



Original Article

บทความวิชาการ

Tongue lesions: prevalence and association with gender, age and health-affected behaviors

Aree Jankittivong B.Sc. (Hons), D.D.S. (Hons), M.S.¹

Vilaiwan Aneksuk D.D.S., Grad. Dip in Clin. Sc. (Periodontology)¹

Robert P. Langlais D.D.S., M.S., FACD, FICD, FRCD(C)²

¹ Department of Oral Medicine, Faculty of Dentistry, Chulalongkorn University

² Department of Dental Diagnostic Science, The University of Texas Health Science Center at San Antonio, San Antonio, Texas, USA

Abstract

Objective The aims of this study were to assess the prevalence of tongue lesions and to relate their occurrence to gender, age and health-affected behaviors in a group of Thai dental patients.

Materials and methods One thousand and six hundred Thai dental patients, dividing into three age groups were clinically examined for tongue lesions. Information regarding smoking and drinking habits was collected from the interview.

Results Among the 1600 subjects, 83.3% had at least one tongue lesion, with a prevalence of 87% for men and 80.9% for women ($P = .002$). The three most common tongue lesions were coated tongue (68.4%), fissured tongue (22.8%) and crenated tongue (10.4%). Coated tongue, fissured tongue, lingual varicosities, and hairy tongue were more common in men than in women ($P = .006$, $P < .001$, $P = .030$ and $P < .001$, respectively). The prevalence of tongue lesions increased with age ($P < .001$). The prevalence rates of coated tongue, fissured tongue, lingual varicosities, macroglossia, atrophic tongue, and hairy tongue increased with age ($P = .014$, $P < .001$, $P < .001$, $P = .006$, $P < .001$, $P < .001$, respectively). Contrary to this, the prevalence of geographic tongue decreased with age ($P = .016$). The occurrence of coated and hairy tongue was associated with smoking and alcohol drinking.

Conclusion The prevalence of tongue lesions in a Thai population was high and was related to gender, age and health-affected behaviors.

(CU Dent J. 2007;30:269-78)

Key words: alcohol; prevalence; tobacco; tongue lesions

Introduction

In Chinese medicine, the tongue is thought of as the mirror of a body. Harmony and disharmony of the body system are reflected in the tongue's color, moisture, size, coating and the location of abnormalities. These signs are said to not only reveal overall states of health but can also be correlated to specific organ functions. Examination of the tongue can provide clinical clues to the presence of systemic disorders as well as local abnormalities.^{1,2} Many conditions and diseases including developmental, traumatic, inflammatory, infectious, and neoplastic lesions may affect the tongue.³

Epidemiological researchers investigating tongue lesions have reported different prevalence rates⁴⁻⁶ and that tongue lesions constitute a significant proportion of oral mucosal abnormalities. The reported prevalence of tongue lesions ranges from 10.7% to 52.2%.⁵⁻⁷ This difference in prevalence rates was related to the number of tongue lesions included in the study, the methodology and the criteria for diagnosis. More over, age, gender, race and habit variations may influence the results.^{5,6,8} The most common reported lesions were coated tongue, fissured tongue, hairy tongue and lingual varicosities.^{5,6,9-11} Hairy tongue was more prominent in men^{4,5} whereas atrophic tongue was found more frequent in women.^{5,8,12} Fissured tongue and lingual varicosities were found more common in older individuals¹³⁻¹⁵ whereas geographic tongue was reported more frequently in younger persons.^{4,12,15,16} An association was reported between tongue lesions and health-affected behaviors such as smoking, black tea drinking and poor oral hygiene. It was found that coated, fissured and hairy tongue was more prevalent among smokers and tea drinkers.⁵

The aims of this study were to assess the

prevalence of tongue lesions in a group of Thai dental patients and to investigate the possible correlation of tongue lesions with gender, age and specific health-affected behaviors (smoking and drinking).

Materials and methods

In this study, a randomized sample of 1600 Thai dental patients was investigated for tongue lesions. This evaluation was a part of the routine oral examination and dental treatment planning procedures performed on patients selected for dental treatment in the Chulalongkorn University Dental School. Two dentists who are experts in Oral Medicine performed an oral examination in the dental chair with the aid of a mouth mirror. Intra- and inter-examiner calibrations were carried out before and during the study. Intra-examiner and inter-examiner reliability was 100%, except for coated tongue (95%).

Tongues were examined and recorded for the presence of abnormalities according to the diagnostic criteria used in epidemiological studies.^{5,17,18} Subjects were divided into three age groups: ≤ 29 years, 30-59 years and 60 years and older. Smoking and drinking behaviors were interviewed and recorded. With regards to a smoking habit, the subjects were divided into two groups: non-smokers and smokers. As for alcohol, subjects were divided into two groups: non-drinkers and habitual drinkers. Occasional drinkers were classified as non-drinkers in our data analyses.

Statistical analyses were performed using the SPSS computer package (version 11.0). The student t-test was used to compare the ages of men and women. Differences between groups were tested for statistical significance by the Pearson Chi-square test. P values of less than .05 were considered statistically significant.

Results

Among the 1600 subjects, 970 (60.6%) were women and 630 (39.4%) were men. Among age groups, there were 580 (36.2%) subjects aged ≤ 29 years, 768 (48%) aged 30–59 years and 252 (15.8%) aged 60 years and older. The age range was 9–83 years. The mean age for women was 38.4 ± 16.7 years and for men 40.8 ± 17.5 years. There were 140 (8.8%) smokers and 207 (12.9%) drinkers. The incidence of smoking and drinking was higher in men than in women (20.8% vs. 0.9%, $P < .001$ for smoking and 30.2% vs. 1.8%, $P < .001$ for drinking).

At least one tongue lesion was present in 83.3% of the subjects. The highest number of tongue lesions in any one subject was five.

Table 1 documents the prevalence of various

tongue lesions in relation to gender. The prevalence rate was 87% for men and 80.9% for women ($P = .002$). Of total, the three most common tongue lesions were coated tongue (68.4%), fissured tongue (22.8%) and crenated tongue (10.4%). Less commonly in decreasing order of frequency were lingual varicosities, ankyloglossia, geographic tongue, macroglossia, atrophic tongue, hairy tongue, aphthous ulcer, traumatic ulcer, median rhomboid glossitis, and fibroma. The other minority group (0.4%) included keratosis, lichen planus, candidiasis and squamous cell carcinoma.

Coated tongue, fissured tongue, lingual varicosities, and hairy tongue were more prevalent in men ($P = .006$, $P < .001$, $P = .030$ and $P < .001$, respectively). There were no gender differences for other tongue lesions.

Table 1 Distribution of various tongue lesions in relation to gender

Tongue lesions	Women (n = 970)	Men (n = 630)	Total (n = 1600)
	n (%)	n (%)	n (%)
Coated tongue*	639 (65.9)	456 (72.4)	1095 (68.4)
Fissured tongue**	178 (18.3)	187 (29.7)	365 (22.8)
Crenated tongue	111 (11.4)	56 (8.9)	167 (10.4)
Lingual varicosities***	61 (6.3)	58 (9.2)	119 (7.4)
Ankyloglossia	53 (5.5)	48 (7.6)	101 (6.3)
Geographic tongue	43 (4.4)	32 (5.1)	75 (4.7)
Macroglossia	33 (3.4)	22 (3.5)	55 (3.4)
Atrophic tongue	35 (3.6)	17 (2.7)	52 (3.2)
Hairy tongue**	14 (1.4)	33 (5.2)	47 (2.9)
Aphthous ulcer	8 (0.8)	2 (0.3)	10 (0.6)
Traumatic ulcer	4 (0.4)	2 (0.3)	6 (0.4)
Median rhomboid glossitis	3 (0.3)	3 (0.5)	6 (0.4)
Fibroma	2 (0.2)	3 (0.5)	5 (0.3)
Others	2 (0.2)	4 (0.6)	6 (0.4)
Total****	785 (80.9)	548 (87.0)	1333 (83.3)

Some subjects had more than one tongue lesion.

* $P = .006$, ** $P < .001$, *** $P = .030$, **** $P = .002$

Table 2 documents the prevalence of various tongue lesions in relation to age. The prevalence of tongue lesions increased with age ($P < .001$). Tongue lesions were noted in 442 (76.2%) subjects aged ≤ 29 years, 656 (85.4%) subjects aged 30–59 years and 235 (93.2%) subjects of the 60 years and older. The prevalence rates of coated tongue, fissured tongue, lingual varicosities, macroglossia, atrophic tongue, and hairy tongue increased with age ($P = .014$, $P < .001$, $P < .001$, $P = .006$, $P < .001$, $P < .001$ respectively). The highest prevalence of

these lesions was in the 60 years and older group. To the contrary, the prevalence of geographic tongue decreased with age ($P = .016$) and the highest prevalence (6.5%) was in the 29 years old and younger group. The occurrence of crenated tongue, ankyloglossia, median rhomboid glossitis and other lesions showed no differences among age groups. In addition, no aphthous ulcers were found in the 60 years and older group whereas no instances of median rhomboid glossitis were found in the youngest age group.

Table 2 Distribution of various tongue lesions in relation to age

Tongue lesions	≤ 29 years (n = 580)	30–59 yrs (n = 768)	≥ 60 yrs (n = 252)
	n (%)	n (%)	n (%)
Coated tongue*	373 (64.3)	536 (69.8)	186 (73.8)
Fissured tongue**	73 (12.6)	186 (24.2)	106 (42.1)
Crenated tongue	61 (10.5)	88 (11.4)	18 (7.1)
Lingual varicosities**	3 (0.5)	40 (5.2)	76 (30.1)
Ankyloglossia	42 (7.2)	43 (5.6)	16 (6.3)
Geographic tongue***	38 (6.5)	31 (4.0)	6 (2.4)
Macroglossia****	9 (1.6)	33 (4.3)	13 (5.1)
Atrophic tongue**	8 (1.4)	21 (2.7)	23 (9.1)
Hairy tongue**	5 (0.9)	27 (3.5)	15 (5.9)
Aphthous ulcer	7 (1.2)	3 (0.4)	0 (0.0)
Traumatic ulcer	0 (0.0)	6 (0.8)	0 (0.0)
Median rhomboid glossitis	0 (0.0)	5 (0.6)	1 (0.4)
Fibroma	0 (0.0)	5 (0.6)	0 (0.0)
Others	0 (0.0)	2 (0.3)	4 (1.6)
Total**	442 (76.2)	656 (85.4)	235 (93.2)

Some subjects had more than one tongue lesion.

* $P = .014$, ** $P < .001$, *** $P = .016$, **** $P = .006$

Table 3 shows the association of tongue lesions with the subjects' health-affected behaviors. Coated tongue and hairy tongue were associated with smoking and alcohol drinking. Coated tongue was found in 76.4% of the smokers and 67.7% of the non-smokers ($P = .033$) and in 74.9% of the drinkers and in 67.5%

of the non-drinkers ($P = .033$). Hairy tongue was found in 12.9% of the smokers and in 2% of the non-smokers ($P < .001$) and in 7.7% of the drinkers and in 2.2% of the non-drinkers ($P < .001$). Fissured tongue was more common in the drinkers than in the non-drinkers (29.9% vs. 21.7%, $P = .009$).

Table 3 Association of tongue lesions and health-affected behaviors

	Coated tongue n (%)	Hairy tongue n (%)	Fissured tongue n (%)
Smokers (n = 140)	107 (76.4)*	18 (12.9)**	39 (27.9)
Non-smokers (n = 1460)	988 (67.7)*	29 (2.0)**	326 (22.3)
Drinkers (n = 207)	155 (74.9)*	16 (7.7)**	62 (29.9)**
Non-drinkers (n = 1393)	940 (67.5)*	31 (2.2)**	303 (21.7)**

* $P = .033$, ** $P < .001$

Discussion

In this study, the findings with regards to the presence of tongue lesions are in agreement with those of other populations in that tongue lesions were found more common in men and were associated with increasing age. However, the prevalence of tongue lesions in the present study was higher than those reported by other investigators. This difference can be explained by the inclusion of more types of tongue lesions in this endeavor. Moreover, we included coated tongue, which usually constituted the major proportion of tongue lesions. This was confirmed by the finding that coated tongue was the most common tongue change in our population and its highest prevalence was observed in individuals aged 60 and above and in men as described in previous studies.^{5,19}

In our study, hairy tongue was related to gender and increased with age. The prevalence of 2.9% was

lower than the prevalence reported in Turks (3.8%)¹¹ and Jordanians (3.4%)⁴ but higher than in Swedish (0.6%).²⁰

In this study, the increased incidence of fissured tongue with age corresponds with other reports.^{13-15,21} The prevalence of fissured tongue in our study (22.8%) is comparable to the prevalence rates reported previously.^{5,13,15} Yarom *et al*²¹ documented the highest prevalence of fissured tongue (30.5%) as compared to other studies. We found fissured tongue was more commonly in men. This is in agreement with the findings of other investigators.^{5,12,13}

We noted the prevalence of lingual varicosities increased with advancing age. This finding is consistent with other reports.^{9-11,13,14} Our results are in agreement with others who noted that this lesion was more common in men.^{9,10,13}

Our results indicated geographic tongue had an overall prevalence of 4.7%, which is similar to data found in previous reports.^{4,15,22} We demonstrated a higher prevalence of geographic tongue in persons younger than 29 years of age. This is also in agreement with most reports of geographic tongue being common in young individuals.^{4,12,15,16} Our data is in agreement with other reports, where an association between fissured and geographic tongue has been suggested.^{8,16,22}

Our study showed the occurrence of macroglossia increased with age. The highest prevalence was noted in the oldest group. This finding corresponds with the data reported by Avcu and Kanli⁵ who also reported a higher prevalence of lateral indentation in persons over 60 years. This later finding is contradictory to our results showing no gender- or age-related differences for lateral crenations. However, we found a significant association between macroglossia and crenated tongue. This may be possible to conclude that large tongue with lateral indentations is secondary to habits associated with negative pressures in the mouth. In his study, Sapiro² stated tongue indentations were indicators of clenching.

Atrophic tongue was observed in 3.2% of our sample. This percentage was similar to the prevalence (3%) found in another study of a Thai population²⁰ but is higher than in Malaysians (1.3%) and Swedish (1.1%)²⁰ and Turks (0.7%).¹¹ This finding was also more common in older individuals and is similar to observations in other reports.^{5,8} However, our study

showed no gender-related differences whereas other investigators.^{5,8,12,20} reported predominance in women. Avcu and Kanli⁵ related this papillary change in women to iron deficiency associated with menstruation disorders.

The prevalence of ankyloglossia (6.3%) as reported here is much higher than in other populations. The differences in our results might stem from the recorded degree of ankyglossia. That is to say, our study included subjects with partial ankyglossia.

We found no association between median rhomboid glossitis (MRG) with gender and/or age. Also, we found no incidence of median rhomboid glossitis in the youngest group. This finding was in agreement with the classic study of Baughman and Charleston²³ who reported no median rhomboid glossitis in young children and concluded this lesion was inflammatory in origin rather than a developmental disorder. MRG is currently related to a chronic infection by *Candida albicans*. However the exact role of this organism in the pathogenesis of this lesion is still not known.^{24,25} Since the occurrence of oral candidiasis increases with age and because we found no instances of median rhomboid glossitis in younger individuals, this evidence may lend partial support to the role of candidiasis in the pathogenesis of MRG. However, since the *Candida* investigation was not performed on MRG lesions, the involvement of *Candida* infection could not be confirmed. Yarom *et al*²¹ reported the higher prevalence of MRG (2.4%) of their Israeli subjects and the prevalence decreased with age. They stated

the decrease in the prevalence of MRG with age did not support the assumption that *Candida* was involved in the pathogenesis of MRG.

This study shows the relationship between coated, hairy and fissured tongues with specific health-affected behaviors. A positive correlation between coated/hairy tongue and smoking and alcohol drinking was found and was more prevalent in men. These results correspond with studies in Sweden,²⁶ Jordan,⁴ and Turkey.¹¹ Fissured tongue has been reported in association with smoking,^{5,18} however, our study failed to show this relationship. In patients with poor oral hygiene, halitosis can result from the degradation of food, the growth of plaque or the presence of debris trapped within the coated, furry and fissured dorsal tongue.^{5,19}

In our series, there was a 66 years old man with extensive squamous cell carcinoma at tongue and floor of mouth. Although this patient has quitted smoking and drinking for several years now but he used to be a heavy smoker and drinker. Tobacco and alcohol are likely to be risk factors for his malignancy. His lesion was previously misdiagnosed as chronic traumatic ulcer due to ill-fitting denture until he was referred to our dental school where the correct diagnosis was made.

Conclusion

We have shown a very high prevalence of tongue lesions in a Thai population. Their tongue lesions correlate with gender and age. It was also demonstrated

that some lesions were associated with smoking and alcohol drinking. In addition, it is well accepted that tobacco and alcohol are potential risk of oral cancer. Dentists can play a significant role in distributing the information regarding the association of oral lesions with health-affected behaviors. Therefore, patients should be advised and encouraged to cease smoking and refrain from heavy alcohol drinking. An oral examination should also be periodically performed and good oral hygiene practices should be strictly followed and maintained.

Acknowledgement

We would like to thank Ms. Vanida Thongtha and Mayurate Prasomthong for their clinical assistance.

References

1. Rogers RS 3rd, Bruce AJ. The tongue in clinical diagnosis. *J Eur Acad Dermatol Venereol.* 2004; 18:254-9.
2. Sapiro SM. Tongue indentations as an indicator of clenching. *Clin Prev Dent.* 1992;14:21-4.
3. McNally MA, Langlais RP. Conditions peculiar to the tongue. *Dermatol Clin.* 1996;14:257-72.
4. Darwazeh AM, Pillai K. Prevalence of tongue lesions in 1013 Jordanian dental outpatients. *Community Dent Oral Epidemiol.* 1993;21:323-4.
5. Avcu N, Kanli A. The prevalence of tongue lesions in 5150 Turkish dental outpatients. *Oral Dis.* 2003; 9:188-95.
6. Voros-Balog T, Vincze N, Banoczy J. Prevalence of tongue lesions in Hungarian children. *Oral Dis.*

- 2003;9:84-7.
7. Taiyeb Ali TB, Razak IA, Raja Latifah RJ, Zain RB. An epidemiological survey of oral mucosal lesions among elderly Malaysians. *Gerodontology*. 1995;12:37-40.
 8. Kullaa-Mikkonen A, Jarvinen J. Effects of age, sex and salivary secretion on the human tongue surface. *Gerodontology*. 1988;4:150-3.
 9. Lin HC, Corbet EF, Lo EC. Oral mucosal lesions in adult Chinese. *J Dent Res*. 2001;80:1486-90.
 10. Garcia-Pola Vallejo MJ, Martinez Diaz-Canel AI, Garcia Martin JM, Gonzalez Garcia M. Risk factors for oral soft tissue lesions in an adult Spanish population. *Community Dent Oral Epidemiol*. 2002;30:277-85.
 11. Mumcu G, Cimilli H, Sur H, Hayran O, Atalay T. Prevalence and distribution of oral lesions: a cross-sectional study in Turkey. *Oral Dis*. 2005; 11:81-7.
 12. Banoczy J, Rigo O, Albrecht M. Prevalence study of tongue lesions in a Hungarian population. *Community Dent Oral Epidemiol*. 1993;21:224-6.
 13. Kovac-Kavcic M, Skaleric U. The prevalence of oral mucosal lesions in a population in Ljubljana, Slovenia. *J Oral Pathol Med*. 2000;29:331-5.
 14. Jainkittivong A, Aneksuk V, Langlais RP. Oral mucosal conditions in elderly dental patients. *Oral Dis*. 2002;8:218-23.
 15. dos Santos PJ, Bessa CF, de Aguiar MC, do Carmo MA. Cross-sectional study of oral mucosal conditions among a central Amazonian Indian community, Brazil. *J Oral Pathol Med*. 2004;33: 7-12.
 16. Jainkittivong A, Langlais RP. Geographic tongue: clinical characteristics of 188 cases. *J Contemp Dent Pract*. 2005;6:123-35.
 17. World Health Organization. Guide to epidemiology and diagnosis of oral mucosal disease and conditions. *Community Dent Oral Epidemiol*. 1980; 8:1-26.
 18. van der Waal I, Pindborg J. Diseases of the tongue. Chicago: Quintessence Publishing, 1980.
 19. Avcu N, Ozbek M, Kurtoglu D, Kurtoglu E, Kansu O, Kansu H. Oral findings and health status among hospitalized patients with physical disabilities, aged 60 and above. *Arch Gerontol Geriatr*. 2005; 41:69-79.
 20. Axell T, Zain RB, Siwamongstham P, Tantiran D, Thampipit J. Prevalence of oral soft tissue lesions in out-patients at two Malaysian and Thai dental schools. *Community Dent Oral Epidemiol*. 1990;18:95-9.
 21. Yarom N, Cantony U, Gorsky M. Prevalence of fissured tongue, geographic tongue and median rhomboid glossitis among Israeli adults of different ethnic origins. *Dermatology*. 2004;209:88-94.
 22. Ghose LJ, Baghdady VS. Prevalence of geographic and plicated tongue in 6090 Iraqi schoolchildren. *Community Dent Oral Epidemiol*. 1982;10:214-6.
 23. Baughman RA. Median rhomboid glossitis: a developmental anomaly? *Oral Surg Oral Med Oral Pathol*. 1971;31:56-65.
 24. Regezi JA, Sciubba JJ. Oral pathology: clinical-pathologic correlations. 2nd ed. Philadelphia: WB

Saunders, 1999:145.

25. Neville BW, Damm DD, Allen CM, Bouquot JE.

Oral and maxillofacial pathology. 2nd ed.

Philadelphia: WB Saunders, 2002:192.

26. Salonen L, Axell T, Hellden L. Occurrence of oral

mucosal lesions, the influence of tobacco habits

and an estimate of treatment time in an adult

Swedish population. J Oral Patho Med. 1990;19:

170-6.

รอยโรคของลิ้น: ความชุกและความสัมพันธ์กับ เพศ อายุ และพฤติกรรมที่มีผลต่อสุขภาพ

อารีย์ เจนกิตติวงศ์ วท.บ. (เกียรตินิยม), ท.บ. (เกียรตินิยม), M.S.¹

วิไลวรรณ อเนกสุข ท.บ., ป. บัณฑิตวิทยาศาสตร์การแพทย์คลินิก (ปริทันตวิทยา)¹

Robert P. Langlais D.D.S., M.S., FACD, FICD, FRCD(C)²

1 ภาควิชาเวชศาสตร์ช่องปาก คณะทันตแพทยศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย

2 Department of Dental Diagnostic Science, The University of Texas Health Science Center at San Antonio, San Antonio, Texas, USA

บทคัดย่อ

วัตถุประสงค์ เพื่อตรวจหาความชุกของรอยโรคของลิ้น และหาความสัมพันธ์ของการเกิดรอยโรคกับเพศ อายุ และพฤติกรรมที่มีผลต่อสุขภาพในผู้ป่วยทางทันตกรรมไทยกลุ่มหนึ่ง

วัสดุและวิธีการ ทำการตรวจทางคลินิกเพื่อหารอยโรคของลิ้นในผู้ป่วยทางทันตกรรม จำนวน 1600 ราย โดยแบ่งเป็น 3 กลุ่มอายุ ข้อมูลของการสูบบุหรี่และดื่มสุราได้จากการสัมภาษณ์ผู้ป่วย

ผลการศึกษา จากผู้ป่วยทั้งหมดจำนวน 1600 ราย พบร้อยละ 83.3 มีรอยโรคของลิ้นอย่างน้อยหนึ่งชนิด โดยที่ความชุกของการเกิดรอยโรคในชายสูงกว่าหญิง คือ ร้อยละ 87 ต่อ 80.9 ($P = .002$) รอยโรคของลิ้น ที่พบมากที่สุดลำดับแรก ได้แก่ คราบบนลิ้น (ร้อยละ 68.4) ร่องบนลิ้น (ร้อยละ 22.8) และ รอยหยักที่ขอบลิ้น (ร้อยละ 10.4) รอยโรคคราบบนลิ้น ร่องบนลิ้น หลอดเลือดลิ้นขด และขนลิ้นยาว พบบ่อยในชายมากกว่าหญิง ($P = .006$, $P < .001$, $P = .030$ และ $P < .001$ ตามลำดับ) ความชุกของรอยโรคของลิ้นแปรตามอายุที่เพิ่มขึ้น ($P < .001$) ความชุกของรอยโรคคราบบนลิ้น ร่องบนลิ้น หลอดเลือดลิ้นขด ลิ้นโต ลิ้นเลื่อน และขนลิ้นยาว เพิ่มขึ้นตามอายุที่สูงขึ้น ($P = .014$, $P < .001$, $P < .001$, $P = .006$, $P < .001$, $P < .001$ ตามลำดับ) ตรงกันข้าม ความชุกของลิ้นแฉกที่กลับลดลงตามอายุที่สูงขึ้น ($P = .016$) การเกิดรอยโรคคราบบนลิ้น และขนลิ้นยาว มีความสัมพันธ์กับการสูบบุหรี่และดื่มสุรา

สรุป ผลการศึกษานี้แสดงให้เห็นว่า รอยโรคของลิ้นในกลุ่มประชากรไทยที่ศึกษามีความชุกสูง และการเกิดรอยโรคมีความสัมพันธ์กับเพศ อายุ และพฤติกรรมที่มีผลต่อสุขภาพ

(ว.ทันต.จุฬาฯ 2550;30:269-78)

คำสำคัญ: ความชุก; ยาสูบ; รอยโรคของลิ้น; สุรา