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Prevalence and Systemic Associations of Angular Cheilitis in Libyan Type 2 Diabetic Patients: A Cross Sectional Study

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Abstract: ***Background: Diabetes mellitus (DM) caused by insulin secretion impairments. Hyperglycemia could be detected by evaluating the HbA1c level. Angular cheilitis (AC) is a clinical disorder, defined as an eroding and erythematous non - vesicular lesion radiating from the angle of the mouth. Between 0.7% and 3.8% of people worldwide with AC. It may occur at any age and affects both males and females equally. Aim of the work: The purpose of this study is to evaluate the prevalence of Angular Cheilitis among Libyan diabetic patients and to investigate its association with systemic diseases, comparing findings between glycemic controlled and uncontrolled patients. Materials and Methods: The present a cross sectional study was conducted on 426 Libyan diabetes patients (DPs). Demographic and medical data was gathered. Medical history, past dental history, age, gender, and HbA1c level for DPs. To examine the association of independent variable (s) with one dichotomous dependent variable, Logistic regression analysis was employed using SPSS 26 (IBM, USA) to describe data and explain the relationship between AC vs independent nominal, ordinal, and scale variables (age, gender, HbA1c, glycemic controlled and glycemic uncontrolled DPs. Result: DPS with AC 20% were glycemic controlled DPs (GCDPs) and 80% were glycemic uncontrolled DPs (GUDPs). (54.1%) were females and (45.8%) were males.60 - 69 years age group was the most frequent affected DPs. Conclusion: A low prevalent rate of Ac in Libyan DPS. There is a significant association between AC and GUDPs. AC was more predominant in females.***

Keywords: Angular cheilitis, Type 2 diabetes, Glycemic control, Systemic diseases, Prevalence

1. Introduction

Diabetes mellitus (DM) is a group of metabolic disorders defined by persistent hyperglycemia is caused by impairments in insulin secretion [(1).] Hyperglycemia can be detected by evaluating the HbA1c level, which is the test for blood glucose that is closely bonded to hemoglobin (Hb) and circulates with erythrocytes throughout its lifespan [(2).] The HbA1c test reflects the average level of blood sugar over the previous three months and indicates overall glycemic control [(3).] An HbA1c test reading of less than 5.7% is considered normal or in the non - diabetic category. Anyone with an HbA1c result of 5.7% to 6.4% is termed pre - diabetic, however diabetes can be diagnosed with a HbA1c of 6.5% or above [(4).]

Significant oral and systemic problems can arise from persistent hyperglycemia in individuals with inadequately controlled or uncontrolled diabetes [(5).] AC is more common in patients with DM2 than in healthy people [(6).] AC is a clinical disorder that may be defined as an eroding and erythematous non - vesicular lesion radiating from the angle of the mouth. It can be unilateral or bilateral in appearance [(7).] The Greek word "cheil" means lip, while the suffix "itis" denotes inflammation [(8).] AC is also referred to by various other names including Angular Celsius, Angular stomatitis, Commissural cheilitis and Perleche [(9).] Between 0.7% and 3.8% of people worldwide are affected with AC, which manifests as an inflammation at the mouth's corner [(10).] AC may occur at any age and affects both males and females equally, but it is particularly common in older individuals who wear dentures [(11).] It is widely recognized that individuals with DM are more prone to fungal infections, especially Candida albicans infections, compared to non - diabetic individuals [(12).] However, it is crucial to emphasize that AC can be caused by both Candida albicans and Staphylococcus aureus [(13).] The primary cause of AC was nutritional inadequacy caused by a lack of vitamin B complex, iron, and folic acid [(14).] The etiology of AC has multiple causes, encompassing both local and systemic causes. Local factors contributing to the development of AC can be categorized as anatomic, mechanical, allergic, chemical, and infectious [(15).] Systemic causes encompass nutritional deficiencies, systemic diseases, and adverse effects associated with medication use. [(16).]

In the beginning, there is a grey - white thickening and redness around the corners of the mouth. Subsequently, it typically manifests as a triangular area of redness, swelling, and softening at each corner of the mouth [(17).] This type of situation may be appears along with pain, discomfort, occasional bleeding, and it can disrupt chewing and speaking [(18).] AC has also been related to orofacial granulomatosis, which causes swelling of the lips [(19).] It is commonly seen in immunocompromised patient, especially those with HIV and

AIDS [20]. It may also manifest in individuals with inflammatory bowel diseases, such as Crohn's disease and ulcerative colitis, as well as in those with macroglossia, congenital hypothyroidism and Down syndrome [21].

Two important differential diagnoses to consider when treating AC are recurrent herpes labialis, especially if the lesions are unilateral, and secondary syphilis, which presents with fissured papules at the corners of the lips resembling cheilitis [22]. Among the conditions to be taken into account in the differential diagnosis of AC are erosive oral lichen planus or lichenoid oral lesions, impetigo, atopic dermatitis, seborrheic dermatitis, allergic contact cheilitis, irritant contact cheilitis, early or isolated diffuse cheilitis, actinic cheilitis, cheilitis glandularis, cheilitis granulomatosa, and exfoliative cheilitis [23].

Although the history and physical exam assist in establishing the diagnosis, confirmation can be obtained through a potassium hydroxide preparation that demonstrates hyphae, pseudohyphae, or spores ([24]. However, the diagnosis is frequently clinical but can be confirmed by laboratory testing, such as microbial cultures or biopsies, particularly in unusual or treatment - resistant cases [25].

For effective treatment of patients with AC, the underlying predisposing factors must be identified and, if feasible, corrected [26]. AC should be considered and treated as a type of persistent oral candidiasis [27].

2. Materials and Methods

This cross - sectional study included 426 Libyan diabetes patients diagnosed at the Diabetes and Endocrine Gland Diseases Hospital, Ministry of Health, Tripoli, Libya, during the time period of Feb 2023 and Jan 2024, all respondents' demographic and medical data was gathered. Medical history, past dental history, age, gender, and HbA1c level for diabetic patients (DPs). DPs with HbA1c values < 7% were termed glycemic managed, whereas those with HbA1c values > 7% were classified glycemic uncontrolled. A clinical assessment of the lips was conducted to identify signs of AC and documented using a specified examination form. Diagnosis relied solely on clinical observations by oral medicine specialists. Patients were provided with an explanation of the study and obtained informed consent. The gathered data encompass various variables, both quantitative and qualitative. Logistic regression analysis was used with SPSS 26 (IBM, USA) to describe data and explain the relationship between one dependent binary variable AC vs eight independent nominal, ordinal, and scale variables (age, gender, HbA1c, glycemic controlled and uncontrolled DPs, and symptoms) in order to identify significant and affective variables for AC. A p - value < 0.05 was considered significant.

3. Result

Among the collected study sample of 426 Libyan DPs, 85 cases (20%) of the patients showed to have AC lesion, all of the cases occurred bilaterally at the angle of mouth (Fig1) (Table1). The ages of diabetic participants in this study varied between 23 and 95 years old with a mean of 62.2 years, a standard deviation (SD) of 8.1 years. The ages of the subjects were categorized into eight groups (20 - 29, 30 - 39, 40 - 49, 50 - 59, 60 - 69, 70 - 79, 80 - 89, >90) Overall, the prevalence of AC was found significantly higher in the 60 - 69 years-old (27.2 %) ($P < 0.023$). On the other hand, AC was found to be least in both the 30 - 39 years (4.3%) and 80 - 89 years (16.7%) (Fig 2).

Out of 426 DPs considered for this study showed 222 cases (52.1%) were females and 204 cases (47.8%) were males. Among the subjects of the entire study sample, the prevalence of AC in females was 46 case (54.1%) and males 39 cases (45.8%) and was thus considerably predominant in females. The difference was found to be statistically not significant $P = 0.448$ (Fig.3). The general male to female ratio of AC in the study sample was approximately 1: 1.2.

According to the HbA1c values of among the entire DPs with AC 17 (20%) were GCDPs and 68 (80%) were GUDPs, this result indicated that no significant relationship ($p = 0.569$) (Fig.4).

The majority of diabetic subjects with AC have systemic diseases 64 (75.2%) while 36 (42.3%) did not have any systemic diseases.

Hypertension 25 cases (39.06%) was the most frequent systemic disease in DPs with AC, followed by other medical conditions 22 cases (34.3%), and then cardiac diseases 17 cases (20%) (Table 2). Regarding to the other medical conditions, Neuropathy was the most frequent condition 21.1% followed by hypothyroidism 2.3% then liver cirrhosis 1.1% and squamous cell carcinoma of the scalp 1.1% (Fig 5).

4. Discussion

This study aimed to determine the prevalence of AC among controlled and uncontrolled diabetic patients, as well as its association with systemic diseases in Libyan patients with Type 2 Diabetes.

Compared to non - DPs, AC occurs more frequently in DPs ([4]. The presented study showed a low prevalence rate (20%) of AC in all DPs of the entire study sample. This finding was consistent with Clarin (2023) [20] who reviewed 30 articles showed that the prevalence of AC in most countries is low and inconsistent with Al - Maweri (2013) [12] who found that the prevalence rate was significantly higher in DPs than in non - diabetic individuals.

The greatest incidence of AC occurs throughout the third, fifth, and sixth decades of life [7]. In our study, the age group most commonly involved and significantly higher was 60 - 69 years-old (27.2 %) ($P < 0.023$). In addition, the number of DPs with AC increases with the increase in age was observed. This was in agreement with Febrine (2023) ([15] who reported that the highest frequency of AC occurred in the 61 - 65 years age group, and in disagreement with Jaisankar (2021) [9] who reported that the people of age group 41 to 50 were the most affected. On the other hand our study in accordance with many previous studies revealed that subjects of age group 20 to 30 years old were the least affected.

AC is more common in adulthood, affecting both genders equally [20].

In our study, the prevalence of AC in females was 46 case (54.1%) and males 39 cases (45.8%) and was thus considerably more prevalent in females than in males with male to female ratio of 1.2: 1. It was observed that statistically was not a significant. This finding was similar to study conducted by Jaisankar (2021) [9] on 125 patient with AC who reported that AC occurs more commonly in Females with 52% incidence and in disagreement with study conducted by Devi (2020) ([19] who found that AC was more predominant in males also inconsistent with Pandarathodiyil (2021) ([20] who stated that AC is seen predominantly in adults, equally in both males and females.

AC is more common in GUDPs with HbA1c levels more than 8 [2]. In our study, DPs with AC were 80% glycemic uncontrolled while 20% were glycemic controlled. This greater prevalence of Ac in GUDPs could be attributed to the fact that GUDPs and undiagnosed DPs are more vulnerable to infections. This finding was consistent with previous study results indicating that inadequate glycemic management is one of the risk factors for AC. Certain variants of AC coexist with systemic or dermatological diseases [6].

In our study the most frequent systemic disease in DPs with AC was hypertension 39.06% followed by other medical conditions 34.3% such as nephropathy, hypothyroidism and liver cirrhosis. Cardiac diseases 20% was the most common third systemic disease. However, there was no statistically significant correlation found between AC and the identified systemic disorders.

5. Conclusion

The prevalence of Angular Cheilitis was low among the study sample but was significantly higher in uncontrolled diabetic patients, particularly among females and those with systemic diseases like hypertension and neuropathy. Additionally, AC increased with age, reaching a peak in the 60–69 age range.

The findings suggest that AC could be a useful indicator of poor glycemic control and related systemic conditions, emphasizing the need for integrated management of oral and systemic health in diabetic care.

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Figure 1: Extra - oral Photographs showing bilateral AC in Female patient.

Table 1: The frequency and percentage of AC in the entire study sample

Presence or absence of AC		Frequency	Percent	Valid Percent
Valid	No	341	80.0	80.0
	Yes	85	20.0	20.0
	Total	426	100.0	100.0

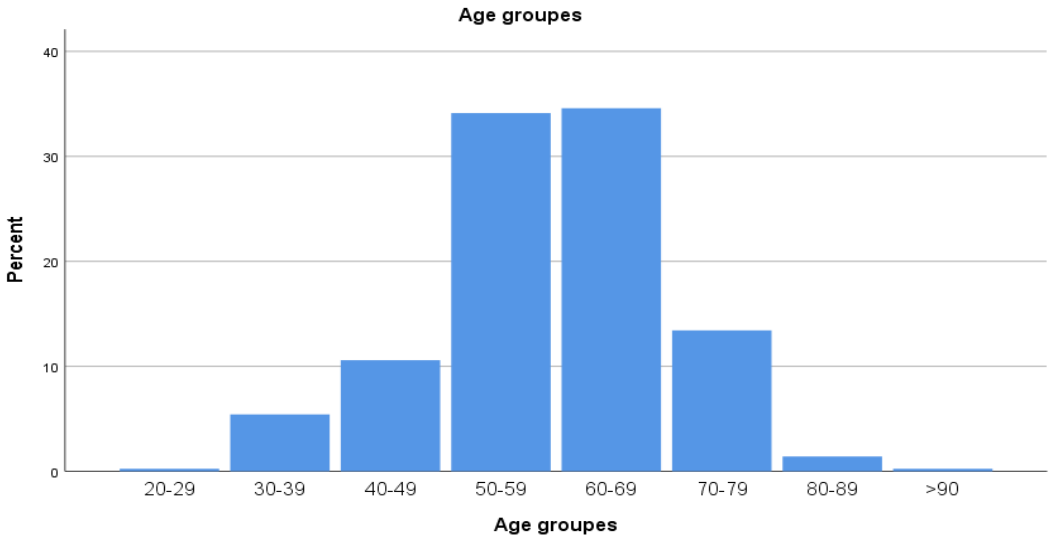

Figure 2: Bar graph demonstrating the prevalence of AC in different age groups.

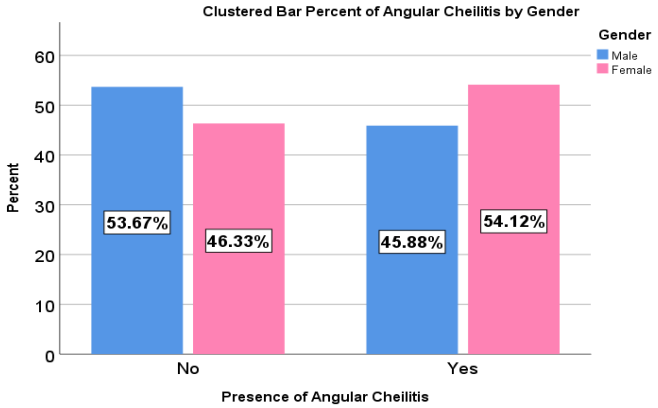

Figure 3: Bar graph representing the percentage distribution of AC in accordance to the gender of DPs.

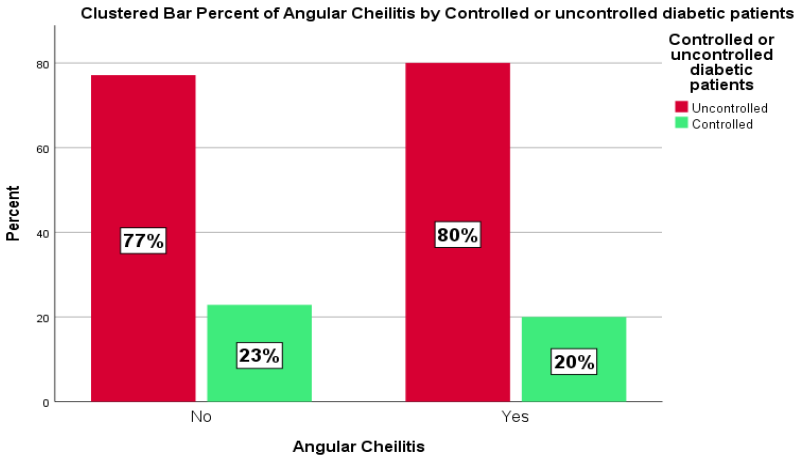

Figure 4: Bar graph demonstrating the percentage of glycemic controlled and uncontrolled DPs diagnosed with AC.

Table 2: Association of hypertension with the presence or absence of AC

Count and percentage			Hypertensive		Total
			No	Yes	
Angular Cheilitis	No	Count	262	79	341
		% within Angular Cheilitis	76.8%	23.2%	100.0%
	Yes	Count	60	25	85
		% within Angular Cheilitis	70.6%	29.4%	100.0%
Total		Count	322	104	426
		% within Angular Cheilitis	75.6%	24.4%	100.0%

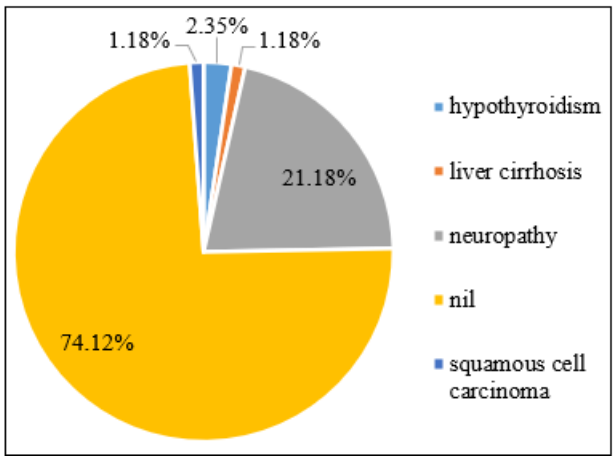

Figure 5: Pie chart representing the most frequent other medical conditions associated with AC.