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Original Article

Restless legs syndrome is highly prevalent in patients with post-polio syndrome

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ABSTRACT

Objective: Few studies have quantified the prevalence of restless legs syndrome (RLS) in patients with post-polio syndrome (PPS). Our objective was to assess the prevalence and severity of RLS in patients with PPS and to examine the demographic characteristics of this population.
Method: This was a cross-sectional study conducted from April 2010 to May 2012 at the outpatient Neuromuscular Disorders clinic of Universidade Federal de São Paulo, São Paulo, Brazil. We evaluated 119 patients with PPS, consecutively recruited, and investigated for RLS based on the diagnostic criteria established by the International Restless Legs Syndrome Study Group (IRLSSG). Patients were evaluated with the Brazilian version of the IRLSSG severity scale.
Results: The prevalence of RLS was 36% ($n = 43$; 32 women and 11 men). The ages at onset of RLS (median = 41 years) and PPS (median = 41 years) were concurrent, and the correlation between onset of symptoms of RLS and onset of symptoms of PPS was positive and very strong (Spearman $r = 0.93$, $p = 0.01$). The median RLS severity was 23 (range, 20–28). Low educational achievement and depression were predictive of RLS development.
Conclusion: In the largest population of patients with PPS studied to date, our results indicate a high prevalence of RLS, marked disease severity, and concomitant onset of both conditions in many patients with PPS. Further studies are needed to elucidate a possible pathophysiologic mechanism linking these two conditions. We suggest that all post-polio patients with sensory and motor complaints in the legs be investigated for RLS.

1. Introduction

Restless legs syndrome (RLS) is a sensorimotor disorder with a prevalence ranging from 3% to 10% in the general population [1,2]. It has been observed in several neurological conditions, such as peripheral neuropathy, multiple sclerosis, Alzheimer's disease, amyotrophic lateral sclerosis, and Parkinson's disease [1,3–6]. Few reports have described its occurrence in patients with post-polio syndrome (PPS) [7,8].

PPS is a neuromuscular condition characterized by new symptoms and signs that occur years after acute poliomyelitis infection, following a prolonged period of stability. It is characterized by new muscle weakness, new atrophy, increased muscle fatigue, joint and muscle pain, swallowing problems, and respiratory distress. There is no specific test for PPS; its diagnosis is based on clinical criteria [9,10]. The pathological changes that produce the symptoms of PPS are uncertain, and several theories have been proposed to explain its etiology, including the following: motor unit dysfunction, overuse or disuse myopathy, loss of motor units with aging, superimposed on the limited number of motor units after acute poliomyelitis, and inflammatory and immunological mechanisms [9–11].

RLS has been observed in patients with PPS in a few studies [7,8,12], but there has no epidemiologic research concerning its prevalence. Within this context, our objective is to estimate the prevalence and severity of RLS and to evaluate its demographic and clinical features in a large sample of patients with PPS.

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2. Method

2.1. Study sample

The study sample comprised patients with PPS who were recruited consecutively from the outpatient Neuromuscular Disorders clinic of the Department of Neurology and Neurosurgery at Universidade Federal de São Paulo, Brazil, from April 2010 to May 2012. All patients fulfilled the diagnostic criteria for PPS proposed by the March of Dimes International Conference on PPS [9,10,13], consisting of the following: (a) prior paralytic poliomyelitis with evidence of motor neuron loss, as confirmed by history of acute paralytic illness, signs of residual weakness, and muscle atrophy on neurologic examination, and/or signs of denervation on electromyography, (b) a period of partial or complete functional recovery after acute paralytic poliomyelitis, followed by an interval (usually 15 years or more) of stable neurologic function, (c) onset of progressive and persistent new muscle weakness, with or without generalized fatigue, muscle atrophy, or muscle and joint pain, (d) symptoms may persist for at least one year, and (e) exclusion of other neurologic, orthopedic, and medical problems as causes of these new symptoms.

The Research Ethics Committee of Universidade Federal de São Paulo approved the study protocol (#0313/10), and all patients provided written informed consent for participation.

2.2. Procedure

We investigated 119 patients (50 men and 69 women) for RLS based on the standard diagnostic criteria established by the International Restless Legs Syndrome Study Group (IRLSSG) [14]. All patients were examined by a neurologist with expertise in sleep disorders, and were diagnosed with RLS when they had all four essential criteria in a face-to-face interview. Because patients with PPS may have many comorbidities, we scrutinized them for mimics of RLS, including any possible symptoms related to pain, arthritis, muscle pain related to PPS or multiple surgeries, arthrodesis, surgical transfer of muscle, polyneuropathies, and other conditions related to orthoses and potential positional complaints.

We used the Brazilian version of the IRLSSG severity scale (IRLSSS) [15] to measure RLS severity and to classify patients as follows: 1–10 points, mild RLS, 11–20 points, moderate RLS, 21–30 points, intense RLS, and 31–40 points, very intense RLS. We used item 10 of the IRLSSS to check for mood disorder (anger, depression, sadness, anxiety, irritability). We evaluated daytime sleepiness with the Epworth Sleepiness Scale (ESS). We considered that patients had excessive daytime sleepiness (EDS) if their ESS total score was higher than nine points [16].

In all cases, we conducted a detailed clinical interview to search for secondary causes of RLS (anemia, neuropathy, pregnancy, end-stage renal disease) and a family history of RLS.

Patients underwent a laboratory workup that included hemoglobin, creatinine, urea, glucose, iron, ferritin, thyroid-stimulating hormone, and creatine phosphokinase. We also evaluated patients for chronic renal failure by assessing the clinical history and calculating creatinine clearance by the Modification of Diet in Renal Disease (MDRD) equation.

2.3. Statistical analysis

The Kolmogorov–Smirnov test showed that continuous data were not normally distributed. We used the Mann–Whitney *U* test to compare independent groups and the Wilcoxon test for dependent groups. We used Spearman correlation coefficients to correlate the age of onset of PPS and the age of onset of RLS. Categorical data were expressed as absolute frequencies (n) and relative frequency (%) and, groups were compared using the χ^2 test. To determine predictors of RLS, we performed a logistic regression analysis. We adopted $p < 0.05$ for significance.

3. Results

Of 119 patients, 43 (36%) had RLS; 32 (74.4%) were women and 11 (25.6%) were men. The patients had a median age of 47 years (range, 41–51 years), and a median educational attainment of 11 years (range, 9–12 years) of schooling. Body mass index (BMI) ranged from 23 to 28 kg/m^2, with a median of 26. The demographic and clinical characteristics of patients with PPS with and without RLS are listed in Table 1.

The ages at onset of symptoms of RLS (median = 41 years) and PPS (median = 41 years) were concurrent, with a strong, positive correlation (Spearman $r = 0.93$; $p = 0.01$). The majority of patients (72%) developed RLS concomitantly with onset of the classic symptoms of PPS, whereas the rest (28%) developed symptoms of RLS 1–14 years after the first symptoms of PPS. No patient had RLS symptoms before the onset of PPS. No patient had a family history of RLS. There was no difference in daytime sleepiness between patients with and without RLS ($p = 0.168$). The median RLS severity was 23 (range, 20–28).

Among the clinical comorbidities, hypertension (32 cases, 27%) and smoking (18 cases, 15%) were most frequent, followed by mood disorder (14 cases, 12%), hypothyroidism (8 cases, 7%), and diabetes (4 patients, 3%). Notably, mood disorder assessed by item 10 of the IRLSSS was more prevalent in the group with RLS symptoms ($p = 0.02$).

Laboratory parameters, including urea, glucose, and thyroid-stimulating hormone, were within normal reference ranges in all patients. No patient had end-stage renal disease. Seven patients had a hemoglobin level below 12 g/dL; of these, six patients had RLS. Hemoglobin levels were significantly lower in patients with RLS than in those without RLS ($p < 0.001$). There was no difference in iron ($p = 0.278$) or ferritin ($p = 0.221$) levels between the groups with and without RLS (Table 2).

In the logistic regression model, low educational attainment (odds ratio [OR] = 1.37, 95% confidence interval [CI] = 1.07–1.76) and mood disorder (OR = 16.36, 95% CI = 16.36–98.59) were predictive of RLS (Table 3).

Table 1
Demographic and clinical characteristics of patients with PPS.

	No RLS	RLS	*p*
Age, y	48 (42–52)	45 (40–51)	0.253
Men/women	38/38	11/32	0.019
Education, y	11 (11–12)	11 (9–12)	0.905
Age at acute polio infection, y	1.25 (0.66–2)	1.5 (0.83–3)	0.147
Age at SPP onset, y	43 (35–47)	41 (36–44)	0.187
Age at RLS onset, y	–	41 (36–44)	–
Body mass index, kg/m^2	25 (22–28)	26 (23–28)	0.259
Fatigue	42	67	0.072
Muscle pain	65	41	0.099
Joint pain	50	35	0.070
ESS score	8 (5–12)	9 (5–15)	0.168
Hypertension	23	9	0.270
Diabetes	3	1	0.637
Peripheral neuropathy	0	0	–
End-stage renal disease	0	0	–
Hypothyroidism	3	5	0.135
Smoking	10	8	0.580
Alcohol abuse	0	0	–
Mood disorder	5	9	0.020

Values are expressed as median (interquartile range).
ESS: Epworth Sleepiness Scale; IRLSS: International Restless Legs Syndrome Study Group rating scale; PPS: post-polio syndrome; RLS: restless legs syndrome.