Original Article

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Altered Sleep Pattern in Patients of Acute Myocardial Infarction at Cardiology Ward of Liaquat University of Medical & Health Sciences

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Author`s Contribution

[1,2]Substantial contributions to the conception or design of the work; or the acquisition, [4,6]Active participation in active methodology, [2,3]analysis, or interpretation of data for the work, [5]Drafting the work or revising it critically for important intellectual content

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ABSTRACT

Objective: To determine the frequency of altered sleep patterns among patients with acute myocardial infarction admitted to the cardiology ward of Liaquat University of Medical & Health Sciences.

Methodology: This prospective observational study was conducted in the Department of Cardiology, Liaquat University Hospital (LUMHS), from September 2023 to March 2024. Patients of both genders, aged 20–65 years, presenting with acute myocardial infarction were included. Sleep patterns were assessed using both open- and close-ended questions, and any deviation from the normal sleep pattern was considered abnormal. Associations between altered sleep patterns and baseline as well as clinical parameters were evaluated, with a p-value < 0.05 considered statistically significant.

Results: The overall mean age of the patients was 54.04 ± 8.82 years. Male patients constituted a higher proportion compared with females (62.82% vs. 37.28%). The overall frequency of altered sleep patterns among patients admitted with acute myocardial infarction was 40.69%. A higher prevalence of altered sleep patterns was observed among males, married individuals, urban residents, housewives, patients belonging to the middle socioeconomic class, those with normal body mass index, non-smokers, patients presenting with typical chest pain, and those diagnosed with non–ST-elevation myocardial infarction (NSTEMI); however, these associations were not statistically significant ($p > 0.05$). Depression was the only variable that showed a statistically significant association with altered sleep patterns among patients with acute myocardial infarction ($p = 0.04$).

Conclusion: The prevalence of altered sleep patterns was notably high among patients admitted with acute myocardial infarction. However, depression was the only factor significantly associated with sleep deviation in this population.

Keywords: Altered sleep pattern, Acute myocardial infarction, Depression.

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Introduction

Sleep is a physiological process that plays a significant role in cardiovascular health. Altered sleep patterns—including poor sleep quality, short and/or long sleep duration, sleep-associated breathing disorders, and circadian rhythm disruption—are recognized risk factors for cardiovascular diseases and acute cardiac events such as acute myocardial infarction (AMI).[1] Myocardial infarction (MI) contributes substantially to global mortality and socioeconomic burden, with annual deaths exceeding 2.4 million in the Americas and more than 4 million in European and Northern Asian regions. The burden is particularly devastating in low- and middle-

income countries, which account for over 80% of cardiovascular disease–related deaths worldwide.[2]

Abnormal sleep patterns are highly prevalent among patients who develop acute myocardial infarction or experience recurrent AMI. These individuals often exhibit significant disruptions in circadian rest–activity rhythms, including fragmented sleep, reduced sleep efficiency, and increased nocturnal awakenings compared with healthy individuals. Such abnormalities are associated with poor prognostic indicators, highlighting the influence of sleep dysfunction on post-MI recovery and outcomes.[3]

According to recent research, poor sleep patterns in the context of cardiovascular events are linked to recurrent cardiac events, post-AMI poor prognosis, and stroke, with disturbed sleep patterns shown as statistically significant independent factor of all-cause mortality even a year after the event of AMI.[4,5] Similarly, in a pilot trail, perceived poor sleep and transient sleep, 1 month prior to acute MI onset, were associated with acute MI among a majority of hospitalized patients, who reported that sleep quality was poor and sleep duration was significantly shorter (below 6 hours).[6] Sleep-disordered breathing (SDB) is markedly prevalent in general population, with Obstructive sleep apnoea reaching up to 50% among males and 23% among females patients.[7] More recently, acute myocardial infarction patients have been shown to struggle with even higher prevalence of Sleep-Disordered Breathing (SDB), reaching up to 75%, where 72% were documented with central sleep apnea and 13 % had obstructive sleep apnea.[8]

Additionally, sleep-associated breathing disorders continue to be frequently undiagnosed even when patients are hospitalized for an AMI, however coexisting SDB has been indicated to influence outcomes following onset of acute coronary syndrome (ACS) and promotes proatherothrombotic and inflammatory pathways, leading to atherothrombosis, which contributes to poorer cardiovascular outcomes in SDB patients. [9]

Despite ample of evidence, published studies show inconsistent finding regarding frequency of altered sleep patterns in AMI patients.[10] Frequency assessment of altered sleep patterns in acute myocardial infarction patients in our part of the world is essential to inform targeted screening, management strategies, and interventions to improve cardiovascular outcomes.

Methodology

This prospective observational study was conducted in the Department of Cardiology, Liaquat University Hospital, Hyderabad, from September 2023 to March 2024, after obtaining ethical approval (Ref. No. DOC# LUMHS/REG/ACD/28900/904). A convenience sampling technique was used, and a total of 145 patients were enrolled. The sample size was calculated based on the prevalence of acute myocardial infarction (AMI) among patients with disturbed sleep patterns (N = 314), using a 95% confidence interval and a 5% margin of error.

Patients of both genders, aged 20–65 years, presenting with acute myocardial infarction—either ST-elevation myocardial infarction (STEMI) or non-ST-elevation myocardial infarction (NSTEMI)—who provided informed consent were included in the study. Patients with congestive heart failure, valvular heart disease, a prior history of myocardial infarction, coronary artery bypass grafting (CABG) or coronary angioplasty, congenital heart disease, severe comorbid conditions with poor prognosis (such as end-stage liver, renal, or pulmonary disease), underlying malignancy, pregnancy, or those using sleeping pills were excluded. All eligible patients admitted with acute myocardial infarction and fulfilling the inclusion criteria were enrolled after obtaining written informed consent. Ethical approval was obtained from the institutional review committee prior to the commencement of the study.

Data were collected on baseline characteristics (age, gender, and smoking status) and clinical variables, including comorbid conditions such as hypertension, diabetes mellitus, dyslipidemia, and depression, type of acute myocardial infarction, presenting symptoms, and sleep patterns. The diagnosis of acute myocardial infarction was established according to the Fourth Universal Definition of Myocardial Infarction proposed by the American College of Cardiology, which requires the presence of at least two of the following criteria: (a) typical retrosternal chest pain lasting ≥20 minutes; (b) electrocardiographic changes, including persistent ST-segment elevation >0.2 mV in two contiguous precordial leads or >0.1 mV in limb leads, development of pathological Q waves, or new ST-segment depression and/or T-wave inversion in contiguous leads; and (c) a rise and/or fall in cardiac biomarkers, preferably cardiac troponin, with at least one value above the 99th percentile upper reference limit.

Sleep patterns were assessed using both open- and close-ended questions. Any deviation from normal sleep patterns was considered abnormal, and its association with disease onset was analyzed. Data were entered and analyzed using SPSS version 22. Continuous variables were expressed as

mean ± standard deviation, while categorical variables were presented as frequencies and percentages. Associations between sleep patterns, types of acute myocardial infarction, and other effect modifiers were assessed using the Chi-square test, with a p-value <0.05 considered statistically significant.

Results

A total of 145 patients were included in the final analysis after meeting the inclusion and exclusion criteria. The overall mean age was 54.04 ± 8.82 years, and males constituted a higher proportion of participants compared with females (62.82%, n = 91 vs. 37.28%, n = 54). Most participants were married (99.30%, n = 144), resided in urban areas (57.20%, n = 83), and belonged to a lower socioeconomic stratum (52.40%, n = 76). Nearly three-quarters of the patients had a normal body mass index (BMI) (72.38%, n = 105), with a mean BMI of 23.62 ± 2.50 kg/m².

The most common occupations were laborers (31.03%, n = 45) and housewives (31.03%, n = 45). Thirty patients (20.59%) were current smokers. A greater proportion of patients presented with non-ST-segment elevation myocardial infarction (NSTEMI) (66.21%, n = 96), and typical chest pain was the most frequent presenting symptom (73.79%, n = 107). The most common comorbid conditions were hypertension (58.62%, n = 85) and diabetes mellitus (40.68%, n = 59), as shown in Table 1.

As per main objective of the study, the large proportion of patient admitted with acute MI had deviated sleep pattern (40.69%, n = 59) while 59.31% (n = 86) had almost normal sleep pattern. (Figure 1)

Furthermore, patients were also evaluated for associated factor causing sleep deviation among patients admitted with AMI. Males, married patients, residents of urban area, housewives, middle social class, patients with normal BMI, non-smokers, patients with typical chest pain, and patients with NSTEMI had higher prevalence of sleep deviation but did not have significant association, p value >0.05. (Table II)

There was no significant association found of sleep pattern with diabetes, hypertension, dyslipidemia, or anxiety (p = >0.05), while depression showed a statistically significant association with deviated sleep pattern (p = 0.03) as shown in table III.

Table I: Demographic and Clinical statistics of participants admitted with AMI. (n=145)

Demographic Variables		N	%
Gender	Male	91	62.76%
	Female	54	37.24%
Marital status	Married	144	99.31%
	Unmarried	1	0.69%
Area of Residence	Rural	62	42.76%
	Urban	83	57.24%
Socioeconomic Status	Upper	7	4.83%
	Middle	62	42.76%
	Lower	76	52.41%
BMI	Underweight	20	13.79%
	Normal	105	72.41%
	Overweight	19	13.10%
	Obese	1	0.69%
Occupation	Laborer	45	31.03%
	Business	10	6.90%
	Office work	20	13.79%
	Retired	20	13.79%
	House wife	45	31.03%
	Jobless	5	3.45%
Smoking Status	Yes	30	20.69%
	No	115	79.31%
Type of AMI	STEMI	49	33.79%
	NSTEMI	96	66.21%
Presenting Symptoms	Typical chest pain	107	73.79%
	SOB	26	17.93%
	Sweating	1	0.69%
	Nausea & vomiting	2	1.38%
	Palpitation	2	1.38%
	Syncope	4	2.76%
	Epigastric pain	3	2.07%
Comorbidity	Hypertension	85	58.62%
	Diabetes mellitus	59	40.68%
	Dyslipidemia	37	25.51%

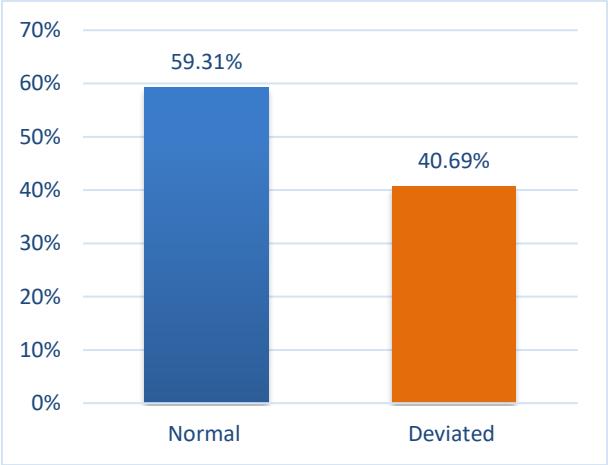

Figure 1. Sleep pattern among patients with acute MI.(n=145)

Table II: Stratification of demographic variables according to pattern of sleep in patients with AMI. (n=145)

Demographic Variables	Pattern of Sleep		p-value
	Normal	Deviated	
Gender			
Male	37.24%	25.52%	0.567
Female	22.07%	15.17%	
Marital status			
Married	59.31%	40.00%	0.223
Unmarried	0.0%	0.69%	
Area of Residence			
Rural	26.90%	15.86%	0.441
Urban	32.41%	24.83%	
Occupation			
Laborer	22.76%	8.28%	
Business	4.83%	2.07%	
Office work	8.28%	5.52%	0.052
Retired	8.97%	4.83%	
House wife	13.10%	17.93%	
Jobless	1.38%	2.07%	
Socioeconomic Status			
Upper	2.76%	2.07%	
Middle	22.76%	20.00%	0.403
Lower	33.79%	18.62%	
BMI			
Underweight	8.28%	5.52%	
Normal	44.83%	27.59%	0.416
Overweight	6.21%	6.90%	
Obese	0.0%	0.69%	
Current Smokers			
Yes	13.10%	7.59%	0.612
No	46.21%	33.10%	
Type of AMI			
STEMI	22.76%	11.03%	0.212
NSTEMI	36.55%	29.66%	
Depression			
Yes	11.03%	22.76%	0.049
No	48.28%	17.93%	

Table III: Association of comorbidity with pattern of sleep among patients with AMI. (n= 145)

Comorbidity	Sleep pattern		p value
	Normal n (%)	Deviated n (%)	
Hypertension			
Yes	48 (33.1%)	37 (25.5%)	0.445
No	38 (26.2%)	22 (15.2%)	
Diabetes Mellitus			
Yes	30 (20.7%)	29 (20%)	0.081
No	56 (38.6%)	30 (20.7%)	
Dyslipidemia			
Yes	18 (12.4%)	19 (13.1%)	0.124
No	68 (46.9%)	40 (27.6%)	
Anxiety			
Yes	8 (5.5%)	11 (7.6)	0.98
No	78 (53.8%)	48 (33.1%)	
Depression			
Yes	0 (0%)	3 (2.1%)	0.03*
No	86 (59.3%)	56 (38.6%)	

** a p value <0.05 is statistically significant*

Discussion

Myocardial infarction (MI) is a critical cardiovascular event caused by obstruction of the coronary arteries. Individuals with acute MI commonly report disturbances in sleep patterns, which are particularly pronounced among those with post-MI depression.[11] In the present study, 145 patients were enrolled to assess altered sleep patterns. The mean age of the study population was 54.04 ± 8.82 years, with a predominance of male participants (62.82%). Comparable demographic characteristics were reported by Gessner et al.[12], who observed a slightly higher mean age (63.2 ± 11.2 years) and a male predominance of 82%. Similarly, Wang et al.[13] reported a higher mean age (60.12 years) and male predominance (61.2%) among patients with poor sleep quality.

In the present study, baseline characteristics showed that most participants were married (99.30%), resided in urban areas (57.20%), and belonged to a lower socioeconomic stratum (52.40%). The most common occupations were laborers (31.03%) and housewives (31.03%), while 20.59% of participants were current smokers. In comparison, Lian et al.[14] reported that a greater proportion of patients with acute myocardial infarction were urban residents (76.1%), and a substantial percentage (55%) were current smokers. Among these smokers, 43.3% consumed 20 or more cigarettes daily, while 11.8% smoked fewer than 20 cigarettes per day—figures notably higher than those observed in our study.

In the present study, nearly three-quarters of patients had a normal BMI (72.38%), with a mean BMI of 23.62 ± 2.50 kg/m². A higher proportion of acute MI patients (66.21%) presented with NSTEMI. Typical chest pain (73.79%) was the most common presenting symptom. Similarly, Zhu CY et al.[15] reported a mean BMI of 24.8 ± 3.7 kg/m² among patients with poor sleep. Consistent with our findings, a previous study by Zhu CY et al.[15] also documented a higher proportion of NSTEMI cases (87.6%).

Additionally, in our cohort, the most common comorbid condition was hypertension (58.62%), followed by diabetes mellitus (40.68%), dyslipidemia (51.51%), anxiety (13.10%), and depression (2.06%). In alignment with our study, Zhu CY et al.[15] demonstrated that among patients with poor sleep, hypertension (55.45%) was the most prevalent risk factor. However, compared to our findings, they reported a higher prevalence of hyperlipidemia (23.85%) than diabetes (20.35%). Similarly, Wang et al.[13] found that hypertension (50.7%)

was the most common comorbidity, followed by diabetes (28.7%).

In this series al large proportion of patient admitted with acute MI had altered sleep pattern (40.69%), which was slightly higher compared to an observational study by Nairz et al[16] who found an overall 36.3% prevalence of sleep disturbances among AMI patients, with females (48.4%) more frequently reporting sleep disturbance compared to males (32.3%). Similarly, Da Costa D et al.[17] found a considerable burden of sleep disturbance among AMI patients, with 36% of patients reporting manifestations of insomnia (Severity Index ≥10) and further 9% of the patients reported symptoms of milder or subthreshold level (Severity Index ≥8). On the other hand, by Ludka et al[18] also revealed comparable findings of sleep disturbances among AMI patients, with an overall 65.7% prevalence of sleep apnea and additionally they found a severity distribution of mild sleep apnea in 32.6%, moderate in 20.4%, and severe sleep apnea in 12.7% of AMI patients. Our findings are further reinforced by study of Andrechuk and Ceolim,[19] who reported very high prevalence of poor sleep quality (71.7%) among AMI patients.

Furthermore, in this study, no significant association was found between altered sleep patterns and demographic or clinical characteristics ($p > 0.05$). These findings are consistent with the study by Nairz et al.,[16] in which sleep disturbances were not significantly associated with sociodemographic variables, lifestyle factors, comorbidities, or clinical characteristics of patients with acute myocardial infarction, including marital status, employment status, body mass index, smoking habits, angina, and the presence of NSTEMI ($p > 0.05$).

Comparable results were also reported by Zhu CY et al.,[15] who found that female gender, normal body mass index, and NSTEMI were not significantly associated with poor sleep quality or all-cause mortality ($p > 0.05$).

Consistently, the study of Wang et al[13] also failed to establish significant association of sleep disturbance among AMI patients with age, sex, hypertension, and diabetes. However, in this study, only AMI patients with depression were significantly associated with sleep deviation, $p=0.03$. In line with this finding, Matsuda et al[20] found sleep disturbance in 43% of patients and reported significant association between depression and poor sleep quality, with strikingly higher depression among females compared to males ($p = 0.008$). In this study several limitations appeared like sleep patterns and depression level were not analyzed using standardized or validated scales for measurements, and other possible influencing factors like medication usage, disease severity and lifestyle factors not assessed. Hence, further multicenter, large-scale studies applying validated assessment tools and incorporating further psychosocial and clinical factors are recommended to well understand the altered sleep pattern among patients with MI.

Conclusion

The prevalence of altered sleep patterns was found to be quite high among patients admitted with acute myocardial infarction, and among the comorbidities assessed, depression was significantly associated with these altered patterns. Overall, the findings emphasize the importance of routine screening for sleep disturbances and depressive disorders in patients with myocardial infarction, as timely detection and management may enhance recovery and improve overall patient outcomes.

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