Research Article

Restless Legs Syndrome, Sleep, Fatigue and Mental Health in Patients with Cardiovascular Diseases

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Abstract

Restless legs syndrome (RLS) is a sleep disorder which is associated with sleep disruption and poor quality of life. It is often found to be a comorbid condition in individuals having cardiovascular diseases (CVD). The purpose of the current study was to find out the frequency of RLS among CVD patients and to examine its relationship with sleep, fatigue, and mental health in these patients.

Methods: It was a cross-sectional study. A convenience sample of 200 CVD patients with age range between 35-65 years (55.49 + 7.67) was taken from Jinnah hospital and Gulab Devi hospital, Lahore. The patients completed the fatigue severity scale (FSS), general health questionnaire12 (GHQ-12), sleep problems scale and restless legs syndrome scale.

Results: The results indicated that 14% of the CVD patients had RLS. Presence of RLS was associated with greater fatigue, poor sleep, and mental health. A multivariate general linear model using the Wilks' lambda test found RLS, BMI, and CVD duration as significant predictors ($p < .05$) of poor sleep quality, fatigue, and deteriorated mental health in patients. Being female, increasing age and obesity were associated with an increased likelihood of RLS.

Conclusion: RLS is prevalent in CVD patients and the findings confirm that it has negative effects on patients related to greater fatigue, poor sleep and deteriorated mental health. Screening the CVD patients for RLS could be beneficial for timely diagnosis and management of the disorder, thereby, reducing complications and improving the treatment outcomes.

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Introduction:

Cardiovascular diseases (CVD) are on the rise in both developed and developing countries and are considered to be one of the major challenges for the healthcare systems. According to World health organization (2020), CVD is responsible for about 75% deaths in middle and low income countries. The prevalence of restless legs syndrome (RLS) among patient population is observed to be higher than that in the general population[1,2]. More recently, research has indicated cardiovascular diseases like stroke, hypertension, coronary heart disease to be more prevalent in patients with RLS[3], however, the association between CVD and RLS is inconsistent and needs to be explored more. When RLS occurs in patients with chronic diseases, physical, psychological, and social functions deteriorate even more.

RLS, also called the Willis-Ekbom disease is a sleep-related movement disorder which causes uncomfortable creeping, crawling, and/or tingling sensations

in the legs accompanied by an irresistible urge to move the legs. The symptoms are usually worse in the evening and night when the individual is at rest and only improves with movement. Severe RLS symptoms are debilitating and disrupts the daily life functioning of the patients. Patients frequently report of exhaustion, daytime drowsiness, low energy, as well as problems with concentration, memory, and work performance. Untreated RLS could be an upsetting experience for the patients as the symptoms make it difficult for them to enjoy or focus on an activity for long especially in the evenings because of an irresistible urge to move and to avoid sitting still at some place for long. It disrupts the social and personal relationships of the individuals, affecting their mental wellbeing adversely[4,5].

Due to its tendency to worsen at night, RLS naturally leads to insufficient sleep and sleep disorders like insomnia. Sleep disturbance is often considered to be the primary reason for which individuals seek medical help and ultimately get diagnosed with RLS. About 55-85% of RLS patients complain of experiencing sleep onset and maintenance issues. Poor sleep quality also impairs daytime alertness and reduces the overall QoL[6]. RLS patients having severe symptoms could have as little as four to five hours of sleep which takes a toll on health and daytime functioning. Relief from symptoms only comes from movement of the legs but recur after a while or when movement stops. Sleep stays disturbed and makes the individuals feel fatigued, irritable and unable to accomplish daily life tasks the following day[7]. When this cycle continues, it has an overwhelming impact by affecting overall functioning. Sleep deprivation disturbs the job performance, personal relationships and activities of daily living. Not only this, empirical evidence has indicated that RLS impacts mental health detrimentally and greatly increases the risks of developing anxiety and depressive disorders[8]. Also, it has been observed through objective metrics that insufficient sleep impacts the autonomic dysregulation, coronary artery disease (CAD), metabolic syndrome, and overall cardiovascular mortality. Thereby, treatment of sleep disorder could also be helpful in reducing the risk of CVD or its complications[9,10].

As discussed earlier, sleep impairment is considered to be a main contributor to deteriorated quality of life in these patients, compromising physical and cognitive functioning during the day. But, what is now considered to be a more serious cause of concern in RLS patients other than sleep disturbances is the psychological distress as it could directly or indirectly lead to psychiatric disorders and compromised mental wellbeing[12]. The emerging data on RLS has suggested that the co-occurrence of both RLS and a psychological disorder is not just by chance and people with sleep disorders are actually at high risk of psychological problems[13]. According to a research study, RLS symptoms themselves were found to have direct detrimental effects on patients' mental health. A large scale population survey in the US and five European countries reported patients' characteristics who experienced moderate distress. 51% patients reported that their symptoms of RLS affect their mood negatively. 47% agreed that having the symptoms drained their energy and they feel fatigued. 40% reported a disruption of daily activities while 20-25% thought that RLS symptoms affected their social life, distracted them from their job, disturbed their personal relations, and were a source of desperation for them[11]. Though RLS is considered a disorder with no life threatening consequences, but its symptoms when persistent tend to have a debilitating impact on patients' lives[12]. Hence, simultaneous occurrence of psychological distress with RLS adds substantively to the adverse effects of RLS and this is why prompt recognition for stress, anxiety, or depression could help to improve the emotional well-being of patients. There are only a few Asian studies which have reported data on the association between mental health and RLS and hence, more indigenous data is needed.

RLS is an underdiagnosed disorder of sleep globally and specifically in Pakistan. There is only limited data available on its prevalence and correlates in the general as well as in patient population[14]. Most of the research studies on both CVD and RLS have been conducted in developed countries. There is paucity of data when it comes to Asian countries specifically Pakistan and hence the relationships among study variables have largely been inferred from foreign literature. The purpose of the current study was to find out the frequency of RLS in patients with cardiovascular diseases and to examine the relationship among RLS, sleep, fatigue, and mental health in these patients with reference to demographic and clinical parameters. The study hypothesized that there will likely be a significant association among RLS, sleep, fatigue and mental health in CVD patients. Another hypothesis was that RLS and clinical variables (duration of CVD and body mass index) will likely be

significant predictors of sleep, fatigue and mental health in CVD patients.

Methods:

A cross-sectional survey was conducted on 200 cardiologist diagnosed CVD patients (men = 100, women = 100) selected through non probability convenience sampling technique. The patients were included if they had stable CVD. Patients with comorbid neurological diseases like dementia, multiple sclerosis, Parkinson's disease and any diagnosed psychological disorder were excluded. The data was collected from outpatient department (OPD) of Jinnah hospital Lahore and Gulab Devi Cardiac Complex Lahore from April 2019-June 2019. The age range of the patients was 35-65 years (55.49 $\pm$ 7.67). Ethical approval and permission of the study was obtained from institutional review board, departmental board of studies and hospital authorities. The purpose of the study was briefed to the participants and informed consent was obtained before getting the questionnaires filled. Medical records were also accessed after taking permission from the relevant authority to obtain information on clinical parameters required for research purposes. The gathered data was analyzed through SPSS v. 25 and the hypotheses were tested.

The measures of the study included a demographic sheet, fatigue severity scale, general health questionnaire, RLS scale and general sleep problems scale. Fatigue was assessed through fatigue severity scale (FSS)[15] which comprises of 9 items. The individuals rate their level of fatigue on a scale of 1 – 7. The minimum score is 9 and the maximum is 63 which depicts greater fatigue severity. The Cronbach alpha of this scale is good (α = .88). General health questionnaire (GHQ-12)[16] is one of the most extensively used tools in patient care settings for assessing psychiatric well-being. It consists of 12 items with a response option of 0-3 and a scoring range of 0 to 36 with high scores indicating worse health. GHQ has excellent internal consistency reliability (α = .76). Restless legs syndrome scale[17] is a self-reported screening tool consisting of 4 items used to assess the severity of RLS symptoms according to DSM-5 criteria. The symptoms are rated on a 5-point likert type scale with 0 (never) to 4 (daily). Higher scores indicate the presence of the RLS symptoms. The Cronbach alpha of the scale is .84 which is very good. General sleep problems scale[17] consists of 6 items which address the common sleep issues related with the presence of a sleep disorder or due to any other physical or psychological condition. The responses are given on a scale of 0-4 with higher scores indicating disturbed sleep. The Cronbach alpha of the scale is excellent (α = .89)

Results:

The results indicated that RLS was present in 14% of the CVD patients. Another finding was presence of RLS symptoms in about 4% patients which needed further investigation as they didn't meet the full criteria of RLS as described by DSM-5. Out of the overall sample of 200 patients, the frequency of RLS was more in women (9%) as compared to men (5%). The mean age and BMI of the RLS group was higher than the no RLS group. The values and percentages are given in Table 1.

Table 1: *Demographic Data of CVD patients (N = 200)*

Variables	Without RLS Frequency (%)	With RLS Frequency (%)
Male (n=100)	90 (45)	10 (5)
Female (n=100)	82 (41)	18 (9)
Total	172 (86)	28 (14)
Age (Years)	56.31+3.45	60.45+2.71
30-39	8 (4)	01 (.5)
40-49	40 (20)	06 (3)
50-59	59 (30)	10 (5)
60 and above	65 (30)	11 (5.5)
Duration of CVD		
< 5 years	50 (25)	03 (1.5)
5-10 years	45 (22.5)	07 (3.5)
10-15 years	48 (24)	09 (4.5)
> 15 years	29 (14.5)	09 (4.5)
BMI	27.33+1.76	29.53+3.78
18.5-24.9 (Healthy)	64 (32)	05 (2.5)
Normal		11 (5.5)
25-	70 (35)	12 (6)
9.9(Overweight)	38 (19)	
30 kg/m2 or higher (Obese)		

Table 2: *Bivariate Correlation among the main study variables*

Variables	1	2	3	4	5	6	7	8	9
1. Gender	-	-.27***	.13	-.07	.13***	.18**	.37***	.22**	.15*
2. Age		-	.11	-.07	.24**	.14*	.03	.10	.04
3. Duration of CVD			-	-.06	.21**	.20**	.27***	.15*	.09
4. Comorbidity				-	-.07	-.09	-.13*	-.06	-.07
5. RLS					-	.51***	.60***	.59***	.59***
6. BMI						-	.55***	.57***	.31**
7. Sleep							-	.61***	.46***
8. Fatigue								-	.46***
9. GHQ									-
M	1.50	53.49	13.37	2.68	9.57	31.37	13.42	43.86	26.40
SD	.50	7.67	5.11	1.43	3.55	5.21	4.88	10.06	6.89

Note. *p<.05; **p<.01; ***p<.001

Bivariate correlation was conducted to examine the relationships among gender, age, BMI, number of comorbid conditions, sleep, RLS, fatigue and mental health. The results in table 2 indicate that RLS symptoms were associated with female gender, increasing age and weight, poor sleep, severe fatigue and deteriorated mental health. Sleep, fatigue, and mental well-being scores had significant positive association with gender indicating poor sleep, fatigue and low mental health scores for females.

Table 3: *Overall Model Significance and Tests of Between-Subjects Effects using General Linear Model*

Source	Dependent Variables	df	Mean Square	F	P	Partial Eta Squared
Corrected Model	Sleep	3	398.34	22.27	.000	.254
	Fatigue		1190.97	14.08	.000	.177
	Mental health		383.48	9.05	.000	.122
Intercept	Sleep	1	1171.82	65.50	.000	.250
	Fatigue		22753.14	269.06	.000	.579
	Mental health		8080.57	190.69	.000	.493
BMI	Sleep	1	141.25	7.90	.005	.039
	Fatigue		36.83	.435	.042	.021
	Mental health		148.44	3.50	.063	.018
Duration of CVD	Sleep	1	266.75	14.91	.000	.071
	Fatigue		186.25	2.20	.139	.011
	Mental health		16.36	.39	.535	.002
RLS	Sleep	1	294.80	16.48	.000	.078
	Fatigue		2211.56	26.15	.000	.118
	Mental health		578.90	13.66	.000	.065

a. Sleep: R2 = .254 (Adjusted R Squared = .243)
c. Fatigue: R Squared = .177 (Adjusted R Squared = .165)
d. Mental health: R Squared = .122 (Adjusted R Squared = .108)

Table 4: *Effect of Predictors on Sleep, Fatigue and Mental Health Using Wilks' Lambda Multivariate Analysis of Variance Tests*

Dependent Variables	Parameters	B	Std. Error	T	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Sleep	Intercept	11.89	1.56	7.62	.000	8.81	14.97
	BMI	.41	.15	2.81	.005	.12	.69
	Duration of CVD	2.44	.63	3.86	.000	1.19	3.68
	RLS	-3.83	.94	-4.06	.000	-5.69	-1.96
Fatigue	Intercept	49.22	3.39	14.51	.000	42.53	55.91
	BMI	.44	.19	1.66	.042	.21	.83
	Duration of CVD	2.04	1.37	1.48	.139	-.67	4.74
	RLS	-10.48	2.05	-5.11	.000	-14.52	-6.44
GHQ	Intercept	28.89	2.40	12.03	.000	24.15	33.62
	BMI	.42	.22	1.87	.063	-.022	.86
	Duration of CVD	.60	.97	.62	.535	-1.31	2.52
	RLS	-5.36	1.45	-3.69	.000	-8.22	-2.50

Discussion:

The study showed that RLS is common in CVD patients and is related with poor sleep quality, fatigue, and mental health. In the current study, 14% of the CVD patients had RLS. Previous studies con-ducted on the general population have reported RLS prevalence to range between 5.1% and 15%[18]. Studies conducted in Pakistan have shown a point pre-valence of 23.6% in general population[19] and 8% in respiratory disease patients[14].

Fatigue, sleep problems and mental distress were more common in CVD patients with comorbid RLS as compared to the ones without RLS. This finding is consistent with previous studies which have shown sleep deprivation, feelings of distress and disruption of normal life activities as consequences of RLS affecting general health and mental wellbeing adversely[20]. Sleep is greatly affected reducing nocturnal sleep hours to no more than 4 to 5 hours. RLS has been associated previously with sleep problems and disorders specifically insomnia. RLS patients often complain of difficulty initiating sleep, maintaining sleep, daytime sleepiness and overall quality of sleep. Similarly, studies have also found sleep problems to be a consequence of the sensory symptoms of RLS[7]. In the light of these findings, it is imperative to treat the sustained sleep disturbances in these patients because of their particular relevance in the development of emotional distress.

The current study also confirmed that the patients having RLS were more disturbed psychologically than the ones not having it. This finding is in agreement with previous findings[2]. Previous studies have also shown a high prevalence of mood disorders, anxiety and depression in patients with RLS. A two to fourfold risk of depression has been found in RLS patients and a dopaminergic dysfunction has been implicated in some of the cases[21]. RLS patients often report difficulties with functioning in sedentary situations, specifically in physically restraining spaces, and also in the evenings, when symptoms are usually aggravated causing complications with their social life, jobs, and leisure activities. Considering the fact that many CVD patients often report elevated fatigue levels, and the fact that RLS increases fatigue symptoms even more, successful management of RLS could help to decrease fatigue symptoms and overall wellbeing.

Identification of RLS in patients having cardiovascular diseases is important clinically as the presence of RLS has been associated with CVD complications and all-cause mortality[22]. The current study found RLS to be more prevalent in women as compared to men and more likely to get severe with increasing

age. This finding has been indicated in earlier studies according to which prevalence of RLS is found to be two times more in women than men and become more frequent with age[19].

The current study also indicated a moderate relationship between RLS presence and obesity. Patients having their body weight in the overweight (5.5%) and obese (6%) categories had an increased prevalence of RLS. Earlier studies have also reported RLS to occur more frequently in obese individuals than in those with normal weight[23]. A study conducted on adult men and women found a 5 kg/m^2 each increase of BMI to be related with 31% higher chances of having RLS[24]. Increasing BMI was also found to be a significant predictor of sleep problems and fatigue. Previous studies have suggested a bidirectional mechanism between sleep problems and weight status. Having poor sleep can lead to weight gain due to changes in endocrine and metabolic functions, while excess weight can also contribute to sleep problems due to disordered breathing[25].

This study had a few limitations. First of all, it had a small sample size and future studies are recommended to make use of large sample for the purpose of generalizability of results. Self-report measures were used in the current study for assessing the study variables, however, future studies could plan formal clinical evaluations for more precision of data.

Conclusion:

In conclusion, it could be said that RLS is a prevalent condition in CVD patients, and the results of this study seem to confirm that RLS has adverse effects on sleep quality, fatigue, and mental health. The awareness of the associations indicated in this study among these variables might help health care providers in treating patients with CVD, sleep disorders or psychological problems to recognize potential contributing factors from the other areas and to address those causes accordingly. Future studies could focus on exploring the relationship between CVD and RLS incidence independently of confounding factors like gender, age, BMI, and lifestyle factors. This study is important as it would help create awareness about RLS among CVD patients and health care providers. Also, it could help in lessening the burden of RLS and implement strategies to enhance the overall well-being of the patients.

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