

Tongue Disorders Occuring in Diabetes Mellitus Patients – A Prevalence Study

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ABSTRACT

Background: Tongue changes in various systemic diseases have been established in many studies. India being the diabetic capital of the world has many undiagnosed/uncontrolled cases of diabetes. Oral cavity is a mirror of systemic illness; many oral manifestations are associated with the metabolic disease Diabetes mellitus (DM). **Aim & Objective:** To estimate the prevalence rate of tongue disorders among diabetes mellitus patients. **Methods:** This observational study includes 100 Diabetic patients taken from the outpatients who reported to the Department of Oral Medicine and Radiology, Tamil Nadu Government Dental College, Chennai and were clinically examined for tongue changes. **Results:** The prevalence rate of various tongue disorders among the total study population was recorded as 91%. The prevalence of tongue disorders in our study was significantly high in type II DM than type I DM, with respect to specific tongue disorders, a highly significant association was observed between Fissured tongue (17%) and type II DM. **Conclusion:** Specialists in Oral Medicine & Radiology must look for tongue disorders as one of the oral manifestation of Diabetes mellitus and suspect the presence of DM based on the tongue manifestations in those who are not aware of their Diabetic status and refer them for screening so as to diagnose DM early and treat it effectively.

Keywords: Tongue disorder, Diabetes Mellitus.

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INTRODUCTION

The rapid increase in population growth, aging, obesity, and inactivity of lifestyle, has made diabetes mellitus (DM) the major burden of adult public health.^[1-3] Wild S et.al in his epidemiological study of the global prevalence of diabetes describes that there were 171 million people with diabetes worldwide in 2000 and was expected to keep increasing to 366 million by 2030.^[3] According to Sarwar N, the number of people with diabetes has risen from 108 million in 1980 to 422 million in 2014.^[4] WHO factsheet reveals that the global prevalence of diabetes among adults over 18 years of age has risen from 4.7% in 1980 to 8.5% in 2014. Amy Bradshaw Kaiser et al, have estimated that in 2018 there were more than 500 million prevalent cases of type 2 diabetes worldwide.^[5]

Chronic diabetes and uncontrolled blood sugar level would lead to micro-vascular or macro-vascular complications.^[6,7] Nazir MA et al in his study

establishes that most diabetic patients were found to have oral manifestations, such as periodontal disease, tooth loss, xerostomia, caries, burning mouth disorder, taste and salivary gland dysfunction, delayed wound healing, lichen planus, geographic tongue, and candidiasis.^[8]

Tongue changes in various systemic diseases have been established in many studies. India being the diabetic capital of the world has many undiagnosed/uncontrolled cases of diabetes. Oral cavity is a mirror of systemic illness; many oral manifestations are associated with the metabolic disease Diabetes mellitus. Specialists in Oral Medicine & Radiology have got a greater role to play in detecting Diabetes mellitus, by seeing the oral manifestations in patients.

MATERIALS & METHODS

This observational study was done on a sample size of 100 Diabetic patients taken from the outpatients who reported to the outpatient department of Oral Medicine and Radiology, Tamil Nadu Government Dental College, Chennai. Informed consent was obtained from all the study participants. All previously diagnosed type I diabetes mellitus cases (IDDM) & type II diabetes mellitus cases (on oral hypoglycaemic agents) were included and patients

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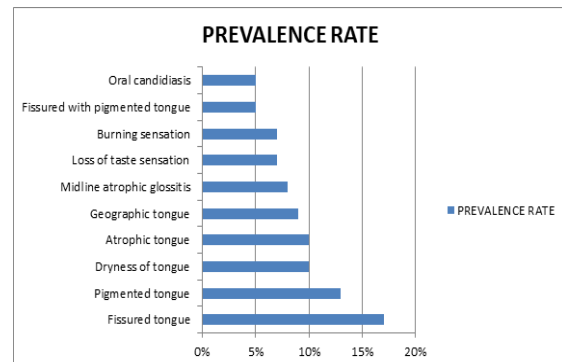
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with malignancies, patients on immunosuppressive drug therapy, patients undergoing chemotherapy, radiotherapy and chronic systemic bacterial infections, denture wearers were excluded. A thorough history taking was done followed by systematic clinical examination of tongue using artificial light, mouth mirror, tweezers, gauze and tongue depressor. Routine blood investigations were done and findings documented. The results were analysed and expressed in percentage.

RESULTS

Our study population was in the age group of 30 – 68years with a gender distribution of male (55%) and female (45%). The Diabetes Mellitus type reported were Type I (14%) & Type II (86%). The prevalence rate of various tongue disorders among the total study population was recorded as 91%. [Graph 1] shows the distribution of various types of

tongue disorders among our study population and [Table 1] shows the distribution of various types of tongue disorders among type I and type II diabetes mellitus patients.



Graph 1: Prevalence rate of various tongue disorders among DM patients

Distribution of various tongue disorders among our study population

Table 1: Distribution of various types of tongue disorders among type I and type II diabetes mellitus patients.

Type of DM	FT (17)	PT (13)	DT (10)	AT (10)	GT (9)	MAG (8)	LTS (7)	BS (7)	PT+FT (5)	OC (5)
Type I (n = 14)	2 (14%)	2 (14%)	3 (21%)	4 (29%)	-	1 (7%)	1 (7%)	-	-	1 (7%)
Type II (n = 86)	15 (17%)	11 (13%)	7 (8%)	6 (7%)	9 (10%)	6 (7%)	6 (7%)	8 (9%)	5 (6%)	4 (5%)

Table 2: Distribution of various types of tongue disorders among different RBS values of type I diabetes mellitus patients.

RBS mg/dl	FT	PT	DT	AT	GT	MAG	LTS	BS	PT+FT	OC
79 -160	1	1	-	1	-	-	-	-	-	1
161 - 200	-	1	2	2	-	1	1	-	-	-
≥ 200	1	-	1	1	-	-	-	-	-	-

*Reference RBS values as per ADA guidelines [9]

Table 3: Distribution of various types of tongue disorders among different RBS values of type II diabetes mellitus patients.

RBS mg/dl	FT	PT	DT	AT	GT	MAG	LTS	BS	PT+FT	OC
79 -160	7	5	3	3	4	1	2	5	1	1
161 - 200	5	2	-	-	4	-	1	3	1	2
≥ 200	3	4	4	3	1	5	3	-	3	1

*Reference RBS values as per ADA guidelines [9]

Table 4: Distribution of various types of tongue disorders among different age groups of study population

Age in Years	FT	PT	DT	AT	GT	MAG	LTS	BS	PT+FT	OC
30-40 (n = 11)	1	4	0	0	2	1	0	1	0	0
41-50 (n = 30)	8	2	3	3	2	3	2	2	1	1
51-60 (n = 30)	4	2	4	5	1	2	3	5	1	2
61-70 (n=29)	4	5	3	3	4	1	2	0	3	2

Table 5: Distribution of various tongue disorders among DM patients with Hypertension

Type of DM	FT (17)	PT (13)	DT (10)	AT (10)	GT (9)	MAG (8)	LTS (7)	BS (7)	PT+FT (5)	OC (5)
Type I (n = 14)	0	1	2	0	0	0	1	0	0	0
Type II (n = 86)	1	3	3	0	1	2	1	1	4	1

Table 6: Distribution of various tongue disorders among DM patients with Smoking & Pan masala chewing

DM	Habits	FT	PT	DT	AT	GT	MAG	LTS	BS	PT+FT	OC
Type I	Smoking	1	0	0	0	0	0	0	0	0	0
	Pan masala chewing	0	0	0	1	0	0	0	0	0	0
Type II	Smoking	0	1	1	1	0	0	0	0	1	0
	Pan masala chewing	1	1	0	1	2	0	1	0	0	0

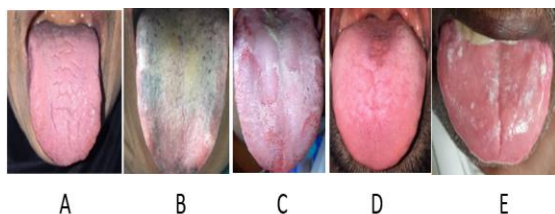


Figure 1: Pictures of different types of tongue disorders in Diabetes Mellitus. (A- Fissured tongue, B – Pigmented tongue, C – Geographic tongue, D – Mid atrophic Glossitis & E – Atrophic tongue.)

DISCUSSION

The prevalence of tongue disorders in our study was significantly high in type II DM than type I DM. Literature (Silva MFA et al) revealed similar high prevalence of tongue disorders among type II DM.^[10] In this study, with respect to specific tongue disorders, a highly significant association was observed between Fissured tongue (17%) and type II DM. The pathogenesis of fissured tongue can be developmental, the result of aging, or changes in the oral environment. This is in accordance with the findings of Guggenheimer et al, where they also noticed high prevalence of fissured tongue.^[11] Pigmented tongue was reported along with fissured tongue in 5% of our study. Pigmented tongue per se was reported to be at 13% in our study. 10% of our study population were found to have Xerostomia, this finding is in accordance to the studies conducted by Ogunbodede EO et al. & Quirino MR who showed that xerostomia was prevalent among diabetic patients.^[12]

Though the pathogenesis remain unclear, the dehydration as a result of prolonged hyperglycaemia and polyurea is considered as a major cause of xerostomia and salivary gland hypofunction in diabetes.

Geographic tongue prevalence was at 9% in our study, similar to findings by Guggenheimer et al., who also found a higher frequency of GT in diabetic patients (5.4%).^[11] The cause of increased prevalence of GT in diabetic patients, although still unknown, may be associated with slower repair and delayed healing mechanisms caused by microangiopathy of the oral vasculature and hypoxia in diabetic patients. 5% of our study population presented with Oral candidiasis (Pseudomembranous) and 8% with midline atrophic glossitis. Hyperglycemia due to poor metabolic control is one possible predisposing factor of oral

candidiasis in diabetic patients. This can lead to the growth of *Candida albicans* and enhanced adhesiveness to the oral epithelium in association with other local factors such as the presence of dental prostheses, salivary pH, salivary flow rate, and oral habits.

7% of our study subjects presented with loss of taste sensation and burning sensation of tongue respectively. Lalla RV, D'Ambrossio JA also reported high frequency of taste dysfunction.^[13] Metabolic and endocrine diseases were proposed as causative factors for this disturbance; nevertheless, salivary dysfunction can contribute to altered taste sensation or elevation of detection thresholds.^[14]

Lacunae:

Sample size was only 100 in number, only random blood sugar (RBS) levels were estimated and the study results were not correlated with the glycaemic control levels (HbA1C). The tongue manifestations were not analysed with respect to the anti-diabetic medication which they were taking.

Future Scope:

This study shall be extended on a larger study sample and the glycaemic control levels by testing HbA1C and correlating it with the tongue changes shall be done. The association between oral hypoglycaemic drugs and tongue manifestations shall also be taken into consideration.

CONCLUSION

In our study, 91% of diabetes patients presented with various forms of tongue disorders. Hence, Dental Surgeons must look for tongue disorders as one of the oral manifestation of Diabetes mellitus and suspect the presence of DM based on the tongue manifestations in those who are not aware of their Diabetic status and refer them for screening so as to diagnose DM early and treat it effectively.

REFERENCES

1. Yang W, Lu J, Weng J, et al. Prevalence of diabetes among men and women in China. *N Engl J Med* 2010;362:1090–101.
2. Engelgau MM, Geiss LS, Saaddine JB, et al. The evolving diabetes burden in the United States. *Ann Intern Med* 2004;140:945–50.
3. Wild S, Roglic G, Green A, et al. Global prevalence of diabetes: estimates for the year 2000 and projections for 2030. *Diabetes Care* 2004;27:1047–53.

4. Diabetes mellitus, fasting blood glucose concentration, and risk of vascular disease: a collaborative meta-analysis of 102 prospective studies. Emerging Risk Factors Collaboration. Sarwar N, Gao P, Seshasai SR, Gobin R, Kaptoge S, Di Angelantonio et al. *Lancet*. 2010; 26;375:2215-2222.
5. Global Prevalence of Type 2 Diabetes over the Next Ten Years (2018-2028). Amy Bradshaw Kaiser, Nicole Zhang, Wouter Van der Pluijm. *Diabetes* 2018 Jul; 67(Supplement 1) <https://doi.org/10.2337/db18-202-LB>
6. Cade WT. Diabetes-related microvascular and macrovascular diseases in the physical therapy setting. *Phys Ther* 2008;88:1322–35.
7. Kitada M, Zhang Z, Mima A, et al. Molecular mechanisms of diabetic vascular complications. *J Diabetes Investig* 2010;1:77–89.
8. Nazir MA, AlGhamdi L, AlKadi M, et al. The burden of diabetes, its oral complications and their prevention and management. *Open Access Maced J Med Sci* 2018;6:1545–53.
9. American Diabetes Association. Diagnosis and classification of diabetes mellitus. *Diabetes Care*. 2005;28:S37-42.
10. Silva MFA et. Al: Prevalence of oral mucosal lesions among patients with diabetes mellitus types 1 and 2 *An Bras Dermatol*. 2015;90(1):49-53.
11. Guggenheimer J, Moore PA, Rossie K, Myers D, Mongelluzzo MB, Block HM, et al. Insulin-dependent diabetes mellitus and oral soft tissue pathologies, part I: prevalence and characteristics of non-candidal lesions. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2000;30:182-92
12. Ogunbodede EO, Fatusi OA, Akintomide A, Kolawole K, Ajayi A. Oral health status in a Nigerian diabetics. *J Contemp Dent Pract*. 2005;6(4):1-7.
13. LallaRV, D'Ambrosio JA: Dental management considerations for the patient with diabetes mellitus. *J Am Dent Assoc* 132:1425–1432, 2001
14. Ship JA, Chavez EM. Special Senses: Disorders of Taste and Smell. In: Silverman S Jr, Eversole LR, Truelove EL, Eds. *Essentials of Oral Medicine*. Hamilton, London: BC Decker Inc., 2001. Pp. 279– 80.

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