

# Oral Hygiene and Pocket Depth among Acute Myeloid Leukemic Adult Patients in Erbil City

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## Abstract

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**Background:** Leukemia is a hematological disease with oral manifestations.

**Objective:** To assess gingival health and periodontal pocket depth of different age groups of both genders.

**Patients and Methods:** A total of 74 patients (aged 20-70 years) who were diagnosed with Acute Myeloid Leukemia (AML) were examined and compared with 74 control group. The oral hygiene status, gingivitis and periodontal pocket were examined. Dental plaque was detected by means of the Silness J & Loe 1, gingival index by Loe H & Silness 2 and calculus index by Ramfjord 3. While the pocket depth was measured by using Williams probe 4.

**Results:** Demonstrated that ; the total mean for plaque(1.31) ,gingival (1.23) , calculus(0.30) scores and pocket depth (2.95) for control group while the total mean of plaque(1.75) ,gingival (1.57) , calculus(0.45) scores and pocket depth (3.22) for leukemic group with significant differences fore plaque (P-value =0.000) and gingival(P-value =0.004) score but with no significant difference for calculus score(P-value =0.095)and pocket depth (P-value). =0.103)between both groups . A larger number and percentage of male suffered from this disorder than female and a higher number and percentage of AML were aged between (20-29) years.

**Conclusion:** AML patients in the present study showed more dental plaque, more gingivitis, more calculus score and more pocket depth, compared with healthy patients.

**Keywords:** plaque, calculus, gingiva, pocket depth, AML

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## Introduction

Hematological disorders are one of systemic diseases in which have oral manifestations in the oral cavity region. For example, leukemia has long been known to be presented with oral health manifestations[3]. These manifestations

frequently occur in leukemia and may appear in early signs of hematopoietic disorders. Acute myeloid leukemia (AML) is a one of heterogeneous group of diseases, whose classification is associated with lineage-commitment and genetics. It is the most common type of acute leukemia in adults rather than in children [4].

Leukemia is a hematological disease which comes from the uncontrolled proliferation of neoplastic cells originating from hematopoietic stem cells. Various organs in the body are affected by Leukemic cells invasion including the gingiva. Infiltration of leukemic cell I to the can be demonstrated by biopsy [5-9].

Gingival enlargement is one of the earliest signs of acute leukemia including AML. Pathologic changes observed in gingival enlargement is Collection of connective tissue with the increased number of cells. Gingival enlargement can be categorized according to the causative factors as inflammatory, drug-induced, neoplastic, false enlargement, and is usually related to systemic diseases especially granulomatous diseases and leukemia [10-12].

The occurrence of gingivitis/periodontitis (poor oral health) can be exhibited in leukemic patients undergoing chemotherapy [13]. Poor hygiene can be considered one of the risk factors for leukemic gingival overgrowth and destructive periodontal disease in which can be manifested by oral pain, hemorrhage, and superinfection, and malaise, pain, fever, laryngeal, and cervical lymphadenopathy can be experienced in severe cases [10-14].

AML can be classified as M0 (Leukemia without differentiation), M1 (Leukemia

without differentiation with little or no differentiation), M2 (myeloblastic with maturation), M3 (promyelocytic leukemia), M4 (myelomonocytic leukemia), M5 (monocytic leukemia), M6 (erythroblastic leukemia), and M7 (megakaryoblastic leukemia). Oral manifestations which can be rapidly fatal if left untreated may be the presenting feature of acute leukemia [15-16]. The aims of the study were to: Evaluate the gingival health status in both genders and different age groups among acute leukemic and normal individuals aged 20–70 years.

To find if there are differences in pocket depth between acute leukemic and normal individuals in Erbil city.

## Patients and Methods

Oral and periodontal status were examined randomly in 74 AML hospitalized patients in the Nanakaly hospital which is the only center of leukemia in Erbil city. An informed consent was obtained from all patients and the study was approved by institutional ethical committee (Ethical approval no. 7776 on Dec 19<sup>th</sup>, 2021). The researcher chooses AML type of leukemia because it was the most common type of leukemia and oral and periodontal manifestations of leukemia are more common in this in acute and sub-acute forms of leukemia than in chronic forms[9]. The research were approved ethically by scientific committee of medical technical institute in Erbil city.

Inclusion criteria were:

1. Patients were under systemic chemotherapy.
2. Patients were under chlorhexidine mouth wash treatment which was prescribed by the physician for reducing of oral complications and protection of oral hygiene.

The patients' age were ranged between 20-70 years .There were 52 males and 22 females. According to oral hygiene status, the patients were divided into three groups: excellent oral hygiene (brushing 3 times a day); good oral hygiene (brushing 1-2 times a day); poor oral hygiene (brushing 0 times a day).

To perform a comparative study, 74 controls were included, based on the following inclusion criteria: absence of any systemic disorders or taking any medications at the time of the study. There were also 52 males and 22 females.

The clinical examinations were performed under natural light. The plaque index by Silness J& Loe 1, gingival index by Loe H& Silness 2 and calculus index by Ramfjord 3 were used for the examination of six teeth which represent six segments of the jaw 3 upper right 1<sup>st</sup> molar, upper left central incisor and upper left 1<sup>st</sup> premolar, lower right 1<sup>st</sup> premolar and central incisor and lower left 1<sup>st</sup> molar. Each tooth was examined at three points (mesial, medial and distal) in the buccal and lingual/palatal surfaces; for measuring pocket depth (Williams probe ) was used at four sides of selected teeth on the (mesiobuccal, distobuccal, mid buccal and mid lingual). The distance in millimeter from the

cementoenamel junction to the most apical extend of the probe inserted to gingival crevice as parallel as possible to the long axis of the teeth and recorded. No pressure is used; the probe allowed falling by its own weight and the measurements are made to the nearest millimeter. The arithmetic mean of the greatest values in the explored teeth were calculated to obtain the mean value of the pocket depth [4].

The examination was done by using plane mouth mirrors, Williams's periodontal probes to detect the dental plaque, gingival health and pocket depth, cotton and disinfectant agent were also used.

### Statistical Analysis

The statistical analysis of the data was carried out by using (SPSS) version was 22.5.This includes: Descriptive statistics (mean, standard error, and percentage).T-test. Values less than or equal to 0.05 ( $P \leq 0.05$ ) were regarded statistically significant.

### Results

The total sample consists of 148 individuals (74 control and 74 AML groups) comprising 70.30 % males and 29.70% females for both groups control and AML patients as shown in Table(1) male were more affected by AML than females.

**Table (1):** Number and percentage of male and female among leukemia and normal individuals

Males control andAML		Females control andAML		Total	
No	%	No	%	No	%
52	(70.30)	22	(29.70)	74	(100)

The AML patients are divided into 5 age groups as shown in Table (2) the highest number and percentage of AML was

demonstrated in age (20-29) years which comprise about (47.29).

**Table (2):** Number and percentage AML according to age group

Age groups	AML	
	No	%
20-29	35	(47.29)
30-39	7	(9.45)
40-49	16	(21.62)
50-59	8	(10.81)
≥60	8	(10.81)
Total	74	(100)

Table (3) demonstrated the oral hygiene of leukemic and control groups. Table (3) about oral hygiene showed that the majority of control group had excellent oral hygiene

44(59.45%) while highest percentage of Leukemic patients had poor oral hygiene (58.10%).

**Table (3):** Oral hygiene of Leukemia and control groups

Groups	NO (%)			Total
	excellent	good	Poor	
Control	44(59.45)	16(21.62)	14(18.91)	74 (100)
AML	18(24.32)	13(17.56)	43(58.10)	74 (100)

Mean plaque, calculus, gingival indices scores and pocket depth of control and AML are shown in Table (4). The highest mean of plaque (1.75), gingival (1.57), calculus (0.45) indices and pocket depth(3.23) were seen related to AML group .Statistical analysis

showed significant differences of plaque and gingival scores between both groups (P-value <0.005) ,while the differences of calculus index and pocket depth between both groups were statistically not significant (P-value >0.005).

**Table (4):** The mean and standard error of plaque, gingival, calculus indices, and pocket depth of control and (AML) groups, with their degree of significances

Variables	Plaque index	Calculus index	Gingival index	Pocket depth
	Mean ±SE	Mean±SE	Mean ±SE	Mean±SE
Control	1.31±0.9	0.30±0.05	1.23±0.08	2.95±0.10
AML	1.75±0.8	0.45±0.08	1.57±0.07	3.22±0.13
t	-3.59	-1.69	-2.93	-1.64
P-value*	000	0.093	0.004	0.103

\* P-value ≤ 0.05 consider as statistical significance

## Discussion

Most of the systemic diseases associated with oral manifestation including periodontal lesions are common in patients with acute leukemia disease. Many cases of gingival

enlargement are reported in patients with acute myeloid leukemia [17].

In the present study male displayed higher number and percentage than female. This study is in agreement with studies which

indicate that male are predominantly more affected than female by all types of leukemia and in all age groups. Also its in agreement with other study in which found that Leukemia is more common in men than in women (3:2), and the maximum incidence of individual types is shown at different ages [9-19].

The incidence rates in the western countries ranged between 0.5 and 5.5 per 100,000. AML has higher rates in men than women with 2:1 ratio [20]. However since the beginning of 1990s remained stable [21]. The incidence rates during 1998-2002 in Italy had been constantly rising in males while it remained relatively stable in females.

Regarding the age group in the present study highest number and percentage of AML were reported in the youngest age group (20-29), this may be due to chemical weapons in which Iraqi people suffered from during Iraqi wars. While other studies indicated that.

In elderly patients more than 65 years the incidence of hematological malignancy is ten times more than younger patients, and more than half of all malignancy related deaths occur in elderly patients [23]. In the United States, the median age of diagnosis is 67 years of age [24]. It is more common in elderly patients especially in patients older than 60 years old with a median of 67 years [25].

The incidence of AML is uncommon in patients younger than 40 years old but it increases with age (1 in 100,000 patients at age 40 and at age 75 and older the incidence is 15 per 100).

Other studies determined that incidence of AML is rare under the age of 40 but rises

with age, from around 1 per 100,000 at age 40 to more than 15 per 100,000 at age 75 and older [26,27]. According oral hygiene; majority of control group in the present study were had excellent oral hygiene (61.42 %) while majority of AML group had bad oral hygiene (58.57%) this may be due to the fact that the patients avoided brushing for fear of bleeding or due to reduce salivary secretion due to chemotherapy. This study is in agreement with another study in which it's explored that around three-quarters of the patients had either fair or poor oral hygiene [10-28].

The present study is in contrast with another study in which highest number and percentage of control and leukemic patient had good oral hygiene [29]. In this study, 90 healthy patients were compared with 88 oncological patients before and after chemotherapy.

Based on the Silness and Loe index, the author recorded a value of 1.31 mean plaque index in the 74 healthy subjects and 1.75 in the 74 AML patients, with statistically significant difference of mean plaque score between both groups (P-value < 0.005), this is may be due to the lack of proper oral hygiene among AML group. This finding is in agreement with other studies [28-31].

Also another study demonstrated that 73 young adults with a diagnosis of AML reported unsatisfactory oral hygiene in around three-quarters of them. A statistically significant association was observed between both gingival overgrowth and periodontal index ( $p < 0.001$ ) and dental plaque levels [10]. Significant or Life threatening infections were reported in more than one-

third of patients, most of which were of bacterial origin.

The highest mean of calculus index were seen related AML group with statistically not significant differences between both groups (P-value>0.005). This finding is in accord with other studies[28,29].

In the present study AML reported higher mean gingival score than control; the difference was found to be statistically significant (p-<value 0.05), this may be due to the leukemic cell infiltration into the gingiva and the patients poor oral hygiene . The present study is in agreement with other studies in which intra oral examination of several AML cases detected gingival inflammation and bleeding[23, 28,29,32,33].

Among 1,076 patients receiving anti-leukemia chemotherapy at a referral centre, gingival hyperplasia was present in Acute Myelogenous Leukemia (AML) with a frequency of 3% to 5%.33 Other studies indicated that gingival hyperplasia is most commonly detected with the AML subtypes Acute Monocytic Leukemia (M5) (66.7%), Acute Myelomonocytic Leukemia (M4) (18.5%), and Acute Myelocytic Leukemia (M1,M2) (3.7%) [33].

The present study demonstrates that the mean pocket depth of AML (3.13mm) was higher than control group (2.90mm) with statistically no significant differences between both groups (P- value>0.005). This is could be due to the fact that leukemic cells less frequently infiltrate alveolar bone than gingiva. While another study reveals periodontal probing of pocket depth of 3-4mm around teeth [34]. Another study demonstrated pocket depth of 10mm among Acute Leukemic patients with extensive bone

loss and mobility [35]. Also statistically significant difference of periodontal index (P < 0.001) was observed between control and AML[28].

### Conclusions

AML patients in the present study showed more dental plaque, more gingivitis, more calculus score and more pocket depth, in contrast with healthy patients. Poor oral hygiene is considered as a risky factor for leukemic and for periodontal destruction. In patients with excellent oral hygiene, the gingivitis and periodontal pocket tends to be less, especially with respect to mechanical tooth cleaning.

### Recommendations

Involving the dentists as a part of multidisciplinary team during pre and post-treatment period of AML patients.

Referring AML patients to the specialized dental centers periodically for examination, monitoring and treatment.

More studies to assess the relation between AML and oral health in all Oncology centers in other governorates in Iraq.

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**Conflict of interest:** Nill

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## نظافة الفم وعمق الجيب اللثوي بين مرضى سرطان الدم النخاعي الحاد البالغين في مدينة

اربيل

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### الملخص

**خلفية الدراسة:** اللوكيميا هو مرض دموي مع مظاهر شفهية (في الفم).  
**اهداف الدراسة:** لتقييم صحة اللثة وعمق الجيب اللثوي للفئات العمرية المختلفة للبالغين من كلا الجنسين.  
**المرضى والطرائق:** تم فحص ٧٤ مريضاً تتراوح اعمارهم بين ٢٠ الى ٧٠ سنة ممن تم تشخيص اصابتهم باللوكيميا النخاعية الحادة ومقارنتهم مع ٧٤ مريضاً ضمن مجموعة (الكوتنرول) أي غير المصابين باللوكيميا النخاعية الحادة، ثم تم فحص حالة نظافة الفم والتهاب وجيوب اللثة، ثم تم الكشف عن البلاك ومؤشر اللويحة السنوية بواسطة (Löe & Silness 1) ومؤشر اللثة بواسطة (Löe & Silness 2) ومؤشر التكلس بواسطة (Ramfjord 3) بينما تم قياس عمق الجيب باستخدام مسبار وليامز ٤.

**النتائج:** اظهرت النتائج أن المتوسط الكلي للبلاك (اللويحة السنوية) هو (١,٣١) و للثة (١,٢٣) و للتكلسات (٠,٣٠) و لعمق الجيب (٢,٩٥) لمجموعة التحكم (المراقبة)، بينما المتوسط الكلي للويحة السنوية هو (١,٧٥) و للثة (١,٥٧) و حساب التكلس هو (٠,٤٥) و عمق الجيب (٣,٢٢) لمجموعة المصابين باللوكيميا مع وجود فروقات ذات دلالة احصائية بين البلاك (قيمة P = 0.000) و درجة اللثة (قيمة P = 0.004) ولكن مع عدم وجود فرق معنوي لدرجات حساب التكلسات ( القيمة P = 0.095) و عمق الجيب ( القيمة P = 0.103) بين المجموعتين. عدد و نسبة الذكور الذين يعانون من هذا الاضطراب اكبر من عدد الاناث كما وأن عدد و نسبة اعلى للمصابين بمرض سرطان الدم النخاعي الحاد تتراوح اعمارهم بين (٢٩-٢٠) سنة.

**الاستنتاجات:** اظهر مرضى سرطان الدم النخاعي الحاد في هذه الدراسة المزيد من البلاك او اللويحات السنوية، والتهاب اللثة، والمزيد من نسب التكلس وعمق الجيوب مقارنة بغير المصابين بهذا المرض.

**الكلمات المفتاحية:** البلاك او اللويحات السنوية، التكلس، اللثة، عمق الجيب، سرطان الدم النخاعي الحاد

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