

Restless Legs Syndrome and Sleep Bruxism: Prevalence and Association Among Canadians

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Summary: A survey conducted through personal interviews was done in Canada to estimate the prevalence of subjective symptoms related to restless legs syndrome (RLS) and to sleep bruxism. Of the 2,019 respondents, all over 18 years of age, 15% reported leg restlessness at bedtime; 10% reported unpleasant leg muscle sensations associated with awakening during sleep and with the irresistible need to move or walk. Both these complaints are related to RLS. The prevalence of RLS-related symptoms increased linearly with age. Tooth grinding, a symptom related to sleep bruxism, was reported by 8% of the subjects; in contrast to RLS-related symptoms, the prevalence of tooth grinding decreased linearly with age. RLS-related symptoms were reported more frequently in Eastern provinces than in Ontario and Western Canada, and more frequently in Roman Catholic and French-speaking responders. This was not the case for sleep bruxism; between 14.5% and 17.3% of the subjects who reported subjective RLS-related symptoms also reported tooth grinding. Conversely, 9.6–10.9% of the tooth grinders reported RLS-related symptoms. These data suggest that both sleep movement disorders can be concomitant and that socio-geographic and age characteristics influence the prevalence of reports. **Key Words:** Restless legs syndrome—Sleep bruxism—Prevalence.

Résumé: Un sondage effectué par entrevues à domicile auprès de 2019 canadiens a permis d'estimer la prévalence et l'association entre le syndrome des impatiences musculaire des jambes à l'éveil (IMJE) et le bruxisme survenant pendant le sommeil. Le syndrome d'impatiences des jambes est rapporté par 15% de la population pour la sensation d'impatience au coucher et par 10% pour la sensation désagréable dans les jambes au cours du sommeil qui induit un éveil ainsi qu'un besoin irrésistible de bouger ou de marcher. Il est intéressant de noter que ces prévalences augmentent de façon linéaire avec l'âge. D'autre part, le grincement des dents associé au bruxisme survenant pendant le sommeil est rapporté par 8% de la population; dans ce cas, la prévalence diminue de façon linéaire avec l'âge. La prévalence des impatiences aux jambes est dominante dans les provinces de l'est du pays et chez les francophones catholiques; le bruxisme ne présente pas ces caractéristiques. De plus, 14.5% and 17.3% des sujets rapportant les plaintes associées au syndrome des impatiences aux jambes souffrent aussi du bruxisme de type grincement; toutefois, que 9.6% et 10.9% des bruxeurs rapportent les plaintes associées au syndrome des impatiences musculaires aux jambes. Ces résultats suggèrent que les deux conditions sont prévalentes pendant le sommeil d'un grand nombre de canadiens et qu'elles sont concomitantes chez environ 10% d'entre eux. Enfin, l'âge et la distribution régionale sont des variables non négligables dans l'étude de ces deux anomalies du mouvement survenant en relation avec le sommeil.

Restless legs syndrome (RLS) is characterized by a sensation of leg paresthesia occurring especially at bedtime. In severe cases, arm paresthesia may also be reported. Some of the sensory words used by patients to describe the syndrome are crawling, creeping, cramping, burning and/or an irresistible urge to move to relieve the leg discomfort. Bedtime is a major prob-

lem for RLS patients; discomfort and unpleasant sensations in the legs often delay sleep onset, interrupt sleep and sometimes force the patients to move or walk to relieve the disagreeable sensations (1–4). Most RLS patients also exhibit periodic leg movements in sleep (PLMS). Although there are standard polysomnographic criteria for PLMS diagnosis, the diagnosis of RLS is primarily based upon the patient's complaints and the presence of leg movements at sleep onset, as indicated by PLMS criteria or through the recently developed immobilization test (3,5).

Restless legs syndrome is estimated to occur in 5–

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15% of normal subjects, 11% of pregnant women, 15–20% of uremic patients and up to 30% of rheumatoid arthritis patients (3,4). Whereas the prevalence of RLS peaks in middle age, PLMS peak later; it is reported in up to 34% of patients over 60 years of age. The wide range of estimated RLS prevalence may be due to the difficulty in assessing RLS, because symptomatology varies in intensity from patient to patient and only severe cases are brought to the attention of physicians, who are frequently unaware of the existence of the condition. Furthermore, RLS and PLMS may sometimes be confused with nocturnal leg cramps or painless legs and moving toes, which are different entities (1,3,6). The first aim of this study, therefore, was to estimate the prevalence of RLS symptomatology across the country and to correlate it with sex, age and another sleep-related movement disorder, sleep bruxism. The analysis of data collected in our clinic with an RLS population, using the same questionnaire as used in this survey, showed that over 12% of the RLS subjects also reported tooth grinding (unpublished data).

Sleep bruxism, as recently defined by the American Sleep Disorders Association (3), is characterized clinically by the subjective signs and symptoms of tooth grinding, tooth clenching, and jaw pain or discomfort upon awakening. A standard method for scoring jaw movements is currently under development (7). Interestingly, sleep bruxism episodes share with PLMS certain characteristics such as some degree of association with K complex, a periodicity of 20 seconds and a sensitivity to dopaminergic medications (1,8–12). While the prevalence of sleep bruxism has been reported at 6–20% of the general population (13–16), its association with RLS is unknown. The second aim of this survey, therefore, was to further document the prevalence of sleep bruxism in the general Canadian population in association with RLS. A short report of this survey was previously presented (17).

METHODS

The survey consisted of interviews conducted by 150 experienced interviewers who visited 2,019 homes in designated areas across Canada between August 18 and September 10, 1992. The logistics of the survey were the responsibility of a private firm (Enviro-nics Research Group LTD, Toronto, Canada). Only one respondent per home was interviewed, in the language of choice (French or English). Sex and age quotas were preselected for each route. The quality of the interviews was controlled by a regional supervisor who recontacted 10% of the respondents. The sample, consisting of Canadians from Québec (26%), Ontario (36%), and the Atlantic (9%) and Western (29%) provinces,

matched as closely as possible the regional distribution determined by the federal government in its census of 1986. The sex distribution was 51% female and 49% male. Age groups were 18–29 (29%), 30–44 (31%), 45–59 (20%), and ≥ 60 years (20%). The language spoken in the home was English for 72%, French for 24%. All questions were pretested, in French and English, for clarity. The general precoded questionnaire consisted of 25 information units. Data were weighted according to the population of each region. The margin of error for a stratified sample of this size is estimated to be $\pm 2.2\%$.

For this survey we selected questions currently used for screening patients in our sleep laboratory (Table 1). These questions are based on symptoms reported by patients. The first two questions were designed to estimate the frequency of RLS symptoms; the third question was designed to estimate the frequency of one of the symptoms associated with sleep bruxism. The data are presented as percentages of the sample. Statistics were done using the hierarchical log linear and χ^2 analysis (Statistical Package for Social Sciences, Chicago, IL).

RESULTS

On the two RLS-related questions (Tables 1 and 2), 15% of respondents indicated a positive response to question 1 (“bedtime leg restlessness”) ($z = 25.2$; $p < 0.001$) and 10% indicated a positive response to question 2 (“unpleasant leg muscle sensation during sleep”) ($z = 27.2$; $p < 0.001$). For each question a linear age effect was noted. The prevalence increased from 9% and 5% in the 18–29-year-old age group to 23% and 18% in the ≥ 60 -year-old group (Table 2, Figs. 1 and 2; $z = -7.3$ and -27.2 , respectively; $p < 0.001$). A sex difference was noted only for “bedtime leg restlessness”; more females than males reported RLS symptoms ($z = -2.2$; $p = 0.025$). “Bedtime leg restlessness” and “unpleasant leg muscle sensation during sleep” were more frequent in the Atlantic provinces and Québec than in other areas in Canada (Table 3, $z = -4.8$ and -3.2 , respectively; $p < 0.001$). French-speaking and Roman Catholic subjects reported higher prevalences than did English-speaking and Protestant respondents (no statistics done due to small sample size); the two samples were, of course, matched for age and sex (e.g. between 45 and 59 years old, 18.2% and 19.6% of the sample were French- and English-speaking, respectively, whereas 19.4% and 20.0% were Roman Catholic and Protestant, respectively). Tooth grinding was reported by 8% of the general population. Interestingly, with tooth grinding a reverse linear response was noted for age ($z = 4.5$; $p < 0.001$); those 18–29 years of age reported a frequency of 13%, where-

TABLE 1. Questions used in the survey

English	
1.	At bedtime, does restlessness in your legs very often, often, occasionally, or never delay your falling asleep?
2.	When you wake up during the night, do you very often, often, occasionally, or never feel unpleasant sensations in your leg muscles that require you to move your legs or to walk in order to be more comfortable?
3.	Do you very often, often, occasionally, or never grind your teeth during your sleep?
French	
1.	Au moment du coucher, diriez-vous qu'il vous arrive très souvent, assez souvent, rarement ou jamais que des impatiences musculaires puissent retarder la venue de votre sommeil?
2.	Lorsque vous vous réveillez la nuit, diriez-vous qu'il vous arrive très souvent, assez souvent, rarement ou jamais de ressentir des impatiences musculaires des jambes qui vous forcent à bouger ou à marcher pour vous soulager?
3.	Diriez-vous qu'il vous arrive très souvent, assez souvent, rarement ou jamais de grincer les dents la nuit?

as those ≥60 years old reported 3% (Table 2, Fig. 3). No sex or geographic differences were noted for this variable (Tables 2 and 3).

The association of responses showed interesting features (Table 4). First, of the 15% of respondents who noted "bedtime leg restlessness" (question 1), 84.5% also reported "unpleasant leg sensation during sleep" (question 2). Of the 10% of subjects who responded positively to the question on unpleasant sleep leg sensation (question 2), 61% also reported bedtime leg restlessness (question 1). The association between these two variables was significant ($\chi^2 = 922.8$; $p < 0.001$). Bruxism was reported by 17.3% of those who reported leg restlessness at bedtime and 14.5% of those who reported unpleasant leg sensations during sleep. Of respondents who reported bruxism, 10.9% indicated leg restlessness at bedtime and 9.6% indicated unpleasant leg sensations during sleep. None of these variables were associated statistically.

DISCUSSION

The prevalence of RLS found in the present study is double or triple that originally reported by Ekbom (4,18). The difference may be due to the type of pop-

Bedtime leg restlessness (RLS)

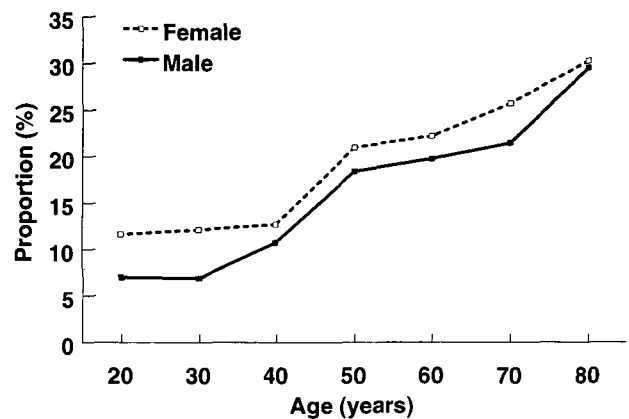


FIG. 1. Percentage, by age, of respondents answering "often" or "very often" to the question on bedtime leg restlessness. The increase is linear. (See text for statistics.)

ulation investigated. Ekbom found symptoms in 5% of "normal" subjects without predilection, whereas we surveyed a general population with varying degrees of health. The RLS-related questions selected in our study are currently used in our sleep center to help clinicians diagnose the condition. The sensitivity of these questions was tested in 93 cases with a clinical diagnosis of RLS; sleep recordings revealed a sensitivity of 85.4% (unpublished data; mean age 53.5 ± 12.4 years with a sex distribution of 57% female and 43% male). The specificity of these questions is, however, difficult to establish because there is no objective method for identifying a non-RLS population.

The significantly higher prevalence of RLS among French-speaking and Roman Catholic populations living in Québec and the Atlantic provinces, where these populations are grouped, was at first surprising. However, the presence of a large number of families affected by RLS in the province of Québec may explain this regional difference. Actually, 69.8% of the 93 RLS patients had a familial history of RLS and they were all French-speaking. Moreover, a familial pedigree for RLS suggests an autosomic dominant transmission that can possibly explain this regional concentration (19,20).

TABLE 2. Percentage of the 2,019 respondents answering "often" or "very often" to the questionnaire items

Questions	Sex		Age				Total (n = 2,019)
	Male (n = 996)	Female (n = 1,023)	18-29 (n = 579)	30-44 (n = 633)	45-59 (n = 401)	60+ (n = 401)*	
RLS							
1. Bedtime leg restlessness	13	17	9	11	21	23	15
2. Unpleasant leg muscle sensation during sleep	9	12	5	8	17	18	10
Bruxism							
3. Grinding	7	8	13	9	7	3	8

* Total for age = 2,014 due to weighted sample process.

Unpleasant leg muscle sensation during sleep (RLS)

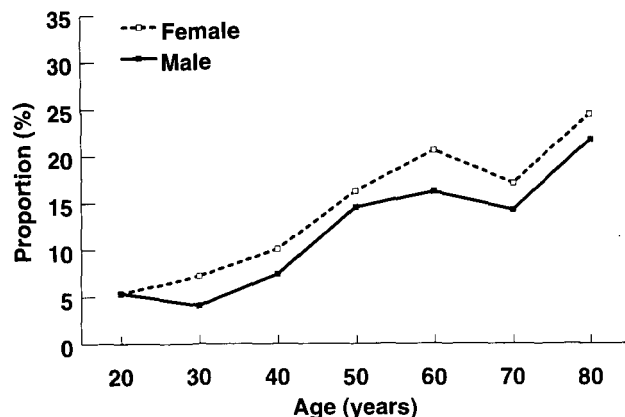


FIG. 2. Percentage, by age, of respondents answering "often" or "very often" to the question on unpleasant leg muscle sensation during sleep. The increase is linear. (See text for statistics.)

Tooth Grinding Bruxism

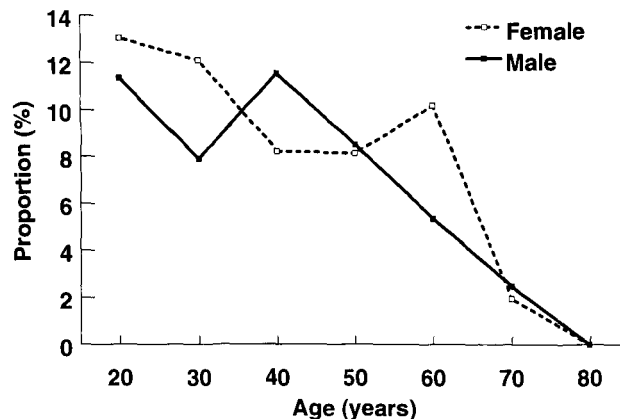


FIG. 3. Percentage, by age, of respondents answering "often" or "very often" to the question on tooth grinding during sleep. The decrease is linear. (See text for statistics.)

The prevalence of tooth grinding in this survey is in the same range as that reported in a similar survey by Goulet et al. (15,16) and close to that noted in university students by Glaros (13) and Reding et al. (21). The question used in this survey is not exclusive because tooth grinding is only one expression of bruxism, the others being tooth clenching and tapping or jaw bracing (11,22). However, in severe cases of bruxism, the specificity of this question has been estimated at 78% in a sleep laboratory study (23). Moreover, it is important to emphasize that the report of tooth grinding is dependent on the presence of a sleep partner or parents; they are the ones who make the tooth grinder aware of the "habit" since most patients are not conscious of the activity. The reports collected in this survey may also be influenced by the typical night-to-night variation in bruxism and the fact that not all bruxism subjects grind during sleep (9,11,24). Consequently, because the estimated prevalence reported here is based on only one symptom of bruxism, it is probably not an overestimate. Although no genetic factor has been identified for bruxism, a familial trend has been reported by Reding et al. (21) and Glaros (13): one tooth grinder in five reports one affected parent. However, this statistic should be interpreted with caution because familial "stress-related behaviors" may be an important variable.

Our finding of increased prevalence of RLS with age is consistent with previous reports (1,2,25). Our report of reduced tooth grinding with age is new, but not surprising. We had, in fact, expected reports of tooth grinding to decrease with age because a large percentage of people over 55 wear dentures (15), and the sound of grinding is not expected from artificial teeth. The reduced sound is probably not the only explanation for the decrease, however. The prevalence of an activity similar to bruxism, rhythmic masticatory muscle activity or chewing movements during sleep, is also significantly reduced with age (unpublished data).

Results of the present study do not support an association between RLS and bruxism: only a small percentage of respondents showed concomitance. This is supported by other observations in our sleep laboratory, tooth grinding was reported by 12.2% of an RLS sleep laboratory population of 93, and PLMS were found in 11.1% of a selected population in a study of frequent tooth grinders (23). However, both conditions share certain physiological and neurochemical characteristics. Both RLS and bruxism are frequently preceded by electroencephalographic K complex. Also, rhythmic masticatory muscle activity is associated with 77% of PMLS events (26). RLS and bruxism also both seem to be sensitive to dopamine. Although RLS and PMLS are relieved by dopamine-related medications,

TABLE 3. Distribution by geographic location, language and religion for each question^a

Questions	Geographic location				Language		Religion	
	Atlantic (n = 182)	Quebec (n = 523)	Ontario (n = 728)	Western (n = 586)	French (n = 484)	English (n = 1,448)	Catholic (n = 921)	Protestant (n = 753)
1. Bedtime leg restlessness	19	20	13	11	21	13	19	13
2. Unpleasant leg muscle sensation during sleep	14	14	9	8	14	9	13	9
3. Grinding	—	—	—	—	7	9	8	8

^a All values are presented as percentages.

TABLE 4. Percentage of respondents answering "often" or "very often" to one question, who also answered another question in the affirmative

Questions	% Association			Total (as in Table 1)
	1.	2.	3.	
1. Bedtime leg restlessness	—	84.5	17.3	15
2. Unpleasant leg muscle sensation during sleep	61.3	—	14.5	10
3. Grinding	10.9	9.6	—	8

bruxism is reported to be aggravated by chronic exposure to L-dopa or amphetamine. Furthermore, although a hypodopaminergic function frequently plays a role in RLS and PMLS, dopamine's role in bruxism is still under investigation (1,9,12,27).

In summary, both RLS and bruxism are moderately prevalent in the general population. Age is an important factor and has an inverse relationship. A regional distribution in eastern provinces was found. Although the two conditions are concomitant in some patients, there is no strong association between these two sleep movement disorders.

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