

Prevalence Rate of Restless Leg Syndrome among Healthcare Students of Karachi

Muhammad Faisal Qureshi^{1*}, Sonya Arshad¹, Farah Deebea¹, Ajay Dherwani¹, Abeeha Raza¹, Aisha Akram¹,
Amna Idrees¹, Aqib Zaman¹, Areeba Ishaq¹ and Areej Sadruddin¹

¹Liaquat National School of Physiotherapy, Karachi, Pakistan

ABSTRACT

Background: Restless leg syndrome (RLS) is an undiagnosed sensorimotor disorder that is accompanied by an unpleasant sensation in the lower limbs which cause an urge to move the leg for temporary relaxation. It causes symptoms such as insomnia, concentration and mood disturbance which affect the quality of life, job and academic performance.

Objective: This study was proposed to find out the prevalence of RLS among healthcare undergraduate students with its primary complications.

Methods: This was a cross-sectional study, conducted in Healthcare Institutes of Karachi in July-19 to October-19. A questionnaire was given to 337 students, which was designed to diagnose RLS on the basis of criteria set by "International Restless Leg Syndrome Study Group". The inclusion criteria were students aged between 18-25 years. Students having any neurological problem, hypertension, diabetes, pregnancy, musculoskeletal deformity or recent traumatic injuries were excluded from this study. Data was analyzed by SPSS version 22.

Results: The median (IQR) age of students was 21 (20-22) years. Out of these 337 students 40(11.9%) were males and 297(88.1%) were females. Restless Leg syndrome was diagnosed in 120(35.6%) students in which 110(91.7%) were females and 10(8.3%) males. 116(34.4%) students experienced leg cramps, while RLS positive students 116(96.7%) did not seek any consultation to health care professional.

Conclusion: This study concluded that there was a high prevalence of RLS among healthcare students yet remains undiagnosed. There should be more awareness programs regarding RLS to prevent its symptoms and to improve the quality of life.

Keywords: Restless leg syndrome, sensorimotor disorder, self-stretching, and strengthening exercises.

INTRODUCTION

Restless leg syndrome (RLS) is a common yet an undiagnosed sensorimotor disorder. The prevalence rate was found to be 3.9% to 15% globally in 2017 by frontiers in Aging Neuroscience [1].

Restless leg syndrome is characterized by an unpleasant or uncomfortable sensation in the leg which causes an irresistible urge to move the leg for temporary relaxation [2-4]. In 1685, an English physician Thomas Willis gave the first description of Restless leg syndrome (RLS), describing a patient with difficulty in sleep due to the involuntary movement of limbs. In 1945, Karl-Axel Ekbom, who was unaware about the work done by Willis coined the term "Restless leg". Restless leg syndrome is widely used term to describe this condition but as it can affect upper limbs as well so it was renamed to Willis-Ekbom disease [5, 6].

In Europe and North America, it was about 5% to 10%. However, RLS is less common in Asia with a prevalence of 1% to 4% as showed by Ohayon *et al.* in 2012 [7]. A Pakistani research showed RLS prevalence of 23.6% in Karachi [8]. People usually do not seek any medical

consultation regarding RLS or even if they have reported any of their symptoms it gets misdiagnosed or overlapped with other medical conditions which are called "RLS mimics" such as positional discomfort, myalgia, vascular or neurogenic claudication, hypnic jerks or habitual foot tapping, *etc.* Turkdogan *et al.* in 2011 reported 5.9% in 538 children were diagnosed with RLS who were referred to a clinic due to sleep walk problem [9]. The only way to diagnose restless leg syndrome is on the basis of its four classical symptoms, criteria set by international restless leg syndrome study group (IRLSSG) [10]. The 5th criterion is used to differentiate RLS with the above mentioned conditions.

Restless leg syndrome can occur at any age, and the symptoms seem to be worsening with growing age. Philips *et al.* showed that 3% of age group 18-29 years were suffered less, while as the age progresses this percent increases as 10% in age group 30-79 years and 19% in 80 years and above [11]. Garcia *et al.* reported high prevalence of restless leg syndrome in children with attention deficit disorders [12]. The symptoms of restless leg syndrome usually affect both male and female however, the ratio is relatively high in female *i.e.* 2:1. The cause of this association is still unknown, but it is believed that it could be due to hormonal imbalance of estrogen, prolactin and progesterone which are also responsible for causing RLS in pregnancy. According to

*Corresponding Author: Muhammad Faisal Qureshi, Liaquat National School of Physiotherapy, Karachi, Pakistan; Email: faisal.qureshi@lnh.edu.pk
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Chen *et al.* RLS is more common in the third trimester as about 8% of pregnant females has restless leg syndrome in the 1st trimester, 16% in the 2nd trimester and 22% in the 3rd trimester [13, 14].

Restless leg syndrome varies in intensity from mild discomfort to severely altering the quality of life. Symptoms of restless leg syndrome might include: sensations like creeping, throbbing or itching in the leg; sometimes people describe it as a feeling of consistent desire to move the leg, insomnia, daytime somnolence, sensations worsen during rest or inactivity and at evening or at night time, difficulty in concentration, mood disturbance, or it could be associated with a condition called night time leg twitching [15, 16].

Among all the symptoms mentioned above insomnia is the most profound one due to which restless leg syndrome is considered as a sleep related disorder. Restless leg syndrome was found as 4th most commonly reported disorder in a research that was done on college students by Gaultney *et al.* in the United States to find the prevalence of sleep disorder [17]. Veldi *et al.* demonstrated the high percentage of RLS that is 22% in medical students in his study concerning sleep quality and sleep related problems [18].

Another problem in restless leg syndrome is that the pathophysiology of it is poorly understood but there are three interrelated components *i.e.* dopaminergic dysfunction, iron deficiency and gene involvement [19]. Marked improvement was seen in RLS symptoms with drugs that stimulate dopamine system such as Levodopa or dopamine agonist, which led to the conclusion of its role in pathophysiology of RLS. The diencephalospinal dopaminergic tracts originating from A11-A14 is considered to be an anatomical site of dopaminergic dysfunction. In RLS as this system projects in the limbic system this could be related with the circadian pattern of symptoms of RLS [20]. Iron plays an important role in the synthesis of dopamine. Dopamine transporter is impaired with iron deficiency [21]. In 2003 Allen *et al.* reported the epidemiology of restless leg syndrome, about 60% in the United States and 63% in Canada and overall around the world 50% of population had positive family history which showed its genetical association as well [2].

Secondary restless leg syndrome can be caused by different underlying conditions such as: diabetes, kidney failure, Parkinson's disease, peripheral neuropathy, medications such as antihistamine, antipsychotics, antiemetics and antidepressants [2, 22, 23]. According to Ohayon *et al.* 22.3% out of 300 individuals with restless leg syndrome had uremia [7].

It was unfortunate to see that a condition that have a significant impact on academic performance of students and their quality of life remained an unaware condition among the population of Pakistan. The purpose of this research was to find restless leg syndrome among

medical students of different institutes in Karachi. Therefore, this research was conducted to highlight some major complications regarding restless leg syndrome so that it could help people to prevent this disease and to create awareness about it.

METHODOLOGY

This was a cross-sectional study, conducted from July-19 to October-19 among healthcare students in different Healthcare Institutes of Karachi (Liaquat National School of Physiotherapy, DOW University of Health Sciences and Karachi Medical & Dental College). The inclusion criteria of this study were healthcare students aged between 18-25 years. Students having any neurological problem, hypertension, diabetes, pregnancy, musculoskeletal deformity or recent traumatic injuries were excluded from this study. Nonprobability consecutive sampling technique was applied to select study participants. The sample size was calculated with RLS prevalence of 23.6% [8], 95% confidence interval and 5% margin of error through open-Epi online calculator. The calculated sample size was 277 but sample size was increased due to non-response rate and total 337 students of both genders were recruited in this study. An informed consent form was taken from all the participants. All the details of the study were also explained to obtain their consent.

A semi-structure questionnaire was designed to find out RLS prevalence. The questionnaire consists of two parts; first part is of demographic details including age, gender and educational status. The second part was about the clinical features of RLS which consist of 10 questions. The prevalence of restless leg syndrome was determined according to the criteria set by international restless leg syndrome study group (IRLSSG), which include: an urge to move the leg usually but not always accompanied by or felt to be caused by uncomfortable and unpleasant sensations in the legs, the urge to move the legs and any accompanying unpleasantly sensations begin or get worse during periods of rest or inactivity such as lying down or sitting, the urge to move the leg and any accompanying unpleasant sensations are partially or totally relieved by movement such as walking or stretching at least as long as an activity continues, the urge to move the legs and any accompanying unpleasant during rest or inactivity only occurs or gets worse in the evening or night than during the day and the occurrence of the above features is not solely accounted for as symptoms primary to another medical or behavioral condition *e.g.* (myalgia, venous stasis, leg edema, arthritis, leg cramps, positional discomfort and habitual foot tapping) [10]. The first three questions were about the classical features of restless leg syndrome which was based upon the diagnosis of RLS. Students who answered yes to the first three questions were considered as RLS positive. Other questions were related to the underlying cause of restless leg syndrome, in which questions were related to the iron deficiency

and the presence of same symptoms in their first degree relative. Students who answered first 3 questions as yes and were already diagnosed with iron deficiency were categorized as RLS positive due to iron deficiency. Students who responded first 3 questions as yes and also reported the same symptoms in their first degree relative were categorized as RLS with positive family history and students who had answered the first three question as yes but was never diagnosed with iron deficiency or did not report the same symptoms in their first degree relative were categorized as RLS positive without any underlying cause. The last four questions find the associated symptoms which could misdiagnose restless leg syndrome or any associated musculoskeletal injuries in the lower limbs and other underlying conditions that could cause RLS.

Data analysis was performed on SPSS version 21. Categorical variables were expressed as frequency and percentage. Non-normal continuous variable 'age' was summarized as median (interquartile range; IQR). Pearson's chi-square test was applied to compare categorical variables among RLS positive and RLS negative patients. P-value < 0.05 was taken as statistically significant.

RESULTS

Total 337 participants were recruited into the study out of which 297(88.1%) were females and 40(11.9%) were males. The median (IQR) age of study participants was 21 (20-22) years. Most of the study participants were in age group of 18-21 years (n=58.5%). Majority of students were physiotherapy students (n=189, 56%) as shown in Table 1. Total 120(35.6%) were RLS positive according to IRLSSG criteria in which 110(91.7%) were females and 10(8.3%) were males as presented in Table 2. Among RLS positive students, condition was more prevalent in age-group 20-22 years (n=71, 59.16%).

According to the etiology of RLS, 59(49.17%) participants had no underlying cause. 37(30.83%) participants had iron deficiency, and most of them were females (n=35, 94.59%). 45(37.5%) participants reported positive family history and majority had positive maternal history (n=23, 51.1%).

A high rate of sensory symptoms was reported by all the study participants which include an urge to move the leg (n=185, 54.9%). The aggravating factor of symptoms reported by the students was sitting (n=87, 25.8), lying (n=33, 9.8), and both (n=30, 8.9). 64(53.33%) students stated that walking and stretching helped to relief their symptoms while 56(46.66%) mentioned no such relief with these activities. Associated symptoms experienced by all study subjects included positional discomfort (n=79, 23.4), insomnia (n=55, 16.3), habitual foot tapping (n=33, 9.8) and myalgia (n=14, 4.2), whereas 156(46.3%) students had no such symptoms (Fig. 1). All participants

also reported for occurrence of musculoskeletal injuries which included leg cramps (n=116, 34.4), sprain and strain (n=56, 16.6), muscle tear (n=14, 4.2), fracture (n=13, 3.9) and 138(40.9%) had no such injury (Fig. 2). Among RLS positive students, only 4(3.3%) seek any medical consultation regarding RLS while 116(96.7%) did not report their symptoms to a doctor.

Table 1: Demographic characteristics of study participants.

Demographic Characteristics	Frequency (%)
Age (in years)*	21 (20 – 22)
Gender:	
Females	297 (88.1%)
Male	40 (11.9%)
Educational Status:	
Students of doctor of physical therapy	189 (56.08%)
Students of MBBS	94 (27.89%)
Students of BDS	54 (16.02)

* Age is expressed as median (inter-quartile range)

Table 2: Comparison of participants' characteristics among RLS positive and RLS negative patients.

Participants' Characteristics	RLS Positive n(%)	RLS Negative n(%)	p-value
Age (in years)			
≤ 21	65 (54.2)	132 (60.8)	0.235
>21	55 (45.8)	85 (39.2)	
Gender			
Male	10 (8.3)	30 (13.8)	0.136
Female	110 (91.7)	187 (86.2)	
Parental History of RLS			
Yes	45 (37.5)	39 (18)	<0.001
No	75 (62.5)	178 (82)	
Iron Deficiency			
Yes	37 (30.8)	53 (24.4)	0.203
No	83 (69.2)	164 (75.6)	

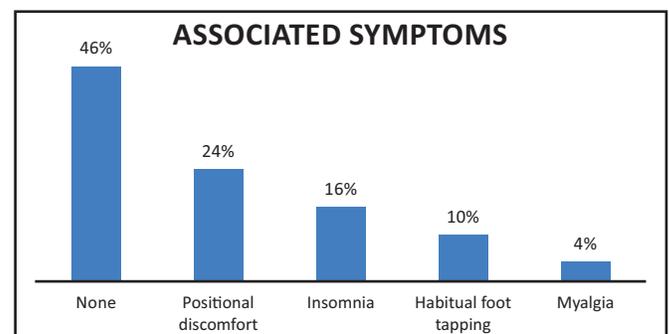


Fig. (1): Frequency of associated symptoms experiences by students.

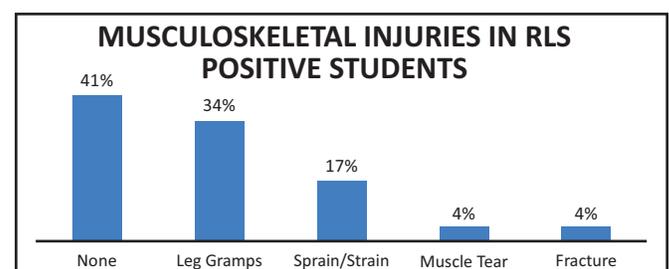


Fig. (2): Frequency of musculoskeletal injuries reported by students.

DISCUSSION

The current study showed that the prevalence rate of RLS among medical students of Karachi was about 35.6% by using the four essential criteria that was set by IRLSSG. A review of epidemiological studies on prevalence of restless leg syndrome worldwide conducted by Ohayon M *et al.* showed that the prevalence among Asian population was about 1.1 - 4 %. In his review, he concluded that the high prevalence of RLS in women increases with age in the European and North American countries but not in Asia [7, 24].

The prevalence rate that was found by Mehmood K *et al.* in the research conducted in Karachi was about 23.6% which is lower than the prevalence found in this study [8]. It is also observed that the prevalence rate of restless leg syndrome is higher in Pakistan than the rest of the Asian countries [24, 25].

In previous studies Berger K *et al.* showed that the prevalence of RLS is more common in females than males which are consistent with the findings of this study in which we have found the high prevalence in females (37.03%) as compared to males (25%) [14, 26-29]. In contrast, Ulfberg J and Benediktsdottir B *et al.* reported no relationship of RLS with gender [21, 30]. The higher rate of RLS in a female is not clear, but it might be possible because of high frequency of the vitamin D and iron deficiency in females than males [31, 32].

Studies conducted across countries like America, Canada and Germany showed positive association exists between family's histories [33-36]. In all these researches it was reported that the first degree relative were affected by RLS but no proper categorization was made to find out which parent or which sibling had the symptoms of RLS, unlike this research. This study validates these above findings of positive relation exist with family history of RLS. This positive association could be because of gene inheritances or that the parents might be suffering from different underlying conditions that can cause RLS.

Multiple studies showed that RLS increases with age [3, 37-39]. While Mehmood K *et al.* showed peak prevalence (38%) at the age of 30 [8, 26]. Several studies were conducted in different countries as in Saudia Arabia in 2013 among Saudi school employees in which there was no association of RLS found with age, which relates with this study [27, 40-42]. This negative association could be due to the variation in number of participants in each age group. Hence, no accurate conclusion can be given about the impact of age factor on RLS.

In the present study, 24% students also reported for having positional discomfort, habitual foot tapping (10%) and myalgia (4%), all these conditions are called "RLS mimics". According to IRLSSG, restless leg syndrome

can occur with any of these conditions as well, yet we were unable to find any percentage of participants having RLS mimics in the studies done by Allen RP, Mahmood K and Berger K *et al.* [8, 14, 33].

A study that was conducted in the United States and European countries showed a high percentage; about 81% of participants who had consultation regarding RLS to primary care doctor [3]. In contrast, this study showed that 96.6% students did not report their symptoms of RLS to any doctor or did not seek any medical consultation regarding it even though all the students belong to different medical institutions. This revealed that how much people were unaware about RLS in Pakistan due to lack of medical screening, they do not consider it as an actual medical condition, and people usually do not report their symptoms to doctors until and unless it causes pain.

Insomnia is one of the main symptoms of RLS as in one study Veldi M *et al.* reported that 22% medical students having RLS were suffering from insomnia [17, 18]. This percentage corresponded with our study in which there were about 16% of students who reported insomnia along with RLS. It is seen that insomnia has become more common in students of Karachi especially in medical students due to late night studying and stress [43]. Therefore, a proper investigation should be held to find that either it is due to RLS or some other condition because insomnia can have an impact on concentration, mood and academic performance [17].

In the present study 34% students reported leg cramps while literature documents spurious association between RLS and nocturnal leg cramps [44].

This study has some limitations. Firstly, the sample size was not large enough for the generalization of the result that was found in this study [45], that is why the ratio of RLS is less prevalent in the male student which needs to be addressed in future studies by increasing the sample quota for male students or by doing the research on male students only. In addition, the four minimum IRLSSG criteria were used in this study which could be one of the reasons for high prevalence rate.

CONCLUSION

In conclusion, the prevalence rate of restless leg syndrome was high among the students of medical institutions of Karachi with the predominance of female students. Further studies should be done to find out the actual cause of this high prevalence. More over the awareness program should be conducted on restless leg syndrome among general population of Pakistan so that it could help to prevent the symptoms of restless leg syndrome at earliest.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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