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# Benign Tongue Abnormalities in a Sample of Libyan Type 2 Diabetic Patients: One Centre Study

Ahmed Mustafa Keshlaf[1*], Naima M. El-Kakalli[2], Abdurahman Musbah Elmezwghi[3], Abdulghani Alarabi[4], Abeer Hussein Elsagali[5]

[1]Assistant Professor, Department of Oral Medicine, Diagnosis and Radiology, Dental Faculty, Tripoli University, Tripoli, Libya
[2]Lecturer, Department of Oral Pathology, Dental Faculty, Tripoli University, Tripoli, Libya
[3]Assistant Professor, Department of Oral Pathology, Dental Faculty, Tripoli University, Tripoli, Libya
[4]Assistant Professor, Department of Orthodontics, Dental Faculty, Tripoli University, Tripoli, Libya
[5]Professor, Department of Oral and Maxillofacial Surgery, Dental Faculty, Tripoli University, Tripoli, Libya

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***Corresponding author:** Ahmed Mustafa Keshlaf
Assistant Professor, Department of Oral Medicine, Diagnosis and Radiology, Dental Faculty, Tripoli University, Tripoli, Libya

## Abstract

***Background*:** Diabetes mellitus (DM) is an endocrine disorder marked by insufficient insulin production, disrupting glucose metabolism and regulation. DM is classified into type I (DM I) and type 2 (DM II). Glycated haemoglobin (Hba1c) is a marker for long-term blood glucose levels. Benign tongue abnormalities (BTAs) associated with (DM II) include the fissured tongue (FT), benign migratory glossitis (BMG), black hairy tongue (BHT), median rhomboid glossitis (MRG), and oral lichen planus (OLP). ***Aim of the work*:** This study aimed to determine the prevalence of BTAs among Libyan patients with controlled and uncontrolled DM II. The study also evaluates the potential correlation between BTA and factors such as age and gender. ***Materials and Method*:** This study included 426 Libyan patients with DM II. Disease duration and complications were obtained from the patient's medical records. Dependent binary variables (BTAs) and independent variables (age, gender, glycemic control in controlled and uncontrolled DM II) were calculated using IBM-SPSS 26. ***Result*:** 77.2% of the 426 patients with type 2 DM exhibited BTAs. FT 96.2% was the most common BTA, followed by MRG 2.1%. BMG 0.9%. BHT 0.6%, and LP 0.3%. 79.3% were glucose-uncontrolled diabetic patients (GUCDPs) and 20.7% were glucose-controlled diabetic patients (GCDPs). ***Conclusion*:** BTAs such as FT, MRG, BMG, BHT and LP were the most frequent conditions. BTA have a high prevalence rate in GUCDPs. BTAs are equally observed in both genders.

**Keywords:** Libyan patients, DMII, HbA1c value, BTAs, glucose-controlled and uncontrolled diabetic patients (DPs).



## INTRODUCTION

DM is a chronic metabolic disorder marked by hyperglycemia resulting from either insufficient insulin production, insulin resistance, or a combination of both [1]. The affected individuals will reach 578 million in 2030 and 700 million in 2045 [2]. There are two classifications of DM, DM I (insulin-dependent) and DM II (non-insulin-dependent) [3]. DM II is the most common variant of diabetes, representing over 90% of all diabetes instances. DM II is characterized by insulin resistance when the body's cells fail to respond adequately to insulin [4]. The symptoms that typically indicate hyperglycemia are polyuria, polydipsia, weight loss, weakness, impaired vision, frequent skin infections, and poor healing of skin wounds after minor injuries [5]. HbA1c is a common marker for long-term blood glucose control [6]. Long-term high blood glucose levels can cause multiple problems in different parts of the body, including the oral mucosa of the mouth, so diabetes management is highly crucial [7]. The tongue mucosa is the oral area frequently affected by diabetes, following periodontal tissue involvement [8]. Several specific tongue abnormalities have been associated with DM II, including fissured tongue, benign migratory glossitis, hairy tongue [9], median rhomboid glossitis and lichen planus [10].

FT (scrotal tongue or lingua plicata) is a condition that appears with many grooves or furrows on

the dorsum of the tongue ranging from 2 to 6 mm deep [11]. It possesses a male preponderance and an estimated prevalent rate of 10% to 20% in the general population, with the incidence increasing significantly with age [12]. The FT is usually asymptomatic unless a secondary infection has occurred [13].

BMG, also known as geographic tongue is frequently observed in daily practice, with an average rate of 2% to 3% in the general public [14]. Clinically, it presents as diffuse red spherical patches with white definite boundaries that give the tongue a map-like shape [15]. Sometimes the lesions move to other parts of the tongue [16]. Leukoplakia, OLP, and candidiasis are considered in differential diagnoses of BMG [17].

MRG manifests as a smooth, shiny, erythematous, well-defined, asymptomatic, plaque-like lesion on the midline of the tongue dorsum [18]. It affects less than 1% of the overall population, with about 70-80% of cases occurring in males [19]. The diagnosis of MRG predominantly depends on clinical examination, although a histopathological study may be required for differential diagnosis in some cases [20].

BHT is a unique disorder characterized by discolouration, elongation, and enlarged papillae on the dorsum of the tongue [21]. It is a self-curing, mostly asymptomatic, benign condition that most commonly affects men and people over the age of 30-40 years [22]. Several factors can cause this condition but the most common cause is prolonged antibiotic use [23].

OLP is a chronic inflammatory oral mucosal disorder induced by T lymphocytes [24]. The prevalence rate in women of all ages is higher than in men worldwide [25]. OLP is marked by one of the following manifestations: reticular, erosive, atrophic, plaque-like form, or bullous [26]. Tongue alterations may help achieve early identification of diabetes and maintain better glycemic control of the disease [27]. However, diagnosing tongue abnormalities is challenging for general dental practitioners because they could be the initial indication or part of underlying systemic disorders [28].

## MATERIALS AND METHODS

This cross-sectional study included 426 Libyan patients diagnosed with Type 2 Diabetes Mellitus (DM II) at the Diabetes and Endocrine Gland Diseases Hospital, Ministry of Health, Tripoli, Libya. Data collection was conducted from July 2023 to August 2024. Information regarding the type of diabetes, glycated haemoglobin (HbA1c) value, disease duration, and complications was obtained from the patient's medical records. Patients with HbA1c readings of 7% or below were considered well-controlled, while those above 7% were classified as poorly controlled.

All patients underwent a comprehensive assessment of past dental history, age, gender, and HbA1c level, followed by clinical evaluation by the same professional examiner using a flashlight, mouth mirror, tweezer, gauze, and tongue depressor.

To identify the presence of tongue abnormalities, all parts of the tongue parts were carefully examined in the following order: dorsal surface, ventral surface, and lateral borders. The obtained data comprises many variables, both quantitative and qualitative.

Descriptive statistics for both the dependent binary variables (presence of tongue abnormalities) and independent variables (age, gender, and glycemic control status in controlled and uncontrolled DM II) were calculated using IBM-SPSS 26 (IBM, USA). A Chi-square test was then conducted to evaluate the relationship between the dependent and independent variables, aiming to identify significant factors associated with tongue abnormalities. P-values less than 0.05 were considered statistically significant.

## RESULT

329 (77.2%) of the 426 Libyan diagnosed with DM II in the study sample exhibited BTAs (Fig 1). FT 327 cases (96.2%) was the most common BTA, followed by MRG 7 cases (2.1%), BMG 3 cases (0.9%), HT 2 cases (0.6%), and LP plaque-like form 1 case (0.3%). Some participants had more than one condition (Fig 2) and (Fig 3).

With a mean age of 58.6 years and a standard deviation (SD) of 10.46 years, the DPs in this study ranged in age from 23 to 95 years. Eight groups were created based on the individuals' ages (20–29, 30–39, 40–49, 50–59, 60–69, 70–79, 80–89, > 90). BTAs were most prevalent in the 50-59 age group, with 113 cases (34.3%) and $P = 0.254$. They were least common in the 20-29 (0.0%) and 90-100 (0.3%) age groups (Table 1).

In this study, 426 DPs participated, comprising 222 females (52.1%) and 204 males. (47.8%), The prevalence of BTAs was 77.5% in females and 77.0% in males, indicating that both genders were equally affected P = 0.917 (Fig 4). The male-to-female ratio of BTAs in the study sample was approximately 1:1.

In a study of HbA1c values among DPs with BTAs, 261 cases (79.3%) were GUCDPs and 68 cases (20.7%) were GCDPs, showing no significant relationship (p = 0.569) (Table 2).

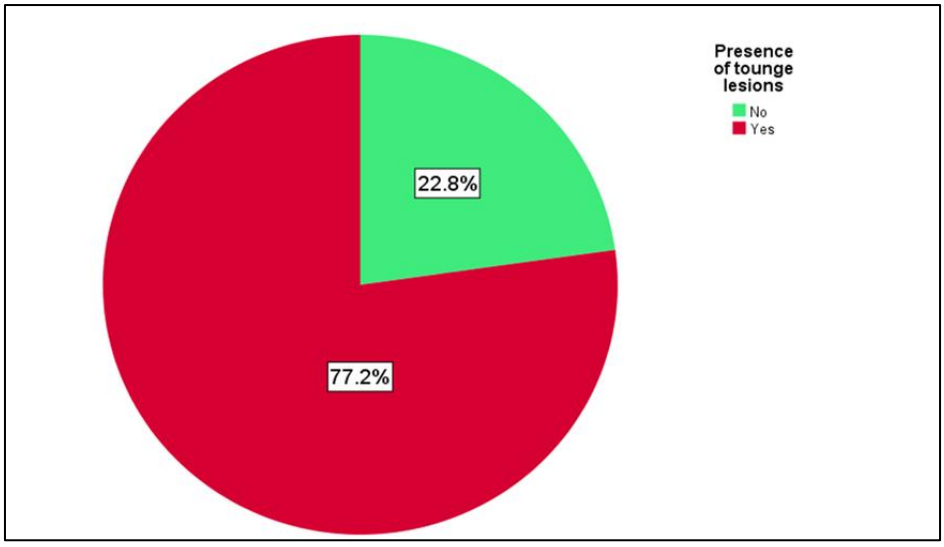


**Figure 1: Pie chart shows the presence and absence of tongue abnormalities**

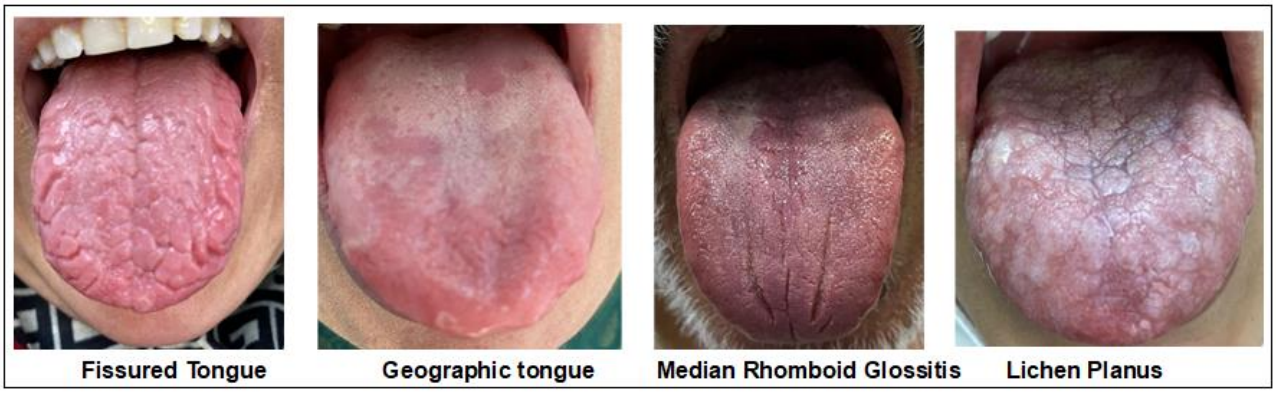


**Figure 2: Intra-oral photographs show different conditions of benign tongue abnormalities**

Note the third picture shows both fissured and median rhomboid glossitis in the same patient

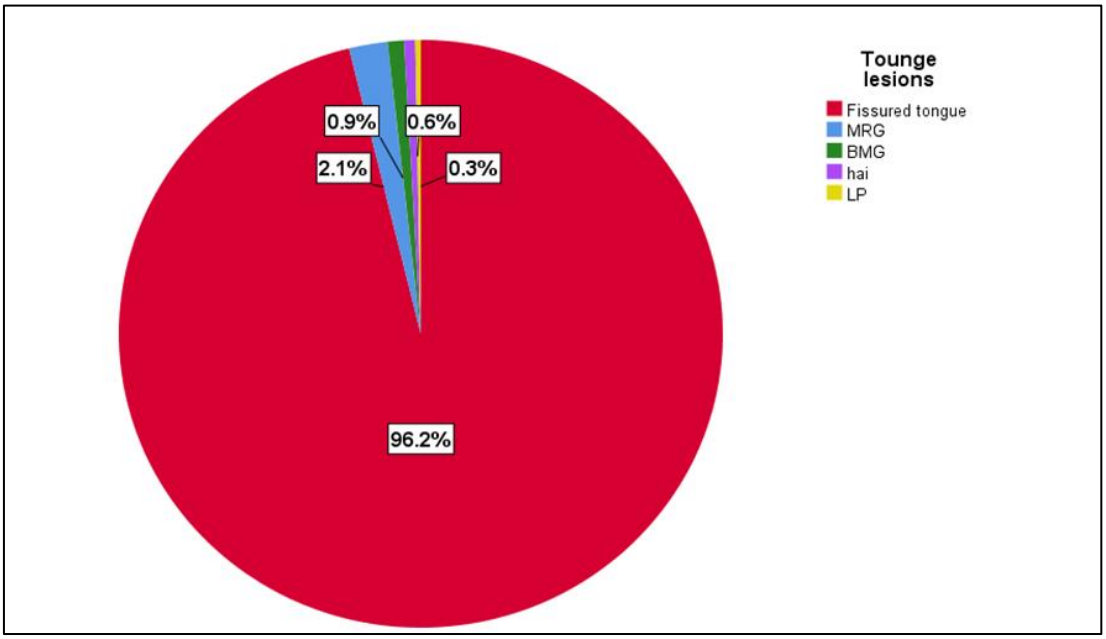


**Figure 3: Pie chart illustrates the percentages of different tongue abnormalities**

**Table 1: Demonstrates an association between the presence of benign tongue abnormalities in different age groups**

| Presence of tongue abnormalities | | Age groups | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 20-29 | 30-39 | 40-49 | 50-59 | 60-69 | 70-79 | 80-89 | 90-100 | |
| No | Count | 1 | 5 | 9 | 32 | 40 | 9 | 0 | 0 | 96 |
| | % within the presence of tongue lesions | 1.0% | 5.2% | 9.4% | 33.3% | 41.7% | 9.4% | 0.0% | 0.0% | 100.0% |
| Yes | Count | 0 | 18 | 36 | 113 | 107 | 48 | 6 | 1 | 329 |
| | % within the presence of tongue lesions | 0.0% | 5.5% | 10.9% | 34.3% | 32.5% | 14.6% | 1.8% | 0.3% | 100.0% |
| Total | Count | 1 | 23 | 45 | 145 | 147 | 57 | 6 | 1 | 425 |
| | % within the presence of tongue lesions | 0.2% | 5.4% | 10.6% | 34.1% | 34.6% | 13.4% | 1.4% | 0.2% | 100.0% |

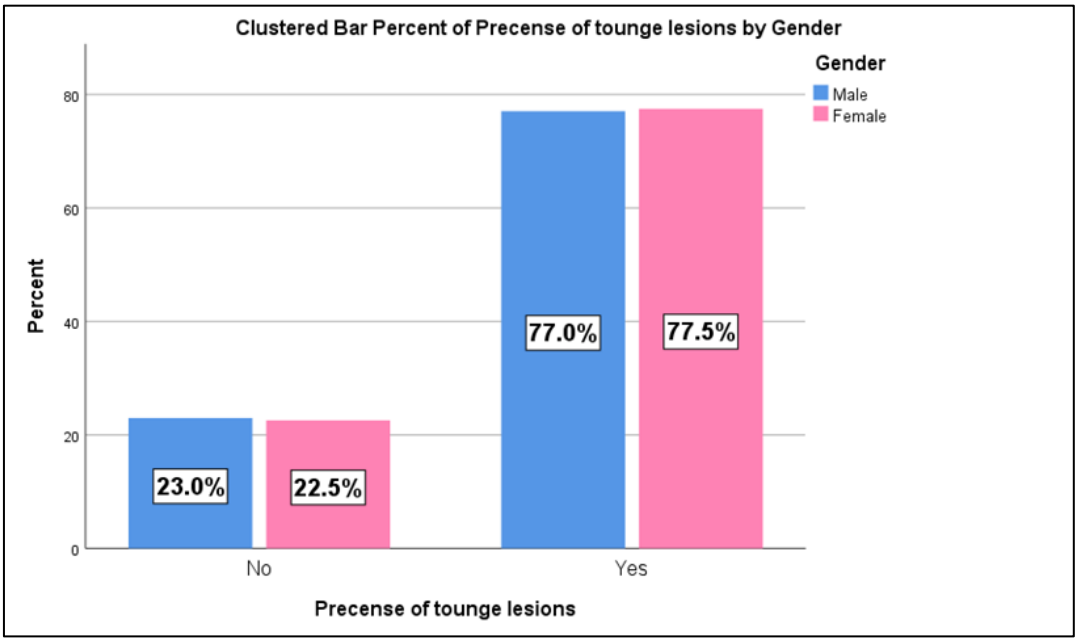


**Figure 4: The Bar graph shows the percentage distribution of benign tongue abnormalities in accordance with the gender of DPs**

**Table 2: Demonstrates the presence of benign tongue abnormalities with the state of DPs Control**

| Presence of tongue lesions | % & No | State Diabetic Control | | Total |
|---|---|---|---|---|
| | | Uncontrolled | Controlled | |
| No | Count | $70_a$ | $27_a$ | 97 |
| | % within the presence of tongue lesions | 72.2% | 27.8% | 100.0% |
| Yes | Count | 261 | 68 | 329 |
| | % within the presence of tongue lesions | 79.3% | 20.7% | 100.0% |
| Total | Count | 331 | 95 | 426 |
| | % within the presence of tongue lesions | 77.7% | 22.3% | 100.0% |

## DISCUSSION

This study aimed to determine the prevalence of BTAs among Libyan patients with DM II, distinguishing between those with controlled and uncontrolled blood sugar levels. Additionally, it sought to evaluate any potential correlation between these BTAs and factors such as age and gender.

DM II patients have a high rate of tongue abnormalities [29]. The current study revealed a high prevalence rate of 77.2% of BTAs among all DPs in the sample. This finding was in line with Manoharan (2019) [30], who reported a high prevalence of tongue alterations among type DM II in a study of 100 DPs.

In the oral cavity, the most common conditions included tongue abnormalities such as coated tongue, FT, MRG, and BMG [20]. In our study, FT was the most common BTA (96.2%), followed by MRG 2.1%, BMG 0.9%, BHT 0.6%, and LP 0.3%. These findings were consistent with Souza (2011) [31] who stated that an association between diabetes and FT had been reported in many previous studies and also agreed with Madathil (2020) [9]. Who reported that FT was more common in

patients with diabetes than in non-diabetics, and in disagreement with Brian (2010) [18] who found that the most common tongue condition is BMG, followed by FT and HT in DPs. The high prevalence of FT in this study may be attributed to its high incidence in the general Libyan population.

In our study, BTAs were more frequent in the 50-59 age group, with males and females equally affected. Unfortunately, only a few studies have been conducted on the relationship between BTAs, age, and gender; furthermore, the size of the study samples also varies.

The American Diabetes Association categorizes DM II patients based on HbA1c levels: uncontrolled (above 7%) and controlled (7% or lower) [32]. In our study, BTAs were most common in GUCDPs, accounting for 79.3% of patients with a Hb A1c level above 7, while 20.7% were GCDPs for levels of 7 or lower. These findings were in line with Keshlaf (2024) [33] who reported a high prevalence of tongue conditions found in GUCDPs and supported by many previous studies. However, high incidences of GUCDPs are perhaps associated with patients' unawareness of prolonged uncontrolled blood hyperglycemia complications and low socioeconomic states.

Chronic hyperglycemia in diabetic individuals, especially when blood glucose levels are uncontrolled, can result in a variety of oral changes [34], in addition to some specific tongue abnormalities [9]. In this study, FT abnormalities had a prevalence of 96%, which was consistent with Manoharan (2019) [30] who found a significant association between the fissured tongue and type DM II, also consistent with Sudarshan (2015) [35] who conducted a Hungarian epidemiological survey showed that FT was coexistent with DM followed by hypertension.

In the current study, MRG was the second most common diabetic tongue abnormality, with a prevalence of 2.1%, significantly lower than FT conditions. This finding was in agreement with Elmezwghi (2021) [6] who studied 464 patients with DM II and found a correlation between MRG and DM II, especially in GUCDPs. While disagreeing with Gawre (2024) [36] who reported a significantly higher prevalence of MRG compared to the control group.

This study found a prevalence of BMG at 0.9% in the study sample, in line with Keshlaf (2024) [34] who reported 0.7% among 426 Type DM II patients. This is also supported by Erriu (2016) [13] who stated that BMG is common in DPs.

BHT is not significantly associated with systemic diseases or medication history [37]. The current study reported only one case of BHT 0.6%, which is inconsistent with Raza (2017) [38] who found three cases among 50 DPs, and Silva (2015) [39] who reported four cases in a sample of 51 DPs.

All studies established a moderate association between DM and OLP [40]. In this study, we reported a single case representing 0.3% of the entire study sample. This result is in line with the findings of Sanjeeta (2022) [10], who also reported one case of OLP in a study conducted on 210 patients diagnosed with DM II and also consistent with Petrou-Amerikanou (1998) [41], who found that the prevalence of OLP in type I DPs was more frequent compared to type DM II. However, some previous studies did not find any cases of OLP in patients with type DM II.

## CONCLUSION

Common BTAs identified in this study include fissured tongue, median rhomboid glossitis, benign migratory glossitis, hairy tongue, and lichen planus. The fissured tongue is the most common benign abnormality of the tongue. BTAs were observed equally in both males and females. BTAs were found to be more prevalent in patients with poor glucose control compared to those with good control. BTAs serve as a primary clinical diagnostic marker in predicting DM disorder and are useful in detecting undiagnosed diabetic cases. Dental practitioners should carefully examine the tongue during intraoral examinations, as this muscular organ can reflect various systemic diseases, especially DM.

## REFERENCES

1. Rohani, B. (2019). Oral manifestations in patients with diabetes mellitus. *World journal of diabetes*, *10*(9), 485-489.
2. Balasubramaniyan, S., Jeyakumar, V., & Nachimuthu, D. S. (2022). Panoramic tongue imaging and deep convolutional machine learning model for diabetes diagnosis in humans. *Scientific Reports*, *12*(1), 186.
3. Mozaffari, H. R., Sharifi, R., & Sadeghi, M. (2016). Prevalence of oral lichen planus in diabetes mellitus: a meta-analysis study. *Acta Informatica Medica*, *24*(6), 390-393.
4. Nazir, M. A., AlGhamdi, L., AlKadi, M., AlBeajan, N., AlRashoudi, L., & AlHussan, M. (2018). The burden of diabetes, its oral complications and their prevention and management. *Open access Macedonian journal of medical sciences*, *6*(8), 1545-1553.
5. Bhandare, N. N., Keny, M. S., Nevrekar, R. P., & Bhandare, P. N. (2014). Diabetic tongue-could it be a diagnostic criterion?. *Journal of family medicine and primary care*, *3*(3), 290-291.
6. Elmezwghi, A. M., Elsagali, A. H., Mo, S. S., Musa, N. H., El-Kakalli, N. M., & Ftis, W. K. (2021). The prevalence correlation of median rhomboid glossitis in diabetic and non-diabetic patients: A cross-sectional study on a sample of Libyan population. *Int J Appl Dent Sci*, *7*(4), 93-98.

7. Yameny, A. A. (2024). Diabetes Mellitus Overview 2024. *Journal of Bioscience and Applied Research*, *10*(3), 641-645.
8. Gandara, B. K., & Morton Jr, T. H. (2011). Non-periodontal oral manifestations of diabetes: a framework for medical care providers. *Diabetes spectrum*, *24*(4), 199-205.
9. Madathil, J., Salim, H. P., Balan, A., Radhakrishnan, C., & Kumar, N. R. (2020). Prevalence of oral lesions in patients with type 2 diabetes in north Kerala population. *Journal of Diabetology*, *11*(1), 32-38.
10. Sanjeeta, N., Sivapathasundharam, B., & Nandini, D. B. (2022). Oral lesions and periodontal status in diabetics and non-diabetics: A hospital based study. *Journal of Oral and Maxillofacial Pathology*, *26*(3), 419-424.
11. Ehsan, H., Azimi, S., Yosufi, A., & Yousufi, R. (2023). The prevalence and significance of fissured tongue in Kabul city among dental patients. *Clinical, Cosmetic and Investigational Dentistry*, 15, 21-29.
12. Bakshi, S. S. (2019). Fissured tongue. *Clev Clin Medi*, *86*(11). doi:10.3949/ccjm.86a.19060.
13. Erriu, M., Pili, F. M. G., Cadoni, S., & Garau, V. (2016). Diagnosis of lingual atrophic conditions: associations with local and systemic factors. A descriptive review. *The open dentistry journal*, *10*, 619-635.
14. Jacob, N. C., John, M. T., & Jayaprakash, R. (2016). Geographic tongue. *Cleve Clin J Medi*, *83*(8), 565-566.
15. Sohal, K. S., Owibingire, S. S., Moshy, J. R., Odhiambo, W. A., & Lubasha, B. (2023). Effectiveness of mixture of aspirin and ethanol regimen in the management of geographic tongue: a prospective study. *Annals of Medicine and Surgery*, *85*(6), 2540-2544.
16. Zahid, E., Bhatti, O., Zahid, M. A., & Stubbs, M. (2022). Overview of common oral lesions. *Malaysian Family Physician: the Official Journal of the Academy of Family Physicians of Malaysia*, *17*(3), 9-21.
17. Chaubal, T., & Bapat, R. (2017). Geographic tongue. *The American Journal of Medicine*, *130*(12), 533-534. doi.org/10.1016/j.amjmed.2017.06.016.
18. Reamy, B. V., Derby, R., & Bunt, C. W. (2010). Common tongue conditions in primary care. *American family physician*, *81*(5), 627-634.
19. Ghabanchi, J. (2011). The Prevalence of Median Rhomboid Glossitis in Diabetic Patients: A Case-Control Study. *Iran Red Crescent Med J*, *13*(7), 503-506.
20. Lago-Méndez, L., Blanco-Carrión, A., Diniz-Freitas, M., Gándara-Vila, P., García-García, A., & Gándara-Rey, J. M. (2005). Rhomboid glossitis in atypical location: case report and differential diagnosis. *Medicina Oral, Patologia Oral y Cirugia Bucal*, *10*(2), 123-127.
21. Ren, J., Zheng, Y., Du, H., Wang, S., Liu, L., Duan, W., ... & Yang, Q. (2020). Antibiotic-induced black hairy tongue: two case reports and a review of the literature. *Journal of International Medical Research*, *48*(10), 0300060520961279.
22. Owczarek-Drabińska. (2020). Black hairy tongue in an infant. *Am J Case Rep*, 21, 926362-926364.
23. Sun, K. W., & Yang, Z. C. (2023). Long-term use of triple antibiotic-induced black hairy tongue: A case report. *SAGE Open Medical Case Reports*, *11*, 2050313X231204136.
24. Indurkar, M. S., Maurya, A. S., & Indurkar, S. (2016). Oral manifestations of diabetes. *Clinical diabetes*, *34*(1), 54-57.
25. Mozaffari, H. R., Rahmani, M., Rezaei, F., Sadeghi, M., Sharifi, R., & Ejtehadi, A. (2016). Evaluation of oral lichen planus frequency in patients referred to pathology centers of Kermanshah city, during 2008 to 2011. *Sch J App Med Sci*, *4*(6E), 2200-2202.
26. Ariani, D., Sasanti, H., & Bramantoro, T. (2020). Is it a Common Oral Lichen Planus or a Part of Grinspan's Syndrome?. *Indian Journal of Public Health Research & Development*, *11*(3), 1490-1494.
27. Al-Maskari, A. Y., Al-Maskari, M. Y., & Al-Sudairy, S. (2011). Oral manifestations and complications of diabetes mellitus: a review. *Sultan Qaboos University Medical Journal*, *11*(2), 179-186.
28. Raman, P. (2022). Tongue Lesions as an Oral Diagnostic Challenge for a Primary Care Physician-A Clinical Case series. *Journal of Family Medicine and Primary Care*, *11*(4), 1573-1579.
29. Silva, M. F. A., Barbosa, K. G. N., Pereira, J. V., Bento, P. M., Godoy, G. P., & Gomes, D. Q. D. C. (2015). Prevalence of oral mucosal lesions among patients with diabetes mellitus types 1 and 2. *Anais brasileiros de dermatologia*, *90*(1), 49-53.
30. Manoharan, G. V., & Jayanthiswari, K. (2019). Tongue Disorders Occuring in Diabetes Mellitus Patients–A Prevalence Study. *Ann Int Med Den Res*, *5*(6), 16-19.
31. de Souza Bastos, A., Leite, A. R. P., Spin-Neto, R., Nassar, P. O., Massucato, E. M. S., & Orrico, S. R. P. (2011). Diabetes mellitus and oral mucosa alterations: prevalence and risk factors. *Diabetes research and clinical practice*, *92*(1), 100-105.
32. Radha, R. K. N., & Selvam, D. (2016). MPV in uncontrolled & controlled diabetics-its role as an indicator of vascular complication. *Journal of clinical and diagnostic research: JCDR*, *10*(8), EC22-26.
33. Keshlaf, A. M. (2024). Oral and systemic complications associated with type 2 diabetes mellitus in a sample of the Libyan population: A single-centre study. *IJADS*, *10*(1), 206-212.
34. Ahmad, R., & Haque, M. (2021). Oral health messiers: diabetes mellitus relevance. *Diabetes, Metabolic Syndrome and Obesity*, 3001-3015.
35. Sudarshan, R., Sree Vijayabala, G., Samata, Y., & Ravikiran, A. (2015). Newer classification system

for fissured tongue: an epidemiological approach. *Journal of tropical medicine*, *2015*(1), 262079. 262079. https://doi.org/10.1155/2015/262079

36. Gawre, S. R., Sonar, P. R., Reche, A., Tiwari, A. V., Arya, A., & Singh, A. (2024). Median Rhomboid Glossitis: A Case Study. *Cureus*, *16*(5), 61182. doi: 10.7759/cureus.61182.
37. Jahanbani, J., Sandvik, L., Lyberg, T., & Ahlfors, E. (2009). Evaluation of oral mucosal lesions in 598 referred Iranian patients. *The open dentistry journal*, *3*, 42-47.
38. Raza, S. (2017). Spectrum of Oral Mucosal Lesions in Patients with Type 2 Diabetes Mellitus. *Indo Am J P Sci*, *4*(8), 2772-2774.
39. Silva, M. F. A., Barbosa, K. G. N., Pereira, J. V., Bento, P. M., Godoy, G. P., & Gomes, D. Q. D. C. (2015). Prevalence of oral mucosal lesions among patients with diabetes mellitus types 1 and 2. *Anais brasileiros de dermatologia*, *90*(1), 49-53.
40. Mallah, N., Ignacio Varela-Centelles, P., Seoane-Romero, J., & Takkouche, B. (2022). Diabetes mellitus and oral lichen planus: A systematic review and meta-analysis. *Oral diseases*, *28*(8), 2100-2109.
41. Petrou-Amerikanou, C., Markopoulos, A. K., Belazi, M., Karamitsos, D., & Papanayotou, P. (1998). Prevalence of oral lichen planus in diabetes mellitus according to the type of diabetes. *Oral diseases*, *4*(1), 37-40.