Effect of anemia on oral cavity and hematological assessments

Hayder Mahdi Idan [ID][1] , Rafid Abdul-Mahdi Hasani [ID] [2], Ibtehal Qahtan Othman[ID] [3]

[1] College of Medicine, University of Diyala, Diyala, Iraq
[2,3] Diyala Health Directorate, Diyala , Iraq

Abstract

Background: Anemia is a decrease in the amount of hemoglobin, or red blood cells, in the blood. Slow-onset symptoms, such as dyspnea, exhaustion, weakness, or impaired exercise capacity, are frequently nonspecific. Red blood cells' capacity to carry oxygen is limited by anemia. This suggests that the body's tissues and organs take less oxygen from the blood.
Objective: To determine the effect of anemia on oral cavity in addition hematological assessments and compare them with healthy controls.
Patients and Methods: Among 80 people, a cross-sectional study was conducted. Twenty healthy control participants (9 male and 11 female) and sixty patients with anemia (22 male and 38 female) made up the study samples. Study was directed in September 2023 in Alkhalis hospital-Diyala.
Results: Level of hemoglobin in the control group showed a statistically highly significant increase with mean ± SE (14.12 ±0.35) as compared with patients' group. The white blood cell counts showed an increase in the control group with mean ± SE (9.92 ±0.54) as compared with patients' group, with a statistically highly significant correlation. Out of 60 patients, 2 (3.33%) were complaining from angular cheilitis, 6 (10%) were complaining from burning mouth syndrome, 5 (8.33%) were complaining from recurrent aphthous stomatitis, and 13 (21.67%) were complaining from atrophic glossitis, with a statistically highly significant relationship.
Conclusion: Differences in white blood cell counts in patients with anemia and healthy control. Many oral manifestations associated with anemia such as atrophic glossitis, burning mouth syndrome, angular cheilitis, and recurrent aphthous stomatitis.
Keywords: Anemia, oral manifestations, hemoglobin, platelets count, white blood cells.

Introduction

Anemia (anaemia), is a blood disease in which the blood's capacity to carry oxygen is diminished because of either an unusually low concentration of red blood cells, a decline in hemoglobin (Hb), or both [1].

Anemia can be caused by a variety of conditions, but studies suggests that nutritional deficiencies, specifically from a decrease in the consumption of foods high in iron, are the most common cause of anemia [2].

Reduced generation of red blood cells (RBCs), increased breakdown of red blood cells, and blood loss can all lead to anemia. Inflammation of the stomach or intestines, bleeding during surgery, severe injuries, and

blood donation are among the reasons for bleeding. Iron deficiency, vitamin B12 deficiency, thalassemia, and many bone marrow malignancies are among the factors contributing to decreased production. Increased breakdown can be attributed to infections like malaria, some autoimmune diseases, and genetic abnormalities such as sickle cell anemia [3].

Job loss and low educational attainment might contribute to a low socioeconomic status. This is probably going to preserve malnutrition, infections, and infection recurrences, which increases the probability that anemia will happen [4].

The symptoms may include weakness, fatigue, headaches, dizziness, shortness of breath, trouble focusing, an irregular or fast heartbeat, a pale or yellow complexion, pale hands and feet, cold sensitivity, poor appetite, easy bruising and bleeding, and muscle weakness [5].

A decrease number of white blood cells (WBC) in the bloodstream that may be produced by either lymphocyte, neutrophils, or both is known as leukopenia [6].

An inflammatory lesion in the lips corner, exactly on the mucocutaneous border, identified as angular cheilitis (AC) can spread to the surrounding skin of the mouth [7]. In a clinical situation, these lesions manifest as ulcerated lesions with crusts or cracks surrounding them. One (unilateral) or both (bilateral) sides may exhibit lesions. Men and women can raise angular cheilitis at any age [8].

The hallmark of burning mouth syndrome (BMS) is a burning sensation in the oral mucosa, while there are no clinically obvious changes to the mucosa. The prevalence of BMS increases with advancing age, with middle-aged and older women suffering it more frequently. Primary and secondary BMS are the two clinical types of BMS that can be distinguished. Peripheral and central neuropathological pathways are involved in essential or idiopathic BMS, where organic local or systemic reasons are not identifiable. There are systemic, psychological, and/or local variables that contribute to secondary BMS. The BMS most frequently affects the tongue, mainly the tip and lateral borders and the hard palate, chiefly the anterior site [9].

One of the most widespread disorders of the oral mucosa, recurrent aphthous stomatitis (RAS), is characterized by painful, recurrent ulcerations on the moveable or non-keratinized oral mucosa. The prevalence of RAS in the overall population ranges from 5% to 66%, with a mean of 20%.

There are three identified forms of RAS: minor, major, and herpetiform types. Approximately 80% of RAS patients have minor RAS, which is the most prevalent type. Genetic disposition, bacterial and viral infections, food allergies, vitamin and microelement deficiencies, systemic disorders, hormone imbalance, mechanical injuries, and stress are some of the factors that change the immune responses in RAS [10].

An inflammatory disorder identified as atrophic glossitis causes a smooth, reddish-colored tongue on the dorsum surface, along with pain and a burning sensation. When 50% of the fungiform and filiform papillae are lost on the tongue's dorsum, atrophic glossitis results. Atrophic glossitis typically occurs when dietary deficits are linked to ir on, niacin, riboflavin, folic acid, vitamin B12,

Diyala Journal of Medicine

and folic acid deficiencies. Atrophic glossitis is thought to be a sign of anemia due to dietary deficiencies [11].

The present study was to detect the effect of anemia on the oral cavity and hematological assessments of patients and compare them with healthy controls in Alkhalis Hospital.

Patients and Methods

Among 80 people, a cross-sectional study was conducted. Twenty healthy control participants (9 male and 11 female) and sixty patients with anemia (22 male and 38 female) made up the study samples. The study was directed in September 2023 in Alkhalis Hospital in Diyala. Questionnaires were used in the data collection process. The questionnaires were divided into two portions. Personal information was included in the first part. The second set of questionnaires focused on hematological tests, including hemoglobin level, platelets, and white blood cells, as well as oral symptoms, including angular cheilitis (inflammatory lesion in the corner of lips, may be unilateral or bilateral), burning mouth syndrome (burning sensation in the oral mucosa), recurrent aphthous stomatitis (recurrent and painful ulcerations of oral mucosa), and atrophic glossitis(smooth, reddish-colored of dorsum surface of the tongue, associated with pain and burning sensation).Study samples were divided into:

1-Group 1 (patients): Sixty patients (22 male and 38 female).

2-Group 2 (control): Twenty healthy controls (9 male and 11 female).

Every patient was examined in uniform by a single examiner, and a mouth mirror was used to examine the oral cavity in artificial light. A blood sample of seven-eight milliliters was obtained from each participant. The blood was collected in a small polyethylene plastic tube. The blood was centrifuged at 1500 RPM for ten minutes, and the supernatant was then used for a number of biochemical analyses, examining white blood cells, platelets, and hemoglobin levels.

Statistical Analysis

The Statistical Analysis System (SAS, 2018) program was used to signify the outcome of differences in study parameters. The T-test (paired sampling test) was applied for statistical analysis, and LSD was employed for comparing means significantly. In this study, the chi-square test was utilized to compare percentages (0.05 and 0.01 likelihood) that were statistically significant.

Results

Regarding the first group (patients), which consisted of 60 patients with anemia, 22 (36.67%) were males and 38 (63.33%) were females, with a statistically significant correlation. The second group (control) included 20 people without anemia; 9 (45%) were males and 11 (55%) were females, with a statistically non-significant correlation as shown in Table (1). Table (1) also shows the duration of anemia increase in (< 20 years old) was 40%, (36.67%) in (20–40 years old), and finally (23.33%) in (>40 years old) with a statistically non-significant correlation.

Table (1): Distribution of the studied-groups according to gender and age

Factor		No	Percentage (%)	P-value
Gender (Patients)	Male	22	36.67 %	0.0389 *
	Female	38	63.33 %	
	Total	60	100%	---
Gender (Control)	Male	9	45.00 %	0.655 NS
	Female	11	55.00 %	
	Total	20	100%	
Age of patients (years)	<20	24	40.00 %	0.242 NS
	20-40	22	36.67 %	
	>40	14	23.33 %	
	Total	60	100%	---
* (P≤0.05), NS: Non-Significant.				

As shown in Table (2), the level of hemoglobin in the control group was statistically highly significant as compared with patients with a mean ± SE (14.12 ±0.35) and (10.36 ±0.16) respectively.

The white blood cell counts showed an increase in the control group as compared to patients, with a statistically high significant correlation of mean ± SE (9.92 ±0.54), (7.74 ±0.26) for control and patients' group respectively as shown in Table (2). In addition, a non-significant correlation existed when comparing the control group and patients concerning platelet counts with the mean ± SE (280.60 ±20.17) versus the mean ± SE (280.03 ±14.22), as shown in Table (2).

Table (2): Comparison between (patients and control groups) in hematological examinations

Group	Mean ± SE		
	Hb (g/dl)	Platelets (10^9/L)	WBC (10^9/L)
Patients	10.36 ±0.16	280.03 ±14.22	7.74 ±0.26
Control	14.12 ±0.35	280.60 ±20.17	9.92 ±0.54
T-test	0.665 **	54.308 NS	1.100 **
P-value	0.0001	0.983	0.0002
** (P≤0.01), NS: Non-Significant.			

Table (3) shows effect of gender on parameters study of patients. The Mean ± SE of hemoglobin, platelets count and white blood cell counts in male: (10.36 ±0.26), (275.45 ±27.71) and (8.11 ±0.35) respectively. The Mean ± SE of hemoglobin, platelets count and white blood cell counts in female: (10.35 ±0.19), (282.68 ±16.01) and (7.52 ±0.36) respectively, with statistically non-significant correlation except white blood cell counts have significant correlation.

Table (3): Effect of Gender in parameters study of patients-group

Factors	Group	Mean ± SE		
		Hb (g/dl)	Platelets (10^3/μL)	WBC (10^3/μL)
Gender	Male	10.36 ±0.26	275.45 ±27.71	8.11 ±0.35
	Female	10.35 ±0.19	282.68 ±16.01	7.52 ±0.36
	P-value	0.985 NS	0.702 NS	0.0489 *
* (P≤0.05), NS: Non-Significant.				

Out of 60 patients, 2 (3.33%) were complaining of angular cheilitis, 6 (10%) complained of burning mouth syndrome, 5 (8.33%) complained of recurrent aphthous stomatitis, and 13 (21.67%) complained of atrophic glossitis, with a statistically highly significant relationship as shown in Table (4) and Figure (1).

Table (4): Distribution of samples study according to type of diseases in patients

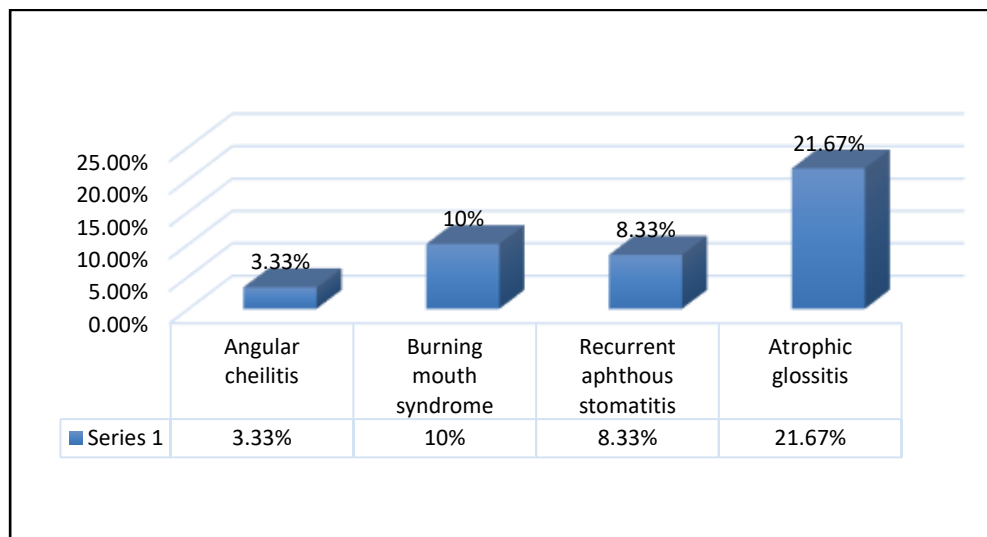| Groups		Yes	No	Total	P-value
Angular cheilitis	Number	2	58	60	0.0001 **
	%	3.33	66.67	100%	
Burning mouth syndrome	Number	6	54	60	0.0001 **
	%	10.00	90.00	100%	
Recurrent aphthous stomatitis	Number	5	55	60	0.0001 **
	%	8.33	91.67	100%	
Atrophic glossitis	Number	13	47	60	0.0001 **
	%	21.67	78.33	100%	
** (P≤0.01).					

Figure (1): The histogram demonstrated the oral manifestations in patients with anemia

Discussion

The exact definition of anemia is a drop in red blood cell (RBC) mass. Carrying oxygen from the lungs to the tissues and carbon dioxide from the tissues to the lungs is the character of the red blood cell. Hemoglobin

(Hb), a tetramer protein consisting of heme and globin, is used to attain this. Anemia is characterized by a lessening of red blood cells (RBCs) that transport oxygen and carbon dioxide, which delays the body's ability to exchange gases. Blood loss, increased hemolysis (the breakdown of red blood cells), or decreased RBC production could all be the reasons for the disorder [12]. There are different types of anemia. The most prevalent kind is iron deficiency anemia (IDA). One in five premenopausal women worldwide suffers from iron deficiency, which is the primary reason for anemia and is mainly common in women of reproductive age [13]. Iron deficiency anemia is often linked to blood loss from heavy menstrual flow in premenopausal women [14,15]. The present study showed that the prevalence of anemia in females (63.33%) was higher than in males (36.67%), with a statistically significant relationship established. This could be explained by the fact that in women of childbearing age, menstrual bleeding is frequently the cause of iron deficiency anemia (IDA) [16]. Women with menorrhagia (heavy menstrual periods) are more prone than the general population to lose more blood during their menstrual cycle than is replaced by food, which can lead to iron deficiency anemia. The present study was conducted on 60 patients: males 22 (36.67%), females 38 (63.33%), The mean± SE of Hb concentration of patients in the present study was 10.36 ±0.16 g/dl, and the control group was 14.12 ±0.35 g/dl. This mean Hb concentration was lower than that reported in the study by Wu *et al*. [17] in which the mean Hb level in men was 10.6 g/dl and the mean Hb level in women was 10.5 g/dl. This variation between Hb means might be due to the different sizes of samples in both studies. The term leukocytopenia refers to a low WBC count in the circulation of blood. Low WBC counts, low lymphocyte counts, low neutrophil counts, or a combination of these issues may be the cause of leukocytopenia. [18]. The present study showed the levels of WBC were found to be lowered in patients with anemia (7.74 ±0.26) as compared to the control group (9.92 ±0.54), with a statistically highly significant relationship. Our study agrees with the study of Lim et al.[19] who reported a decrease in hemoglobin level was shown to be associated with a lessening in WBC counts. The authors described their result based on numerous effects of iron on the stromal cell lines and primary hematopoietic cells, such as effect on communal progenitors, effects on cytokines, and thrombopoietic outcome of erythropoietin, which is affected directly by iron levels (20) The present study showed normal or no differences in the platelet counts of patients (280.03 ± 14.22) in comparison to the control group (280.60 ± 20.17). This agrees with the study done by Sandoval *et al*., [21] who found that thrombocytopenia in relation to iron deficiency is relatively rare. Also, our study agrees with the study done by Morris *et al*., [22] who stated that anemia that occurs in combination with severe thrombocytopenia is infrequent and may suggest other diagnoses such as Evan's syndrome, failure of bone marrow, aplastic anemia, or malignancy. On the other hand, Singh [23] stated that the lessened platelet counts were noticed in cases of anemia compared to controls. Leucocytes are altered in cases of anemia. There is a

strong connection between thrombocytosis and iron deficiency anemia, according to many investigations. Additionally, it is often seen that people with decreased hemoglobin or iron stores have superior platelet counts [24]. This study showed significantly higher frequencies of all oral manifestations in patients than in healthy controls. These oral manifestations included burning sensation of oral mucosa (10%), angular cheilitis (3.33%), RAS (8.33%), and atrophic glossitis (21.67%), this may be explained by the fact that the reduced ability of the blood to carry oxygen to the oral mucosa in RAS patients with anemia finally causes atrophy of the oral mucosa. Moreover, iron is essential for oral epithelial cells to work normally, and folic acid and vitamin B12 are important for cell division and synthesis of DNA. The turnover rate of oral epithelial cells is relatively high. Therefore, oral epithelial atrophy may be triggered by folic acid, vitamin B12, and iron deficiency. Atrophic oral epithelium in patients with hematinic deficiency may describe why some patients with deficiencies of hematinic are disposed to have RAS [10]. The cause for the burning sensation, taste impairment, and numbness practiced by a significant majority of our IDA patients could be partly attributed to atrophic oral mucosa [17]. An appetite of person may be affected by nutritional insufficiencies if there are variations to the tongue papilla, such as depapillation or atrophy, which can alter the tissue construction of the oral cavity. Contrariwise, changes in the tongue papilla often serve as the first suggestions of clinical malnourishment; later, it is possible to maintain that nutrition effects oral health and vice versa. It is well documented that deficits in precise nutrients can lead to the growth of oral lesions, which can result in signs and symptoms in the oral cavity involving atrophic glossitis or oral mucosal ulcers [11].

Conclusions

The prevalence of anemia in female more than in male. The levels of WBC were lowered in patients with anemia as compared to control group. Oral manifestations in patients significantly higher than in healthy controls.

Recommendations

Specialists should be aware of the possibility that anemia could be the cause of leukopenia, as this could result in oral manifestations such atrophic glossitis, burning mouth syndrome, angular cheilitis, and recurrent aphthous stomatitis.

Ethical clearance: This study was conducted according to the approval of College of Medicine/ University of Diyala and in accordance with the ethical guidelines of the Declaration of ethical committee of the College (document no. 2023HMI814).

Conflict of interest: Nil

References

[1] "Anemia: Practice Essentials, Pathophysiology, Etiology". 9 November 2021. Retrieved 8 February 2022.

[2] Hussam Aldeen Hameed, Oday Abbood Khalil, Emad Wissam, Jalil IAlezzi, Epidemiological Study of Anemia in Diyala Province / Iraq. Diyala Medical Journal 2021:20(1): 11-16. DOI:https://doi.org/10.26505/DJM.20015570906

[3] Janz TG, Johnson RL, Rubenstein SD "Anemia in the emergency department: evaluation and treatment". Emergency Medicine Practice. 15 (11): 1–15, quiz 15–16. (November 2013). PMID 24716235.

[4] Mehdi SHAl-Zuheiry, Nadhim Ghazal Noaman, Ali Ammer Abd: Anemia in Children under 5 years, The Prevalence and Contributing Factors in Al-Batool Teaching Hospital/Diyala Governorate. Diyala Journal of Medicine Vol.18.Issue 2,June 2020. DOI:https://doi.org/10.26505/DJM.18024970929.

[5] What Are Symptoms of Anemia?". National Heart, Lung, and Blood Institute. 24 March 2022. Retrieved 26 June 2022.

[6] Hussam A Almasri, Ashraf T Soliman, Vincenzo De Sanctis, Arwa E Alsaud, Ruoa Alhashimy, Mona M Babikir, Rita T Ahmad, Majd M Aldwairi, Mohammad N Kloub, Shaima Ahmed, Mustafa A Al-Tikrity, Mahmoud S Eisa, and Mohamed A Yassin: Prevalence and Significance of Leukopenia Induced by Intravenous Iron Therapy in a Large Cohort of Females with Iron Deficiency Anemia (IDA): 2022; 93(2): e2022183 doi: 10.23750/abm.v93i2.11978.

[7] Pandarathodiyil, A. K., Anil, S., & Vijayan, S. P. Angular Cheilitis - An Updated Overview of the Etiology, Diagnosis, and Management Research. International Journal of Dentistry and Oral Science (IJDOS). (2021).

[8] Fajriani, F. Management of Angular Cheilitis in children. Journal of Dentomaxillofacial Science, (2017). 2(1), 1. https://doi.org/10.15562/jdmfs.v2i1.461.

[9] Chun-Pin Chiang, Yu-Hsueh Wu, Yang-Che Wu, Julia Yu-Fong Chang, Yi-Ping Wang, Andy Sun: Anemia, hematinic deficiencies, hyperhomocysteinemia, and serum gastric parietal cell antibody positivity in 884 patients with burning mouth syndrome: Volume 119, Issue 4, April 2020, Pages 813-820. https://doi.org/10.1016/j.jfma.2019.10.013.

[10] Chun-Pin Chiang, Julia Yu-Fong Chang, Yi-Ping Wang, Yu-Hsueh Wu, Yang-Che Wu, Andy Sun: Recurrent aphthous stomatitis-Etiology, serum autoantibodies, anemia, hematinic deficiencies, and management Journal of the Formosan Medical Association: Volume 118, Issue 9, September 2019, Pages 1279-1289. https://doi.org/10.1016/j.jfma.2018.10.023.

[11] Rahmatia Djou1, Indah Suasani Wahyuni, Atrophic Glossitis as A Clinical Sign for Anemia in The Elderly (Case report)., Dentino Jurnal Kedokteran Gigi Vol IV. No 1. Maret 2019.

[12] Smith ML Anemia: Evaluation of Suspected Anemia. FP Essentials 2023 Jul. 530:7-11.

[13] Kassebaum NJ, Jasrasaria R, Naghavi M, et al. A systematic analysis of global anemia burden from 1990 to 2010. Blood. 2014;123(5):615-624. doi: 10.1182/blood-2013-06-508325

[14] Camaschella C. Iron-deficiency anemia. N Engl J Med. 2015;372(19):1832-1843. doi: 10.1056/NEJMra1401038

[15] Elstrott B, Khan L, Olson S, Raghunathan V, DeLoughery T, Shatzel JJ. The role of iron repletion in adult iron deficiency anemia and other diseases. Eur J Haematol. 2020;104(3):153-161. doi: 10.1111/ejh.13345

[16] Ganz T (2016). "Iron Deficiency and Overload". In Kaushansky K, Lichtman MA, Prchal JT, Levi MM, Press OW, Burns LJ,

Caligiuri M (eds.). Williams Hematology (9th ed.). New York, NY: McGraw Hill. ISBN 978-0-07-183301-1.

[17] Wu YC, Wang YP, Chang JY, Cheng SJ, Chen HM, Sun A. Oral manifestations and blood profile in patients with iron deficiency anemia. Journal of the Formosan Medical Association (JFMA).113: 83–87. Nutritional anaemias, 2014. https://doi.org/10.1016/j.jfma.2013.11.010.

[18] Lima CSP, Paula EV, Takahashi T, Saad STO, Lorand-Metze I, Costa FF. Causes of incidental neutropenia in adulthood. Ann Hematol. 2006;85:705 9.

[19] Yoojoo Lim, EunYoung Lee, InSil Choi, TaeYong Kim, Sung-Soo Yoon, Ki Hwan Kim: Leukopenia in Patients with Iron Deficiency Anemia: Volume 118, Issue 21, 18 November 2011, Page 5279. https://doi.org/10.1182/blood.V118.21.5279.

[20] Babikir M, Ahmad R, Soliman A, Al-Tikrity M, Yassin MA. Iron-Induced Thrombocytopenia: A Mini-Review of the Literature and Suggested Mechanisms. Cureus [Internet] 2020;12(9):e10201.

[21] Sandoval C, Berger E, Ozkaynak MF, et al. Severe iron deficiency anemia in forty-two pediatric patients. Pediatr Hematol Oncol. 2002;19:157–161. https://doi.org/10.1080/0888001027535413 05.

[22] Van K. Morris, Holly L. Spraker, Scott C. Howard, Russell E. Ware, and Ulrike M. Reiss, Severe Thrombocytopenia with Iron Deficiency Anemia Pediatr Hematol Oncol. 2010 Aug; 27(5): 413–419. doi: 10.3109/08880011003739455.

[23] Singh K., Leucocyte counts in anaemia. Indian J Physiol Pharmcol. 2010 Jan-Mar;54(1):85-8.

[24] Hemendra Mhadgut MD, Hadiza Galadima, Hassan Raymond Tahhan MD: Thrombocytosis in Iron Deficiency Anemia: Volume 132, Supplement 1, 29 November 2018, Page 4985. https://doi.org/10.1182/blood-2018-99-119352.

Diyala Journal of Medicine

تأثير فقر الدم على تجويف الفم وتقييمات الدم

حيدر مهدي عيدان ¹ , رافد عبد المهدي حساني ² , ابتهال قحطان عثمان ³

الملخص

خلفية الدراسة: فقر الدم هو انخفاض في كمية الهيموجلوبين أو خلايا الدم الحمراء في الدم. غالبًا ما تكون الأعراض البطيئة الظهور، مثل ضيق التنفس أو الإرهاق أو الضعف أو ضعف القدرة على ممارسة الرياضة، غير محددة. يتم إعاقة قدرة خلايا الدم الحمراء على حمل الأكسجين بسبب فقر الدم. وهذا يشير إلى أن أنسجة الجسم وأعضائه تستهلك كمية أقل من الأكسجين من الدم.

اهداف الدراسة: لتحديد تأثير فقر الدم على تجويف الفم بالاضافه الى تقييمات الدم ومقارنتها مع المسيطرين صحيا.

المرضى والطرائق: من بين ٨٠ شخصا، أجريت دراسة مقطعية. عشرون مشاركا من الأصحاء (٩ ذكور و ١١ أنثى) وستين مريضا يعانون من فقر الدم (٢٢ ذكرا و ٣٨ أنثى) شكلوا عينات الدراسة. تم توجيه الدراسة في سبتمبر ٢٠٢٣ في مستشفى الخالص-ديالى.

النتائج: أظهر مستوى الهيموجلوبين في المجموعة الضابطة زيادة ذات دلالة إحصائية عالية بمتوسط SE ± (١٤,١٢ ±٠,٣٥) مقارنة بمجموعة المرضى. أظهر تعداد خلايا الدم البيضاء زيادة في المجموعة الضابطة بمتوسط SE ± (٩,٩٢ ±٠,٥٤) مقارنة بمجموعة المرضى، مع وجود علاقة ذات دلالة إحصائية عالية. من بين ٦٠ مريضًا، كان اثنان (٣,٣٣٪) يشكون من التهاب الشفة الزاوي، و٦ (١٠٪) يشكون من متلازمة الفم الحارق، و٥ (٨,٣٣٪) يشكون من التهاب الفم القلاعي المتكرر و١٣ (٢١,٦٧٪) يشكون من التهاب اللسان الضموري مع نسبة عالية إحصائيًا. علاقة مهمة.

الاستنتاجات: وجود اختلافات في عدد خلايا الدم البيضاء لدى مرضى فقر الدم والمسيطرين صحيا. العديد من المظاهر الفموية لها علاقة بفقر الدم مثل التهاب اللسان الضموري، ومتلازمة الفم الحارق، والتهاب الشفة الزاوي، والتهاب الفم القلاعي المتكرر.

الكلمات المفتاحية: فقر الدم، المظاهر الفموية، الهيموجلوبين، عدد الصفائح الدموية، خلايا الدم البيضاء

¹ كلية الطب – جامعة ديالى- ديالى - العراق

³,² دائرة صحة ديالى – ديالى - العراق