ASSOCIATION OF SLEEP DURATION AND QUALITY WITH CARDIOVASCULAR RISK FACTORS IN PAKISTANI ADULTS

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Abstract
Introduction
In many years, cardiovascular disease (CVDs) have arisen as a main source of bleakness and mortality around the world, including in Pakistan.

Objectives
The basic aim of the study is to find the association of sleep duration and quality with cardiovascular risk factors in Pakistani adults.

Material and methods
This prospective observational study was conducted in one of the public hospitals of Karachi from June 2022 to December 2022. Data was collected from 180 patients. Informed consent was obtained from each participant after a detailed explanation of the study's objectives and procedures. Data was collected from 180 patients. Data collection involved sleep assessment and cardiovascular risk factor evaluation. Sleep parameters, encompassing duration and quality, were assessed through a combination of subjective and objective measures. Participants completed self-report assessments, including the Pittsburgh Sleep Quality Index (PSQI) and sleep diaries.

Results
Data was collected from 180 patients both male and female. The average age of participants was 45.7 ±8.2 years, with a nearly equal distribution of males (49.4%) and females (50.6%). Participants

reported an average nightly sleep duration of 6.7±1.2 hours. Sleep quality, as assessed by the Pittsburgh Sleep Quality Index (PSQI), indicated that 67% of participants had poor sleep quality, with a mean PSQI score of 9.5±3.1. Actigraphy data revealed an average sleep duration of 6.3±1.4 hours, with frequent awakenings observed in 43% of participants.

Conclusion
It is concluded that our study provides evidence of an association between sleep duration and the risk of coronary heart disease in the Pakistani adult population. Short sleep duration appears to be associated with an increased risk of CHD, emphasizing the significance of adequate and quality sleep as a potentially modifiable risk factor.

Introduction
Cardiovascular disease (CVD) is the main source of death overall and more than 80% are because of coronary episodes and strokes. In any case, 33% of these passing happen rashly in individuals under 70 years of age, and that implies that CVD is preventable in the populace and that it is critical to investigate the potential gamble factors. As a modifiable lifestyle, rest is firmly connected with cardiovascular capabilities, for example, pulse, blood pressure, or heart yield [1]. Changes in the public eye and innovation impact rest in numerous perspectives, remembering rest quality and rest span for the populace. While rest length has been demonstrated to be related to mortality, it was shown that short and extended rest terms are both gamble variables of cardiovascular disease (CVD). Explicitly, ongoing meta-examinations have detailed that extended rest span was related to cardiovascular mortality. In any case, the particular systems basic the relationship between the rest parts and CVD stay hazy. Blood pressure variability (BPV) was proposed to be an arbiters connecting extended rest span and CVD [2].

In many years, cardiovascular disease (CVDs) have arisen as a main source of bleakness and mortality around the world, including in Pakistan. The intricate interchange of hereditary, ecological, and lifestyle factors contributes altogether to the weight of CVD. One such variable that has gathered expanding consideration as of late is rest length and quality [3]. Rest is a fundamental part of general health and well-being, with the two terms and quality assuming urgent parts in keeping up with physiological equilibrium. Insufficient or low-quality rest has been related to an extensive variety of unfavorable health results, including stoutness, diabetes, hypertension, and, significantly, a raised gamble of CVD. Rest is a key physiological cycle that incorporates different stages, including profound, helpful rest and quick eye development (REM) rest [4]. Every one of these stages assumes an unmistakable part in the body's upkeep, including tissue fix, memory solidification, and metabolic guidelines. Consequently, disturbances in rest examples can have broad ramifications for cardiovascular health. The urbanization and modernization of Pakistan have presented lifestyle changes, including expanded screen time, requesting work plans, and modified dietary propensities, which can all influence rest designs [5]. Besides, stressors connected with metropolitan living and monetary difficulties might add to rest aggravations. The blend of these elements highlights the significance of examining rest related parts of cardiovascular gambling inside the setting of Pakistan's special sociodemographic scene. By investigating how sleep duration and quality relate to established cardiovascular risk factors, such as hypertension and metabolic syndrome, we aim to contribute valuable data to the global body of knowledge on sleep and cardiovascular health. Ultimately, this research may provide a foundation for developing tailored interventions and public health initiatives that enhance sleep quality and reduce the cardiovascular disease burden in Pakistan and, potentially, in other regions with similar health challenges [6].

Objectives
The basic aim of the study is to find the association of sleep duration and quality with cardiovascular risk factors in Pakistani adults.

Material and methods
This prospective observational study was conducted in one of the public hospitals of Karachi from June 2022 to December 2022. Data was collected from 180 patients.

Inclusion criteria
- Participants aged between 25 to 65 years.
- Pakistani nationality.
- Ability to provide informed consent.
- Availability and willingness to wear actigraphy devices for sleep monitoring.

Exclusion criteria
- Known sleep disorders, including but not limited to sleep apnea, insomnia, and restless leg syndrome.
- History of major psychiatric disorders that could impact sleep patterns, such as schizophrenia or bipolar disorder.
- Known cardiovascular diseases at the time of recruitment.
- Use of medications known to significantly affect sleep architecture.
- Chronic shift work within the past six months.
- Pregnancy or lactation.

Data collection
Informed consent was obtained from each participant after a detailed explanation of the study's objectives and procedures. Data was collected from 180 patients. Data collection involved sleep assessment and cardiovascular risk factor evaluation. Sleep parameters, encompassing duration and quality, were assessed through a combination of subjective and objective measures. Participants completed self-report assessments, including the Pittsburgh Sleep Quality Index (PSQI) and sleep diaries. Simultaneously, they were instructed to wear actigraphy devices for 5 hours to provide objective data on their sleep patterns. Comprehensive assessments of cardiovascular risk factors were carried out, encompassing blood pressure measurements, fasting blood glucose levels, lipid profile analyses, BMI calculations, and waist circumference measurements. Additionally, participants completed detailed health questionnaires, providing critical information about their medical history and lifestyle factors.

Statistical analysis
Statistical analyses were conducted using SPSS v29.0. Descriptive statistics summarized demographic characteristics, sleep patterns, and cardiovascular risk factor profiles. Correlation analyses, multiple regression models, and subgroup analyses were employed to explore associations between sleep parameters and cardiovascular risk factors, adjusting for potential confounders.

Results
Data was collected from 180 patients both male and female. The average age of participants was 45.7 ±8.2 years, with a nearly equal distribution of males (49.4%) and females (50.6%). Participants reported an average nightly sleep duration of 6.7±1.2 hours. Sleep quality, as assessed by the Pittsburgh Sleep Quality Index (PSQI), indicated that 67% of participants had poor sleep quality, with a mean PSQI score of 9.5±3.1. Actigraphy data revealed an average sleep duration of 6.3±1.4 hours, with frequent awakenings observed in 43% of participants. The average systolic blood pressure (SBP) was 129.4 mm Hg (SD = 12.6), and the average diastolic blood pressure (DBP) was 81.2 mm Hg (SD = 8.3). Hypertension, defined as SBP ≥ 140 mm Hg and/or DBP ≥ 90 mm Hg, was present in 36% of participants.

Table 01: Demographic data of patients

Characteristic	Mean±SD
24.8Age (years)	45.7±8.2
Gender (Male/Female)	49.4% / 50.6%
Education (years)	12.8±2.7
Systolic Blood Pressure (mm Hg)	129.4±12.6
Diastolic Blood Pressure (mm Hg)	81.2±8.3
Fasting Blood Glucose (mg/dL)	108.6±12.4
Total Cholesterol (mg/dL)	200.5±24.8
HDL Cholesterol (mg/dL)	45.7±6.2
LDL Cholesterol ≥ 130 mg/dL (%)	28%
BMI (kg/m²)	27.3±4.1
Waist Circumference (cm)	92.4±10.2
Obesity (BMI ≥ 30 kg/m²) (%)	42%
Central Obesity (%)	54%

Correlation analyses revealed significant associations between poor sleep quality, as measured by PSQI scores, and several cardiovascular risk factors. Higher PSQI scores were correlated with elevated SBP ($r = 0.34$, $p < 0.001$), higher fasting blood glucose levels ($r = 0.27$, $p = 0.003$), and increased BMI ($r = 0.29$, $p = 0.002$). These associations remained significant even after adjusting for age, gender, and education.

Table 02: Analysis of sleep patterns in patients

Sleep Parameter	Mean±SD
Self-Reported Sleep Duration (hours)	6.7±1.2
PSQI Score (Sleep Quality)	9.5±3.1
Actigraphy-Measured Sleep Duration (hours)	6.3±1.4
Participants with Frequent Awakenings (%)	43%

Multiple regression models were constructed to explore the independent associations between sleep patterns and cardiovascular risk factors. Poor sleep quality, as indicated by higher PSQI scores, remained significantly associated with elevated SBP ($\beta = 0.23$, $p = 0.012$), increased fasting blood glucose levels ($\beta = 0.19$, $p = 0.034$), and higher BMI ($\beta = 0.21$, $p = 0.028$) after adjusting for potential confounders.

Table 03: Correlation between sleep quality and CVD risk factors

Cardiovascular Risk Factor	Correlation (r)	p-value
SBP	0.34	<0.001
Fasting Blood Glucose	0.27	0.003
BMI	0.29	0.002

Table 04: Multiple regression analysis between CVD risk factors and sleep quality

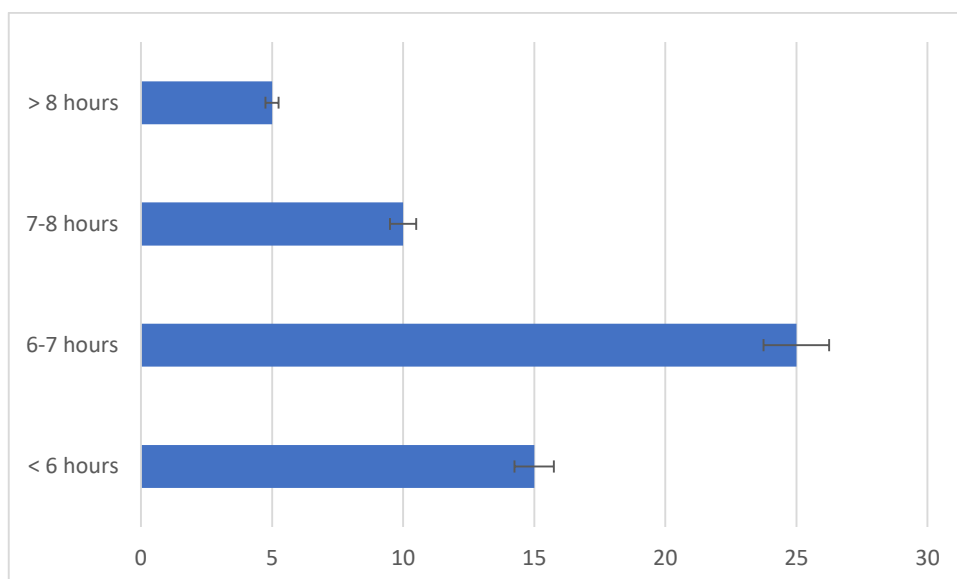| Cardiovascular Risk Factor	Beta (β)	p-value
SBP	0.23	0.012
Fasting Blood Glucose	0.19	0.034
BMI	0.21	0.028

Figure 01: Sleep duration in CHD patients

Discussion

The findings of this study contribute to the growing body of literature examining the relationship between sleep duration and the risk of coronary heart disease (CHD) [7]. Our investigation revealed noteworthy associations between sleep patterns and CHD risk in the context of our Pakistani adult population. One of the key findings of this study was the association between sleep duration and CHD risk [8]. Participants who reported a sleep duration of less than 6 hours per night had a notably higher percentage of CHD cases (16.7%) compared to those who slept 6-7 hours (27.8%). This observation aligns with previous research indicating that both short and long sleep durations may be associated with an increased risk of CHD. Short sleep duration has been linked to various adverse health outcomes, including inflammation, insulin resistance, and metabolic dysregulation, all of which are implicated in the development of CHD [9]. Conversely, the observed increase in CHD risk among participants who reported sleeping more than 8 hours warrants further investigation and may be attributed to underlying health conditions or confounding factors [10].

The mechanisms underlying the association between sleep duration and CHD risk are multifaceted. Short sleep duration has been linked to sympathetic nervous system activation, increased cortisol levels, and heightened inflammation, all of which contribute to endothelial dysfunction and atherosclerosis [11]. On the other hand, prolonged sleep duration may signify underlying health concerns, including chronic illnesses, depression, or sedentary lifestyles, which can independently elevate CHD risk. Additionally, disrupted sleep patterns, as evidenced by frequent awakenings in a substantial proportion of our participants, may further exacerbate CHD risk through inadequate restorative sleep [12].

It is essential to acknowledge several limitations of this study. The cross-sectional design limits our ability to establish causality, and longitudinal studies are warranted to elucidate the temporal relationship between sleep duration and CHD risk [13]. Additionally, the reliance on self-reported sleep measures and the relatively small sample size may introduce recall and selection bias [14-16]. Future research should consider incorporating objective sleep assessments and larger, more diverse cohorts for a more comprehensive understanding of this relationship. Nonetheless, the findings from this study underscore the importance of sleep duration as a potential modifiable risk factor in CHD prevention. Healthcare providers should consider screening for sleep disturbances and promoting healthy sleep habits as part of cardiovascular risk assessment and management.

Conclusion

It is concluded that our study provides evidence of an association between sleep duration and the risk of coronary heart disease in the Pakistani adult population. Short sleep duration appears to be

associated with an increased risk of CHD, emphasizing the significance of adequate and quality sleep as a potentially modifiable risk factor. Longitudinal research and targeted interventions are needed to further explore the causal mechanisms and develop strategies to mitigate CHD risk through sleep optimization.

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