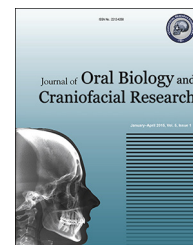


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Original Article

Prevalence and subjective knowledge of tongue lesions in an Indian population



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ABSTRACT

Aim: The current study was designed to determine prevalence of various tongue lesions and their association with age, gender, systemic illness, deleterious habits, and distribution over the surfaces of tongue. It also explored the awareness and knowledge of subjects in relation to presence of tongue lesions, etiological factor, symptoms, and treatment received if any.

Methods: The present study was conducted on 1360 randomly selected dental outpatients from 1/10/2013 to 30/09/2014. Examination of tongue included surface changes, size, movements, and the presence of mucosal lesions. The subjects were asked about the knowledge, symptoms, and treatment obtained in case of awareness regarding the lesion.

Results: The prevalence of tongue lesions was found to be 13.75%. The most prevalent lesion was found to be coated tongue. The majority of the lesions were located on dorsum of tongue and not related with age, gender, habit, and systemic condition. A considerable number of subjects were aware of the changes on their tongue but negligible number sought any treatment.

Conclusions: The presence of tongue lesions in the study population was found be significant. Hence, general dental practitioners and health care providers should be educated about the diagnosis, etiology, investigations, and proper management of such tongue lesions.

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1. Introduction

Tongue is a remarkable muscular organ which performs a host of diverse yet important functions such as taste, phonation,

mastication, deglutition, suckling, maintenance of oral hygiene, protection of deeper structures, and facilitation of orofacial growth.¹ The easy clinical accessibility of tongue makes it a good indicator in oral and general clinical examinations. Due to its strategic location, various oral as well as systemic diseases often

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encompass tongue in a diversified pattern, and hence consequently can hamper its structure and functions noticeably. Nevertheless, involvement of tongue is also seen in various syndromes such as Vanderwoude and Melkersson Rosenthal to name a few.²

Building and augmenting research aptitude in public health are highly recommended by World Health Organization for effective control of disease and the socioeconomic development of any given country.³ Epidemiological studies performed in different locale have substantiated importance of tongue lesions considerably but extensive review of literature revealed lack of such studies being conducted in developing countries, especially in South East Asian region. With a working hypothesis that a considerable variety of lesions occur in the study population, the current study was designed to determine the prevalence of various tongue lesions in a population of socioeconomically underprivileged Purba Medinipur district of West Bengal, India and to assess the subjects symptoms, knowledge, and awareness of their tongue lesions, and the type of the treatment provided. The association of the lesions with age, gender, adverse habits, and underlying systemic disorder was also appraised in the present study.

2. Material and methods

The present cross-sectional study was conducted on 1360 dental outpatients (10–70 years) who visited the Department of Oral Medicine and Radiology from 1/10/2013 to 30/09/2014. The study design was approved by the Ethical Committee of the institute and informed written consent forms in the local Bengali language were obtained from the subjects or their guardians who were willing to participate in the study. The study questionnaire collected information regarding age, gender, deleterious habits, and medical and pharmacological history. The consumption of tobacco in any form and alcohol were considered under deleterious habits.

All the investigators, oral medicine experts, were trained and calibrated by the most experienced investigator. To determine interobserver reliability, the initial 25 subjects were examined by all the investigators and Cronbach's alpha test was applied. The value of Cronbach's alpha test was 0.8 and thus the internal consistency between examiners was found to be good. Henceforth, tongue was examined by all the investigators under artificial light with conventional mouth mirror, tweezer, and gauze piece.

The universal precautionary measures were observed and the lesions were diagnosed according to WHO criteria suggested by Kramer and co-researchers.⁴ Examination of tongue included surface changes, its size and movements, and the presence of mucosal lesions. As the questionnaire was open ended, the subjects were asked about the knowledge, symptoms, and treatment obtained in case of awareness about the lesion. The cases that required additional exams, such as biopsy (malignancy, lymphangioma, squamous papilloma, hemangioma, lichen planus, candidiasis, and leukoplakia) were included only after the final diagnosis was confirmed. The obtained data were compiled and subjected to statistical analysis using Statistical Package for Social Sciences (SPSS) software version 16 (SPSS Inc., Chicago, IL, USA). Chi square

test was used to compare lesions with age, gender, habits, and systemic illness. Frequencies and percentages were calculated. p -Value <0.05 was considered statistically significant.

3. Results

The study was conducted on 1360 outpatients, out of which 187 subjects showed presence of one or more tongue lesions with prevalence rate of 13.75%. Majority of the subjects, i.e. 103 (55.1%) were from 31 to 50 years age group. One hundred and four subjects (55.6%) were male and 83 (44.4%) were female, although the difference was not statistically significant (p value = 0.124). A total number of 81 subjects with tongue lesions gave history of tobacco consumption in some form but it was not significant statistically (p value = 0.06). Twenty-one varieties of lesions with total number counting to 222 were noted, with coated tongue (30.6%) being the most prevalent lesion (Table 1). As much as 25.7% subjects were suffering from some type of systemic illness with gastrointestinal disorders topping the list (Table 2). The various gastrointestinal disorders evaluated were gastritis, gastroesophageal reflux, and inflammatory bowel diseases. None of the patients were on medications which could cause manifestations on tongue. A statistical significance was noted with distribution of lesions which showed majority of the lesions (77.9%) located on the dorsum of tongue. Nearly 30% of the subjects were aware of the changes on their tongue with as much as 21.9% being symptomatic but astoundingly less than 5% of them sought any treatment for the same.

Most common tongue lesions in the study such as coated tongue, pigmented tongue, fissured tongue, and lichen planus were predominantly noted in middle age group (Table 3). Among them, pigmented tongue was significantly encountered in females (p value 0.003). The presence of lichen planus

Table 1 – Frequency and percentage of tongue lesions.

S. no.	Lesion	No. of patients	Percentage
1.	Coated tongue	68	30.6
2.	Fissured tongue	45	20.1
3.	Pigmented tongue	29	12.9
4.	Lichen planus	19	8.5
5.	Partial ankyloglossia	17	7.6
6.	Geographic tongue	8	3.6
7.	Depapillated tongue	7	3.1
8.	Traumatic ulcer	4	1.8
9.	Traumatic fibroma	3	1.3
10.	Squamous cell carcinoma	3	1.3
11.	Candidiasis	3	1.3
12.	Oral submucous fibrosis	3	1.3
13.	Apthous ulcer	2	0.9
14.	Median rhomboid glossitis	2	0.9
15.	Hairy tongue	2	0.9
16.	Foliate papillitis	2	0.9
17.	Leukoplakia	1	0.4
18.	Hemangioma	1	0.4
19.	Varicosity	1	0.4
20.	Squamous papilloma	1	0.4
21.	Lymphangioma	1	0.4

Table 2 – Frequency and percentage of tongue lesions patients with systemic diseases.

Systemic disease	No. of patients	Percentage
Gastrointestinal	14	6.3
Gastrointestinal, Hypertension	2	0.9
Gastrointestinal, Asthma	1	0.4
Neurological	3	1.3
Hypothyroidism	6	2.7
Diabetes mellitus	7	3.1
Gastrointestinal, Diabetes mellitus	1	0.4
Diabetes mellitus, Hypertension	1	0.4
Hypertension	11	4.9
Asthma	1	0.4
Anemia	1	0.4

was significantly associated with adverse habit (p value 0.019). The presence of the aforementioned lesions was not significantly associated with any systemic illness.

4. Discussion

Tongue is a diagnostic indicator of various systemic diseases and truly mirrors the body. The involvement of tongue in various disorders and diseases poses a diagnostic and therapeutic challenge to a general dental practitioner with limited knowledge about the same. The patients can effortlessly survey their tongue due its easy accessibility as compared to other parts of oral cavity and liable to misconstrue any alteration perceived by them. Thus, an oral physician or stomatologist can provide immense service to humankind by performing thorough examination of the tongue as it provides valuable clues to the diagnosis. To name a few, sudden increase in the size of tongue may indicate neoplasm or endocrine disorder or metabolic disease like amyloidosis, abnormal tongue movements are suggestive of motor neuron disease, depapillation with redness is a common feature of nutritional deficiencies, erythematous

tongue may be a first indicator of candidiasis, median rhomboid glossitis arouses suspicion of diabetes mellitus, slurry speech and dysgeusia/ageusia may indicate neurologic deficits. A large number of these disorders can be diagnosed easily by their clinical presentation while some may require further investigations. Sometimes the tongue abnormality may be the first clinical evidence of a previously undiagnosed systemic condition, the early recognition and treatment of which may modify the course or reduce the severity of the underlying disease, and thus render profound service to the patient. Therefore, the role of oral medicine specialist is noteworthy in appropriate diagnosis of various tongue lesions, determining any underlying systemic disorder, detecting any malicious change at its earliest, referring for pertinent investigations, apt management, and most importantly education of the patient. Thus, the current study was designed to determine prevalence of tongue lesions and their association with age, gender, habit, systemic illness, symptoms, awareness, knowledge, and treatment received.

The prevalence of tongue lesions in the study population was estimated to be 13.75%. The results are in close proximity with the lone Indian study conducted by Patil et al.⁵ However, the study conducted by Al-Mobeerick et al. estimated a very low prevalence of 3.96%.⁶ Darwazeh et al. and Voros et al. reported a much higher prevalence of 23.7% and 35.11%, respectively.^{7,8} Such wide variations in results point to a lack of standardization in data for reference apart from racial discrepancies.

The distribution of majority of lesions in 31–50 years age group may be owed to more number of patients from the middle age group reporting to the department. The study conducted in a dental college may be more of a model indicative of general and daily dental practice rather than the scenario in general population which is obviously randomized.

The gender distribution in the current study was similar to the studies conducted by Byahatti et al. and Darwajeh et al.^{9,10}

Most of the lesions were illustrated in patients with gastrointestinal disorders, hypertension, and diabetes

Table 3 – Contingency analysis of most prevalent lesions with age groups, gender, habit, and systemic illness.

Lesion (number of patients)	Age groups ^a	Gender	Habit	Systemic illness
Coated tongue (68)	A: 02 (2.9%)	M: 36 (52.9%)	Present: 33 (48.5%)	Present: 15 (22%)
	B: 48 (70.6%)	F: 32 (47.1%)		
	C: 18 (26.5%)			
	p value: 0.00001	p value: 0.578	p value: 0.276	p value: 0.392
Fissured tongue (45)	A: 01 (2.2%)	M: 28 (62.2%)	Present: 14 (40%)	Present: 14 (31.1%)
	B: 32 (71.1%)	F: 17 (37.8%)		
	C: 12 (26.7%)			
	p value: 0.0005	p value: 0.305	p value: 0.057	p value: 0.337
Pigmented tongue (29)	A: 05 (17.24%)	M: 09 (31%)	Present: 05 (17.24%)	Present: 08 (27.6%)
	B: 21 (72.4%)	F: 20 (69%)		
	C: 03 (10.3%)			
	p value: 0.11	p value: 0.003	p value: 0.002	p value: 0.797
Lichen planus (19)	A: 0	M: 13 (68.4%)	Present: 13 (68.4%)	Present: 03 (15.78%)
	B: 17 (89.5%)	F: 06 (31.6%)		
	C: 02 (10.5%)			
	p value: 0.0047	p value: 0.235	p value: 0.019	p value: 0.298

^a Age groups – A: 10–30 years; B: 31–50 years; C: 51–70 years.
M: Male F: Female.

mellitus. According to the study by Patil et al., anemia was the most common prevalent systemic illness followed by hypertension and diabetes.⁵ The association between presence of tongue lesions and systemic conditions has not been researched extensively in the literature and the current study is one of the very few studies which seeks to explore the same.

Atrophic glossitis appears as complete or patchy baldness of the tongue caused by atrophy of the lingual papillae secondary to iron deficiency anemia, pernicious anemia, and various other conditions.¹¹ Glossitis with varying severity of atrophy of fungiform and filiform papillae have been attributed to substantial reduction in the mean epithelial thickness secondary to nutritional deficiencies.¹² In diabetics, manifestations on tongue may include candidiasis, generalized atrophy of the tongue papillae, taste dysfunction, fissured tongue, geographic tongue, and burning mouth syndrome. Pigmentation of oral mucosa involving tongue, an initial manifestation of primary adrenal insufficiency and Addison's disease, results from increased melanocytic stimulating hormone production.¹³

Medications such as antimalarials, antipsychotics, cytotoxic drugs, and oral contraceptives may cause hyperpigmentation in oral cavity. Antihypertensives such as ACE inhibitors may lead to xerostomia and loss of taste. Improper and long-term usage of corticosteroids in asthmatic patients can result in candidiasis on tongue.¹² The presence of tongue lesions in the study population could not be attributed to medications taken by the subjects for various systemic illnesses.

A wide variety of tongue lesions with overall 222 lesions were encountered in our study population. There were 21 types of lesions with coated tongue (30.4%) being the most widespread followed by fissured tongue (20.1%), pigmented tongue (12.9%), lichen planus (8.5%), partial ankyloglossia (7.6%), and geographic tongue (3.6%).

A similar existence of coated tongue (28%) has been reported by Patil et al.⁵ A lesser prevalence of coated tongue has been reported in the studies conducted by various other researchers.^{9,10,14} The much higher presence of coated tongue in the study population could be attributed to a lack of awareness and maintenance of oral hygiene due to compromised general health as a result of poor socio-economic conditions in the studied population.¹⁵ Patients with coated tongue mostly reported with halitosis (2.7%) in the present study. Tongue coating, comprising of anaerobic bacteria, large amounts of desquamated epithelial cells, leukocytes from periodontal pockets, blood metabolites, and different nutrients, has been considered an ideal atmosphere to produce malodorous compounds which includes hydrogen sulfide, methyl mercaptan, and dimethyl sulfide, therefore, establishing the relationship between tongue coating and halitosis.¹⁶ Previous literature fails to draw a parallel among the same.

Fissured tongue was found to be the most prevailing condition in the studies of Darwazeh et al., Al-Mobeerick et al., Voros et al., and Byahatti et al.^{6,8-10} Our finding falls within the range of the previous studies. Darwazeh et al. and Byahatti et al. reportedly estimated 23% and 16% of patients with fissured tongue to be symptomatic, respectively.^{9,10} In our study, 4.4% of the subjects were found to be symptomatic. Fissured tongue is generally an asymptomatic condition but it can present with symptoms if the fissures are deep enough to

retain food debris which become reservoir for bacteria and consequently cause inflammation.¹⁰ Scanty studies related the presence of fissured tongue and symptoms; accordingly, there is wide variation in the findings due to lack of uniform criteria for the researches.

Pigmentation of tongue has been considered as a physiologic process and thus not been studied comprehensively. We included this condition so as to distinguish between physiologic pigmentation and post-inflammatory pigmentation associated with lichen planus. The post-inflammatory pigmentation could be an outcome of one of the two processes which include increase in melanin production due to direct stimulation of melanocytes by inflammatory chemical mediators and due to abnormal distribution of melanin pigment secondary to presence of melanophages (macrophages laden with melanin) in the underlying connective tissue.^{17,18} Lichen planus is one of the most common conditions resulting in post-inflammatory pigmentation of oral mucosa. The research by Koay and colleagues predicted presence of pigmented tongue to be 6.2%, whereas in our study it was found to be 12.9%, out of which 13.7% were concomitantly associated with lichen planus.¹⁹

The most frequent symptoms associated with the above lesions were burning sensation and pain (9%), typically noted in patients with lichen planus (8.5%). Similar results were observed in study conducted by Byahatti et al.⁹ Mast cells migrate from blood vessels in the deeper connective tissue to the extravascular compartment and subsequently toward the subepithelial zone, where they exert their biologic effect on blood vessels and help in recruitment of inflammatory cells to the lesional area.²⁰ This reason possibly justifies presence of burning sensation in patients suffering from lichen planus.

Majority of the lesions were found on dorsum of tongue (77.9%), which was statistically significant. Similar finding has been stated by Byahatti et al.⁹ The dorsum of tongue with its complex morphology can harbor majority of the lesions.

In the current study, about 56 subjects were aware of the changes on their tongue and 41 out of them had symptoms but surprisingly only 9 sought any treatment for the same and that too improper treatment was received in almost all the cases provided by general practitioners unaware of various oral conditions. More often, we came across patients who preferred taking folk medicine for the same. Usually, antifungal agents were found to be prescribed for conditions such as geographic tongue, fissured, and hairy tongue although they are not fungal infections. The lack of awareness of existence and role of oral physicians among the general population has resulted in negligence of the diseases in many cases or receiving inappropriate treatment. The assessment of patient's knowledge regarding the cause of lesions revealed that 10% of the patients had some idea about the attributing factor though it was irrelevant in maximum cases. Similar lack of awareness was found in the study by Darwazeh et al.¹⁰ This is an alarming situation as oral and dental health is compromised worldwide and resulting in huge burden of oral diseases.

This is the first ever detailed Indian study on tongue lesions. The Purba Medinipur district of West Bengal remains conspicuous for its deteriorating socioeconomic status because of underdevelopment, poor agricultural produce, and

inadequacy of alternative sources of income. Eventually, this region harbors considerable population with poor general and oral health conditions.¹⁵ It is also important to note here that due to widespread presence of oral diseases, general dental practitioners and dental health care providers should be educated about the etiology, diagnosis, investigations, and apposite management of such lesions. Undertaking mass education through extensive use of social media and humanitarian aid organizations may also be beneficial in spreading knowledge and motivating the general population to seek treatment from qualified oral physicians without exception.

In conclusion, a wide spectrum of tongue lesions with significant prevalence in the West Bengal population was noted. However, the results of the current study should be interpreted with caution and conducting such surveys in different racial populations and on large random samples is recommended. Nevertheless, such studies are expensive and laborious to undertake. Until resources are available and better utilized, some relevant information may be obtained from small low-budget studies on selected population.

Conflicts of interest

The authors have none to declare.

REFERENCES

1. du Toit DF. The tongue: structure and function relevant to disease and oral health. *SADJ*. 2003;58:375–376. 380–383.
2. Rajendran R, Sivapathasundharam B. *Shafer's Textbook of Oral Pathology*. 5th ed. India: Elsevier; 2006. pp. 20, 39.
3. Petersen PE. Priorities for research for oral health in the 21st century—the approach of the WHO Global Oral Health Programme. *Commun Dent Health*. 2005;22:71–74.
4. Kramer IR, Pindborg JJ, Bezroukov V, Infirri JS. Guide to epidemiology and diagnosis of oral mucosal diseases and conditions. World Health Organization. *Commun Dent Oral Epidemiol*. 1980;8(1):1–26.
5. Patil S, Kaswan S, Rahman F, Doni B. Prevalence of tongue lesions in the Indian population. *J Clin Exp Dent*. 2013;5(3): e128–e132.
6. Al-Mobeeriek A, AlDosari AM. Prevalence of oral lesions among Saudi dental patients. *Ann Saudi Med*. 2009;29(5): 365–368.
7. Darwazeh AM, Pillai K. Prevalence of tongue lesions in 1013 Jordanian dental outpatients. *Commun Dent Oral Epidemiol*. 1993;21(5):323–324.
8. Vörös-Balog T, Vincze N, Bánóczy J. Prevalence of tongue lesions in Hungarian children. *Oral Dis*. 2003;9(2):84–87.
9. Byahatti SM, Ingafou MSH. The prevalence of tongue lesions in Libyan adult patients. *J Clin Exp Dent*. 2010;2(4):e163–e168.
10. Darwazeh AM, Almelaih AA. Tongue lesions in a Jordanian population. Prevalence, symptoms, subject's knowledge and treatment provided. *Med Oral Patol Oral Cir Bucal*. 2011;16(6): e745–e749.
11. Chi AC, Neville BW, Krayer JW, Gonsalves WC. Oral manifestations of systemic disease. *Am Fam Phys*. 2010;82:1381–1388.
12. Greenberg MS, Glick M. *Burket's Oral Medicine Diagnosis and Treatment*. 11th ed. Ontario, Canada: BC Decker; 2003. pp. 116, 314, 329, 388.
13. Parks TE, Lancaster H. Oral manifestations of systemic disease. *Dermatol Clin*. 2003;21:171–182.
14. Vieira-Andrade RG, Zuquim Guimarães Fde F, Vieira Cda S, Freire ST, Ramos-Jorge ML, Fernandes AM. Oral mucosa alterations in a socioeconomically deprived region: prevalence and associated factors. *Braz Oral Res*. 2011;25(5):393–400.
15. Mondal M. Land people – a dynamic interaction of Purba Medinipur district, West Bengal. *J Pharm*. 2012;2(6):56–61.
16. Lawande SA, Lawande GS. Tongue hygiene and its significance in the control of halitosis. *J Orofac Res*. 2013;3(4):256–262.
17. Morelli JG, Norris DA. Influence of inflammatory mediators and cytokines on human melanocyte function. *J Invest Dermatol*. 1993;100:191S–195S.
18. Mergoni G, Ergun S, Vescovi P, Mete O, Tanyeri H, Meleti M. Oral postinflammatory pigmentation: an analysis of 7 cases. *Med Oral Patol Oral Cir Bucal*. 2011;16(1):e11–e14.
19. Koay CL, Lim JA, Siar CH. The prevalence of tongue lesions in Malaysian dental outpatients from the Klang Valley area. *Oral Dis*. 2011;17(2):210–216.
20. Sharma R, Sircar K, Singh S, Rastogi V. Role of mast cells in pathogenesis of oral lichen planus. *J Oral Maxillofac Pathol*. 2011;15(3):267–271.