

**Ministry of Higher Education
and Scientific Research
University of Diyala
College of Medicine**



Oral findings and laboratory investigations in pregnancy in Al-Batool Teaching Hospital

Submitted to the Council of the College of Medicine, Diyala University,
in Partial Fulfillment of Requirements for the Bachelor Degree in
medicine and general surgery.

SUBMITTED BY

SAVANNA SAEED FARES

SUPERVISED BY

DR. HAYDER MAHDI IDAN

2022-2023

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

(يَرْفَعِ اللَّهُ الَّذِينَ آمَنُوا مِنْكُمْ وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ وَاللَّهُ بِمَا تَعْمَلُونَ خَبِيرٌ)

Acknowledgement

I owe a great many thanks to the great people who helped and supported me to complete this project.

My deepest thanks to **(Dr. Hayder Mahdi Idan)** my teacher and supervisor for guiding me in the article by correcting the mistakes and giving him valuable opinions in many aspects in both scientific facts and literature ones. I hope all the best and successes to him in his career future.

I would like to express my gratitude towards **My parents** for their kind cooperation and encouragement which help me in completion of this project.

My thanks and appreciations also go to **My best friends** and their support in developing the project and people who have willingly helped me out with their abilities.

List of contents

Acknowledgement			2
Abstract			4-5
Introduction			6-9
Aims of the study			10
Subjects, materials and methods			11-12
Results	2	1	13-15
	0	4	
Discussion	0	2	16-18
	2	2	
Conclusions			19
References			20-22

Abstract

Background: Pregnancy is a dynamic physiological state evidenced by several transient changes. These can develop into various physical signs and symptoms that can affect the patient's health

During pregnancy, woman's organs undergo various physiological, neurological, and hormonal changes, in turn, the oral cavity shows some events during this period also hematological profile is considered one of the factors affecting pregnancy and its outcome. The hematologic system undergoes a series of adaptive changes in preparation for fetal hematopoiesis and wellbeing while also serving as a cushion against expected blood loss at delivery

Objectives: To determine the prevalence of oral manifestations in the third trimester of pregnancy and detect the hemoglobin level and platelet counts in relation to pregnancy and comparison with non-pregnant women (control group).

Subjects, materials and methods: The study samples consist of (50) pregnant at third trimester and (20) control group, the study conducted from the period (10/2022) to (3/2023) to determine the prevalence of oral manifestations in Al-Batool Teaching Hospital in Diyala with age range from (16- 40 years old), detection the hemoglobin level and platelet counts. The data were collected using questionnaires. The questionnaires had two sections. The first section contained personal information. The second section involved questions related to oral manifestations. The blood collected into small plastic polyethylene tube. The collected blood, later used for various biochemical studies including the following hemoglobin level and platelet counts. **Statistical analysis:** Data of present study were analyzed by SPSS version 24 program. Ordinal and nominal data were described as frequency and percentage, and the differences between percentages were measured by chi-square test. Numerical data were described as Mean \pm stander deviation. The differences between means were measured by independent t test. The levels of significant was 0.05 (this paragraph putting after material and methods).

Results: The present study showed that highly significant different ($p<0.001$) between age groups and study groups. Out of 50 pregnant women 6 (12%) were complaining from aphthous ulcer, 4 (8%) complaining from angular cheilitis, 24 (48%) complaining from bad odor and 3 (6%) complaining from burning mouth syndrome with a statistically highly significant relationship compared to control groups. Results of current study showed there is significant different ($p<0.05$) of mean levels of hemoglobin between pregnant and control group. While highly significant different ($P<0.001$) of mean levels of platelets, between pregnant and control groups. The mean levels of hemoglobin and platelets were lowest in pregnant group (9.82 ± 1.55 and 247.88 ± 70.63) than controls (12.83 ± 1.86 and 319.35 ± 94.82).

Conclusions: Clinical examination of oral cavity during pregnancy recorded many oral manifestations involving (aphthous ulcer, angular cheilitis, bad odor and burning mouth syndrome), Bad odor is the most prevalent oral manifestations in pregnant group. The mean levels of hemoglobin and platelets were lowest in pregnant group.

Introduction

Pregnancy is the time during which one or more offspring develops (gestates) inside a woman's uterus (womb). [1,2] A multiple pregnancy involves more than one offspring, such as with twins. [3]

Childbirth typically occurs around 40 weeks from the start of the last menstrual period, a span known as the gestational age. [1,4] This is just over nine months. Counting by fertilization age, the length is about 38 weeks. [2,4] Pregnancy is "the presence of an implanted human embryo or fetus in the uterus"; implantation occurs on average 8–9 days after fertilization. An embryo is the term for the developing offspring during the first seven weeks following implantation (i.e. ten weeks' gestational age), after which the term fetus is used until birth. [4]

Signs and symptoms of early pregnancy may include missed periods, tender breasts, morning sickness (nausea and vomiting), hunger, implantation bleeding, and frequent urination. [5] Pregnancy may be confirmed with a pregnancy test. [6] Methods of birth control—or, more accurately, contraception—are used to avoid pregnancy.

Pregnancy is divided into three trimesters of approximately three months each. The first trimester includes conception, which is when the sperm fertilizes the egg. The fertilized egg then travels down the Fallopian tube and attaches to the inside of the uterus, where it begins to form the embryo and placenta. During the first trimester, the possibility of miscarriage (natural death of embryo or fetus) is at its highest. Around the middle of the second trimester, movement of the fetus may be felt. At 28 weeks, more than 90% of babies can survive outside of the uterus if provided with high-quality medical care, though babies born at this time will likely experience serious health complications such as heart and respiratory problems and long-term intellectual and developmental disabilities.

Complications of pregnancy may include disorders of high blood pressure, gestational diabetes, iron-deficiency anemia, and severe nausea and vomiting. [1]

The increased hormones in the body might make mouth an ideal breeding ground for plaque. An increase in the levels of estrogen and progesterone might exacerbate the response of the gums to plaque and cause gingivitis or inflamed gums. Swollen gums have pockets where food gets lodged and cause bad odor. Good hygiene can reduce plaque and thus reduce the swelling of gums in pregnancy. [7]

Pregnancy-induced nausea and vomiting due to morning sickness are experienced by 66% of pregnant women. Frequent vomiting leads to the creation of an acidic environment in the mouth and subsequent demineralization of the teeth. It makes the teeth more prone to food lodgment and decay, which can cause a bad odor. [8]

Mouth ulcers are small, often-painful sores that appear inside the mouth, most commonly on the inside of the cheeks and lips, and occasionally on the tongue. Mouth ulcers are often caused by errant bites, cuts, burns from foods or drinks, or excess stress or fatigue, but they can also be symptoms of the hormonal imbalances triggered during pregnancy. [9]

Mouth ulcers can be triggered by hormonal changes in the body, so though pregnancy is not a DIRECT cause of mouth ulcers, it CAN make them more likely to appear. While pregnant, a woman's immune system tends to be lower than normal, leaving her more susceptible to ailments such as the flu, the common cold, and mouth ulcers. [9]



Figure (1) Aphthous ulcer in the oral cavity.

Angular cheilitis is thought to be multifactorial disorder of infectious origin, [10] with many local and systemic predisposing factors. [11] The sores in angular cheilitis are often infected with fungi (yeasts), bacteria, or a combination; this may represent a secondary, opportunistic infection by these pathogens. Some studies have linked the initial onset of angular cheilitis with nutritional deficiencies, especially of the B (B2-riboflavin) vitamin and iron (which causes iron deficiency anemia), [12] which in turn may be evidence of malnutrition or malabsorption.



Figure (2) Angular cheilitis in at angle of the mouth.

There is a physiological decrease in platelet count during normal pregnancy due to hemodilution, increased consumption in peripheral tissue and increased aggregation (higher levels of thromboxane A₂). The physiological thrombocytopenia of pregnancy is mild and has no adverse effects for the mother and fetus. By contrast, a significant thrombocytopenia associated with medical conditions can have serious maternal-fetal consequences and requires specific monitoring and appropriate management. [13]

During pregnancy, anemia increased more than fourfold from the first to third trimester. It is a well-established fact that there is a physiological drop in hemoglobin (Hb) in the mid trimester. This physiological drop is attributed to increase of plasma volume and hence decrease of blood viscosity led to better circulation in placenta. [14]

Therefore, the present study was investigated in order to show the prevalence of oral manifestations in the pregnant women.

Finally, the research is supplemented with biochemical studies for different laboratory investigations to detect the hemoglobin level and platelet counts in relation to pregnant women and comparison with non-pregnant women (control group).

Aims of the study

The present study will design to

1-Determine the prevalence of oral manifestations in the third trimester of pregnancy, to provide a base line information for future studies and comparison and to correlate demographic with clinical finding.

2-Detect the hemoglobin level and platelet counts in relation to pregnancy and comparison with non-pregnant women (control group).



Subjects, materials and methods

1-The samples

The study samples consist of (50) pregnant at third trimester and (20) control group, the study conducted from the period (10/ 2022) to (3/2023) to determine the prevalence of oral manifestations in Al-Batool Teaching Hospital in Diyala with age range from (16- 40 years old), detection the hemoglobin level and platelet counts.

2-Instruments used for oral examination of patients

- Disposable plane mouth mirror.
- Piece of gauze.
- Plastic spatula.

3-Materials:

Material used for biochemical analyses

Equipment and Kits

- Spectrophotometer.
- Water bath at 37 °c temperature.
- Vortex mixture.
- Stop wax
- Centrifuge.
- Disposable syringes 5ml.
- Pipettes "precision and adjustable".
- Test tubes (different sizes).

4- Methods

-Method of examination

A-Questionnaire

B-Oral examination

All the patients examined by a single examiner, under standardized conditions; the oral cavity examined in an artificial light by using a mouth mirror.

C- Oral manifestations:

Oral manifestations were classified according to the following criteria: -

a-Aphthous ulcer:

Presents as a painful open sore inside the mouth, or upper throat characterized by a break in the mucous membrane.

b-Angular cheilitis:

Appear as inflammatory lesion at the labial commissure, or corner of the mouth, and often occurs bilaterally. The condition manifests as deep cracks or splits. In severe cases, the splits can bleed when the mouth is opened and shallow ulcers or a crust may form.

c-Burning mouth syndrome (BMS):

Burning mouth syndrome causes chronic burning pain in the mouth, the pain from burning mouth syndrome may affect the tongue, gums, lips, inside of the cheeks, roof of the mouth, or widespread areas of the whole mouth. The pain can be severe.

d-Bad odor:

Halitosis, or bad breath, is a term used to describe noticeably unpleasant odors exhaled in breathing—whether the smell is from an oral source due to bacteria or otherwise.

5-Biochemical study

Specimen collection: the blood collected into small plastic polyethylene tube, then collected blood used for various biochemical studies including the following: a- Hemoglobin. b- Platelet counts.

Statistical analysis:

Data of present study were analyzed by SPSS version 24 program. Ordinal and nominal data were described as frequency and percentage, and the differences between percentages were measured by chi-square test. Numerical data were described as Mean \pm stander deviation. The differences between means were measured by independent t test. The levels of significant was 0.05 (this paragraph putting after material and methods).

Results

The study samples consist of (50) pregnant at third trimester and (20) control group, with age range from (16- 40 years old).

The present study showed that highly significant different ($p < 0.001$) between age groups and study groups. (21-30) years scored highest percentage (50.0%) in patients compared to (≤ 20) years that scored highest percentage (65.0%) in controls. While (≤ 20) years scored lowest percentage (20.0%) in patients compared to (31-40) years that scored lowest percentage (5.0%) in controls as shown in (table 1 and figure 3).

Table (1): comparative of age groups between study groups

			Groups		Total	P value
			Pregnant	Control		
Age groups (years)	≤ 20	N	10	13	23	$P < 0.001$ *** (HS)
		%	20.0%	65.0%	32.9%	
	21-30	N	25	6	31	
		%	50.0%	30.0%	44.3%	
	31-40	N	15	1	16	
		%	30.0%	5.0%	22.9%	
Total		N	50	20	70	
		%	100.0%	100.0%	100.0%	

HS= Highly significant

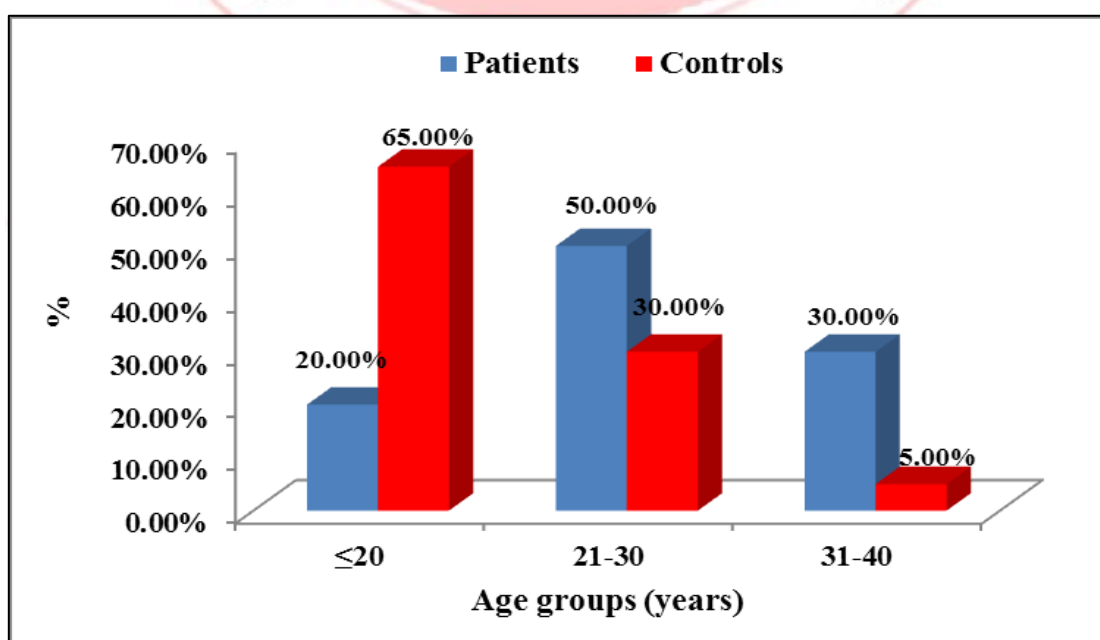


Figure (3): comparative of age groups between study groups

Out of 50 pregnant women 6 (12%) were complaining from aphthous ulcer, 4 (8%) complaining from angular cheilitis, 24 (48%) complaining from bad odor and 3 (6%) complaining from burning mouth syndrome with a statistically highly significant relationship compared to control groups as shown in (table 2 and figure 4).

Table (2): Distribution of samples study according to oral manifestations

Groups		no	yes	total	p value
Aphthous ulcer	Pregnant	44 (88%)	6 (12%)	50	$P < 0.001^{***}$ (HS)
	Controls	20 (100%)	0 (0%)	20	
Angular cheilitis	Pregnant	46 (92%)	4 (8%)	50	$P < 0.001^{***}$ (HS)
	Controls	20 (100%)	0 (0%)	20	
Bad odor	Pregnant	26 (52%)	24 (48%)	50	$P < 0.001^{***}$ (HS)
	Controls	17 (85%)	3 (15%)	20	
Burning mouth syndrome	Pregnant	47 (94%)	3 (6%)	50	$P < 0.001^{***}$ (HS)
	Controls	20 (100%)	0 (0%)	20	

HS= Highly significant

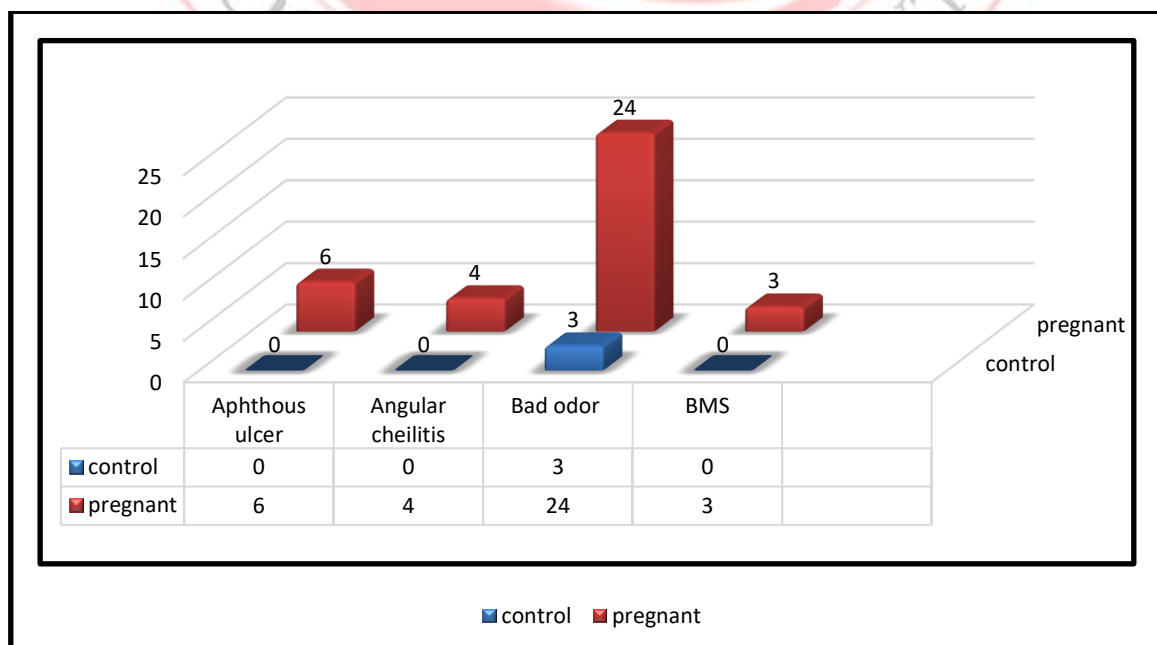


Figure (4): The bar chart illustrated the oral manifestations in pregnant and control groups

Results of current study showed there is significant different ($p < 0.05$) of mean levels of hemoglobin between pregnant and control group. While highly significant different ($P < 0.001$) of mean levels of platelets, between pregnant and control groups. The mean levels of hemoglobin and platelets were lowest in pregnant group (9.82 ± 1.55 and 247.88 ± 70.63) than controls (12.83 ± 1.86 and 319.35 ± 94.82) as shown in (table 3 and figure 5).

Table (3): comparative hemoglobin and platelets between study groups

Groups		N	Mean	SD	P value
Hemoglobin	Pregnant	50	9.82	1.55	$P < 0.05^*$ (S)
	Control	20	12.83	1.86	
Platelets	Pregnant	50	247.88	70.63	$P < 0.001^{***}$ (HS)
	Control	20	319.35	94.82	

HS= Highly significant
S= significant

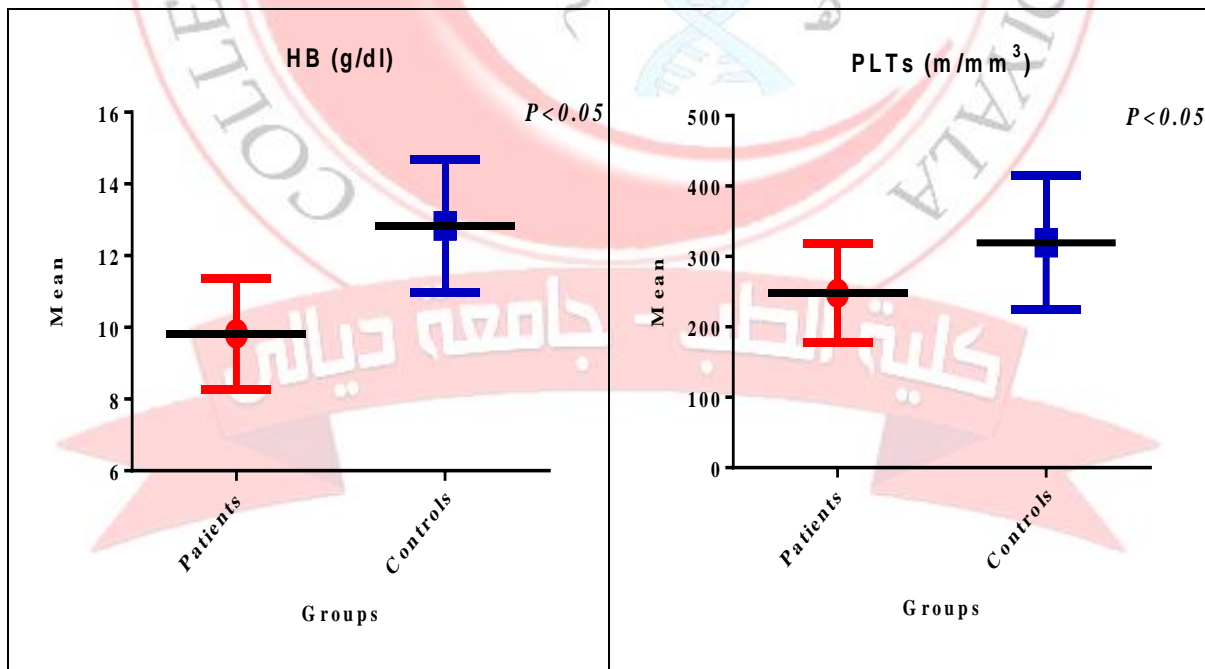


Figure (5): Comparative hemoglobin and platelets between study groups

Discussion

There is sufficient evidence that the lack of oral health care during pregnancy can have negative outcomes for both mothers and their newborns. To improve the oral–systemic health outcomes for mothers and their newborns, it is essential to increase the current and future interprofessional oral health workforce capacity. Current women's health care providers and nurse practitioners, nurse-midwives, medical doctors, doctors of osteopathic medicine, and physician assistants, students, as future women's health care providers, can increase their knowledge of the oral health care needs of pregnant women through the use of oral health educational resources. [15]

The present study showed (21-30) years scored highest percentage of pregnant women with oral problems and because of it due to sample size and during these periods, the most women are been pregnant. During pregnancy, the oral cavity is exposed more often to gastric acid that can erode dental enamel. Morning sickness is a common cause early in pregnancy; later, a lax esophageal sphincter and upward pressure from the gravid uterus can cause or exacerbate acid reflux. [16]

Gingivitis is the most common oral disease in pregnancy, with a prevalence of 60 to 75 percent. Approximately one half of women with preexisting gingivitis have significant exacerbation during pregnancy. Gingivitis is inflammation of the superficial gum tissue. During pregnancy, gingivitis is aggravated by fluctuations in estrogen and progesterone levels in combination with changes in oral flora and a decreased immune response. Thorough oral hygiene measures, including tooth brushing and flossing, are recommended. [17]

Candidiasis, an often-encountered oral disease, has been increasing in frequency. Most commonly caused by the overgrowth of *Candida albicans*, oral candidiasis can be divided into several categories including acute and chronic forms, and angular cheilitis. Risk factors for the development of oral candidiasis include immunosuppression, wearing of dentures, pharmacotherapeutics, smoking,

infancy and old age, endocrine dysfunction, and decreased salivation. Oral candidiasis may be asymptomatic. More frequently, however, it is physically uncomfortable, and the patient may complain of burning mouth, dysgeusia, dysphagia, anorexia, and weight loss, leading to nutritional deficiency and impaired quality of life. [18] All these factors mentioned above affect the oral cavity of pregnant women and cause abnormal changes during pregnancy periods. Pregnancy is characterized by a deep modification of physiological functions of the pregnant woman's body. Indeed, during the pregnancy, there is a considerable increase of the metabolic needs, as well as modifications of the hormonal balance. These phenomena provide enough justification for the hematological disorders. This study was done to estimate the reference values of hemoglobin and platelets parameters in healthy pregnancy women from the Al-Batool teaching hospital.

Anemia in pregnancy is associated with increased maternal and neonatal morbidity. There is increasing awareness amongst obstetricians about the need to screen for iron deficiency anemia, as well as growing literature on diagnosis and treatment. [19]

According to the results of this study, we noticed that the rate of Hb was significantly lower for pregnant women in comparison to the control group, and these results were compatible to results of Bakrim *et al.*, [20] this may be explained by that physiological anemia induced by progressive hemodilution (the plasmatic volume increases more quickly than the erythrocyte mass), on the other hand increased need of vitamins and minerals for fetal hematopoiesis (iron, vitamin B12, folic acid). This is physiological modifications which occur in all pregnant women to compensate for the needs associated with the fetus and its environment. [21]

Recent study showed a high prevalence of anemia among pregnant women worldwide, and the highest of this prevalence is mild anemia. The prevalence of anemia in the third trimester was higher than in the first and second trimesters.

Anemia in pregnant women in developing countries is significantly higher than in developed countries due to pregnancy's economic, sociological, and health factors. [22]

Dewi et al., [23] showed that diet and physical activity have a relationship with the incidence of anemia in pregnant women. Suggestions for pregnant women to increase antenatal care visits and find out about the incidence of anemia in pregnancy. Epidemiological studies suggest an association between vitamin D deficiency and anemia. Vitamin D deficiency may be a risk factor for anemia in pregnant women. [24]

Concerning platelet counts, in the present study the mean value of the PLT for pregnant women was significantly lower with regard to that observed in non-pregnant women. Our results are similar to the results done by Bakrim *et al.*, [20] Thrombocytopenia is a relatively common hematological abnormality in pregnancy. The pathophysiology responsible for thrombocytopenia will range from benign process, where observation alone may be appropriate, to more sinister microangiopathies, where urgent fetal delivery or initiation of specific treatment are critical for the survival of the mother and fetus. [25]

Authors noticed that the physiological variation of the hematological parameters during pregnancy makes difficult the definition of the "normal" hematological reference intervals for pregnant women. Authors suppose that the iron-deficiency anemia during pregnancy is not a physiological situation. [26]

Conclusions

- 1-Clinical examination of oral cavity during pregnancy recorded many oral manifestations involving (aphthous ulcer, angular cheilitis, bad odor and burning mouth syndrome)
- 2- Bad odor is the most prevalent oral manifestations in pregnant group.
- 3- The mean levels of hemoglobin and platelet counts were lowest in pregnant group.



References

- 1-Pregnancy: Condition Information". Eunice Kennedy Shriver National Institute of Child Health and Human Development. 19 December 2013. Archived from the original on 19 March 2015. Retrieved 14 March 2015
- 2-Mosby (2009). Mosby's Pocket Dictionary of Medicine, Nursing & Health Professions - E-Book. Elsevier Health Sciences. p. 1078. ISBN 978-0323066044.
- 3-Wylie L (2005). Essential anatomy and physiology in maternity care (Second ed.). Edinburgh: Churchill Livingstone. p. 172. ISBN 978-0-443-10041-3. Archived from the original on 10 September 2017.
- 4-Abman SH (2011). Fetal and neonatal physiology (4th ed.). Philadelphia: Elsevier/Saunders. pp. 46–47. ISBN 978-1-4160-3479-7.
- 5-What are some common signs of pregnancy?". Eunice Kennedy Shriver National Institute of Child Health and Human Development. 12 July 2013. Archived from the original on 19 March 2015. Retrieved 14 March 2015.
- 6-"How do I know if I'm pregnant?". Eunice Kennedy Shriver National Institute of Child Health and Human Development. 30 November 2012. Archived from the original on 2 April 2015. Retrieved 14 March 2015.
- 7- Supawadee Naorungroj, Jaranya Hunsrisakhun and Supitcha Talungchit, Oral hygiene status, self-reported oral malodor, oral hygiene practices, and oral health knowledge: A cross-sectional study in a group of Muslim Thai pregnant women; Journal of International Oral health
- 8- Mustafa Naseem ET AL., Oral health challenges in pregnant women: Recommendations for dental care professionals; The Saudi Journal for Dental Research.
- 9- Scott McDougall: Mouth Ulcers in Pregnancy: Causes, Symptoms and Treatments:13 Dec 2022.

- 10-Soames JV, Southam JC, JV (1999). Oral pathology (3rd ed.). Oxford: Oxford Univ. Press. pp. 197–98. ISBN 978-0192628947.
- 11-Tyldesley WR, Field A, Longman L (2003). Tyldesley's Oral medicine (5th ed.). Oxford: Oxford University Press. pp. 37, 40, 46, 63–67. ISBN 978-0192631473.
- 12-"Riboflavin (vitamin B₂) deficiency (aribo flavinosis)". National Institutes of Health. Archived from the original on 2010-07-24.
- 13- Anca Marina Ciobanu: Thrombocytopenia in Pregnancy: 2016 Mar; 11(1): 55–60.
- 14- Tan EK, Tan EL. Alterations in physiology and anatomy during pregnancy. Best Practice & Research Clinical Obstetrics & Gynaecology. 2013;27(6):791–802. [PubMed] [Google Scholar].
- 15- Hartnett, E., Haber, J., Krainovich-Miller, B., Bella, A., Vasilyeva, A., & Kessler, J. L. (2016). Oral health in pregnancy. Journal of Obstetric, Gynecologic & Neonatal Nursing, 45(4), 565-573.
- 16- Kong, A., Dickson, M., Ramjan, L., Sousa, M. S., Goulding, J., Chao, J., & George, A. (2021). A qualitative study exploring the experiences and perspectives of Australian Aboriginal women on oral health during pregnancy. International Journal of Environmental Research and Public Health, 18(15), 8061.
- 17- Kaura, M. A., Bawa, H. M., Ekuase, E., & Bamgbose, B. O. (2021). Oral hygiene level and prevalence of gingivitis amongst pregnant women in a nigerianteaching hospital. Journal of DentomaxillofacialScience, 6(1), 10-16.
- 18- Cabras, M., Gambino, A., Broccoletti, R., Lodi, G., & Arduino, P. G. (2020). Treatment of angular cheilitis: A narrative review and authors' clinical experience. Oral diseases, 26(6), 1107-1115.
- 19- Igbinsosa, I., Berube, C., & Lyell, D. J. (2022). Iron deficiency anemia in pregnancy. Current Opinion in Obstetrics and Gynecology, 34(2), 69-76.
- 20- Bakrim, S., Motiaa, Y., Ouarour, A., & Masrar, A. (2018). Hematological parameters of the blood count in a healthy population of pregnant women in the

Northwest of Morocco (Tetouan-M'diq-Fnideq provinces). *Pan African Medical Journal*, 29(1), 1-12.

21- Karami, M., Chaleshgar, M., Salari, N., Akbari, H., & Mohammadi, M. (2022). Global Prevalence of Anemia in Pregnant Women: A Comprehensive Systematic Review and Meta-Analysis. *Maternal and child health journal*, 26(7), 1473-1487.

22- Geta, T. G., Gebremedhin, S., & Omigbodun, A. O. (2022). Prevalence and predictors of anemia among pregnant women in Ethiopia: Systematic review and meta-analysis. *PloS one*, 17(7), e0267005.

23- Dewi, S. S. S., Hasibuan, D. A., Aswan, Y., Harahap, M., & Anggraini, W. (2022). Relationship Between Diet and Physical Activity with the Event of Anemia in Pregnant Women. *International Journal of Public Health Excellence (IJPHE)*, 1(2), 87-92.

24- Lima, M. S., Pereira, M., Castro, C. T., & Santos, D. B. (2022). Vitamin D deficiency and anemia in pregnant women: a systematic review and meta-analysis. *Nutrition Reviews*, 80(3), 428-438.

25- Park, Y. H. (2022). Diagnosis and management of thrombocytopenia in pregnancy. *Blood research*, 57(S1), 79-85.

26- Krayem, B., Brenner, B., & Horowitz, N. A. (2022, December). Thrombosis in pregnant women with hematological malignancies: a case-based review. In *Seminars in Thrombosis and Hemostasis*. ThiemeMedical Publishers, Inc.