Published in final edited form as:

Br J Dermatol. 2015 June ; 172(6): 1654–1656. doi:10.1111/bjd.13613.

The Prevalence of Burning Mouth Syndrome: A Population-Based Study

John J. Kohorst, BA, Alison J. Bruce, MB, ChB, Rochelle R. Torgerson, MD, PhD, Louis A. Schenck, MS, and Mark D. P. Davis, MD

Department of Dermatology (Drs Bruce, Torgerson, and Davis) and Division of Biomedical Statistics and Informatics (Mr Schenck), Mayo Clinic, Rochester, Minnesota. Mr Kohorst is a student, Mayo Medical School, Mayo Clinic College of Medicine, Rochester, Minnesota

Abstract

Background—Burning mouth syndrome (BMS) is defined as symptoms of persistent burning in the mouth without objective findings accounting for the symptoms.

Objectives—To calculate the point prevalence of BMS in Olmsted County, Minnesota, on December 31, 2010.

Methods—The Rochester Epidemiology Project (REP) medical records linkage system was used to identify BMS cases diagnosed or potentially diagnosed before December 31, 2009. Inclusion criteria were subjective oral discomfort, normal oral examination, and documented BMS diagnosis by a REP physician.

Results—In total, 149 BMS cases were confirmed, representing age- and sex-adjusted point prevalence of BMS in Olmsted County of 0.11%, or 105.6 (95% CI, 88.6–122.6) per 100,000 persons. Age-adjusted prevalence in women was significantly higher than men: 168.6 (95% CI, 139.0–198.2) vs 35.9 (95% CI, 21.4–50.3) per 100,000 persons ($P<.001$). The highest prevalence was in women aged 70 through 79 years (527.9 per 100,000 persons). Mean (SD) age at BMS diagnosis was 59.4 (15.1) years (range, 25–90 years).

Conclusions—To our knowledge, we provide the first report of population-based BMS prevalence. The data show that BMS most commonly affects women older than 50 years, and when defined through diagnostic criteria, it is less prevalent than described previously.

Keywords

burning mouth syndrome; prevalence; Olmsted County; population-based; Rochester Epidemiology Project

©2014 Mayo Foundation for Medical Education and Research

Reprints: Mark D. P. Davis, MD, Department of Dermatology, Mayo Clinic, 200 First St SW, Rochester, MN 55905 (davis.mark2@mayo.edu Phone: 507-284-2555).

Per the Rochester Epidemiology Project (REP): Once your paper is accepted for publication, please ensure that the corresponding author or the journal submits the manuscript to PubMed Central (PMC) to obtain a reference number (PMCID). In the event you need help with the process, the REP has a wealth of experience with applying for PMCID numbers. In particular, you may e-mail Carol Greenlee (greenlee.carol@mayo.edu) as a resource person.

Conflict of Interest

The authors state no conflict of interest.

Introduction

Burning mouth syndrome (BMS) is the persistent burning sensation of the mouth in the absence of objective signs. Published prevalence data are sparse and highly variable, ranging from 1% to 40% (Table 1). Our group has recently described the incidence of BMS, but to our knowledge, no population-based data exist on BMS prevalence. The aim of this study was to determine the population-based prevalence of BMS in Olmsted County, Minnesota.

Materials and Methods

After approval by the Mayo Clinic and Olmsted Medical Center institutional review boards, the REP medical records linkage system was used to identify cases of BMS. Since 1966, the REP has collected patient records of Olmsted County residents with 98% represented by the REP.¹² The county is socioeconomically and demographically similar to the US white population.^{19–14}

The REP was screened for patients with a BMS diagnosis between January 1, 2000 and December 31, 2009. Inclusion criteria were subjective oral discomfort, a normal oral examination, and a documented BMS diagnosis by a REP physician. Exclusion criteria was any objective abnormality in the mouth that would account for oral burning symptoms.

The earliest BMS entry was retained for any duplicate entries. All demographic and symptom-specific data was retrospectively collected from the medical record. Intensity of pain was abstracted from either a 0-to-10 numeric pain scale or a subjective description of mild, moderate, or severe pain.

Data were analyzed with SAS version 9.3 software (SAS Institute Inc). Point prevalence of BMS in Olmsted County was calculated assuming the entire population of Olmsted County for 2010 was at risk. The prevalence estimates were age- and sex-adjusted to the population distribution of US whites in 2010. Age- and sex-specific denominator values used the total Olmsted County population at the 2010 census. The 95% CIs for prevalence were constructed assuming Poisson error distribution. Difference in prevalence by sex was assessed with a Poisson regression to control for age. Observations used in the regression were crude prevalence counts by 10-year age-groups and sex, which were offset by the natural logarithm of the number of persons in each observation. Overdispersion was accounted for through estimation of the dispersion parameter, which was used to adjust the variance of the parameter estimates.¹⁵ The calculated *P* value was 2-sided.

Results

A total of 546 patients were identified from the Rochester Epidemiology Project (REP) as having a potential BMS diagnosis. Patients were excluded for the following characteristics: 24, lack of research authorization; 26, nonresident status; and 74, death before December 31, 2010. Of the remaining 413 patients, 149 met the study inclusion criteria, while the remainder had objective findings on oral examination (n=4) or did not receive a diagnosis of BMS by an REP physician (n=260).

The 149 prevalent cases involved 125 women (83.9%) and 24 men (16.1%). Most were white (92.6%) and never smokers (62.6%). Mean (SD) age at BMS diagnosis was 59.4 (15.1) years (range, 25–90 years). The tongue, alone or in conjunction with other areas, was a site of burning mouth symptoms in 81.9% of the 149 prevalent cases. Symptom intensity was frequently described as mild (41.6%) with bilateral (89.3%) and midline (73.2%) localization. Symptoms typically occurred in a continuous pattern (86.6%) throughout the day (68.5%). Parageusia was reported in 10.7% of cases and xerostomia in 28.2%.

Age- and sex-adjusted point prevalence of BMS in Olmsted County was 0.11% or 105.6 (95% CI, 88.6–122.6) per 100,000 persons (Table 2). Total prevalence was highest in the group aged 70 through 79 years (0.34%). The age-adjusted prevalence in women was significantly higher than in men: 168.6 (95% CI, 139.0–198.2) vs 35.9 (95% CI, 21.4–50.3) per 100,000 persons ($P<.001$). The highest prevalence was in women aged 70 through 79 years (527.9 per 100,000 persons); the highest prevalence in men was in this age-group (204.9 per 100,000 persons).

Discussion

Demographic and symptom data in our study are comparable with prior BMS prevalence studies and BMS was again found most commonly in postmenopausal women.⁷ However, the present study shows a lower BMS prevalence than previously reported (Table 1). This is likely owing to the strict BMS definition used. Many definitions of BMS have been used in prior prevalence studies, but few would fulfill the stringent criteria applied in this study (persistent symptoms of oral discomfort, no findings on oral examination, exclusion of other causes of oral burning). Past studies have retained patients with subjective oral burning as the only inclusion criterion^{3,5} or abnormal findings on oral examination,¹¹ which may account for the higher reported prevalence in these studies. Additionally our study observed that BMS prevalence suddenly increases after age 70 in males: why this should be the case is unclear.

This study has multiple limitations. Factors that could contribute to the sensation of oral burning, including medication intake, nutritional status, and both local and systemic diseases, were not analyzed. Pain intensity was not consistently documented in the medical records, but rather subjectively described. Finally, the use of stringent BMS criteria is both a strength and a limitation. The strength is that these data offer a specific representation of the BMS population with persistent oral symptoms and thorough exclusion of other possible etiologic factors. The limitation is that patients with burning mouth symptoms who did not meet these diagnostic criteria were excluded.

To our knowledge, these are the first-reported population-based prevalence data for BMS. The findings provide a reliable contribution to the nascent BMS epidemiology literature. The data show that BMS most commonly affects women older than 50 years, and that when defined through diagnostic criteria, BMS is less prevalent than previously suspected with a prevalence of approximately 1:1,000 patients. Further studies should evaluate the impact of medication intake, nutritional status, and the presence of both local and systemic diseases on the prevalence of this challenging disease.

Acknowledgments

This study was made possible by the Rochester Epidemiology Project (grant number R01-AG034676; principal investigators Walter A. Rocca, MD, and Barbara P. Yawn, MD).

Funding source: None

Abbreviations

BMS	burning mouth syndrome
REP	Rochester Epidemiology Project

References

1. Dangore-Khasbage S, Khairkar PH, Degwekar SS, et al. Prevalence of oral mucosal disorders in institutionalized and non-institutionalized psychiatric patients: a study from AVBR Hospital in central India. *Journal of oral science*. 2012; 54:85–91. [PubMed: 22466891]
2. Netto FO, Diniz IM, Grossmann SM, et al. Risk factors in burning mouth syndrome: a case-control study based on patient records. *Clin Oral Investig*. 2011; 15:571–5.
3. Suzuki N, Mashu S, Toyoda M, Nishibori M. Oral burning sensation: prevalence and gender differences in a Japanese population. *Pain Pract*. 2010; 10:306–11. [PubMed: 20230455]
4. Rabiei M, Kasemnezhad E, Masoudi rad H, et al. Prevalence of oral and dental disorders in institutionalised elderly people in Rasht, Iran. *Gerodontology*. 2010; 27:174–7. [PubMed: 19702672]
5. Moore PA, Guggenheimer J, Orchard T. Burning mouth syndrome and peripheral neuropathy in patients with type 1 diabetes mellitus. *J Diabetes Complications*. 2007; 21:397–402. [PubMed: 17967714]
6. Brailo V, Vueiaeeviae-Boras V, Alajbeg IZ, et al. Oral burning symptoms and burning mouth syndrome: significance of different variables in 150 patients. *Med Oral Patol Oral Cir Bucal*. 2006; 11:E252–5. [PubMed: 16648763]
7. Bergdahl M, Bergdahl J. Burning mouth syndrome: prevalence and associated factors. *J Oral Pathol Med*. 1999; 28:350–4. [PubMed: 10478959]
8. Riley JL 3rd, Gilbert GH, Heft MW. Orofacial pain symptom prevalence: selective sex differences in the elderly? *Pain*. 1998; 76:97–104. [PubMed: 9696462]
9. Hakeberg M, Berggren U, Hagglin C, Ahlqvist M. Reported burning mouth symptoms among middle-aged and elderly women. *Eur J Oral Sci*. 1997; 105:539–43. [PubMed: 9469602]
10. Thorstensson B, Hugoson A. Prevalence of some oral complaints and their relation to oral health variables in an adult Swedish population. *Acta Odontol Scand*. 1996; 54:257–62. [PubMed: 8876738]
11. Tammiala-Salonen T, Hiidenkari T, Parvinen T. Burning mouth in a Finnish adult population. *Community Dent Oral Epidemiol*. 1993; 21:67–71. [PubMed: 8485972]
12. St Sauver JL, Grossardt BR, Leibson CL, et al. Generalizability of epidemiological findings and public health decisions: an illustration from the Rochester Epidemiology Project. *Mayo Clin Proc*. 2012; 87:151–60. [PubMed: 22305027]
13. Rocca WA, Yawn BP, St Sauver JL, et al. History of the Rochester Epidemiology Project: half a century of medical records linkage in a US population. *Mayo Clin Proc*. 2012; 87:1202–13. [PubMed: 23199802]
14. St Sauver JL, Grossardt BR, Yawn BP, et al. Data resource profile: the Rochester Epidemiology Project (REP) medical records-linkage system. *Int J Epidemiol*. 2012; 41:1614–24. [PubMed: 23159830]
15. McCullagh, PJ.; Nelder, JA. *Generalized Linear Models*. Vol. xiii. London: Chapman and Hall; 1983.

What's already known about this topic?

- Burning mouth syndrome is the sensation of oral burning unexplained by other disease.
- Published prevalence data on burning mouth syndrome are sparse and variable and were produced using a variety of burning mouth syndrome definitions and populations.

What does this study add?

- This is the first population-based prevalence study of burning mouth syndrome.
- The study shows that when defined by specific diagnostic criteria, burning mouth syndrome is less prevalent than previously described.

Table 1**Epidemiologic Studies of Burning Mouth Syndrome**

Reference	Prevalence, %	Study Method
Kohorst et al, present report ^a	0.11, total; 0.04, male; 0.17, female	Population-based retrospective review of Olmsted County, Minnesota
Netto et al ²	1.0	Retrospective review of 3,243 patients referred to oral pathology department at a single hospital in Brazil over 7 y
Suzuki et al ³	3.0, total; 2.8, male; 3.2, female	Questionnaire of 2,599 dental patients at 2 offices in Japan
Rabiei et al ⁴	16.9	Cross-sectional study of 216 nursing-home residents in Iran
Moore et al ⁵	2.1	Cross-sectional study of 216 volunteer participants in Pittsburgh, Pennsylvania
Brailo et al ⁶	5.4	Retrospective review of 1,399 patients referred to oral medicine department in Croatia in 2001
Bergdahl and Bergdahl ⁷	3.7, total; 1.6, male; 5.5, female	Survey of 1,427 Swedish volunteers (age, 20–69 y)
Riley et al ⁸	1.7	Telephone survey of 1,636 volunteers from North Florida (age, >65 y)
Hakeberg et al ⁹	4.6	1,017 middle-aged and elderly women in Sweden
Thorstensson and Hugoson ¹⁰	3.4	Survey of 533 Swedish volunteers (age, 20–70 y)
Tammiala-Salonen et al ¹¹	14.8	431 Finnish volunteers

^aPoint prevalence on December 31, 2010.

Adapted from Kohorst JJ, Bruce AJ, Torgerson RR, et al. A population-based study of the incidence of burning mouth syndrome. *Mayo Clin Proc* 2014; pii: 1–8. [Epub ahead of print] Used with permission.

Table 2

Point Prevalence of Burning Mouth Syndrome per 100,000 Persons by Age and Sex in Olmsted County, Minnesota, on December 31, 2010

Age-group, y	Women (n=125)		Men (n=24)		Both Sexes (N=149)	
	No. of Cases	Proportion per 100,000 Persons (95% CI)	No. of Cases	Proportion per 100,000 Persons (95% CI)	No. of Cases	Proportion per 100,000 Persons (95% CI)
<50	31	62.7 (42.6–89.0)	9	18.2 (8.3–34.5)	40	40.4 (28.9–55.1)
50–59	29	277.5 (185.8–398.5)	4	40.7 (11.1–104.1)	33	162.7 (112.0–228.4)
60–69	33	507.1 (349.1–712.2)	2	34.5 (4.2–124.6)	35	284.5 (198.1–395.6)
70–79	21	527.9 (326.8–807.0)	7	204.9 (82.4–422.2)	28	378.7 (251.6–547.3)
80	11	326.6 (163.0–584.4)	2	101.5 (12.3–366.5)	13	243.5 (129.6–416.4)
Total (95% CI)		169.5 (141.1–201.9) ^a		34.0 (21.8–50.7) ^a		103.3 (87.4–121.3) ^b

Prevalence per 100,000 persons is directly age- and sex-adjusted to the population structure of the US total population in 2010.