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Treatment wish of individuals with known and unknown restless legs syndrome in the community

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■ **Abstract** *Study objectives* Restless legs syndrome (RLS) is a frequent sleep disorder with a prevalence of 5 % to 15 % in Caucasion populations. Dopaminergic treatment is known to reduce sensorimotor RLS symptoms and is approved for RLS, but not all patients ask for treatment. About 2 % to 3 % of patients presenting to a primary care physician require RLS-specific treatment. The overall treatment preference of RLS sufferers, however, is still unknown. The aim of this study was to assess the prevalence and treatment preference in patients with previously diagnosed and those with yet undiagnosed RLS in a population-based survey in Germany. *Design and setting* Cross-sectional health survey with face-to-face interviews with 1312 participants in the Dortmund Health Study. RLS was assessed with standardized, validated questions addressing the four minimal diagnostic criteria for RLS defined by the International Restless Legs Syndrome Study Group. *Participants* Participants were aged 25 to 75 years and were randomly selected from the city register. *Results* The overall prevalence of individuals with a known doctor diagnosis of RLS was 2.3 %. In addition, 6.5 % fulfilled the four minimal criteria but did not know about this diagnosis yielding an overall prevalence of 8.8 %. Prevalence was higher in women (10.2 %) and German descendents (9.2 %) compared to men (7.1 %) and migrants (6.7 %). Almost 60 % of all RLS cases reported symptoms at least once a week. 33.3 % of cases with a known RLS diagnosis and 14.1 % with an unknown diagnosis had an RLS treatment wish. The latter is determined by knowledge of the diagnosis, daily symptoms, diabetes and sleep disturbance. *Conclusion* About every fourth RLS case knows about the diagnosis and overall every fifth RLS case wishes medication to effectively reduce symptoms, corresponding to 1.6 % of the whole study population.

■ **Key words** restless legs syndrome (RLS) · prevalence · treatment wish

Introduction

In 1995, the International Restless Legs Syndrome Study Group (IRLSSG) published diagnostic criteria for the restless legs syndrome (RLS) [11], the so-called minimal criteria. These criteria and their little revision in 2003 [1] formed the basis for a wider assessment of RLS in population studies in subsequent years. Since then many studies assessing the prevalence of restless legs syndrome in the general population or specific patient populations have been published, especially in this century

(for review see [5]). The vast majority of the studies that applied the four diagnostic criteria stated in their introduction or discussion that RLS is either underdiagnosed or still not well-known in the medical community. However, 12 years after the publication of the diagnostic criteria and 322 years after its first description by Sir Thomas Willis (in the year 1685) [12], the question arises if RLS still represents "the most common unknown disease you have never heard of" [13]. There are doubts about this especially since the past decade has seen a strong increase in the interest in the disease with the registration of effective drugs for treatment of RLS, the establishment of patient support groups in many countries worldwide and the development of tools to assess severity, disease-specific quality of life and other aspects of RLS.

The availability of registered drugs for treating RLS symptoms has brought up in more detail the question when drug treatment of RLS should be started. There is no absolute indication or need to treat RLS. It is the patient whose symptom severity determines the treatment decision. It is unknown to date how many RLS cases actually wish treatment with medication, given the considerable costs of registered drugs, such as dopamine agonists. Knowing this proportion would enable the estimation of treatment needs and of costs of treatment in a specific population or specific region such as Germany.

Our study had two aims, first to assess the proportion of individuals who have a medical diagnosis of RLS and, thus, know about the disease, in comparison to the proportion of subjects fulfilling the minimal criteria but have not had a RLS diagnosis. Second, to assess the wish for treatment in affected cases and to analyse determinants influencing this wish.

Patients and methods

■ Subjects

The Dortmund Health Study (DHS) is a population-based health survey conducted in the city of Dortmund in the west of Germany. Primary aim of this study is to determine the prevalence of cardiovascular and other chronic diseases, headache types and behavior dependent risk factors in this population. Participation was restricted to age groups 25 to 75 years. From the total population of 587,607 living in Dortmund on December 31, 2003, a random sample of 3820 persons was drawn from the population register, independent of nationality and stratified by 5-year age groups and gender. From these, 395 persons were non-eligible because of death, or having moved outside the study area between sampling and invitation, or lack of sufficient knowledge of the German language to understand informed consent. The remaining were invited to an interview and standardized examination in the central study center located in the city's Office of Health (first choice) or, alternatively (second choice), to answer a standardized questionnaire with a reduced but otherwise identical set of questions. Overall, 1312 individuals participated in the personal interview and 979 completed the questionnaire. The overall response propor-

tion was 67 %, the proportion with a personal interview was 38.3 % of all eligibles, and 57.3 % of all participants. Traditionally, many people with a migration background particularly from Eastern Europe, Italy, Spain, and Turkey live in Dortmund in the first, second or third generation. In 2003, 12.9 % of the inhabitants had a foreign nationality.

RLS assessment was restricted to interview participants only, because the respective questions were not included in the questionnaire due to the reduced space available. RLS assessment was done in face-to-face interviews with a short questionnaire that had been previously validated against physician classification [3] and had already been used in identical form in two other German studies [2, 9]. In brief, the following questions were used according to the minimal criteria published by the International Restless Legs Syndrome Study Group [1]: 1) Do you have sensory discomfort like tingling, crawling with ants or pain in the legs associated with an urge to move? 2) Do these symptoms occur at rest, i.e., while sitting down or falling asleep, and do they improve by moving? 3) Are these symptoms worse in the evening or at night, compared with the morning? The three answer categories included "Yes", "No" or "Don't know". Participants were only classified as RLS positive if they answered all three questions with "Yes". Knowledge of an RLS diagnosis was assumed if a participant answered "Yes" to the question if he or she was ever diagnosed with RLS by a physician. Socio-demographic data, medical histories including neurological diseases, other comorbidities and several health-related lifestyle variables were also assessed in interview form by trained and certified interviewers. The current medication, taken within the last seven days, was listed and subsequently classified according to the Anatomical –Therapeutical Classification (ATC Code). For this analysis, the following medication codes were considered: levodopa (N04BA), dopamine agonists (N04BC), anticonvulsants (N03A), opioids (N02A), and benzodiazepines (N03AE, N05BA, N05CD, N05CF). Treatment wish was assessed by a single question ("Are your symptoms so severe that you would consider taking a medication if this would effectively reduce them?"). Answer options were "Yes", "No" and "Don't know". A "Yes" answer was assumed to express treatment wish.. Height, weight and blood pressure were measured using standard protocols. Seven questions of the Pittsburgh Sleep Quality Index (PSQI) [4], enabling the calculation of components 1 (subjective sleep quality), 3 (sleep duration), 4 (sleep efficiency), and 7 (day sleepiness) were used to assess sleep problems. Migrational background was classified based on nationality (passport) and four additional questions asking for own place of birth and the nationality of mother and father. Written informed consent was obtained from all participants in the interview and the study protocol was approved by the local ethics committee of the Medical Faculty at the University of Münster.

■ Statistical analysis

Differences in categorical variables between the two groups with a known and unknown RLS diagnosis were compared using Chi-square test or Fisher's exact test (if a cell number was 5 or less). Differences in means or medians of continuous variables were compared using Student's t-test (means) or the Wilcoxon rank sum test (medians), respectively. Multivariable logistic regression was used to analyse determinants of treatment wish for RLS with this wish being the dichotomous (yes – no) dependent variable. All analyses were done in Stata (version 6.0).

Results

■ Demographics of the study population

In the Dortmund Health Study (DHS), 1312 participants (52.9 % female) were interviewed by trained interview-

ers. Of these participants 16.0 % had a migrational background, 7.3 % reported alcohol consumption of ≥ 40 g/d, and 25.5 % were current smokers. Clinical and demographic data of the study population as well as comorbidities such as cardiovascular risk factors are presented in Table 1, stratified by RLS status.

■ Prevalence of RLS

In Table 2, the prevalences of RLS, according to knowledge of a diagnosis, are shown. The prevalence of RLS was calculated as (a) RLS previously diagnosed by a physician independent from fulfillment of the minimal criteria (women: 2.2 %, men: 2.4 %, migrants: 1.9 %, total: 2.3 %), (b) individuals not knowing about an RLS diagnosis but fulfilling the minimal criteria (women: 8.1 %, men: 4.7 %, migrants: 4.9 %, total: 6.5 %), (c) all RLS individuals either fulfilling the minimal criteria or having a physician diagnosis of RLS or both (women: 10.2 %,

men: 7.1 %, migrants: 6.7 %, total: 8.8 %). The overall prevalence increased considerably with age in both genders. Interestingly, the prevalence of a doctor diagnosis of RLS was higher in men than in women, while the prevalence of unknown RLS was twice as high in women as in men. Study participants with a migrational background had lower prevalences of a known diagnosis of RLS as well as an unknown RLS. From the overall 115 RLS cases, 96 (7.3 %) fulfilled the minimal criteria and yielded the prevalence that is directly comparable to the other two studies in Germany conducted using identical methods. Among the 30 individuals with a known RLS diagnosis 21 fulfilled at least one and 11 all of the diagnostic minimal criteria at the time of assessment.

■ Symptom characteristics

Previously diagnosed RLS patients reported non-significantly higher symptom frequency compared to pre-

Table 1 Characteristics of the participants in the Dortmund Health Study, stratified according to RLS status and a known or unknown RLS diagnosis

Characteristic	No RLS N = 1197	RLS known N = 30	RLS unknown N = 85	p-value for difference between known and unknown RLS
Sociodemographic factors				
Age, Mean (years)	51.8	59.4	54.4	0.07
Women, %	52.1	50.0	65.9	0.12
School education ≤ 9 years, %	48.7	63.3	56.5	0.51
Number of children born[1], Mean (Median)	1.6 (1)	2.3 (2)	1.4 (2)	(0.15)
Migrational background[2], %	16.4	13.3	11.8	0.82
Risk factors				
BMI ≥ 30, %	25.8	36.7	31.8	0.62
Alcohol consumption: nondrinker, %	40.1	43.3	41.2	0.51
1–39 g/d, %	52.6	46.7	54.1	
≥ 40 g/d, %	7.3	10.0	4.7	
Smoker:				
never, %	44.2	36.7	45.8	0.25
ex, %	30.3	43.3	27.1	
current, %	25.5	20.0	27.1	
Comorbidities				
History of heart attack[3], %	3.7	10.0	2.4	0.08
Known diabetes[3], %	7.5	23.3	7.1	0.02
Known hypertension[3], %	34.6	56.7	36.5	0.05
Measured hypertension[4], %	52.7	63.3	62.4	0.92
Depressive symptoms[5], %	16.3	20.0	22.4	0.79
History of commotio[3], %	6.0	3.3	9.4	0.29
History of skull fracture[3], %	1.0	3.3	0.0	0.26
History of seizure[3], %	1.6	6.7	1.2	0.17
History of cancer[3], %	4.2	13.3	7.1	0.30
Hysterectomy[1], %	22.5	26.7	33.9	0.59

[1] Restricted to women only (n = 694)
[2] First and second generation migrants, classified by own and parents place of birth and nationality
[3] Self-reported physician diagnosis
[4] Systolic blood pressure ≥ 140 mmHg or diastolic blood pressure ≥ 90 mmHg, mean of two measurements 10 minutes apart using a standardized measurement protocol
[5] Center of Epidemiological Studies Depression Scale score ≥ 16 points (Scale minimum = 0, maximum = 60)

Table 2 Prevalence of study participants with RLS according to an individually known or unknown diagnosis, stratified by gender, age and migrational background

		Restless Legs Syndrome (RLS)					
		Restless Legs Syndrome (RLS)		RLS unknown		All	
		N	%	N	%	N	%
Total		30	2.3	85	6.5	115	8.8
Gender							
Women	25–44	2	0.8	19	7.8	21	8.6
	45–75	13	2.9	37	8.2	50	11.1
	All	15	2.2	56	8.1	71	10.2
Men	25–44	2	1.1	5	2.8	7	3.9
	45–75	13	3.0	24	5.5	37	8.5
	All	15	2.4	29	4.7	44	7.1
Migrational background[1]							
Yes	25–75	4	1.9	10	4.9	14	6.7
No	25–75	26	2.4	75	7.0	101	9.2

[1] First and second generation migrants, classified by own and parents place of birth and nationality

Table 3 Clinical characteristics of cases with RLS according to an individually known or unknown diagnosis of RLS

RLS characteristics	RLS known N = 30	RLS unknown N = 85	All N = 115	p-value for difference between known and unknown RLS
Symptom frequency				0.18
daily, %	21.1	14.3	15.5	
3–6 per week, %	36.8	14.3	18.5	
1–2 per week, %	15.8	27.4	25.2	
1–3 per month, %	15.8	28.2	26.2	
≤ 1 per month, %	10.5	15.5	14.6	
Age of onset (years), Mean	55.6	47.2	49.4	0.01
Positive family history[1], %	14.3	30.6	27.4	0.11
Symptom duration				
Median, (years)	2.5	3.0	3.0	0.10
Drug intake[2]				
L-dopa or dopamine agonists %	13.3	0.0	3.5	0.004
Anticonvulsants, %	3.3	1.2	1.7	0.45
Opioids, %	0.0	0.0	0.0	na
Benzodiazepines, %	0.0	0.0	0.0	na
Sleep characteristics[3]				
Pretty/very bad sleep quality (component 1), %	43.3	36.5	38.3	0.33
Sleep duration < 6 h (component 2), %	30.0	24.7	26.1	0.37
Sleep efficiency < 75 % (component 4), %	33.3	30.6	31.3	0.48
Problems with daytime sleepiness (component 7),%	23.3	24.1	24.4	0.55
Sleep summary score[4], median	3.5	4.0	4.0	0.67

[1] Self-report of RLS symptoms in 1st degree relative
[2] Reported intake of medications over the last 7 days with subsequent classification according to the Anatomical –Therapeutical Classification (ATC Code)
[3] Assessed with 4 out of 7 components of the Pittsburgh Sleep Quality Index
[4] Summary score based on the components 1, 2, 4 and 7 of the Pittsburgh Sleep Quality Index with a minimum score of 0 (best) and maximum score of 12 (worst)
na not analyzed

viously undiagnosed patients (Table 3). Age of onset was significantly higher in previously diagnosed patients than in undiagnosed patients (p < 0.01). The latter reported more often a positive family history and slightly longer mean symptom duration. However, both results were not significantly different in both groups. 13.3 % of previously diagnosed RLS patients were on levodopa or dopamine agonist treatment, 3.3 % took anticonvulsants. Among previously undiagnosed patients only one individual received medication with anticonvulsants (1.2 %). None of the cases took anticonvulsants for RLS but for epilepsy or pain syndromes. No RLS case reported opioid or benzodiazepine intake. Sleep characteristics in both RLS groups were considerably worse than those of non-affected study participants. In the latter group, 19.9 % reported poor sleep quality, 17.5 % a sleep duration < 6 hours, 20.5 % a sleep efficiency < 75 % and 16.5 % problems with daytime sleepiness. RLS-unaffected participants had a medium sleep summary score of 3. Compared to this unaffected group sleep scores in both RLS groups were worse but did not differ significantly be-

tween individuals with a known and an unknown diagnosis.

Treatment preference for RLS

In Table 4 the proportions of RLS cases with a wish for treatment is shown according to gender, age, symptom frequency and migrational background. A significant higher proportion of cases with a known RLS diagnosis expressed a wish for treatment compared to those not knowing about the diagnosis. Interestingly, treatment wish was very similar in men and women. It increased with age and with more frequent symptoms. These increases were stronger among cases with a known diagnosis.

Association with treatment wish

In Table 5, potential determinants of a wish for RLS treatment are shown. In multivariable logistic regression analysis cases with daily symptoms were more than five times as likely to express a treatment wish compared to those with less frequent symptoms. Each additional point in the sleep summary score increased the chance for this wish by 33 %. A known history of diabetes was the strongest determinant of treatment wish; however, the confidence interval around the odds ratio was very wide due to very few cases. Interestingly, knowledge about the RLS diagnosis was a strong determinant of treatment wish of borderline significance, independently of the other factors listed in the table.

We additionally analysed other social as well as clinical factors for a relation with treatment wish. None of these other variables was a significant determinant.

Discussion

In a population-based study we found an overall prevalence of RLS of 8.8 % in the adult population aged 25 to 75. About every fourth of these RLS cases knew about a doctor diagnosis of RLS. Thus, in contrast, 75 % of the cases in this community study were previously unknown. Interestingly, every third male case knew about the diagnosis as compared to only every fifth female case. Of all RLS-affected cases 18 % had a wish for treat-

Table 5 Determinants of a treatment wish for RLS in the Dortmund Health Study

Determinants	All RLS cases (N = 115)		
	OR*	95 % CI*	p
Age (per 10 years increase)	1.23	[0.69–2.22]	0.48
Male gender	0.52	[0.11–2.51]	0.41
Symptoms daily	5.35	[1.17–24.57]	0.03
Sleep summary score[1] (per point increase)	1.33	[1.04–1.69]	0.02
History of diabetes[2]	19.20	[2.88–295.6]	0.004
Positive family history[3]	2.94	[0.75–11.50]	0.12
Known RLS diagnosis[4]	3.48	[0.91–13.30]	0.07

*Odds ratio and 95 % confidence intervals derived from logistic regression with treatment wish as the dependent and all determinants listed in the table being the independent variables
[1] Summary score based on the components 1, 2, 4 and 7 of the Pittsburgh Sleep Quality Index and a minimum score of 0 (best) and maximum score of 12 (worst)
[2] Self-reported physician diagnosis of diabetes
[3] Self-report of RLS symptoms in 1st degree relative
[4] Self-reported physician diagnosis of RLS

Table 4 Treatment wish of affected individuals according to an individually known or unknown diagnosis of RLS

Positive treatment wish	RLS known N = 30 %	RLS unknown N = 85 %	All N = 115 %	p-value for difference between known and unknown RLS
Overall	33.3	14.1	17.9	0.05
By gender				
Women	30.0	12.5	15.2	0.17
Men	36.4	17.2	22.5	0.19
By age group				
≤ 45 years	25.0	4.2	7.1	0.27
> 45 years	35.3	18.0	21.8	0.12
By symptom frequency				
Daily	75.0	25.0	35.5	0.12
1–6/week	35.7	21.3	24.6	0.22
< 1/week	20.0	5.4	7.1	0.32
By migrational background[1]				
Yes	0.0	30.0	21.4	0.33
No	41.2	12.0	17.4	0.009

[1] First and second generation migrants, classified by own and parents place of birth and nationality

ment with a considerably higher proportion among those with a known diagnosis of RLS. A generalisation of the treatment wish proportion and the observed overall prevalence to the Dortmund population within the age range of 25 to 75 years (n = 420,087) would yield 6,617 individuals within the city (1.6 %) with RLS and a treatment wish.

Our study is the third population-based study in Germany and the fourth within German-speaking countries that used identical methods to classify cases. Compared to the other three studies [7, 8, 10] we observed a slightly lower overall prevalence based on the presence of the IRLSSG diagnostic criteria. However, the prevalence of 9.8 % in the Augsburg study [8] and 10.6 % in the Bruneck study [7] was assessed in considerably older populations which are known to have higher prevalences. Restricting the participants of the Dortmund Health Study to age groups 65 and older yielded an RLS prevalence of 8.5 % which is still slightly lower than in the other two studies. We would consider these differences in prevalences as being low, potential explanations include regional variabilities within Germany and/or German-speaking countries, slight differences in the proportion of female participants given the considerable higher prevalence in women and a higher proportion of participants with a migrational background. The latter group had a lower overall prevalence than people without a migrational background in our study (6.7 % vs. 9.2 %); the difference, however, did not reach statistical significance. Among individuals with a migrational background first, second and third generation Turkish migrants represent the largest group in the Dortmund region, but many other nationalities are also represented. Interestingly, a recent door-to-door survey in Turkey yielded a lower prevalence of 3.2 % [5, 10]. The lower prevalence among migrants in our study was observed despite the process of cultural assimilation and the use of the same health care system and might indicate differences in genetic predisposition. This observed difference, however, suggests that population-based studies should assess and stratify prevalences of RLS according to migrational background. Symptom frequency and symptom duration did not differ significantly between patients with previously known versus previously unknown RLS despite a higher proportion with frequent symptoms among those with a known RLS diagnosis. Sleep characteristics, a supportive symptom in RLS, were considerably worse in all cases compared to noncases but very similar in both case groups.

We observed a stronger treatment wish among cases who knew about their disease status than among individuals with RLS not yet knowing about the condition. It is reasonable to assume that knowledge about a disease status increases the wish for treatment, irrespective of RLS symptoms. Since there is no absolute indication for the treatment of RLS one has to be aware that clas-sifying the symptoms as a disease will induce a wish for treatment in an affected individual. Next to a known RLS diagnosis daily RLS symptoms and poor sleep could be identified as main determinants of treatment preference in RLS sufferers. People who are still at work are usually more sensitive to poor sleep and may ask for RLS specific treatment to improve sleep more often than older retired people. To our knowledge, our study is the first to analyze treatment wish of RLS cases in a population-based survey. It adds to one other study that examined treatment preference in a patient population presenting to a primary care physician [6]. That survey suggested an RLS treatment preference about 2 %–3 %; however, patients were not asked directly whether they wish an RLS-specific treatment or not but were stratified by having relevant RLS symptoms likely to require medical management. This might be the reason why the percentage of patients who needed RLS-specific treatment was about twice as high as in our study. Since treatment of RLS is not only known to be effective but also costly, and since we do not know to date whether an early dopaminergic treatment might worsen the long-time course of RLS patients [8], it is important to know exactly how many patients really need to be treated and what the different determinants of treatment are.

Our study has several strengths and limitations. It is based on a study sample drawn from the general population in a defined region using established epidemiological methods. Standardized methods to assess and classify RLS including the standard diagnostic criteria of the IRLSSG [1] were used, specifically trained interviewers performed all interviews. We were able to assess RLS symptom frequency and disease-related consequences such as sleep disturbance. The population under study included a broad age range, and we were able to differentiate between people with and without a migrational background. We were not able to differ between idiopathic and symptomatic RLS which might influence treatment preference and we did not assess RLS severity individually.

We conclude that RLS is common in the general population; however, only every fifth case would ask for treatment if this would improve her or his symptoms. This difference indicates that a treatment decision should be based on individual preferences and be done with caution. Prevalences in this study translate to an overall proportion of 1.6 % in the adult population in Dortmund with a treatment wish due to RLS. This wish is mainly determined by a previously known RLS diagnosis, daily symptoms and poor sleep. Knowledge of these determinants may be an important step for the interaction between patient and physician in the decision about treatment. Every fourth case already knew a diagnosis of RLS indicating that RLS has given up its status as "the most common medical condition you have never heard of" (RLS foundation, US).

References

1. Allen R, Picchietti D, Hening W, Trenk-walder C, Walters A, Montplaisir J (2003) Restless legs syndrome: diagnostic criteria, special considerations, and epidemiology. A report from the restless legs syndrome diagnosis and epidemiology workshop at the National Institute of Health. Sleep Med 4:101–119

2. Berger K, Lüdemann J, Trenkwalder C, John U, Kessler C (2004) Sex and the risk of restless legs syndrome in the general population. Arch Intern Med 164:196–202

3. Berger K, von Eckardstein A, Trenk-walder C, Rothdach A, Junker R, Weiland SK (2002) Iron metabolism and the risk of restless legs syndrome in an elderly general population: the MEMO study. J Neurol 249:1195–1199

4. Buysse DJ, Reynolds CF 3rd, Monks TH, et al. (1989) The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. Psychiatry Res 28:193–213

5. Garcia-Borreguero D, Egatz R, Winkelmann J, Berger K (2006) Epidemiology of restless legs syndrome: the current status. Sleep Med Rev 10:153–167

6. Hening W, Walters AS, Allen RP, Montplaisir J, Myers A, Ferini-Strambi L (2004) Impact, diagnosis and treatment of restless legs syndrome (RLS) in a primary care population: the REST (RLS epidemiology, symptoms, and treatment) primary care study. Sleep Med 5:237–246

7. Högl B, Kiechl S, Willeit J, et al. (2005) Restless legs syndrome. A community-based study of prevalence, severity, and risk factors. Neurology 64:1920–1924

8. Paulus W, Trenkwalder C (2006) Less is more: Pathophysiology of dopaminergic-therapy-related augmentation in restless legs syndrome. Lancet Neurol 5:878–886

9. Rothdach AJ, Trenkwalder C, Haberstock J, Keil U, Berger K (2000) Prevalence and risk factors of RLS in an elderly population. The MEMO study. Neurology 54:1064–1068

10. Sevim S, Dogu O, Camdeviren H, et al. (2003) Unexpectedly low prevalence and unusual characteristics of RLS in Mersin, Turkey. Neurology 61:1562–1569

11. Walters AS (1995) Toward a better definition of restless legs syndrome. The International Restless Legs Syndrome Study Group. Mov Disord 10:634–642

12. Willis T (1685) The London Practice of Physick. London, England: Bassett & Crooke, 404

13. Youakun R (1996) Nightwalkers: Do your legs seem to have a life of their own – your torment has a name. Modern maturity 35:82–83