Journal of Applied Pharmaceutical Science Vol. 10(10), pp 050-053, October, 2020
Available online at http://www.japsonline.com
DOI: 10.7324/JAPS.2020.10105
ISSN 2231-3354

Association of sleep quality, pain severity, and depression in patients undergoing maintenance hemodialysis

Daniel Anila Roy[1], Uday Venkat Mateti[1*], Pradeep Shenoy[2], B. C. Srinidhi[1]

[1]Department of Pharmacy Practice, Nitte Gulabi Shetty Memorial Institute of Pharmaceutical Sciences, Nitte Deemed to be University, Deralakatte, India.
[2]Department of Nephrology, KS Hegde Medical Academy, Nitte Deemed to be University, Justice K.S. Hegde Charitable Hospital, Deralakatte, India.

ARTICLE INFO

Received on: 02/01/2020
Accepted on: 21/08/2020
Available online: 05/10/2020

Key words:
Pain, depression, sleep, hemodialysis.

ABSTRACT

Previously conducted studies state that hemodialysis (HD) patients are vulnerable to pain, depression, and insomnia. However, none of the studies have conducted the association between sleep problems, pain severity, and depression among HD patients. A cross-sectional study was conducted in the HD center of a charitable hospital for a period of 6 months to assess the prevalence of sleep problems, pain severity, and depression among patients undergoing maintenance HD and to study the association between sleep quality, pain severity, and depression in patients undergoing maintenance HD. Sleep problems, pain severity, and depression were assessed using Pittsburgh Sleep Quality Index, Beck Depression Inventory, and Visual Analog Scale questionnaires, respectively. The results showed that among the 60 patients enrolled, a majority of the subjects were male (80%) and most of them belonged to the age group of 45–64 years (63.33%). The most common comorbidity was hypertension, followed by diabetes mellitus and ischemic heart disease. Among the enrolled subjects, majority had mild pain (78.33%), poor sleep quality (78.33%), and moderate depression (43.33%). The study concludes that pain severity and depression (p-0.037), and depression and sleep quality (p-0.000) are significantly correlated among HD patients. There is a significant association between the duration of HD, sleep quality (0.000), and depression (0.002).

INTRODUCTION

Hemodialysis (HD) patients are highly vulnerable to emotional anxieties due to chronic stress associated with disease burden, dietary restrictions, functional constraints, concomitant diseases, adverse drug reactions, vicissitudes, and fear of death. Pain, depression, and insomnia are remarkably relevant patient outcomes in evaluating quality of life (QoL) (Davison and Jhangri, 2005; Trbojević-Stanković *et al*., 2014). Sleep and psychological issues are common in HD patients (Perl *et al*., 2006). It has been reported that 80% of HD patients suffer from sleep disorders and the incidence is much significant than that among general population (15%) (Finkelstein and Finkelstein, 2000; Parker *et al*., 2003; Sabry *et al*., 2010).

*Corresponding Author
Uday Venkat Mateti, Department of Pharmacy Practice, Nitte Gulabi Shetty Memorial Institute of Pharmaceutical Sciences, Nitte (Deemed to be University), Deralakatte, India. E-mail: udayvenkatmateti @ gmail.com

The causal relationship between the HD and insomnia remains hypothetical, while psychological causes, such as depression and physical disturbances, like pain, muscle cramps, and electrolytes or body fluids imbalance, also significantly affect the quality of sleep. Inspite of their profound occurrence, these conditions usually go unnoticed because every patient does not clearly express these noticeable symptoms (Rai *et al*., 2011).

Physical and psychological factors may play a prominent role in the HD patients, while intrinsic sleep disturbance also plays a more significant role. Some studies suggest that depressive disorder and poor sleep quality are independent predictors of QoL, morbidity, and mortality (Perl *et al*., 2006; Rai *et al*., 2011). There is also increasing recognition that pain is one of the most frequent issues experienced by end-stage renal disease (ESRD) patients associated with depression and diminished QoL, but even then pain is not the only predictor of poor QoL. Pain and sleep disorders independently and synergistically have a deep harmful impact on ESRD patients.

Previously conducted studies state that HD patients are vulnerable to pain, depression, and insomnia. However,

© 2020 Daniel Anila Roy *et al*. This is an open access article distributed under the terms of the Creative Commons Attribution 4.0 International License (https://creativecommons.org/licenses/by/4.0/).

none of the studies have conducted the association between these parameters. The complex effects of poor quality of sleep, pain severity, and depression will adversely effect patients' QoL (Davison and Jhangri, 2005; Trbojević-Stanković *et al*., 2014). Therefore, there is an increased need to evaluate the association of sleep quality, pain severity, and depression among HD patients. The objective of this study is to assess the prevalence of sleep problems, pain severity, and depression among patients undergoing maintenance HD and also to study the association between sleep quality, pain severity, and depression with demographic characteristics in patients undergoing maintenance HD.

MATERIALS AND METHODS

Study design and site

A cross-sectional study was carried out for a period of 6 months (February 2019–July 2019) in HD center of Justice K. S. Hegde Charitable Hospital, Dakshina Kannada, Mangaluru.

Sample size and study criteria

The present study is a 6–month, time–bound, hospital-based study. The sample size was estimated by taking into consideration the previous records of patients visiting the outpatient HD unit of the hospital in the preceding years. The following formula was used to calculate the sample size: $n = Z_{1-\alpha}^2 P.Q/d^2$; $n = [(1.96)^2 \times 0.2 \times 0.8]/(0.1)^2 = 61$. The required sample for the study is 61. During the study period, only 66 patients visited the outpatient HD unit. The patients were chosen using random sampling method. Out of 66 patients, 60 patients gave their consent for participation in the study.

Patients who are undergoing maintenance HD aged 18 and above of either sex were included in the study. Pregnant women, critically ill patients, and patients who were not willing to give their consent were excluded from the study.

Ethics approval

Approval was obtained from the Institution Ethics Committee (IEC) Ref No: NGSMIPS/IEC/22/2018-19 and Clinical Trials Registry - India (CTRI) registration (CTRI Ref. No: CTRI/2019/02/017378) was done prior to the study.

Study procedure

The aim of the study was explained to all the participants, and the subjects who were voluntarily interested to partake in the study were made to sign the informed consent before participation, and they also were assured about the confidentiality. Patients who met the inclusion criteria, the demographic details such as age, gender, marital status, employment status, comorbidities, frequency, and vintage of HD were collected from the medical records and the patients themselves. Sleep quality, pain severity, and depression in patients undergoing maintenance HD was assessed using the scales mentioned below.

Severity of pain was assessed using a single-item Visual Analog Scale (VAS) and the scores ranged from 0 to 10 (Haefeli and Elfering, 2006; Huskisson, 1974; Jensen *et al*., 1986; McCormack *et al*., 1988; Upadhyay *et al*., 2014). Original Beck Depression Inventory (BDI) questionnaire was used to assess the depression among the subjects, which is 21-item self-reporting questionnaire. The BDI scores ranged from 1 to above 40 (Jackson-Koku, 2016). The sleep quality of patients was assessed using the 10-item Pittsburgh Sleep Quality Index (PSQI). The PSQI scores ranged from 0 to 36 (Mehrabi *et al*., 2017).

The validated VAS and PSQI questionnaires, of Kannada and Malayalam local languages, were provided by the original developers. The BDI was translated into Kannada and Malayalam local languages by using a 3-step process and it was validated by an expert panel. Cronbach's alpha value was more than 0.7.

Statistical analysis

Frequency and percentage were used to present categorical data. The association between the categorical variables was assessed by using Chi-square/Fisher's exact test, with $p < 0.05$ being considered as statistically significant. Spearman's correlation was applied to find the association between pain severity, sleep quality, and depression among HD patients. Kruskal–Wallis' test was applied to find the association between disease scales (pain severity, sleep quality, and depression) among HD patients. Statistical Package for the Social Sciences Statistical software (version 20) was used to analyze the data.

RESULTS AND DISCUSSION

Sociodemographic characteristics

A total of 60 subjects were interviewed over a period of 6 months. Among the 60 patients interviewed, majority were male (80%) and the rest (20%) were females, which is similar to the study findings of Aggarwal *et al*. (2017), where male subjects were predominant than female subjects. The age of the HD patients ranged from 18 to 83 years, the mean age of the subjects was 53.51 ± 12.06 years, and majority of patients were in the age group of 45–64 years, which is similar to the study findings of Rai *et al*. (2011) which reported the mean age to be 53.82 ± 8.06 in their study, with majority of the population belonging to the age group of 40–55 years and majority of them are married. With regard to the presence of comorbidities, the most common comorbidity was hypertension, followed by diabetes mellitus. With regard to the sociodemographic parameters observed in the current study, such as male predominance, majority of patients were in the age group of 45–64 years, most of them were married (91.66%), more than half of the subjects were unemployed (60%), and the most common comorbidity was hypertension, followed by diabetes mellitus and ischemic heart disease. These findings were observed to be similar to the demographic parameters in the study conducted by Uzzal *et al*. (2015) for ESRD patients. In this study, majority of the subjects were undergoing HD twice a week and the vintage HD ranged from 1 to 18 months and 57% of the subjects were unemployed due to the burden of the disease. Detailed demographics of the patients are summarized in Table 1.

Pain, depression, and sleep quality among HD patients

In this study, most of the patients had mild pain (78.33%), followed by 11.66% patients who had moderate pain which is in accordance with the study conducted by Rosa Marques *et al*. (2016)

where mild pain was seen to be more common. It was found that most of the subjects had moderate depression (43.33%), followed by mild mood disturbance (11.66%) and severe depression (11.66%), which was in contrast to the study conducted by Cengic and Resic (2010) where most of the subjects were observed to have mild depression (30%) more commonly followed by moderate depression (8.5%). In this study, it can be seen that majority of patients had low quality sleep (78.33%), which is in line with the study conducted by Masoumi *et al*. (2013) where majority of the HD patients (86.6%) had poor quality sleep in terms of total PSQI scores. The occurrence of pain, depression, and sleep quality among HD patients are summarized in Table 2.

Association between pain severity, sleep quality, and depression among HD patients

In this study, there is a significant association between pain and depression (p = 0.036) which indicates that there is significant impact of pain severity on developing depression in HD patients and these findings are in accordance with the findings of Davison and Jhangri (2005), which observed that pain was associated with depression.

It was also seen that there is a significant association between depression and sleep, which illustrates that the quality of sleep among HD patients is affected due to the depression that they are going through, which is strongly in line with the findings of the study conducted by Trbojevic-Stankovic *et al*. (2014), which observed depressed patients to have worst quality of sleep and also the poor sleepers had a significantly high BDI, i.e., there is a correlation between BDI and PSQI. At the same time, there was no association found between the severity of pain and sleep quality of HD patients, which was in agreement with the study conducted by Davison (2003), where it was found that pain is independently associated with insomnia. The association between pain severity, sleep quality, and depression among HD patients are summarized in Table 3. The association between pain severity, sleep quality, and depression, with demographic details among HD patients, are summarized in Table 4 and 5.

Table 1. Demographic details of the patients.

Demographics	No. of patients (%)(n = 60)
Age groups (Years)	
18–44	14 (23.33%)
45–64	38 (63.33%)
≥65	8 (13.33%)
Gender	
Male	48 (80%)
Female	12 (20%)
Marital status	
Married	55 (91.66%)
Unmarried	5 (8.33%)
Co-morbidities	
Hypertension	60 (100%)
Diabetes mellitus	28 (46.66%)
Ischemic heart disease	20 (33.33%)
Chronic liver disease	8 (13.33%)
Frequency of hemodialysis	
Single	8 (13.33%)
Double	27 (45%)
Triple	25 (41.6%)
Vintage of hemodialysis	
1–6 months	40 (66.66%)
7–12 months	12 (20%)
13–18 months	8 (13.33%)
Employment status	
Employed	24 (40%)
Unemployed	36 (60%)

Table 2. Pain, depression, and sleep quality among hemodialysis patients.

Type of domain	No. of patients (%)(n = 60)
Pain severity	
No pain (0–0.4 cm)	3.33%
Mild pain (0.5–4.4 cm)	78.33%
Moderate pain (4.5–7.4 cm)	11.66%
Severe pain (7.5–10 cm)	6.66%
Depression	
Normal (1–10)	18.33%
Mild mood disturbance (11–16)	11.66%
Borderline depression (17–20)	8.33%
Moderate depression (21–30)	43.33%
Severe depression (31–40)	11.66%
Extreme depression (>40)	6.66%
Sleep quality	
Low quality sleep	78.33%
High quality sleep	21.66%
Variables	Median score (Q3-Q1)
Pain	14 (31.5–2.50)
Depression	22 (27–14.50)
Sleep	6 (10–5)

Table 3. Association between pain severity, sleep quality, and depression among hemodialysis patients.

Variables	Correlation coefficient (r value)	p value
Pain *vs.* depression	0.272	0.036*
Pain *vs.* sleep	0.224	0.085
Depression *vs.* sleep	0.445	0.000***

*p < 0.05; ***p < 0.000.

Table 4. Association between age and duration of HD with pain severity, sleep quality, and depression.

	Correlation coefficient (r value)	p-value
Age *vs.* pain	0.170	0.194
Duration of HD *vs.* pain	0.110	0.405
Age *vs.* depression	0.126	0.336
Duration of HD *vs.* depression	0.487	0.000***
Age *vs.* sleep quality	−0.008	0.954
Duration of HD *vs.* sleep quality	0.394	0.002**

**p < 0.001; ***p < 0.000.

Table 5. Association between pain severity, sleep quality, and depression with patients' demographics.

Variables		Pain [Median (Q3-Q1)]	*p*-value	Depression [Median (Q3-Q1)]	*p*-value	Sleep quality [Median (Q3-Q1)]	*p*-value
Sex	Male	9.5 (29–2.50)	0.251	22 (26.50–14.50)	0.760	6 (10−5)	0.314
	Female	27 (44–8)		21.50		5.5 (7−3.5)	
Employment	Employed	7.50 (27.50–2)	0.294	19.50 (26.50–10)	0.103	5.50 (9−5)	0.377
	Unemployed	15 (40.50–3.50)		22 (28.5–19.50)		6 (10.50−5)	
Frequency of HD	1	18 (48.50–12.50)	0.376	22.50 (24.50–19)	0.206	6.50 (10−5.50)	0.430
	2	6 (31–1)		21 (27–13)		6 (8−4)	
	3	12 (41–4)		22 (33–19)		6 (11−5)	

HD = Hemodialysis; (Q3−Q1) = Interquartile range.

This study has some limitations as it is conducted in just one hospital, which diminishes the generalizability of findings, and also there was difficulty in drawing accurate comparison with other studies due to considerable variations in settings, duration, size, and method. Also, the association of other psychosocial and risk factors is not taken into consideration.

CONCLUSION

The study concludes that HD patients are highly prone to pain and depression which ultimately contribute to insomnia. Among the enrolled subjects, majority had mild pain (78.33%), poor sleep quality (78.33%), and moderate depression (43.33%). The study concludes that the pain severity and depression (p-0.037), and depression and sleep quality (p-0.000) have a significant correlation among HD patients. There is a significant association between the duration of HD, sleep quality (0.000), and depression (0.002).

CONFLICT OF INTEREST

Authors declared that there are no conflicts of interest.

FUNDING

None.

REFERENCES

Aggarwal HK, Jain D, Dabas G, Yadav RK. Prevalence of depression, anxiety and insomnia in chronic kidney disease patients and their co-relation with the demographic variables. Pril (MakedonAkadNaukUmet Odd Med Nauki), 2017; 38:35–44.

Čengič B, Resic H. Depression in hemodialysis patients. Bosn J Basic Med Sci, 2010; 10:S73.

Davison SN. Pain in hemodialysis: prevalence, cause, severity and management. Am J Kidney Dis, 2003; 42:1239–47.

Davison SN, Jhangri GS. The impact of chronic pain on depression, sleep, and the desire to withdraw from dialysis in hemodialysis patients. J Pain Symptom Manage, 2005, 30:465–73.

Finkelstein FO, Finkelstein SH. Depression in chronic dialysis patients: assessment and treatment. Nephrol Dial Transplant, 2000; 15:1911–3.

Haefeli M, Elfering A. Pain assessment. Eur Spine J, 2006; 15:S17–24.

Huskisson EC. Measurement of pain. Lancet, 1974; 2:1127–31.

Jackson-Koku G. Beck depression inventory. Occup Med (Lond), 2016; 66:174–5.

Jensen MP, Karoly P, Braver S. The measurement of clinical pain intensity: a comparison of six methods. Pain, 1986; 27:117–26.

Masoumi M, Naini AE, Aghaghazvini R, Amra B, Gholamrezaei A. Sleep quality in patients on maintenance hemodialysis and peritoneal dialysis. Int J Prev Med, 2013; 4:165–72.

McCormack HM, Horne DJ, Heather S. Clinical applications of visual analogue scales: a critical review. Psychol Med, 1988; 18: 1007–19.

Mehrabi S, Sarikhani S, Roozbeh J. Sleep quality in patients undergoing long-term hemodialysis using the Pittsburgh sleep quality index. Nephrourol Mon, 2017; 9:e13137.

Parker KP. Sleep disturbances in dialysis patients. Sleep Med Rev, 2003; 7:131–43.

Perl J, Unruh ML, Chan CT. Sleep disorders in end-stage renal disease: 'Markers of inadequate dialysis? Kidney Int, 2006; 70: 1687–93.

Rai M, Rustagi T, Rustagi S, Kohli R. Depression, insomnia and sleep apnea in patients on maintenance hemodialysis. Indian J Nephrol, 2011; 21:223–9.

Rosa Marques V, Benetti PE, Benetti ER, Rosanelli CL, de Fátima Colet C, Stumm EM. Pain intensity assessment in chronic renal patients on hemodialysis. Rev Dor São Paulo, 2016; 17:96–100.

Sabry AA, Abo-Zenah H, Wafa E, Mahmoud K, El-Dahshan K, Hassan A, Abbas TM, Saleh AEM, Okasha K. Sleep disorders in hemodialysis patients. Saudi J Kidney Dis Transpl, 2010; 21:300–5.

Trbojević-Stanković J, Stojimirović B, Bukumirić Z, Hadzibulić E, Andrić B, Djordjević V, Marjanović Z, Birdjozlić F, Nesić D, Jovanović D. Depression and quality of sleep in maintenance hemodialysis patients. Srp Arh Celok Lek, 2014; 142:437–43.

Upadhyay C, Cameron K, Murphy L, Battistella M. Measuring pain in patients undergoing hemodialysis: a review of pain assessment tools. Clin Kidney J, 2014; 7:367–72.

Uzzal OK, Islam MN, Ahmed PI, Al Mamun MA, Hossain B, Bhuiyan FK, Khan MF, Depression and insomnia in patients on maintenance hemodialysis. J Dhaka Med Coll, 2015; 24:3–11.

How to cite this article:
Roy DA, Mateti UV, Shenoy P, Srinidhi BC. Association of sleep quality, pain severity, and depression in patients undergoing maintenance hemodialysis. J Appl Pharm Sci, 2020; 10(10):050–053.