Critical Care Nursing
Journal home page: www.inhc.ir
Iran J Crit Care Nurs. 2015;8(2):95-102

The correlation between restless leg syndrome and sleep disorders among hospitalized patients with acute coronary syndrome

Elham Sepahvand[*], Mohammad Daneshmandi[1], Rostam Jalali[2], Maryam Mirzaeii[3]
**. University of Social welfare and Rehabilitation, Tehran, Iran*
1. Department of Nursing, Baqiyatallah University of Medical Sciences, Tehran, Iran
2. Department of Nursing, Kermanshah University of Medical Sciences, Kermanshah, Iran
3. Department of Nursing, Jahrom University of Medical Sciences, Jahrom, Iran

ARTICLE INFO

Article type:
Original article

Article history:
Received: 6 May 2013
Revised: 5 May 2014
Accepted: 9 Jun 2014

Key word:
Restless leg syndrome
Sleep disorders
Acute coronary syndrome
Coronary care unit

ABSTRACT

Aims: Restless leg syndrome is a sensorimotor disorder characterized by restlessness and irritability in legs mainly during nighttime immobility. It can occur secondary to cardiovascular disease. The aim of this study was "to examine the correlation of restless leg syndrome with sleep disorders among hospitalized patients with acute coronary syndrome".
Methods: This descriptive-analytical study was conducted in 2012. A random sample of 221 patients with acute coronary syndrome was drawn from the coronary care unit of Imam Ali Hospital, Kermanshah, Iran. Sleep disorders and restless leg syndrome were evaluated by using the researcher-made Cardiac Patients' Sleep Disorders Inventory. The SPSS16 was used for data management and analysis.
Results: The mean of participants' age and the prevalence of restless leg syndrome among them were 61.27 years and 65.1%, respectively. Most of the patients (61.5%) were male. The prevalence of restless leg syndrome among patients with and without sleep disorders was 70.8% and 20%, respectively. Restless leg syndrome was significantly correlated with sleep disorders ($p<0.001$).
Conclusions: Restless leg syndrome is rather prevalent among cardiac patients. However, it usually remains undiagnosed and untreated. Consequently, performing diagnostic screening tests for identifying cardiac patients with this syndrome as well as implementing interventions such as muscular relaxation, massage, and sleep promotion techniques for managing it are recommended.

Please cite this paper as:
Sepahvand E, Daneshmandi M, Jalali R, Mirzaeii M. The correlation between restless leg syndrome and sleep disorders among hospitalized patients with acute coronary syndrome. Iran J Crit Care Nurs. 2015;8(2):95-102.

1. Introduction

Restless leg syndrome (RLS) is a sensorimotor disorder characterized by restlessness and irritability in legs mainly during nights when the afflicted person is immobile [1]. It is a common disorder which was first explained by Willis in 1672 [2]. The mechanism of the disorder is yet unknown. However, evidence shows that dopaminergic

* Correspondence Author: Elham Sepahvand
University of Social welfare and Rehabilitation, Tehran, Iran.
TEL:+988318282102
Email el.sepahvand@yahoo.com

[Downloaded from jccnursing.com on 2026-11-04]

system disorders can be an underlying cause. Genetic studies have also revealed that genetic factors may contribute to RLS [1,3]. About half of patients with RLS report having a positive family history [1]. Moreover, diabetes mellitus, hypertension, and cardiovascular diseases are the most prevalent underlying conditions among patients with RLS [4]. Mehanna and Jankovic (2013) reported that RLS can be secondary to cardiovascular diseases [5].

The prevalence of RLS has increased during the recent years [4] and is currently 1–24%, depending on race and assessment methods. Winkelman et al. (2006) reported a prevalence rate of 10.6% for the disorder [1]. It is more common in northern Europe compared with southern Europe and Asia. Moreover, it is more common among people with older ages as well as among women [1,3].

The manifestations of RLS include irresistible urge to move the legs, abnormal sensations in the legs which are aggravated while sitting, lying, or taking a break, as well as worsening of the manifestations in the evening or at night. Periodic intentional movements of the legs during sleep (such as repetitive flexion of the hip, knee, and ankle) are present in about 90% of patients with RLS [6]. Mandatory movements of the legs during sleep causes sleeplessness, low sleep and life quality, fragile general health, daily sleepiness, social function disorders, high blood pressure, and increased risk for cardiovascular disease [1,7]. The length of sleep among patients with RLS is less than five hours [8].

Compared with the general population, RLS is more common among patients hospitalized in critical care units. For instance, Habibzadeh et al. (2011) and Kim et al. (2008) reported that the prevalence of RLS in critical care units was 36.3% and 28%, respectively [9,10]. However, this disorder usually remains undiagnosed because of critical care patients' lack of knowledge about it. According to Zamani et al. (2008), patients do not provide information about this disorder during physical examinations and hence, it is usually taken for granted by physicians [7].

Ensuring adequate sleep for patients is among the most basic responsibilities of nurses. Nurses need to assess patients' sleep disorders, determine their causes, and employ appropriate nursing measures for managing them [11,12]. However, despite the commonness of RLS among patients with heart problems, there is little information about the relationship of RLS with afflicted patients' sleep disorders. The aim of this study was to examine the correlation of RLS with sleep disorders among hospitalized patients with acute coronary syndrome.

2. Methods

This descriptive-analytical study was conducted in 2012 on patients with acute coronary syndrome hospitalized in the coronary care unit of Imam Ali teaching hospital, Kermanshah, Iran. The inclusion criteria were suffering from coronary artery disease, having an age of eighteen or higher, and being desired for participating in the study. Patients with chronic or unstable conditions (such as congestive heart failure) or sensory-cognitive and cognitive problems (such as hearing or visual impairments) were excluded. Patients were recruited by using the simple random sampling technique.

The data collection tool was a researcher-made questionnaire whose validity and reliability had been assessed and reported elsewhere [13]. The first part of the study tool was a demographic questionnaire consisting of items on patients' age, gender, educational status, employment, and previous history of heart problems, hypertension, or hospitalization in critical care units. The second part of the study tool was the Cardiac Patients' Sleep Disorders Inventory (CPSDI) [13]. The 25 items of the CPSDI are scored on a five-point scale from 0 (Never) to 4

[Downloaded from jccnursing.com on 2026-11-04]

(Always). Consequently, the total score of the CPSDI can range from 0 to 100. Scores of 0–24, 25–49, 50–74, and 75–100 are interpreted as no sleep disorder, mild sleep disorder, moderate sleep disorder, and severe sleep disorder, respectively.

The five main domains of the CPSDI are difficulty falling or staying asleep, daytime dysfunction, sleep disorders due to environmental factors, sleep disorders due to heart problems, and sleep movement disorders. One of the domains of the CPSDI assesses RLS. Scores of 9 to 12 on this domain reflect the presence of RLS. We invited the eligible patients to complete the study questionnaires three days after their admission to hospital. Study participants were informed about the aim of the study and were ensured of the confidentiality of their personal data. The SPSS16 was used for data management and analysis.

3. Results

In overall, 221 cardiac patients with a mean age of 61.27 years were studied. About 61.5% of the participants were male. The educational status of the participants was as follows; illiterate: 48%; below-diploma educations: 33.5%; high school diploma: 8.1%, and higher educations: 10.4%. Almost half of the patients (48.4%) had a previous history of hospitalization in critical care units.

About 80.99% of the participating patients reported having sleep disorders. Sleep disorders were mainly mild (64.54%) or moderate (35.46%). Most of the participating patients (65.1%) had RLS. The prevalence of RLS among the participating men and women was

Table 1: Participants' demographic characteristics and their correlation with RLS

				RLS	
Demographic characteristics		N	%	P value	χ^2, , df
Gender	Male	136	61.5	0.002	35.4, 3
	Female	85	38.5		
Educational status	Illiterate	106	48	0.15	3.68, 3
	Below-diploma	74	33.5		
	High school diploma	18	8.1		
	Higher educations	23	10.4		
History of hypertension	Yes	109	49.3	0.13	2.34, 1
	No	112	50.7		
History of Diabetes mellitus	Yes	90	40.7	0.21	1.66, 1
	No	131	59.3		
Previous history of hospitalization in critical care units	Yes	104	48.4	0.12	2.67, 2

The Fisher's exact test

[Downloaded from jccnursing.com on 2026-11-04]

Table 2: The mean of the participants' sleep quality

Sleep quality indices	Mean	N	%
Difficulty falling sleep	2.43±1.085	130	58.8
Frequent nighttime awakenings	2.60±0.983	138	62.5
Early awakening in the morning	2.50±0.934	134	60.6
Daytime fatigue	2.19±1.274	114	51.6
Sleep duration	2.00±0.871	160	72.4
Using hypnotics	1.25±1.45	71	32.1
Low sleep quality	1.92±1.003	143	64.7
Total score	4.58±13.9	221	100

Table 3: Cross-tabulation of RLS and sleep disorders

Sleep disorders	Yes		No	
RLS	N	%	N	%
Yes	138	70.8	5	20
No	57	29.2	20	80
Total	195	100	25	100
Chi-square test	χ^2 =44.9 , df=3 , p< =0.0001			

57.4% and 77.6%, respectively. The relative frequency of RLS among patients with previous history of hospitalization in critical care units was 70.1%. RLS was not significantly correlated with age, educational status, and previous history of hospitalization in critical care units ($p<0.05$) while its correlation with gender and sleep disorders was statistically significant ($p=0.002$ and <0.001, respectively).

More than one third of the patients with RLS (40.7%) were diabetic. Compared with patients with no history of diabetes mellitus, RLS was more prevalent among patients suffering from it (34.4 vs. 65.6%). However, this difference was not statistically significant ($p=0.21$). Moreover, the correlation of RLS with the history of diabetes mellitus was not statistically significant (Table 1). Most of the patients suffered from difficulty falling or staying asleep (table 2). About 49.3% of patients suffered from hypertension. However, there was no significant correlation between RLS and the history of hypertension ($p=0.13$). Most of the patients with acute coronary syndrome (70.8%) reported suffering from sleep disorders (Table 3).

[Downloaded from jccnursing.com on 2026-11-04]

4. Discussion

Patients with acute coronary syndrome who are hospitalized in critical care units suffer from sleep disorders due to factors such as RLS.

Most of the patients suffered from difficulty falling or staying asleep (Table 2). Johansson et al. (2010) also reported that 21% of patients with myocardial infarction have difficulty falling or staying asleep [14]. Tembo and Parker (2009) also found that all patients in intensive care units suffer from frequent awakenings and decreased duration of rapid-eye-movement (REM) sleep [15]. Generally, cardiac patients, particularly those who are hospitalized in critical care units, suffer from sleep disorders which negatively affect their health [16]. Sleeplessness increases heart rate, the force of myocardial contractions, and myocardial oxygen demand [17]. On the other hand, the stressful environment of critical care units, the acuteness of cardiac problems, and frequent medical and nursing procedures disturb patients' sleep and cause sleeplessness among them [18,19].

Study findings revealed that 32.1% of patients (71 ones) used hypnotics. The commonness of sleep disorders among cardiac patients and their inability to have adequate sleep require them to use hypnotics for promoting their sleep. However, Johansson et al. (2010) found that most patients with myocardial infarction who suffered from sleep disorders did not use hypnotics because they were afraid of drug dependence and the aggravation of their sleep problems after discontinuing hypnotics [14].

We also found that the sleep duration of most of the participating patients had been decreased significantly. Al-Otair et al. (2011) also reported that nighttime sleep duration among patients hospitalized in coronary care unit was significantly less than the average normal sleep [20]. According to Drouot et al. (2008), inadequate and interrupted sleep are the commonest sleep disorders among patients who are hospitalized in coronary care units [21]. Inadequate sleep is associated with increased risk for cardiovascular disease [22] and heart attack [23].

About 60.6% of our patients (134 ones) had experienced early awakening. According to Yen et al. (2010), early awakening is common among cardiac patients [19]. Most cardiac patients suffer from reduced duration of the REM sleep as well as early awakening in the morning [24].

Study findings also revealed that 51.6% of patients (114 ones) complained of daytime fatigue and sleepiness. Johansson et al. (2010) also found that after developing an acute coronary syndrome, one third of patients often or always feel fatigued [14]. Generally, lack of vitality, fatigue, and sleepiness are among the most common complaints of patients with coronary disorders [14 and 25]. Daytime fatigue and sleepiness are secondary to decreased amount of the REM and the non-REM sleep as well as sleep interruption [26]. Caska et al. (2009) noted that cardiac patients are irritable and nervous due to having a low-quality sleep [27].

We also found that the prevalence of RLS among patients participating in the present study was 65.1%. Habibzadeh et al. (2011) reported an RLS prevalence of 36.3% for patients hospitalized in critical care units while Kim et al. (2008) found it to be 27% for Korean patients receiving hemodialysis [10]. Kuchukhidze et al. (2012) also reported that the prevalence of RLS in Georgian primary healthcare setting was 11.3%. The contradiction among the findings of these studies regarding the prevalence of RLS can be attributed to the difference in their samples.

The study findings also indicated that 70.8% of patients with RLS suffered from sleep disorders. Moreover, there was a significant correlation between RLS and sleep disorders ($p<0.001$). All individuals with sleep disorders participating in a study conducted by Bhowmik et al. (2003) also suffered from RLS [28]. Other studies also revealed that most patients with RLS had sleep disorders such as difficulty

[Downloaded from jccnursing.com on 2026-11-04]

falling asleep and inadequate sleep [29–33]. These studies also reported that about one third of patients with RLS experience severe sleep disorders. According to Bogan et al. (2013), RLS is manifested by delayed onset of sleep, short sleep duration, frequent nighttime awakenings, and daytime fatigue [34]. Moreover, irresistible urge for moving the legs can disrupt sleep among patients with RLS [34].

We also found that the prevalence of RLS in female patients was significantly higher than males (77.6% vs. 57.4%; p = 0.002). This is in line with the findings of the previous studies [2, 5, 35, and 36]. However, Ghanei et al. (2011), Salamipour et al. (2012), and Alidosti et al. (2013) found no significant correlation between gender and RLS [4,33,37). The conflict among different studies regarding the correlation of gender with RLS can be related to differences in their sample structures.

In the present study, there was no significant correlation between RLS and hypertension (p = 0.31). Szentkiralya et al. (2013) also found no significant correlation between these two variables [38]. We also found that RLS was not significantly correlated with the history of diabetes mellitus while Ghanei et al. (2011) and Loes et al. (2005) reported that RLS was significantly more common among patients with diabetes mellitus [4,39]. This contradiction between the findings of the studies is probably due to the small number of patients with diabetes mellitus in our study (40%). Finally, the findings of the present study revealed that RLS was not significantly correlated with previous history of hospitalization in coronary care unit. However, this correlation was significant in a study conducted by Habibzadeh et al. (2011) [8]. Racial and environmental differences can be the reasons behind such a conflict between the findings of these two studies.

5. Conclusions

Study findings indicate that RLS is rather common among cardiac patients. Moreover, RLS is significantly correlated with sleep disorders among these patients. Consequently, performing diagnostic screening tests for identifying cardiac patients with RLS as well as implementing interventions such as muscular relaxation, massage, and sleep promotion techniques for managing it are recommended.

6. Acknowledgments

We would like to thank the participating patients as well as the personnel of the coronary care unit of Imam Ali hospital, Kermanshah, Iran, who supported us throughout conducting this study.

References

1. Winkelman J W Finn L Young T. Prevalence and correlates of restless legs syndrome symptoms in the Wisconsin Sleep Cohort. Sleep Medicine. 2006;7:545–552.
2. Chen N H, Chuang L P, Yang CH, Kushida C A, Hsu SH, Wang P, Lin SH, Chou Y, Chen R, Li H, Lai S CH. The prevalence of restless legs syndrome in Taiwanese adults. Psychiatry and Clinical Neurosciences. 2010; 64:170–8.
3. Winter AC, Schu RKS M, Glynn RJ, Buring JE, Gaziano JM, Berger K, Kurth T. Restless legs syndrome and risk of incident cardiovascular disease in women and men: prospective cohort study. BMJ Open. 2012;2:1-9.
4. Ghanei R, Hemati-Maslak-Pak M, Ghosi S, Hossein-Pour H, Amin-Pour E, Baghi V. Restless legs syndrome and the quality of sleep in type II diabetes. Feyz. 2011;15(3):240-6.
5. Mehanna R, Jankovic J. Movement disorders in cerebrovascular disease. Lancet Neurol. 2013;12:597-608.
6. Walters AS, Rye DB. Review of the Relationship of Restless Legs Syndrome and Periodic Limb Movements in Sleep to Hypertension, Heart Disease, and Stroke. SLEEP. 2009;32(5):589-97.
7. Zamani B, Fereshtehnejad M, Bakhti S, Jamali danesh Y, Ghorbani M. Prevalence of restless leg syndrome in neurology and orthopedia patients. J Neurology. 2008;6(19,20):11-20.

[Downloaded from jccnursing.com on 2026-11-04]

8. Habibzade H, Khalkhali1 H R, Reza Ghaneii R. Study of the relationship between restless legs syndrome and sleep disturbance among patients in Critical Care Units. Iranian Journal of Critical Care Nursing. 2011;4(3):153-8.
9. Kuchukhidze G, Toidze I, Khatiashvili I, Maisuradze L, Frauscher B, Högl K B. Prevalence of Restless Legs Syndrome in a Georgian Primary Healthcare Setting: A Pilot Study. Eur Neurol 2012;68:177-80.
10. Kim JM, Kwon HM, Lim CS, Kim YS, Lee SJ, Nam H. Restless Legs Syndrome in Patients on Hemodialysis: Symptom Severity and Risk Factors. J Clin Neurol. 2008;4(4):153-7.
11. Sadeghi H, Azizzadeh Foruzi M, Haghdoost AA, Mohammad Alizadeh S. Effect of implementing continuous care model on sleep quality of hemodialysis patients. IJCCN. 2010;3(1):5-6.
12. Saeedi M, Ashk Torab T, Saatchi K, Zayeri F, Amir Ali Akbari S. The Effect of Progressive Muscle Relaxation on Sleep Quality of Patients Undergoing Hemodialysis. IJCCN. 2012;5(1):23-8.
13. Sepahvand E. Development and initial validation of the sleep disturbance inventory of acute coronary syndrome patients in coronary care units. Msc Thesis of critical care nursing, Kermanshah University of Medical Science. 2012.
14. Johansson I, Karlson B W ,Grankvist G, Brink E. Disturbed sleep, fatigue, anxiety and depression in myocardial infarction patients. European J Cardiovascular Nursing. 2010;9:175-80.
15. Tembo A C, Parker V. Factors that impact on sleep in intensive care patients. Intensive & Critical Care Nursing. 2009; 25:314-22.
16. Hardin K A. Sleep in the ICU: potential mechanisms and clinical implications. Chest. 2009;136:284-94.
17. Neyse F, Daneshmandi M, Sadeghi sherme M, Ebadi A. The effect of earplugs on sleep quality in patients with acute coronary syndrome. Iranian J Critical Care Nursing. 2011;4(3):127-34.
18. Gay Peter C. Sleep and Sleep-disordered breathing in the hospitalized patient. Respiratory care. 2010;55(9):1240-54.
19. Yen CH, King B, Chang Y. Factor structure of the Athens Insomnia Scale and its associations with demographic characteristics and depression in adolescents. J. Sleep Res. 2010;19:12-8.
20. AL-Otair H, AL-Shamiri M,Bahobail M, Sharif M, Bahaman A. Assessment of sleep pattern energy expenditure and circadian rhythms of skin temprature in patients with acute coronary syndrome. Med Sci Monit. 2011;17(7):397-403.
21. Drouot X, Cabello B, Ortho M P, Brochard L. Sleep in the intensive care unit. Sleep medicine reviews 2008;12:391-403.
22. Hamazaki Y, Morikawa Y, Nakamura K, Sakurai M, Miura K,Ishizaki M, Kido T, Naruse Y, Suwazono Y, Nakagawa H. The effects of sleep duration on the incidence of cardiovascular events among middle-aged male workers in Japan. Scand J Work Environ Health. 2011;37(5):411-7.
23. Kronholm E, Laatikainen T, Peltonen M, Sippola R, Partonen T. Self-reported sleep duration, all-cause mortality, cardiovascular mortality and morbidity in Finland. Sleep Medicine. 2011;12:215–21.
24. Mitamura S, Nakamura M, Yamamato T, Uchiyama M. Obsevational assessment of patients sleep complaints in the coronary care unit. Japanese Society of Sleep Research. 2000;164-5.
25. Appels A, Kop WJ, Schouten E. The nature of the depressive symptomatology preceding myocardial infarction. Behav Med. 2000;26:86–9.
26. Schiza S E, Simantivakis E, Bouloukaki I, Mermigkis CH, Arfanakis D, Chrysostomakis S, et al. Sleep patterns in patients with acute coronary syndrome. Sleep Medicine. 2010;11:149-53.
27. Caska C, Hendrickson B, Wong M, Ali S, Neylan T, Whooley M. Anger expression and sleep quality in patients with coronary heart disease finding from the heart and soul study. Psychosomatic medicine. 2009;71:280-5.
28. Bhowmik D, Bhatia M, Gupta S, Agarwal SK, Tiwari SC, Dash SC. Restless legs syndrome in hemodialysis patients in India: a case controlled study. Sleep Med. 2003;4(2):143-6.
29. Allen RP, Bharmal M, Calloway M. Prevalence and disease burden of primary restless legs syndrome: results of a general population survey in the United States. Mov Disord. 2011;26:114–20.
30. Earley CJ, Allen RP, Hening W. Restless legs syndrome and periodic leg movements in sleep. Handb Clin Neurol. 2011;99:913–48.
31. Hornyak M, Feige B, Voderholzer U, Philipsen A, Riemann D. Polysomnography findings in patients with restless legs syndrome and in healthy controls: a comparative observational study. Sleep. 2007;30:861-5.
32. Merlino G, Piani A, Dolso P, Adorati M, Cancelli I, Valente M, Gigli GL. Sleep disorders in patients with end-stage renal disease undergoing dialysis therapy. Nephrol Dial Transplant. 2006;21(1):184-90.
33. Alidosti M, Hemate Z, Reisi M. Relationship between the quality of sleep and restless legs syndrome among the hemodialysis patients admitted to dialysis centers in Chaharmahal and Bakhtiari during 2011-2012. Feyz. 2013;17(1):85-90.
34. Bogan R K, Ellenbogen A, Becker PG M, Kushida C, Eric Ball E, Ondo W G, Caivano CH K, Kavanagh S. Gabapentin enacarbil in subjects with moderate to severe primary restless legs syndrome with and

[Downloaded from jccnursing.com on 2026-11-04]

without severe sleep disturbance: an integrated analysis of subjective and novel sleep endpoints from two studies. J Parkinsonism and Restless Legs Syndrome. 2013;3:31-40.
35. Ulfberg J, Nystrom B, Carter N, Edling C. Restless legs syndrome among working-aged women. Eur Neurol. 2001;46:17-9.
36. Ulfberg J, Nystrom B, Carter N, Edling C. Prevalence of restless legs syndrome among men aged 18 to 64 years: an association with somatic disease and neuropsychiatric symptoms. Mov Disord. 2001;16:1159-63.
37. Salami pour H, Azizi F, Moetamed N, Tayebi N, Delavar kasmaii H, Karimi M. Restless leg syndrome in hemodialysis patients and its relationship with serum ferritin. Southern Medical J. 2010;12(3):206-13.
38. Szentkiralyi A, Volzke H, Hoffmann W, Happe S, Berger K. A time sequence analysis of the relationship between cardiovascular risk factors, vascular diseases and restless legs syndrome in the general population. J Sleep Res. 2013; 22(4):434–42
39. Lopes LA, Lins Cde M, Adeodato VG, Quental DP, de Bruin PF, Montenegro RM Jr, et al. Restless Legs Syndrome and Quality of Sleep in Type 2 Diabetes. Diabetes Care. 2005;28(11):2633-6.

[Downloaded from jccnursing.com on 2026-11-04]