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Frequency of Nocturnal Leg Cramp Symptoms and Gender Comparison of Stress, Physical Activity and Sleep Disturbances in Middle Aged Adults with Nocturnal Leg Cramps

Gece Bacak Krampları Olan Yaşlı Erişkinlerde, Gece Bacak Kramplarının Sıklığı ve Stres, Fiziksel Aktivite ve Uyku Bozukluklarının Cinsiyete Göre Karşılaştırılması

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Abstract

Objective: Nocturnal leg cramps are painful, sleep related involuntary muscle contractions of the lower limb. The objective was to determine the frequency of nocturnal leg cramp symptoms and to compare stress, sleep disturbances, and physical activity between males and females in middle-aged adults having nocturnal leg cramps.

Materials and Methods: An analytical cross-sectional survey was conducted on 220 participants in twin cities of Pakistan. Patients between the ages of 35-55 years who experienced nocturnal leg cramps in the previous three months were included, those with any comorbidities were excluded from the study. A diagnostic criterion from a previous systematic review was used to determine and find the frequency of nocturnal leg crampsymptoms. The perceived stress scale, Pittsburgh sleep quality index, and global physical activity questionnaire were used to analyze stress, sleep, and physical activity, respectively.

Results: The mean age of all participants was 44.01±6.74 years. The most reported symptom by participants was pain duration lasting from seconds to 10 minutes 219 (99.55%), whereas pain/cramps in thigh/hamstrings 162 (73.64%) was least reported symptom. The mean age of participants in the male and female groups was 44.27±7.65 years, 44.72±6.56 years. Group comparison of gender showed a significant difference with stress ($p<0.05$) whereas sleep and physical activity showed no significant difference ($p>0.05$).

Conclusion: The study concludes that majority of the participants experienced all symptoms of the nocturnal leg cramps, whereas leg cramps were the most frequent symptom. Furthermore, females suffering from nocturnal leg cramp reported higher levels of stress compared with males.

Keywords: Middle aged, muscle cramps, pain, Pakistan, sleep

Öz

Amaç: Gece bacak krampları ağrılı, uykuyla ilişkili alt ekstremitelerde görülen istemsiz kas kasılmalarıdır. Bu çalışmanın amacı, gece bacak krampları semptomlarının sıklığını belirlemek ve gece bacak krampları olan orta yaşlı erişkinlerde stres, uyku bozuklukları ve fiziksel aktiviteyi cinsiyete göre karşılaştırmaktı.

Gereç ve Yöntem: Pakistan'ın ikiz şehirlerinde 220 katılımcı üzerinde analitik bir kesitsel anket çalışması yapıldı. Çalışmaya 35-55 yaş arası, son üç ayda gece bacak krampları yaşayan hastalar dahil edilirken, herhangi bir komorbiditesi olan hastalar çalışma dışı bırakıldı. Gece bacak krampları semptomlarının sıklığını bulmak için önceki sistematik derlemeden bir tanı kriteri kullanıldı. Algılanan stres ölçeği, Pittsburgh uyku kalitesi indeksi ve global fiziksel aktivite anketi sırasıyla stres, uyku ve fiziksel aktiviteyi analiz etmek için kullanıldı.

Bulgular: Tüm katılımcıların yaş ortalaması 44,01±6,74 yıl idi. Katılımcılar tarafından en çok bildirilen semptom 219 (%99,55) hastada saniyeler ile 10 dakika arasında süren ağrı idi. Uyluk/hamstringlerde ağrı/kramplar 162 (%73,64) hasta tarafından bildirildi ve en az bildirilen semptomdu. Erkek katılımcıların yaş ortalaması 44,27±7,65 yıl iken kadın katılımcıların yaş ortalaması 44,72±6,56 yıl idi. Kadın ve erkek katılımcılar arasında stres açısından anlamlı farklılık saptanırken ($p<0,05$), uyku ve fiziksel aktivite açısından farklılık saptanmadı ($p>0,05$).

Sonuç: Çalışmada, katılımcıların çoğunluğunun gece bacak kramplarının tüm semptomlarını yaşadığı, buna karşın bacak kramplarının en sık görülen semptom olduğu sonucuna varılmıştır. Ayrıca, gece bacak kramplarından muzdarip kadınlar, erkeklere kıyasla daha yüksek düzeyde stres bildirmişlerdir.

Anahtar Kelimeler: Orta yaşlı, kas krampları, ağrı, Pakistan, uyku

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Introduction

Nocturnal leg cramps (sleep related cramps) are sudden, involuntary tightening and painful sensations experienced in the lower limb mainly the calf muscles during rest at night or during day time with periods of pain afterwards (1,2). The duration of these cramps vary from several seconds to minutes (3). These cramps are unilateral in most of the cases (4). Nocturnal leg cramps can affect any age group but the frequency and disease severity increases with age (5). These cramps can have a profound impact on sleep quality and quality of life (6).

In Utah (Western United States) 50-60% of adults and 7% of children report nocturnal leg cramps. The prevalence is slightly higher in females than males (7). About 33-55% females experience leg cramps during pregnancy (8). About 20% of patients with leg cramps have daily symptoms that cause them to seek medical attention (7).

Despite being a very common condition, nocturnal leg cramps are poorly understood and the exact mechanism is still not known. A recent study showed that muscle fatigue and nerve dysfunction, rather than electrolyte and other abnormalities cause nocturnal leg cramps (7). Electromyographic activity of gastrocnemius muscle seen in patients with chronic nocturnal leg cramps showed significantly higher rates of repetitive firing of motor unit action potentials than voluntary muscle contraction (9). Many cases of nocturnal leg cramps are idiopathic in nature. However; the likelihood of having cramps increases with certain medical conditions (neuromuscular diseases, vascular diseases, hyperthyroidism), medications (diuretics, nifedipine, statins and steroids), age, poor sleep quality, higher body mass index (BMI), smoking, and depression (2,5,7). Furthermore, electrolyte imbalances, muscle weakness, and decreased peripheral blood are also proposed as potential contributors to nocturnal leg cramps (7). Musculoskeletal conditions associated with sedentary lifestyle, as well as prolonged standing and sitting have been recently added to the known causes of cramps, particularly nocturnal leg cramps (3). A survey conducted on Australian adults showed poor health related quality of life in patients with nocturnal leg cramps (3).

Patients with frequent nocturnal leg cramps may experience severe distress and night-time sleep disruption. Literature has reported that patients whose sleep had been disrupted by nocturnal cramps are unable to sleep for months except in an armchair (10). Recent studies have determined the impact of gender, age, and support of family on perceived stress and coping strategies in different diseased population, concluding that perceived stress, coping, and diet regimen were associated with gender and age. Literature showed higher level of physical activity in males than females in general and diseased population.

Nocturnal leg cramps, restless legs syndrome, and periodic limb movement disorder are all sleep disorders characterized by leg cramps and poor sleep quality, so differential diagnosis is very important to distinguish these conditions. Thorough history and physical examination can help differentiate NLCs from similar leg conditions but up to our best knowledge there is no gold standard tool for diagnosing nocturnal leg cramps. However, a systematic review by Hallegraff et al. (9) developed seven symptoms based diagnostic criteria. This criteria is not yet tested in Pakistani middle age population experiencing nocturnal leg cramps. The purpose of this study is to use this criteria to determine the frequency of all the experienced symptoms of nocturnal leg cramps. Furthermore, in previous studies gender differences were found in different diseased populations however, limited literature was available to find gender differences in stress, physical activity and sleep disturbances in patients with nocturnal leg cramps. Therefore, this study is aimed to fill the geographical gap and add up to the current literature.

Materials and Methods

This analytical cross-sectional survey was conducted in Islamabad, Pakistan from January 2021 to June 2021, and included 220 participants (177 females and 43 males). The data was recruited from the general population of Rawalpindi and Islamabad using non-probability purposive sampling method in which participants are selected on the basis of certain characteristics defined for a purpose.

This research study was ethically approved by the Institutional Review Board (IRB) of Shifa International Hospital (IRB # 055-21) Islamabad, Pakistan. The participants signed an informed consent document. Each participant was given a detailed explanation of the entire procedure. Participation in the study was entirely voluntary & also assured the confidentiality of participant.

Middle-aged adults aged between 36-55 years who had nocturnal leg cramps, defined as sudden, involuntary and painful knotting sensations in the lower limbs, from last three months and were able to speak and understand English were included in the study whereas, participants diagnosed with any medical conditions (cardiovascular diseases, neurologic deficit, end-stage renal disease, osteoarthritis, peripheral neuropathy, venous insufficiency, peripheral vascular disease), pregnant females, who were unable to understand English or participants who had a history of cancer treatment were excluded from the study.

Self-structured questionnaire along with diagnostic criteria from a previous systematic review study consisting of eight questions was used to find out the demographics and frequency of symptoms in patients having nocturnal leg cramps respectively (11). Furthermore, global physical activity questionnaire (GPAQ), perceived stress scale (PSS) and Pittsburgh sleep quality index were used to assess physical activity, stress levels and sleep quality of the participants. GPAQ consists of 16 questions that gather information in three domains of physical activity participation (activity at work, travel to and from places, and recreational activities) and sedentary behavior (12). GPAQ was filled by the researcher to ensure high reliability and validity of the questionnaire. PSS consists of total score of 40 which was categorized into low (0-13), moderate (14-26), and high (27-40) (13). Pittsburgh sleep quality index scale (PSQI) is a highly reliable and valid tool, used to evaluate a wide range of sleep

domains and it consists of 19 self-reported questions that rank seven different aspects of sleep on a scale of 0 to 3 with a total score of 21 (14).

For group comparison of stress, physical activity, and sleep disturbances between gender, the participants were allocated into two groups; group A: Male and group B: Female. Out of the initial 177 females, 43 were allocated by method of systematic sampling with 4th interval into group B to have equal participants in each group.

Statistical Analysis

Data was analyzed using SPSS version 21. Frequency and mean were determined using descriptive statistics. We calculated the mean of quantitative variables, including: Age, BMI, and scores of PSS, PSQI, and GPAQ and frequency of qualitative variables, which includes: Gender, symptoms of NLC, and BMI categories. The total number of participants in each group were greater than 30, so our choice of test for group comparison of stress, sleep disturbances and physical activity between males and females was Independent t-test. Statistical significance was set at alpha value of 0.05.

Results

Out of 220 participants included, 43 (19.55%) were males and 177 (80.45%) were females. The mean and standard deviation of age and BMI of all participants was 44.01±6.74 (years), 20.99±1.1 (kg/m^2). The participants within the normal weight of the standard BMI category were 175 (49.9%). Out of the remaining 45 participants, 14 (6.36%) were at risk, 15 (6.82%) were in obese class 1 and 16 (7.27%) participants were in obese class 2 category of standard BMI. Further frequency of each symptom of diagnostic criteria of NLC was calculated and all of the participants 220 (100%) showed leg pain or cramps at rest. The less experienced symptom was muscle cramps in the thighs and hamstrings as it was reported by 167 (73.64%) participants (Figure 1). The mean and standard deviation of the PSS, PSQI and the three variables of GPAQ: Meantime of total physical activity per day, total physical activity METS-minutes/week, total sedentary activity minutes per day are given in (Table 1). A sample of 86 participants with 43 in each group (group A: Male, group B: Female) was assessed further for gender-based group comparison of stress, sleep disturbances, and physical activity. The mean and standard deviation of age of group A and group B was 44.27±7.45 years, 44.72±6.56 years. The mean and standard deviation of BMI of group A and group B was 21.22±1.04, 21.09±1.17 kg/m^2. Group comparison of sleep quality, mean total physical activity per day, total physical activity METS-minutes/week, and total sedentary activity minutes per day between the groups showed a non-significant difference with p-value =0.127, 0.394, 0.472, 0.176 respectively. Whereas, comparison of stress showed a significant difference (p-value =0.006) between the groups (Table 2).

Discussion

In the present study, majorly reported symptoms were intense leg pain/cramps in the calf lasting from several seconds to minutes that resulted in disrupted sleep. While cramps in hamstrings/thigh and distress were not frequently experienced in NLC episode by participants. Our findings were supported by a systematic review in which distress and hamstrings cramps were seldomly experienced by NLC patients, whereas intense leg pain/cramps in the calf lasting from several seconds to minutes and sleep disruption were experienced by majority of the NLC population (11). Furthermore, association of moderate to severe nocturnal leg cramps with sleep disruption have also been reported in the literature (5). Our findings were also consistent with a relatively old survey involving 233 patients with nocturnal leg cramps, which showed that on average symptoms lasted for 9 minutes and 24% of patients reported very distressing leg cramps (15). In contrast to our findings residual weakness was seen in 30% children lasting for 30 minutes and sleep disruption was reported by 31% of adults over 60 years of age with nocturnal leg cramps (4,16). In addition, similar contradictory findings; mild residual weakness and mild sleep disturbances were reported by nocturnal leg

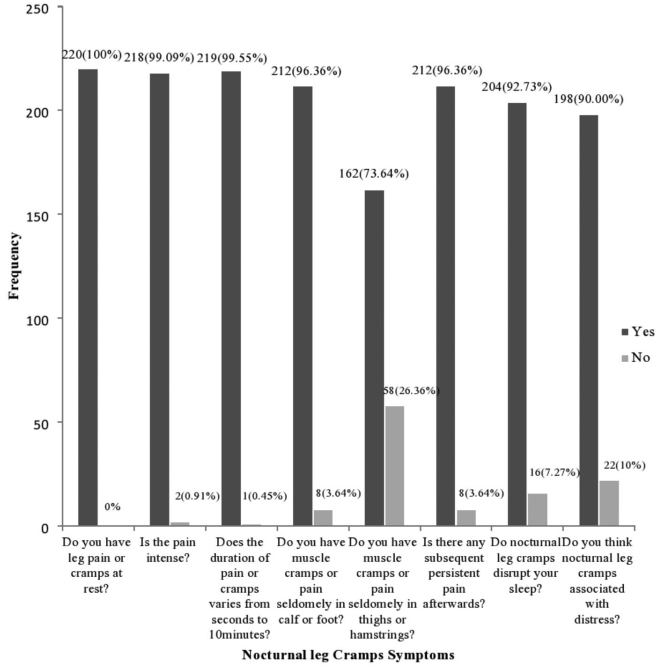

Figure 1. Frequency of NLC symptoms

NLC: Nocturnal leg cramps

Table 1. Mean score of perceived stress scale, Pittsburgh sleep quality index and global physical activity questionnaire

Scales	Mean ± standard deviation
Perceived stress scale	18.8±5.05
Pittsburgh sleep quality index	7.29±3.329
Mean time of total physical activity per day	55.69±80.95
Total physical activity MET-minutes/week	1985.86±4187.6
Total sedentary activity minutes per day	379.88±211.89

Table 2. Comparison of perceived stress scale, Pittsburgh sleep quality index and global physical activity questionnaires between groups				
Variables	**Gender**	**Mean ± standard deviation**	**Mean difference**	**p**
Perceived stress scale	Male	17.44±4.244	-2.581	0.006*
	Female	20.02±4.284		
Pittsburgh sleep quality index	Male	6.32±3.19	-0.976	0.127
	Female	7.30±2.66		
Mean time of total physical activity per day	Male	46.97±70.51	-13.98	0.394
	Female	60.96±80.57		
Total physical activity MET-minutes/week	Male	2550.44±7758.74	884.116	0.472
	Female	1666.32±2012.25		
Total sedentary activity minutes per day	Male	428.48±230.34	63.83	0.176
	Female	364.65±202.51		

cramps patients over the age of 50 years in a prospective observational study (n=129) (17). On the contrary, residual weakness and sleep disruption was reported by 96.36%, 92.7% patients in our study. The possible explanation of these contradictory findings might be explained due to recall bias as the frequency of symptoms was a self report of the patients on the basis of recall, as well as different study type and the difference in sample size may have impacted the results.

The current study reported higher level of stress in females than males having nocturnal leg cramps. There are anecdoctal findings in the literature of gender-based differences in stress in patients with nocturnal leg cramps and up to our knowledge this study is the first of its kind to demonstrate gender differences in stress in nocturnal leg cramps patients. However, a survey on general population conducted in Spain (n=2816) showed that women have higher stress scores as compared to men despite same life events (18).

Our findings confirm that there are no differences in sleep quality between males and females. Our results were in line with a prospective observational study carried out in Western Switzerland on 129 participants that showed no difference in the global and component scores of PSQI in males and females (10). In accordance to our study, females were more physically active than males but the total physical activity METS minutes per week were greater in males but group comparison of gender with physical activity showed no difference between males and females. A relatively smaller sample size might be the cause of statistically non-significant group differences between males and females. A Korean case control study done on 2615 occupational workers showed higher prevalence of nocturnal leg cramps in female workers because of greater hours of prolonged standing postures in comparison to male workers (19). These results were in contrast to our findings maybe because of the relatively small sample size (n=86) for group comparison in our study and the another reason could be that the authors in this study compared the amount of physical activity per day between males and females from the same occupations and with same work demands.

In our study sample size was small because the data collection from general population was difficult to obtain due to Coronavirus pandemic. The sample was selected on the basis of having nocturnal leg cramps, so in future studies the cases should be confirmed with laboratory testing. In future factor analysis of diagnostic criteria of nocturnal leg cramps can be done to make it a gold standard tool and the frequency of symptoms should be analyzed and compared between different age groups.

Conclusion

The study concludes that majority of the participants were experiencing all the symptoms of the nocturnal leg cramps whereas leg cramps was the most frequent symptom. Furthermore, females suffering from nocturnal leg cramps reported higher level of stress as compared to males.

Ethics

Ethics Committee Approval: This research study was ethically approved by the Institutional Review Board (IRB) of Shifa International Hospital (IRB # 055-21) Islamabad, Pakistan.

Informed Consent: The participants signed an informed consent document. Each participant was given a detailed explanation of the entire procedure. Participation in the study was entirely voluntary & also assured the confidentiality of participant.

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Authorship Contributions

Concept: S.K., S.S., Design: S.K., S.S., H.F., T.R., Data Collection or Processing: S.K., S.S., Analysis or Interpretation: H.F., T.R., I.I., Z.M., Literature Search: S.K., S.S., Writing: S.K., S.S., H.F., I.I., Z.M.

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