dis. 2015;21(7):905–12.

[50] Båge T, Kats A, Silva Lopez B, Morgan G, Nilsson G, Burt I, et al. Expression of prostaglandin E synthases in periodontitis: Immunolocalization and cellular regulation. Am J Pathol. 2011;178(4):1676–88.

[51] Tarannum F, Faizuddin M, Madaiah H. Gingival crevicular fluid prostaglandin E2 level as a predictor of preterm low birth weight: a pilot investigation. J Oral Sci. 2011;53(3):293–300.

[52] Konopka T, Rutkowska M, Hirnle L, Kopec W, Karolewska E. The secretion of prostaglandin E2 and interleukin 1-beta in women with periodontal diseases and preterm low-birth-weight. Bull Gr Int Rech Sci Stomatol Odontol. 2003;45(1):18–28.

[53] Sruthy MS, Sanjeev R, Shyamaladevi MP. Chair Side Tests: En Route to Smarter Periodontics. Evaluation of Corah's Dental Anxiety Scale and Visual Analogue Scores (VAS) for patients undergoing Periodontal Therapy: A Pilot Study. Int J Periodontics Restorative Dent. 2021;41:67.

[54] Colameco S, Brown A, Parks TC. Ambient temperature stabilization of SARS-CoV-2 viral RNA in OMNIgene®• ORAL (OME-505) collected saliva samples.

[55] Pittman TW, Decsi DB, Punyadeera C, Henry CS. Saliva-based microfluidic point-of-care diagnostic. Theranostics. 2023;13(3):1091.