

Sleep Quality Status and its Associated Factors among the Person with Stroke at a Rehabilitation Center in Bangladesh: A Cross-Sectional Study

By

Shihabul Hasan

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Faculty of Medicine

**University of
Dhaka**



Student's Declaration

- This work has not previously been accepted for any degree and is not concurrently submitted for any degree.

- This dissertation is for partial fulfilment of the requirements for the MSc in Occupational Therapy.

- This dissertation results from my independent work/investigation. Other sources are acknowledged by giving references.

- I confirm that if anything is identified in my work that I have done is plagiarism or any form of dishonesty that will directly award me a failed. I am subject to disciplinary actions of authority.

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Thesis Supervisor's Statement

As the supervisor of Shihabul Hasan's MSc thesis in Occupational Therapy, I am confirming that he acknowledges his thesis. **“Sleep Quality Status and its Associated Factors among the Person with Stroke at a Rehabilitation Center in Bangladesh: A Cross-Sectional Study”** is suitable for examination.

Muhammad Millat Hossain,
Associate Professor & Course Coordinator,
Department of Rehabilitation Science.
Bangladesh Health Professional Institute (BHPI)
CRP, Chapain, Savar, Dhaka-1343.

Signature:.....

Date:

Board of Examiners

Md. Saddam Hossain

Assistant Professor

Department of Occupational Therapy

Bangladesh Health Professions Institute (BHPI)

CRP-Chapain, Savar, Dhaka-1343.

Signature:.....

Date:

Dr. Md. Ezharul Islam

Professor

Department of Computer Science and Engineering

Jahangirnagar University


Signature:

Date:

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List of Abbreviations
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BDT	Bangladeshi Taka
BHPI	Bangladesh Health Professions Institute
CBT-I	Cognitive Behavioral Therapy for Insomnia
CRP	Centre for the Rehabilitation of Paralysed
CSA	Central sleep apnea
CPAP	Continuous Positive Airway Pressure
CT scan	Computed Tomography scan
FNE	First-Night Effect
HSP	Hemiplegic Shoulder Pain
IRB	Institutional Review Board
NIHSS	National Institutes of Health Stroke Scale
OSA	Obstructive sleep apnea
OT	Occupational Therapy
OTD	Occupational Therapy department
OTs	Occupational Therapists
PSD	Post-stroke depression
PSF	Post-stroke fatigue
PSQI	Pittsburgh Sleep Quality Index
RBD	Rapid eye movement sleep behavior disorder
RCT	Randomized controlled trial
REM	Rapid Eye Movement
RLS	Restless legs syndrome
SD	Standard Deviation
SDB	Sleep-disordered breathing
SPSS	Statistical Package for Social Science
WHO	World Health Organization

Abstract

Background: Sleeping is a crucial physiological state that enhances physical and mental health, memory, metabolism, and immunity. Sleep disturbances are prevalent among stroke survivors, significantly impacting their recovery and quality of life.

Aim: To measure sleep quality status and associated factors among the person with stroke at a rehabilitation center in Bangladesh.

Methods: The study used a cross-sectional design to conduct a face-to-face survey with 152 stroke patients' where was 74.3% male and 25.7% female who received outpatient intervention from the Occupational Therapy Department at the Centre for the Rehabilitation of Paralyzed (CRP). Standardised questionnaires Pittsburgh Sleep Quality Index (PSQI) were used to evaluate the sleep quality and patterns of stroke patients from the month before the data collection date. Statistical analysis was performed using the SPSS 26 version software, focusing on the associations between PSQI and demographic variables.

Results: 71.7% (n=109) of participants reported experiencing poor sleep quality according to PSQI criteria. Among the 109 participants, 55.3% suffered from insomnia and the remaining 44.7% suffered from sleep-disordered breathing. Older age (61-70 years) was significantly associated with poor sleep, where male suffered more 68.8% rather than female 31.2%. Among participants was found an increase with insomnia, which was 3.43 times higher among those without insomnia (AOR=3.426, CI=1.886-160.705, $P=.001$). Morning alertness was also significantly associated with sleep quality, with tired participants having 2.7 times higher poor sleep compared to refreshed participants (AOR=2.698, CI= .659-1.711, $P=.020$). Participants who faced upper limb pain were 0.83 less

have poor sleep (AOR = 0.834, CI = 0.211-0.891, $P = 0.023$) than those with no pain. Comorbidities such as diabetes ($P=.004$), mental health issues ($P=.016$), immobility ($P=.010$), and shoulder subluxation ($P=.049$), Stress ($P=.005$), upper-limb pain ($P=.021$), and nocturnal bathroom visits ($P=.011$) were associated with poor sleep quality.

Conclusion: Over two-thirds of stroke patients are suffering from sleep disturbances, insomnia and sleep-disorder breathing were the most common sleeping-related problems. Older age (61–70 years), male sex, waking up tired, diabetes, mental health problems, immobility, shoulder subluxation, upper-limb pain, stress, and frequent nocturnal bathroom visits associated with poor sleep. There were no associations with socio-demographic factors, stroke characteristics (stroke type, lesion side and recurrence), lifestyle and environmental variables. Sleep assessment should be performed routinely (e.g., using the PSQI). Management of pain, stress, depression, optimization of daytime naps, educate sleep hygiene routine, CBT-I and multidisciplinary care for comorbid conditions. Need to conduct larger sample and intervention-based studies after stroke. These findings suggest that clinical practice and national policy in Bangladesh need to include protocols for sleep management. Important components of this integration should focus on staff training, patient counselling, and the use of technologies such as sleep monitors and mobile applications.

Keywords: Sleep, Stroke, Sleep disorder, Sleep issue, Sleep problem, sleep disturbance.

CHAPTER I: INTRODUCTION

1.1: Background

Sleeping is a periodic and temporary interruption of the state of alertness. During sleep, the awareness of the surrounding and object is maximally diminished and level for reflex, sensitivity and reactivity is raised (Pasic et al., 2011). Scott et al. (2021) reported that sleep is one of the physiological activities that reduces the threat of physical and mental health problems. It also helps improve memory, regulates metabolism, boosts immunological function and cognitive abilities.

According to the WHO (2020), stroke is one of the leading causes of death and long-term disability around the global. Stroke also causes various physical, emotional as well as social effect in the lives of the survivors. Every year, 15 million people worldwide experience a stroke, one-third of whom die and another one-third become permanently disabled (Mohandas et al., 2024). Stroke survivors face many complications such as movement, cognitive, and sleep disorder that hinder rehabilitation and reduce their quality of life (Tsao et al., 2022). Sleep disorders commonly arise as complications of post-stroke, yet they are often unrecognized and untreated, adversely affecting recovery outcomes (Sterr et al., 2008).

Multiple factors contribute to stroke survivors having poor sleep quality. Demographic factors including age and sex, clinical factors including the severity of stroke and the location of the lesion, and psychosocial factors such as depression and anxiety have been reported to influence sleep quality (Mohandas et al., 2024; Khazaei et al., 2022). Mood disorders such as depression are commonly associated with sleep problems. For

example, post-stroke depression (PSD) is identified in 20-63% of people who survive a stroke (Hackett & Pickles, 2014). An association with poor sleep and post-stroke depression is link.

Many stroke survivors experience sleep disorders, ranging from insomnia and hypersomnia (Pasic et al., 2011) and obstructive sleep-disordered breathing (SDB) with a prevalence of 25–80% sleep issues (Mohandas et al., 2024). Poor sleep quality can affect stroke recovery from a problem. It can increase fatigue, affect mood, and lead to poor health (Cai et al., 2021; Byun et al., 2020). Mohandas et al. (2024) conducted a meta-analysis showing that 40% of post-stroke patients experience insomnia. The authors reported that insomnia was significantly greater in women and patients with more severe strokes (measured by NIHSS). According to Khazaei et al. (2022), 84% of stroke patients in Iran reported poor sleep quality.

Stroke and sleep disorders are interrelated. Sleep disorders can increase the risk of stroke, while stroke can also disrupt sleep patterns. (Duss et al., 2018). The condition obstructive sleep apnea (OSA) causes high blood pressure, an irregular heart rhythm and arterial narrowing. OSA has also been associated with an increased risk of stroke (Wallace et al., 2012). Strokes affecting the thalamus or brainstem, areas of the brain responsible for regulating sleep-wake cycles that can alter sleep architecture. Environmental factors, such as disorders/noise/light/sleep disruptions that occur in hospitals, have also caused insomnia during recovery (Oliveira et al., 2017).

Many stroke patients experience sleep problems, yet there is limited research on this, especially in low and middle-income countries. Most studies have been conducted in Western or high-income regions, creating a gap in understanding the specific challenges

faced by stroke survivors in diverse settings (Iwuzo et al., 2023). Mansour et al. (2020), Ethiopian study found that 70.6% of stroke patients have sleep disorders, with insomnia being the most frequent complaint. We don't have similar data from Bangladesh a country with high burden of stroke and a poor rehab setup.

Since sleep is important for the brain and healing itself, sleep disorder should be affected in stroke rehab. Without enough local data, it is hard to create any effective interventions for stroke survivors in Bangladesh. The purpose of the study is to evaluate sleep quality and its associated factors among stroke survivors receiving rehabilitation services in Bangladesh. Insights from the results will be useful for clinical practice and policy on the improvement of rehabilitation outcomes and quality of life of stroke patients in this context.

1.2: Rationale of the study

More than half of stroke survivors all over the world experience sleep disorder such as insomnia or sleep-disordered breathing, along with circadian rhythm disorder (Y. Wang, Li, et al., 2025; Katzan et al., 2020). Daytime sleepiness, lower participation in work, reduced sex desire, increased chance of hypertension and cardio vascular disease (Morgenthaler & Kolla, 2025; O'Donoghue & McKay 2012; Green 2008) and they affect neuro recovery and lengthens rehabilitation (Cai et al., 2021). Sleep rehabilitation has become a common practice in Occupational Therapy (OT) internationally. Despite this trend, Bangladesh a high-burden stroke setting lacks any studies examining sleep quality and determinants among stroke survivors. Moreover, this lack of research occurs despite limited rehabilitation resources. Investigating a rehabilitation center in Bangladesh regarding their sleep quality and other associated factors like depression and functional

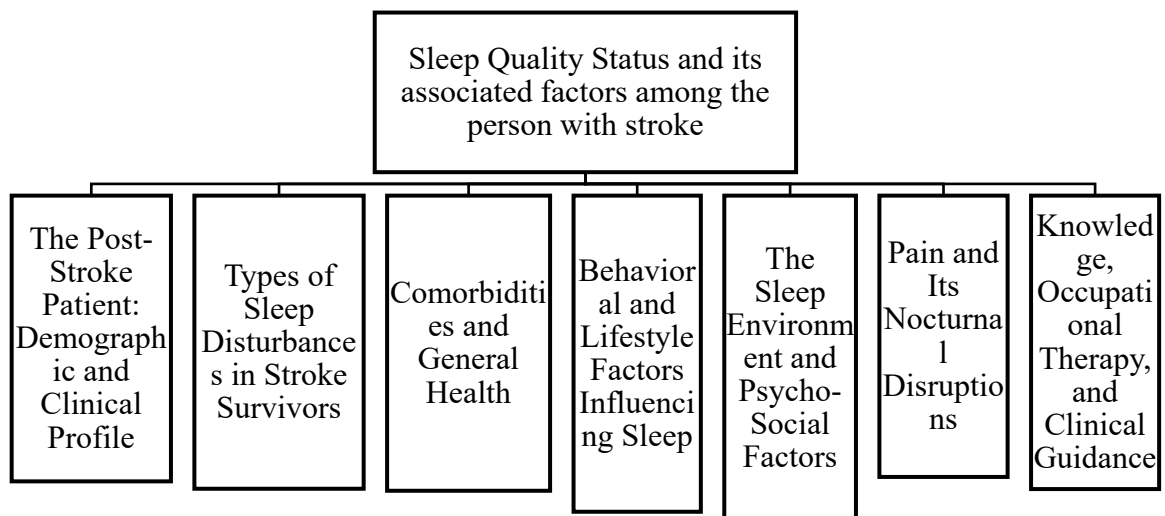
disability and environmental stressors. The findings will provide baseline data, identify modifiable risk factors for targeted intervention, enable evidence-based integration of sleep protocols into OT, and guide decision on allocation of resources for sleep screening in resource-poor settings. This will create the basis for optimized rehabilitation and equitable sleep health service in Bangladesh.

CHAPTER II: LITERATURE REVIEW

The literature review chapter summarize articles on stroke survivors with sleep disorder. Sleep disorders for stroke survivors is a major issue its effect on healing, quality of life and long-term health outcomes. Many research such as systematic reviews, cross-sectional studies, and prospective study have the same result that sleep disorders are common in stroke patients. This study helps us to understand the relationship between stroke, sleep disorders and associated factors of sleep disorder. A systematic search was performed using PubMed, Hindawi, and Sleep OT to select the peer-reviewed documents published between 2011 and 2025. Sleep, Stroke, Sleep disorder, Sleep issue, Sleep problem, Associated factors keywords were used to search them. The literature review is as follows.

Figure 2.1

Overview of the literature finding



2.1 The Post-Stroke Patient: Demographic and Clinical Profile:

2.1.1 Demographic Determinants of Health

The link between demographic factors and post-stroke sleep disorder puzzling and sometimes contradictory, except for the mass of evidence linking age and gender for sleep disorder post stroke. Iddagoda et al. (2019), does not find a significant association with insomnia among older age groups and females. Which directly contradicts the findings of other studies which show that the elderly and females have a higher incidence of insomnia (Hasan et al., 2021; Kim et al., 2017). Research further highlights that SDB is more common in men as well as more severe in men post-acute ischemic stroke (McDermott et al., 2018). Stronger socioeconomic and social-structural demographics were found to have more consistent protective associations. Living in a large house is known for protecting against disorder in sleep after a stroke. In contrast, one-person or small-family home living is linked to a higher risk of post-stroke sleep disorder (Cahuiche et al., 2025; Dong et al., 2020). Greater education, higher income was more likely to sleep better. They were also more likely to attend rehabilitation and have better recovery (Butsing et al., 2025; Zamzam et al., 2020).

2.1.2 Clinical Stroke Characteristics

People who have a stroke and also have a sleep disorder experience more limitations and disability than people who do not have a sleep disorder (Fulk et al., 2020). PSQI is reliable & valid on different clinical and non-clinical groups which includes stroke survivors. It is frequently used among other sleep measures to assess insomnia and sleep dysfunction (Niu et al., 2023). Sleep disorder affect many stroke survivors. Around the world, extensive poor sleep quality among stroke patients is estimated at 50.26% (Y. Wang, Li, et al., 2025).

Different areas experience various rates of this phenomenon. In Iran, the rates are as high as 84% (Khazaei et al., 2021). In Ethiopian, the rate is 70.6% (Mansour et al., 2020). In Saudi Arabia, the rate is 60.0% (Alabdali et al., 2025). On the other hand, Central Taiwan experiences a much lower 15.6% (Tsai et al., 2022). The differences can likely be attributed to variations in sampling, method of assessment, cut-off point, and characteristics of the population. Post-stroke sleep disorders come in a variety of forms, and while insomnia and sleep-disordered breathing (SDB) are the most common sleep disorder after stroke, other often seen disorder include excessive daytime sleepiness, restless legs syndrome and circadian rhythm disorders (Hasan et al., 2021). Sleep disorder occurs at different rates along the stroke timeline. According to Tsai et al. (2022), the rate is 34.3% during the acute period, 37.4% during the chronic period, and 29.7% in the period before the stroke.

Research shows that the causes and progression of sleep problems after a stroke are not always clear., particularly concerning the time duration of stroke and location of brain lesions. There are conflicting studies on sleep disorder after a stroke. Some studies show that time since stroke is not significantly associated with sleep problems. Other studies show that sleep quality may improve over time (Nilsson et al., 2025, Duss et al., 2022). A clear contradiction exists regarding the role of the hemisphere of the stroke. One study finds that lesion side is not a statistically significant factor regarding sleep disorders (Kojić et al., 2022). On the other hand, Wang et al. (2025), specifically point to left hemisphere lesions and a lower risk of poor sleep quality. Global distribution data indicates that methodological and demographic characteristics are more significant risk indicators for sleep disorders than specific neurological correlates.

2.2 Types of Sleep Disorders in Stroke Survivors

Patients with sleep disorders are at risk of poor recovery. 47% of stroke patients develop insomnia shortly after their stroke. Further, a third of the patients develop a chronic condition like insomnia after the incident. Hypersomnia associated with subcortical or thalamic strokes usually improves over time but fatigue can last for years. Nearly 60% of all stroke patients have obstructive sleep apnea (OSA), and OSA is associated with increased long-term mortality. On the other hand, central sleep apnea (CSA) is associated with poor prognosis. The other types of somatic disorders that are included in parasomnias are Rapid Eye Movement sleep behavior disorder (RBD), which occurs in about 11% of participants, more often with brainstem lesions, and restless legs syndrome (RLS) which affects approximately 12% of patients and makes rehabilitation efforts more difficult. Moreover, sleep issues are strongly associated with post-stroke depression (PSD), which affects 30% of survivors their recovery, further supporting the long-term management of this association (Cai et al., 2021).

2.3 Comorbidities and General Health

In this regard, post-stroke depression (PSD) occurs in about 30% of stroke survivors (Cai et al., 2021). Also, sleep disorders show equally high prevalence rates. According to research, 65% of patients have poor sleep quality and 64.7% for impairment (Zhao et al., 2021). There is general agreement that depression is a “strong predictor” of sleep difficulty at night. Moreover, it is a risk factor for post-stroke fatigue (PSF) just like more consistent predictors which are female gender, anxiety, and lesion location (Zhang et al., 2020; Kwon et al., 2015). Poor sleep increases the risk of PSD and cardiovascular death (Chen et al., 2024) and poor sleep is a risk factor for ischemic stroke (Matas et al., 2024). There is a

two-way link to emphasize this. Research show that other health issues were very important too. Diabetes mellitus was significantly correlated with sleep disorder (Gu et al., 2018) similarly hypertension and obesity (Alabdali et al., 2025; Siarnik et al., 2018). Low education and mood disorders are linked to chronic insomnia. Psychosocial factors, particularly social support, significantly influence sleep quality, with anxiety and depression acting as mediators (Zhao et al., 2021). which makes the conclusion that sleeping is an effective target for rehabilitation (Davis et al., 2019).

2.4 Behavioral and Lifestyle Factors Influencing Sleep

2.4.1 Pre-Sleep Routines and Sleep Hygiene

The reviews highlight significant behavioral and nutritional factors that disrupt sleep, leading to daytime impairments such as sleepiness, low energy, and irritability, particularly associated with overnight technology use (Hartley et al., 2022) or nocturia (Asplund, 2005; Asplund, 2004). Caffeine and alcohol affect the structure of sleep architecture in different ways. Caffeine reduces total sleep time, sleep efficiency, deep sleep but increases sleep latency consistently. In contrast, alcohol delays the onset of REM sleep and reduces the amount of total REM sleep after multiple nights and is said to have a prolonged effect (McCullar et al., 2024; Gardiner et al., 2023). There was a bidirectional relationship between lifestyle and sleep. For instance, smoking is associated with a higher severity and shorter duration of insomnia (Nuñez et al., 2020). On the other hand, poor sleep quality and insomnia are linked to a poor diet and greater energy intake (Zuraikat et al., 2020). Komleva et al. (2024) found an association between nocturia and poor sleep quality and duration. Similarly, Asplund (2005) stated that a major therapeutic principle for nocturia is a reduction in fluids during the evening.

2.4.2 The Influence of Daytime Behaviors on night time sleep

Exercising during the day and napping can enhance night-time sleep and cognitive function. While exercise generally leads to better outcomes, the effects of napping are more complex. Regular exercise helps reduce sleep fragmentation and the severity of obstructive sleep apnea, which can alleviate fatigue in chronic stroke patients (Frange et al., 2022; Tai et al., 2022). Moderate napping is no more than 30 minutes or 30 to 90 minutes which is good for your cognitive health. However, napping longer than 90 minutes will counter act these benefits and instead lead one to worse outcomes (Li et al., 2022). He also said that napping can be considered less therapeutic because its effects may depend on how long the nap is. This creates a confusion that the exercise literature does not contain. There is a notable lack of research relating to how frequency, timing, and intention affect cognition. These would be critical towards putting forth clear cut guidelines (Li et al., 2022).

2.5 The Sleep Environment and Psycho-Social Factors

The studies by Cao et al. (2021) and Xiong et al. (2020) highlight temperature as a key environmental factor influencing sleep quality, alongside noise. They differ in their findings regarding humidity Xiong et al. (2020), consider it a significant frustration, while Cao et al. (2021), said it insignificant. He also identifies an optimal combination of temperature, humidity, and illuminance for better sleep quality. Changes in sleep parameters, such as Sleep Onset Latency (SOL) and Total Sleep Time (TST), exist between lab and home environments, potentially influencing the first-night effect in sleep studies. Schruers et al. (2025) highlight that environmental factor significantly affect stroke patients and other critical conditions, including neurological damage and psychological issues like depression.

2.6 Pain and its night Disruptions

HSP (Hemiplegic Shoulder Pain) refers to a moderate-to-severe pain that often fluctuates, increases during sleep times, and leads to poor sleep quality, insomnia, and restless sleep. The relationship between pain, sleep, and depression is bidirectional. This creates a harmful cycle. As a result, pain, sleep disorder and depression predict poor quality of life in stroke patients. It is important to identify HSP on time and manage it well to break this vicious cycle and positively influence patient outcomes (Khatooni et al., 2025).

2.7 Knowledge, Occupational Therapy, and Clinical Guidance

2.7.1 Health Literacy Regarding Sleep

The three reviews contain a substantial analysis highlighting a significant gap in health systems in terms of sleep. Research has repeatedly shown how sleep is a serious health issue but notably there is a big gap between that knowledge and care taking place. A recent paper by Benca et al. (2023), published in sleep shows that physicians and patients agree sleep disorders are important medical conditions. However, there are important treatment gaps. Both sides believe that the treatments now available do not work.

Affini et al. (2022) reported that almost none of the hospitals have institutionalized promoting sleep. Providers want to improve sleep but are unable to do so due to standardised workflows that do not prioritize sleep. According to Ludwig et al. (2022), Occupational Therapists (OTs) have insufficient knowledge to assess and manage sleep problems. The identification of this deficiency is extremely concerning as it reflects a level of education that ought to be readily available to OTs. Refer to the failure to deliver effective sleep care at the clinical and institutional levels (Benca et al., 2023; Affini et al., 2022). On the other hand, Ludwig et al. (2022) highlight a prior fault in preparing health

professionals with the necessary sleep-related competencies. Together these studies paint a system failing to convert the broad consensus on the importance of sleep into effective, standardized, and widely practiced care of the patient.

2.7.2 The Role of Rehabilitation

Recognizing the great influence activity of sleep on participation, the American Occupational Therapy Association has classified sleep as a separate occupational area (Tester & Foss, 2017). Although most occupational therapists identify sleep as a practice area, few say they have a level of in-depth knowledge and confidence in assessment and management of sleep that would lead to sleep-related goals frequently appearing in intervention programs (Hartman et al., 2024; Ludwig et al., 2022). Occupation-based interventions do exist and are effective for helping people, such as assistive devices, sensory interventions, lifestyle redesign, and Cognitive Behavioral Therapy for Insomnia (CBT-I), which OTs can successfully provide (Yoo, 2023; Eakman et al., 2022 and Ho & Siu, 2018). However, there still remain needless barriers such as lack of professional education and low caregiver buy-in (Hartman et al., 2024). Therefore, improved sleep curricula, ongoing research and development of evidence-based assessment and interventions are needed to further incorporate sleep management into OT practice in a variety of settings (Tester & Foss, 2017; Faulkner & Mairs, 2015).

2.8 Key Gaps in the Studies

- Insufficient research has been done on the Bangladeshi population about sleep disturbance but not among stroke patient. Most existing research focuses on United State of America (USA), the United Kingdom (UK), Canada. South-East, Middle, Asian populations. Not enough research has been done on or focuses on Asian.

- In Bangladesh, completely new patterns of living, a different climate, culture, and above all medical conditions will make the sleep timing and outcomes far different after strokes compared with any other country.

CHAPTER III: METHODS AND MATERIALS

3.1: Study Question, Aim, Objectives

3.1.1 Study Question

What is quality of sleep status and its associated factors among the person with stroke at a rehabilitation center in Bangladesh?

3.1.2 Aim of the study

The aim of this study is to measure sleep quality status and its associated factors among the person with stroke at a rehabilitation center in Bangladesh.

3.1.3: Objectives of the study

- To measure the sleep quality status among the person with stroke.
- To identify associated factors with sleep quality among the person with stroke.
- To find at the sociodemographic information among the person with stroke.

3.2 Study Design

3.2.1 Study method

The researcher followed the quantitative method for this study. In order to obtain results, a quantitative research method deals with quantifying and analyzing variables. It entails applying particular statistical approaches to analyze and answer the questions. The purpose of quantitative research methods is to provide an explanation for a problem or phenomenon by collecting data and evaluating it using mathematical methods, specifically statistics (Apuke, 2017). In this research, the researcher collected the data from the participants, then performed a statistical test to measure the outcome, so researcher selected quantitative design for this study.

3.2.2 Study Approach

The researcher adopted a cross-sectional approach in this study. To assess the sleep condition status and associated factors among the person with stroke at a rehabilitation center in Bangladesh was surveyed a population. The present study (Being) a cross-sectional study because the study was directed at a specified group of the population and data are collected once at a certain point (Wang & Cheng, 2020). The current study was aimed to measure sleep quality status and associated factors among the person with stroke at a rehabilitation center in Bangladesh.

3.3 Study Setting and Period

3.3.1 Study Setting

The study was conducted at adult outpatient unit of Occupational Therapy department in Centre for the Rehabilitation of Paralysed (CRP), Savar.

3.3.2 Study Period

The study period was from January 2025 to November 2025.

3.4 Study Participants

3.4.1 Study Population

The study population was person with Stroke who are attending the Occupational Therapy Neuro outpatient unit.

3.4.2 Sample Size

According to the study by Wang et al. (2025), the global prevalence of poor sleep quality in stroke survivors is 50.26%. Naing et al. (2022) used this prevalence value, and the sample size for this research can be calculated using the following formula:

Where:

$$n = \frac{Z^2 p(1 - p)}{d^2}$$

$Z = 1.96$ (Z statistic for 95% confidence level),

$P = 0.5026$ (Prevalence of poor sleep quality in stroke survivors),

$d = 0.05$ (Precision, assumed to be 5%).

Step-by-step calculation:

Step 1:

$$1 - p = 1 - 0.5026 = 0.4974$$

Step 2:

$$p(1 - p) = 0.5026 \times 0.4974 \\ = 0.24999324$$

Step 3:

$$Z^2 = 1.96^2 = 3.8416$$

Step 4:

$$3.8416 \times 0.24999324 \\ = 0.960374030784$$

Step 5:

$$d^2 = 0.05^2 = 0.0025$$

Step 6: Divide

$$n = \frac{0.960374030784}{0.0025}$$

$$= 384.1496123136$$

Step 7: Round up

$$n \approx 384$$

According to this equation, the sample should be 384 participants. After matching the inclusion and exclusion criteria within a short period of time, the researcher reached 152 participants.

3.4.3 Sampling Techniques

The researcher used the purposive sampling strategy in this research. Purposive sampling is one of the most common sampling strategies for preselected criteria relevant to a

particular research question (Campbell et al., 2020). The researcher chosen this type of sampling because the study had some specific inclusion and exclusion criteria. Therefore, the researcher selected participants who meet these criteria using purposive sampling.

3.4.3.1 Inclusion Criteria

- The stroke patient who was taken therapy service from CRP.
- Both of male and female will be included.
- Both acute and chronic patients will be included.

3.4.3.2 Exclusion Criteria

- Participants who have major hearing or speech impairment, emotional and cognitive impairment will be excluded from the study.

3.5 Variables

3.5.1 Demographic Information

- Age (in years)
- Gender
- What type is your residence?
- Marital status
- Present living arrangement
- Number of family members
- Educational level
- Employment status
- Monthly net income (BDT)

- Monthly family expenditure (BDT)

3.5.2 Stroke-Related Information

- Time since stroke
- Type of stroke you had (if known)
- Which side of the brain was affected in stroke?
- Other current health disorder (besides stroke)

3.5.3 Sleep Knowledge and Habits

- General knowledge about importance of sleep
- Did your occupational therapist give you any advice about sleep or rest during OT sessions?
- Type of sleep
- How do you feel after waking up from sleep?
- Which of the following activities are applicable before bedtime?
[What barriers are patients facing to change these activities?]
- Environment and personal habits that influence sleep quality
[What barriers are patients facing to solving this issue?]
- Do you share a bed with anyone else?
- Based on bed partner observations, do you move in your sleep?
- Do you sleep during the daytime?
- Do you exercise regularly?
- Where do you feel pain in your body during sleep?

3.5 Data sources/ measurement

First of all, the researcher prepared an initial list of potential participants attending individual therapy in the Adult Outpatient Unit of the Occupational Therapy Department at the Centre for the Rehabilitation of the Paralyzed. (CRP). Then, each potential participant was examined closely in order to establish their suitability or not for participation in the actual research according to inclusion and exclusion criteria. Those who could meet the requirements were then approached by the researcher. After giving a clear explanation of the purpose and methods of the research, those participants who showed an interest in joining were contacted one by one directly by the investigator. Following confirmation of their suitability an informed consent form was signed. Finally, using standardized assessment instruments and a structured questionnaire specially developed for this study, data was collected from each participant.

3.6 Bias

3.6.1 Ethical clearance

The proposal was reviewed and ethical approval was obtained from the Institutional Review Board (IRB) at the Department of Occupational Therapy, Bangladesh Health Professions Institute (BHPI). The IRB approval number is CRP-BHPI/IRB/05/2025/1082 (please see in details Appendix-A). Permission was also obtained from the Head of the Occupational Therapy department, BHPI, to collect data from the outpatient unit of Occupational Therapy department, CRP. The study followed ethical guidelines set forth by the World Medical Association (World Medical Association, 2022).

3.6.2 Informed consent:

Participants were informed sufficiently about the purpose and procedure of the study and researcher had followed the ethical standards of the Declaration of Helsinki guideline (World Medical Association, 2022). Before conducting the study, each participant was given two written consent form for participation and withdrawal from the study. Beside these, the researcher maintained 100% confidentiality about participant's information. The consent form was signed by the participants and it was also informed them that they have opportunity to withdraw at any time during study period.

3.6.3 Unequal relationship

The researcher gathered data using a standardised questionnaire, and the participants completed it independently. This approach eliminated potential bias, ensuring a balanced power relationship.

3.6.4 Risk and beneficence:

The participants did not involve any risk and did not get any benefit for participating in this study. The study's risks and benefits are among the most important considerations when doing research on human subjects. The researcher did not pay or offer any other benefit to the participants for giving data. The risk comprises both the possibility of injury and its consequences (Barke, 2008). There was no bias in the selection procedure because the study's participants were collected based on inclusion and exclusion criteria. The participants' provision of the information was voluntary and came with no risk.

3.6.5 Confidentiality

The researcher was highly concerned about keeping the participants' information confidential. Their names, identities, and other personal details were only shared with the

supervisor, which was clearly mentioned in the information sheet. Furthermore, any identifiable information about the participants would not be disclosed for future purposes like reports, publications, conferences, or discussions. The participants were informed about all of the confidential issues through an information sheet.

3.8: Data collection process

3.8.1 Data collection method

The data was collected through a face-to-face survey by the researcher and patient through a socio-demographic questionnaire, and the Bangla version Pittsburgh Sleep Quality Index (PSQI) (For details about the tools, see section- 3.8.2 Data Collection Instrument). The researcher administered the questionnaire in person. Face-to-face surveys maintained the quality of data and decreased the potential biases (Doyle, 2005). Several advantages existed for face-to-face surveys. These surveys were flexible and structured. They were founded on interpersonal communication and were controlled within the survey (Szolnoki & Hoffmann, 2013). Face-to-face surveys provide visual interaction between the respondent and researcher, which may encourage respondents to answer all questions correctly. During a face-to-face survey, the survey questions are verbally presented to the respondents so that they can answer them orally (Heerwegh & Loosveldt, 2008).

3.8.2 Data collection Instrument

The study used a Demographic Information Form and the Bangla version of Pittsburgh Sleep Quality Index (PSQI) to assess sleep disorder. Structured feedback form used to collect various feedback of the participants regarding the measuring sleep quality status and its associated factors. The PSQI was adapted and validated in Bangla (Mondal et al., 2018). The Bangla version Pittsburgh Sleep Quality Index (PSQI) is a self-report

questionnaire that was standardized and validated. It is used to measure the quality and patterns of sleep over a one-month period among adults. The Pittsburgh Sleep Quality Index (PSQI) is 19-items long which produces seven different components that include subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disorders, use of sleeping medication, daytime dysfunction. The scoring is done on a scale from 0 to 3. Higher scores mean greater difficulty in sleeping, and the global score ranges from 0 to 21. A global score greater than 5 is usually indicative of poor sleep quality. The PSQI is easy to administer either in paper form or electronically, which allows for easy data collection. The PSQI relies on self-reported data which may be subject to recall or social desirability bias (Buysee et al., 1989).

3.8.3 Field test

The researcher translated the demographic questionnaire into Bengali, the native language of Bangladesh, with the help of a supervisor. The researcher conducted the field test with five persons with stroke. Through this field test, some changes were fixed later, which helped to maintain the question 's quality.

3.9 Statistical methods

Data were analysed using the Statistical Package for Social Sciences (SPSS) version 26. Descriptive statistics were used to summarise the study variables. Continuous variables were presented as mean $\pm$ standard deviation (SD), while categorical variables were summarised using frequency (n) and percent (%). Analysis of the relationship between two variables at a time was conducted using the Chi-square (χ^2) test. Where the assumptions for the Chi-square test were not met (e.g., expected cell counts < 5), the Fisher's exact test was applied. Regression analysis assessed the strength and direction of relationships

between variables, reporting relevant effect measures such as regression coefficients and odds ratios with 95% confidence intervals (CI). A *P*-value of < 0.05 indicated statistical significance, corresponding to a 95% confidence level.

CHAPTER IV: RESULTS

The research was a cross-sectional study that examined the measure sleep quality status and associated factors among the person with stroke at a rehabilitation center in Bangladesh. In chapter of the result findings were displayed on tables and figures focusing more on participant's sociodemographic characteristics, clinical stroke characteristic, sleep related status, knowledge, pre-bed habit, environmental factors and exercise habits.

4.1 Sociodemographic characteristic

Table 4.1

Distribution of sociodemographic characteristics of the respondents

Variable	Category	Frequency (n=152)	Percent %
Age	18-30 years	5	3.3
	31-40 years	17	11.2
	41-50 years	55	36.2
	51-60 years	39	25.7
	61-70 years	29	19.1
	>70 years	7	4.6
	Mean age=52.08, SD=±11.630, Minimum age=18 years, Maximum age =87 years		
Gender	Male	113	74.3
	Female	39	25.7
Type of residence	Rural	79	52.0
	Semi urban	15	9.9
	Urban/Town	58	38.2
	Living alone	3	2.0
Present living arrangement	Living with spouse/partner	21	13.8
	Living with family	126	82.9
	Living in a care facility	2	1.3
Number of Family Members	1-2 Person	14	9.2
	3-4 Person	75	49.3
	5-6 Person	54	35.5
	7 or more Person	9	5.9
Marital Status	Single	3	2.0
	Married	137	90.1
	Separated	1	0.7
	Widow/Widower	11	7.2
	Divorced	0	0.0
Educational Level	No formal education	16	10.5
	Primary school	19	12.5
	Secondary school	49	32.2
	High school	34	22.4

	Bachelor's degree	20	13.2
	Master's / PhD or higher	14	9.2
Employment Status	Student	2	1.3
	Service Holder	34	22.4
	Business	28	18.4
	Abroad	30	19.7
	Housewife	37	24.3
	Laborer	4	2.6
	Unemployed/Retired	9	5.9
	Farmer	8	5.3
Monthly family income	less than 5000 Taka	97	63.8
	5000-25000 Taka	21	13.8
	25001-45000 Taka	17	11.2
	45001-65000 Taka	12	7.9
	Above 65000 Taka	5	3.3
	Mean=16118.42 BDT, SD= ±46575.572, Minimum=0		
Monthly family expenditure	10000-25000 Taka	30	19.7
	25001-40000 Taka	57	37.5
	40001-55000 Taka	26	17.1
	55001-70000 Taka	26	17.1
	Above 70000 Taka	13	8.6
	Mean= 45000 BDT, SD= ±26855.019, Minimum=10000		

Note: Percent is reported based on single response.

Table 4.1 shows the sociodemographic details of stroke patients. The study includes a total of 152 participants. The participants from this group had a mean age of 52.08 years (SD = ±11.630) and an age range of 18-87 years. The highest percentage of participants were between the ages of 41 and 50, 36.2% (n = 55). A majority, 74.3% (n = 113), of the sample were male, and 25.7% (n = 39) were female. More than 50.0% (n = 79) of the respondents lived in a rural area, 38.2% (n = 58) lived in an urban area/town, and 9.9% (n = 15) lived in a semi-rural area.

In terms of social and family structure, most of the participants were married, 90.1% (n = 137), and living with a family, 82.9% (n = 126). A family with 3-4 members was the most common, 49.3% (n = 75), followed by 5-6 members, 35.5% (n = 54). The data showed that most of the respondents attended secondary school, 32.2% (n = 49), while 10.5% (n = 16) were uneducated.

The most reported occupations were housewife, 24.3% (n = 37), service holder, 22.4% (n = 34), working abroad, 19.7% (n = 30) and Farmer 5.3% (n=8). A total of 5.9% (n = 9) were unemployed or retired.

The mean monthly family income was found to be 16,118.42 BDT (SD=±46,575.572). Most respondents, 63.8% (n = 97), reported a monthly income of less than 5,000 Taka. Monthly family expenditure was 45,000 BDT (SD=±26,855.019). The largest group selected for this study, 37.5% (n = 57), selected the range from 25,001-40,000 Taka. This indicates that much of the sample likely spent more than they earned.

4.2 Stroke related factors

Table 4.2

Distribution of respondents' responses regarding Stroke

Variable	Category	Response	
		Frequency (n=152)	Percent of cases %
Second stroke	Yes	27	17.8
	No	125	82.2
Third stroke	Yes	6	3.9
	No	146	96.1
Type of stroke	Ischemic Stroke	95	62.5
	Hemorrhagic Stroke	57	37.5
side of the brain was affected	Right Hemisphere	77	50.7
	Left Hemisphere	71	46.7
	Both Hemispheres	4	2.6

Note: Percent of cases is reported because multiple responses were allowed.

In 4.2 table, 100.0% (n=152) reported that this was their first stroke, while 17.8% (n=27) had experienced a second stroke. A small minority, 3.9% (n=6), had a history of a third stroke. Regarding the type of stroke, Ischemic Stroke was more prevalent, accounting for 62.5% (n=95) of the cases, compared to 37.5% (n=57) for Hemorrhagic Stroke. The side of the brain affected was relatively evenly distributed between the hemispheres: the right

hemisphere was affected in 50.7% (n=77) of participants, and the left hemisphere in 46.7% (n=71). A small proportion of c 2.6% (n=4), involved both hemispheres.

4.3 Comorbidity disease

Table 4.3

Comorbidity disease status among the respondents

Variable	Category	Response	
		Frequency (n=152)	Percent of cases %
Comorbidities disease	Diabetes	104	68.4
	Hypertension	140	92.1
	Mental health issues	97	63.8
	Immobility	60	39.5
	Shoulder subluxation	42	27.6
	Urinary/bowel problems	33	21.7
	Cardiovascular Disease	32	21.1
	Blood Lipid Issues	57	37.5
	Other health problems	46	30.3

Note: Percent of cases is reported because multiple responses were allowed.

Table 4.3 shows the comorbidity profile of the 152 survivors of stroke, indicating a high burden of current health conditions. Hypertension was the most common and prevalent, affecting the large majority of the respondents, 92.1% (n=140). This was followed by diabetes, 68.4% (n=104), and mental health issues, 63.8% (n=97). A small proportion of participants also reported blood lipid issues, 37.5% (n=57), and immobility, 39.5% (n=60). Other physical complications included shoulder subluxation, 27.6% (n=42), urinary/bowel disorders, 21.7% (n=33), and cardiovascular disease, 21.1% (n=32). Less common conditions were contracture, vision problems, metabolic diseases, and swallowing difficulties, with hearing disorders being rare, 30.3% (n=46).

4.4. Sleep related characteristics

Table 4.4

Type of Sleep status among the respondents

Variable	Category	Response	
		Frequency (n=152)	Percent of cases %
Type of sleep disorder	Insomnia	84	55.3
	Hypersomnia	34	22.4
	Sleep-disordered Breathing	68	44.7
	Sleep-related Movement Disorder	15	9.9
	None	34	22.4

Note: Percent of cases is reported because multiple responses were allowed.

Table 4.4 shows the more frequent type of report was insomnia, which affected the majority of the reported cases, 55.3% (n=84). Sleep-disordered breathing was also found to be significantly common, with 44.7% (n=68) of participants reporting it. Hypersomnia was reported in 22.4% (n=34) of the sample. Less frequent conditions included sleep-related movement disorders, 9.9% (n=15). Despite the high burden of sleep disorders, a proportion of participants in the group, 22.4% (n=34), indicated suffering from none of the specified sleep disorders.

Table 4.5

Sleep recovery and feeling after wakeup among the respondents

Variable	Category	Frequency (n=152)	Percent (%)
Morning alertness	Feel refreshed and energetic when I wake up	58	38.2
	Feel tired, but it's easy to start my day when I wake up	31	20.4
	Feel a little sleepy when I wake up	24	15.8
	Feel very tired and need more rest when I wake up	39	25.7

Note: Percent is reported based on single response.

Table 4.5 shows the subjective experience of sleep recovery and morning alertness as experienced by the participants. When asked to rate the feeling among participants refreshed and energetic, the greatest percentage of respondents, 38.2% (n=58), said that they felt refreshed and energetic upon waking. Similarly, 25.7% (n=39) reported that they were very tired and needed more rest, and 20.4% (n=31) felt that they were tired but that it was easy to start the day. A further 15.8% (n=24) reported being a little sleepy after waking up. This means that although a minority experience a state of feeling refreshed upon waking up, the majority of stroke survivors in this sample experience tiredness.

Table 4.6

General knowledge about sleep among the respondents

Variable	Category	Frequency (n=152)	Percent (%)
General knowledge about sleep	Little to no knowledge	56	36.8
	Basic knowledge	55	36.2
	Moderate knowledge	29	19.1
	Good knowledge	10	6.6
	Very detailed knowledge	2	1.3

Note: Percent is reported based on single response.

Table 4.6 shows the evaluation of the general knowledge of the participants on the topic of sleep, which indicated very little general knowledge among the evaluated participants. The most common levels of knowledge reported were little to no knowledge, 36.8% (n=56), and basic knowledge, 36.2% (n=55), meaning that a combination of 73% of the group of participants fell into these two lowest categories. A lower number of those surveyed said they had moderate knowledge, 19.1% (n=29). Only a few reported having higher levels of understanding, including 6.6% (n=10) claiming they had good knowledge and only 1.3% (n=2) claiming they had very detailed knowledge.

Table 4.7*Respondents receipt advice from Occupational Therapist of sleep rest*

Variable	Category	Frequency (n=152)	Percent (%)
Receipt of sleep rest advice from OT	No	117	77.0
	Yes	35	23.0

Note: Percent is reported based on single response.

Table 4.7 showed that the majority of the 152 respondents reported that they never received certain sleep rest advice from an occupational therapist 77.0% (n=117). Only a small proportion of participants, 23.0% (n=35), responded confirmed to the question on having received such advice.

4.8 Pre bed time sleep behavior and associated environmental factor

Table 4.8*Pre-Bedtime behaviors among the respondents*

Variable	Category	Response	
		Frequency (n=152)	Percent of cases %
Pre-Bedtime behaviors	Phone use	53	35.8%
	Stimulants use	52	35.1%
	Unhealthy bed time eating habit	46	31.1%
	Drinks water within 1–2 hours before bedtime	73	49.3%
	None	28	18.9%

Note: Percent of cases is reported because multiple responses were allowed.

Table 4.8 showed the analyzing of individuals' pre-bedtime behaviors, it was found that there are a number of common practices that can influence sleep quality. The commonest behavioral practice was drinking water 1-2 hours before going to bed, reported by almost half of the respondents 49.3% (n=73), while 35.1% (n=52) report taking stimulants (such as caffeine or nicotine) before bedtime. Moreover, 31.1% (n=46) of the participants have problematic like heavy meal, hugger, poor eating habits before going to bed. Finally, 18.9%

(n=28) of respondents said that they were performing none of the appearances in the survey. These results offer some interesting information about different habits prior to going to bed and how they may impact the quality of sleep.

Table 4.9

Environment and personal habits that influence sleep quality

Variable	Category	Response	
		Frequency (n=152)	Percent of cases %
Sleep Quality Influences	Bedroom uncomfortable for sleep	34	22.5%
	Outside interruptions	27	17.9%
	Psychological and behavior factors	94	62.3%
	None of the above	48	31.8%
Get up to use the bathroom	Not during the past month	25	16.4%
	Less than once a week	29	19.1%
	Once or twice a week	13	8.6%
	Three or more times a week	85	55.9%

Note: Percent of cases is reported because multiple responses were allowed.

Table 4.9 shows a number of environmental and personal factors that were reported to influence the quality of sleep of the participants. There are several factors, but the most important is psychological and behavioral problems, as 62.3% (n=94) of participants stated that mental stress, unfamiliar environment, and irregular sleep schedules caused a negative impact on their physiology, such as sleep quality. The second most important factor is the uncomfortable bedroom environment, affecting 22.5% (n=34) of the subjects, who reported room temperature, light, airflow, sunlight, and bedding as having an effect on sleep. Outside interruptions, such as distractions by other people or the sleeping habits of their partner, influence 17.9% (n=27) of the respondents. Lastly, 31.8% (n=48) of participants reported that none of the given factors affected sleep quality. Regarding bathroom usage, 16.4% (n=25) of respondents did not need to use the bathroom in a month,

19.1% (n=29) used it less than once a week, 8.6% (n=13) once or twice a week, and the majority, 55.9% (n=85), used it three or more times a week.

Table 4.10

Sleep Patterns and Exercise Habits Among Participants

Variable	Category	Frequency (n=152)	Percent %
Bed sharing arrangement	Alone	19	12.5
	Husband/wife only	88	57.9
	Husband/wife and children	15	9.9
	Caregiver	30	19.7
Perceived sleep movement	No	19	12.5
	Yes	118	77.6
	Sometimes, but not often	15	9.9
Day time Sleeping	No	26	17.1
	Yes	126	82.9
Day time sleep duration	No nap	26	17.1
	Short nap	6	3.9
	Moderate duration nap	76	50.0
	Extended duration nap	44	28.9
	Mean=76.72, SD=68.615, Minimum=0, Maximum=300,		
Regularly exercise	Yes	78	51.3
	No	74	48.7
Frequency of Exercise	1-60 minutes	64	42.1
	61-120 minutes	7	4.6
	Above 120 minutes	7	4.6
	Mean=30.49, SD=44.617, Minimum=0, Maximum=240		

Note: Percent is reported based on single response.

Table 4.10 shows the examination of sleep patterns and exercise habits, showing some important characteristics. As for sleeping arrangements, most participants, 57.9% (n=88), only shared a bed with their husband or wife, while 19.7% (n=30) slept with a caregiver, and 12.5% (n=19) slept alone. A significant percentage of the respondents, 77.6% (n=118), had the perception that they moved during their sleep. Daytime sleeping was extremely common, with 82.9% (n=126) reporting napping. The length of these naps showed that half of the group of participants, 50.0% (n=76), took moderate-length naps, and 28.9% (n=44)

took extended naps. The mean nap duration was 76.72 minutes ($SD=\pm 68.62$). Regarding physical activity, the sample was almost equally divided, with only 51.3% ($n=78$) of them reporting that they exercise regularly. However, for those who did exercise, the sessions were usually quite short, with a mean duration of 30.49 minutes ($SD=\pm 44.62$), and 42.1% ($n=64$) exercised for 60 minutes or less per session.

Table 4.11

Pain location during sleep among response

Variable	Category	Response	
		Frequency ($n=152$)	Percent of cases %
Pain locations during Sleep	No pain during sleep	56	36.8%
	Axial skeleton	37	24.3%
	Upper limb	86	56.6%
	Lower limb	41	27.0%

Note: Percent of cases is reported because multiple responses were allowed.

Table 4.11 shows the evaluation of pain locations during sleep, finding that a significant majority of the 152 study participants, 63.2% ($n=96$), had pain in one or more body areas. Those who did report pain had the upper limb (shoulder, elbow, wrist, finger) as the most common location, affecting 56.6% ($n=86$) of participants. The second most common location was the axial skeleton (head, neck, chest, upper back, lower back, abdominal, pelvic), affecting 24.3% ($n=37$) of the participants. Finally, 27.0% ($n=41$) of participants had lower extremity pain (hip, knee, ankle, foot). These findings indicate that the most common type of pain reported was upper limb pain, followed by axial and lower limb pain, with less frequency.

Figure 4.1

A level of sleep quality among the participants

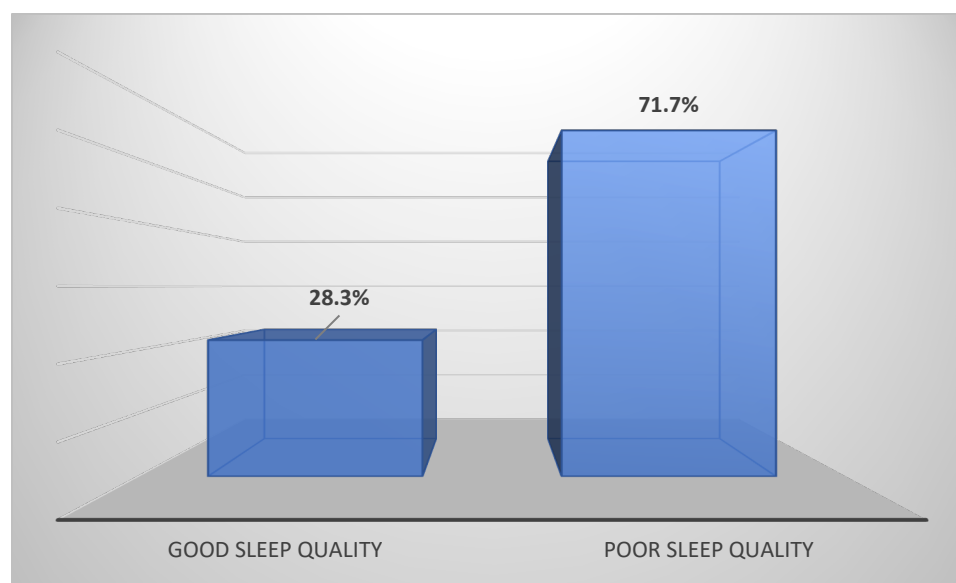


Figure 4.1 shown the total sleep quality of the subjects, evaluated with the Pittsburgh Sleep Quality Index (PSQI). The results show a high incidence of poor sleep in the participants. The mean calculated PSQI score was $(1.72, \pm .452)$. Based on a clinical cutoff score of >5 , 71.7% ($n=109$) of respondents were identified as poor sleepers. In contrast, 28.3% ($n=43$) of the subjects were classified as good sleepers. This indicates that sleep disorder is a prevalent problem among the studied population of stroke survivors.

Table 4.12

The association of Overall Pittsburgh Sleep Quality Index (PSQI) with demographic factors

Variable	Category	Good Sleep (n%)	Poor Sleep (n%)	Fisher's Exact Test	P-value
Age	18-30 years	2(4.7%)	3(2.8%)	14.848	.007
	31-40 years	4(9.3%)	13(11.9%)		
	41-50 years	21(48.8%)	34(31.2%)		
	51-60 years	13(30.2%)	26(23.9%)		
	61-70 years	1(2.3%)	28(25.7%)		
	70 years above	2(4.7%)	5(4.6%)		
Marital Status	Single	2(4.7%)	1(0.9%)	2.987	.425

	Married	39(90.7%)	98(89.9%)		
	Separated	0(0.0%)	1(0.9%)		
	Widow/Widower	2(4.7%)	9(8.3%)		
Present living arrangement	Living alone	0(0.0%)	3(2.8%)		
	Living with spouse/partner	5(11.6%)	16(14.7%)	1.440	.729
	Living with family	38(88.4%)	88(80.7%)		
	Living in a care facility	0(0.0%)	2(1.8%)		
Number of Family Members	1-2	6(14.0%)	8(7.3%)		
	3-4	18(41.9%)	57(52.3%)	2.530	.470
	5-6	16(37.2%)	38(34.9%)		
	7 or more	3(7.0%)	6(5.5%)		
Educational Level	No formal education	6(14.0%)	10(9.2%)		
	Primary school	4(9.3%)	15(13.8%)		
	Secondary school	12(27.9%)	37(33.9%)	2.600	.776
	High school	11(25.6%)	23(21.1%)		
	Bachelor's degree	7(16.3%)	13(11.9%)		
	Master's / PhD or higher	3(7.0%)	11(10.1%)		
Employment Status	Student	1(2.3%)	1(0.9%)		
	Service Holder	10(23.3%)	24(22.0%)		
	Business	12(27.9%)	16(14.7%)		
	Abroad	12(27.9%)	18(16.5%)	12.099	.071
	Housewife	5(11.6%)	32(29.5%)		
	Laborer	0(0.0%)	4(3.7%)		
	Unemployed/Retired	1(2.3%)	8(7.3%)		
	Farmer	2(4.7%)	6(5.5%)		
Monthly family income	less than 5000 Taka	29(67.4%)	68(62.4%)		
	5000-25000 Taka	6(14.0%)	15(13.8%)		
	25001-45000 Taka	3(7.0%)	14(12.8%)	1.365	.876
	45001-65000 Taka	4(9.3%)	8(7.3%)		
	Above 65000 Taka	1(2.3%)	4(3.7%)		
Monthly family expenditure	10000-25000 Taka	10(23.3%)	20(18.3%)		
	25001-40000 Taka	18(41.9%)	39(35.8%)	1.467	.854
	40001-55000 Taka	6(14.0%)	20(18.3%)		
	55001-70000 Taka	6(14.0%)	20(18.3%)		
	Above 70000 Taka	3(7.0%)	10(9.2%)		

Note: Fisher's Exact test was used to examine.

Table 4.12 shows that Fisher's Exact test was used to analyze the link between different demographic factors and overall sleep quality (as measured by the Pittsburgh Sleep Quality Index, PSQI). The results showed the presence of a significant association with Age ($P=.007$), with the greatest difference existing between the two groups of individuals aged 61-70 years, where a greater proportion of the poor sleepers, 25.7% ($n=28$), were present

compared to only 2.3% (n=1) of the good sleepers. In contrast, there were no statistically significant associations with marital status ($P=.425$), present living arrangement ($P=.729$), number of family members ($P=.470$), educational level ($P=.776$), employment status ($P=.071$), monthly family income ($P=.876$), or monthly family expenditure ($P=.854$). This suggests that in this sample, age was the only demographic factor that had a clear statistical association with sleep quality.

Table 4.13

The association of Overall Pittsburgh Sleep Quality Index (PSQI) with stroke related factors

Variable	Category	Good Sleep (n%)	Poor Sleep (n%)	Fisher's Exact Test	P-value
Third stroke	Yes	1(2.3%)	5(4.6%)	.460	.497
	No	42(97.7%)	104(95.4%)		
side of the brain was affected	Right Hemisphere	22(51.2%)	55(50.5%)	1.137	.731
	Left Hemisphere	21(48.8%)	50(45.9%)		
	Both Hemispheres	0(0.0%)	4(3.7%)		
General knowledge about sleep	Little to no knowledge	15(34.9%)	41(37.6%)	.803	.984
	Basic knowledge	17(39.5%)	38(34.9%)		
	Moderate knowledge	8(18.6%)	21(19.3%)		
	Good knowledge	3(30%)	7(6.4%)		
	Very detailed knowledge	0(0.0%)	2(1.8%)		
Morning alertness	Feel refreshed and energetic when I wake up	33(76.7%)	25(22.9%)	39.500	.001
	Feel tired, but it's easy to start my day when I wake up	6(14.0%)	25(22.9%)		
	Feel a little sleepy when I wake up	2(4.7%)	22(20.2%)		
	Feel very tired and need more rest when I wake up	2(4.7%)	37(33.9%)		

Bed sharing arrangement	Alone	4(9.3%)	15(13.8%)	2.156	.546
	Husband/wife only	28(65.1%)	60(55.0%)		
	Husband/wife and children	5(11.6%)	10(9.2%)		
	Caregiver	6(14.0%)	24(22.0%)		
Perceived sleep movement	No	4(9.3%)	15(13.8%)	2.399	.288
	Yes	37(86.0%)	81(74.3%)		
	Sometimes, but not often	2(4.7%)	13(11.9%)		
Day time sleep duration	No nap	5(11.6%)	21(19.3%)	9.028	.023
	Short nap	1(2.3%)	5(4.6%)		
	Moderate duration nap	30(69.8%)	46(42.2%)		
	Extended duration nap	7(16.3%)	37(33.9%)		
Frequency of Exercise	1-60 minutes	20(76.9%)	44(84.6%)	2.006	.419
	61-120 minutes	4(15.4%)	3(5.8%)		
	Above 120 minutes	2(7.7%)	5(9.6%)		

Note: Fisher's Exact test was used to examine.

Table 4.13 shows that Fisher's Exact Test was used to explore the relationship between clinical, knowledge, and behavioral factors on post-stroke sleep quality PSQI index. The results show that the incidence of a third stroke ($P=.497$) and the side of the brain affected ($P=.731$) showed no statistically significant association with sleep quality. Similarly, a person's self-rated general knowledge about sleep ($P=.984$), his or her bed-sharing arrangement ($P=.546$), presence of perceived sleep movement ($P=.288$), and duration of exercise ($P=.419$) were not significantly associated with whether they had good or poor sleep. However, two factors showed significant associations. First, morning alertness was highly significantly associated with sleep quality ($P=.001$), and the difference was that 76.7% ($n=33$) of good sleepers reported feeling refreshed and energetic upon waking, compared to only 33.9% ($n=37$) of poor sleepers, who were more likely to feel sleepy or very tired. Second, the duration of daytime sleep was also a significant factor ($P=.023$), with a moderate daytime nap being more frequent in good sleepers, 69.8% ($n=30$), than

poor sleepers, 42.2% (n=46), while an extended daytime nap was higher in the poor sleep group, 33.9% (n=37), than in the good sleep group, 16.3% (n=7).

Table 4.14

The association of Overall Pittsburgh Sleep Quality Index (PSQI) with demographic factors

Variable	Category	Good Sleep (n%)	Poor Sleep (n%)	Chi-Square (x ²)	P-value
Gender	Male	38(88.4%)	75(68.8%)	6.188	.013
	Female	5(11.6%)	34(31.2%)		
Type of residence	Rural	21(48.8%)	58(53.2%)	.331	.847
	Semi urban	5(11.6%)	10(9.2%)		
	Urban/Town	17(39.5%)	41(37.6%)		
Second stroke	Yes	5(11.6%)	22(20.2%)	1.545	.214
	No	38(88.4%)	87(79.8%)		
Type of stroke	Ischemic Stroke	31(72.1%)	64(58.7%)	2.354	.125
	Hemorrhagic Stroke	12(27.9%)	45(41.3%)		
side of the brain was affected	Right Hemisphere	22(51.2%)	55(50.5%)	1.639	.441
	Left Hemisphere	21(48.8%)	50(45.9%)		
	Both Hemispheres	0(0.0%)	4(3.7%)		
Receipt of sleep rest advice from OT	No	33(76.7%)	84(77.1%)	.002	.996
	Yes	10(23.3%)	25(22.9%)		
Day time Sleeping	No	5(11.6%)	21(19.3%)	1.269	.260
	Yes	38(88.4%)	88(80.7%)		
Regularly exercise	No	17(39.5%)	57(52.3%)	2.009	.156
	Yes	26(60.5%)	52(47.7%)		
Need to get up to use the bathroom	Not during the past month	11(25.6%)	14(12.8%)	11.161	0.011
	Less than once a week	11(25.6%)	18(16.5%)		
	Once or twice a week	6(14.0%)	7(6.4%)		
	Three or more times a week	15(34.9%)	70(64.2%)		

Note: Chi-Square (x²) test was used to examine.

Table 4.14 shows that the chi-square test was used to analyze the relationship between other demographic and clinical variables with quality of sleep (PSQI) as the outcome. The findings showed there is a statistically significant relationship with Gender ($P=.013$), where males were more represented in the good sleepers, 88.4% (n=38), compared to the

poor sleepers, 68.8% (n=75), and females were more represented in the poor sleepers, 31.2% (n=34), than in the good sleepers, 11.6% (n=5). Several other factors were not significantly correlated to sleep quality. These included the type of residence ($P=.847$); the categorical distribution of rural, semi-urban, and urban dwellers across sleep quality groups was similar; the presence of a second stroke ($P=.214$); the type of stroke (Ischemic vs. Hemorrhagic, $P=.125$); and the side of the brain involved ($P=.441$). In addition, clinical and behavioral factors such as receipt of sleep rest advice from an Occupational Therapist (OT) ($P=.996$), daytime sleeping ($P=.260$), and self-reported exercise regularly ($P=.156$) did not have significant relationships with sleep quality outcomes. This means that of all the variables tested in this table, gender was the only variable with statistical significance to sleep quality post-stroke.

Individuals who frequently wake up at night to use the bathroom are more likely to experience poor sleep quality. A significant association was found between nighttime bathroom visits and sleep quality ($P=.011$), highlighting the impact of frequent nocturnal urination (nocturia) on overall sleep health. Among those who did not wake up, 25.6% (n=11) reported good sleep, while only 12.8% (n=14) reported poor sleep. For those waking less than once a week, 25.6% (n=11) had good sleep, with 16.5% (n=18) experiencing poor sleep. In the once or twice a week group, 14.0% (n=6) reported good sleep compared to 6.4% (n=7) with poor sleep. However, among participants who woke three or more times a week, 64.2% (n=70) reported poor sleep, while 34.9% (n=15) reported good sleep.

Table 4.15

The association of Overall Pittsburgh Sleep Quality Index (PSQI) with health issues, sleep disorders, pre-bedtime behavior, and sleep quality

Variable	Category	Good Sleep (n%)	Poor Sleep (n%)	Chi-Square (x ²)	P-value
Comorbidities disease	Diabetes	22(21.2%)	82(78.8%)	8.266	.004
	Hypertension	37(26.4%)	103(73.6%)	3.027	.082
	Mental health issues	21(21.6%)	76(78.4%)	5.826	.016
	Immobility	10(16.7%)	50(83.3%)	6.601	.010
	Shoulder subluxation	7(16.7%)	35(83.3%)	3.865	.049
	Urinary/bowel problems	8(24.2%)	25(75.8%)	.340	.560
	Cardiovascular Disease	10(31.3%)	22(68.8%)	.175	.676
	Blood Lipid Issues	15(26.3%)	42(73.7%)	.175	.676
	Other health problems	10(%)	36(78.3%)	1.395	.23
Type of sleep disorder	Insomnia	3(3.6%)	81(96.4%)	56.550	.001
	Hypersomnia	6(17.6%)	28(82.4%)	2.445	.118
	Sleep-disordered Breathing	14(20.6%)	54(79.4%)	3.597	.058
	Sleep-related Movement Disorder	4(26.7%)	11(73.3%)	.022	.883
	None	23(67.6%)	11(32.4%)	33.442	.001
Pre-Bedtime behaviors	Phone use	13(24.5%)	40(75.5%)	.567	.451
	Stimulants use	11(21.2%)	41(78.8%)	1.984	.159
	Unhealthy bed time eating habit	10(21.7%)	36(78.3%)	1.395	.238
	Drinks water within 1–2 hours before bedtime	17(23.3%)	56(76.7%)	1.732	.188
	None	15(53.6%)	13(46.4%)	10.814	.001
Sleep Quality Influences	Bedroom uncomfortable for sleep	9(26.5%)	25(73.5%)	.071	.789
	Outside interruptions	8(29.6%)	19(70.4%)	.029	.865
	Psychological and behavior factors	19(20.2%)	75(79.8%)	7.921	.005

	None of the above	20(41.7%)	28(48%)	6.188	.013
	No pain during sleep	24(42.9%)	32(57.1%)	9.275	.002
Pain locations	Axial skeleton	6(16.2%)	31(83.8%)	3.514	.061
during Sleep	Upper limb	18(20.9%)	68(79.1%)	5.288	.021
	Lower limb	8(19.5%)	80.5(%)	2.132	.114

Note: Chi-Square (χ^2) test was used to examine.

Table 4.15 shows the results of a Chi-Square test of the relationship between various health issues, sleep disorders, pre-bedtime behavior, and sleep quality. It shows an important fact that diabetes ($P=.004$), mental health issues ($P=.016$), immobility ($P=.010$), and shoulder subluxation ($P=.049$) were significantly associated with poor sleep quality. However, hypertension ($P=.082$), cardiovascular disease ($P=.676$), and urinary/bowel disorder ($P=.560$) were not significantly related to sleep quality.

Regarding sleep disorders, insomnia ($P=.001$) was significantly associated with poor sleep quality, whereas hypersomnia ($P=.118$) and sleep-disordered breathing ($P=.058$) were not significantly associated with poor sleep quality. Individuals who reported having no sleep disorders were also significantly associated with good sleep quality ($P=.001$).

In terms of pre-bedtime behaviors, there were no significant associations between phone use ($P=.451$), stimulant use ($P=.159$), and unhealthy bedtime eating habits ($P=.238$) and sleep quality. However, those who reported doing none of these behaviors showed a significant correlation with better sleep quality ($P=.001$). Psychological and behavioral considerations ($P=.005$), such as stress and irregular sleep habits, had significant associated effects, showing a significant relationship with poor sleep quality, whereas quality of sleep

was not significantly related to bedroom comfort ($P=.789$) or interruptions from external sources ($P=.865$).

Finally, pain locations during sleep showed that no pain ($P=.002$) was significantly associated with good quality sleep, and pain located in the upper limbs ($P=.021$) was moderately associated with poor quality of sleep. However, axial skeleton pain ($P=.061$) and lower limb pain ($P=.114$) did not show a significant relationship to sleep quality. These findings indicate that comorbidities such as diabetes, mental health issues, immobility, shoulder subluxation, psychological factors, and upper limb pain have an important influence on sleep quality, while pre-bedtime behaviors and some environmental factors are less influential.

Table 4.16

Binary and multivariate logistic regression analysis of factors associated with Pittsburgh Sleep Quality Index (PSQI) (Unadjusted and Adjusted Model)

Variables	PSQI		Unadjusted Model		Adjusted Model	
	Good sleep	Poor sleep	COR (95%CI)	P-value	COR (95% CI)	P-value
Age						
18_30 years	2(4.7%)	3(2.8%)	Reference		Reference	
31_40 years	4(9.3%)	13(11.9%)	.511(.053_6.795)	.680	1.142(.009_11.934)	.537
41_50 years	21(38.2%)	34(31.2%)	.262(.178_9.474)	.796	.2919(.037_14.949)	.849
51_60 years	13(30.2%)	26(23.9%)	.434(.115_3.645)	.622	1.234(.017_4.908)	.392
61_70 years	1(2.3%)	28(25.7%)	.223(.136_4.696)	.805	.985(.021_6.678)	.503
70 years above	2(4.7%)	5(4.6%)	2.416(.847_148.131)	.067	.960(.074_92.783)	.598
Gender						
Male	38(88.4%)	75(68.8%)	1.237(.105_802)	.017	.706(.117_2.086)	.337
Female	5(11.6%)	34(31.2%)	Reference		Reference	
Morning alertness						
Feel refreshed and energetic when I wake up	33(76.7%)	25(22.9%)	Reference		Reference	

Feel tired, but it's easy to start my day when I wake up	6(14.0%)	25(22.9%)	3.195(.009_.186)	.001	2.698(.007_.659)	.020
Feel a little sleepy when I wake up	2(4.7%)	22(20.2%)	1.491(.042_1.207)	.082	1.903(.013_1.711)	.126
Feel very tired and need more rest when I wake up	2(4.7%)	37(33.9%)	.520(.078_4.526)	.616	1.793(.010_2.806)	.213
Day time sleep duration						
No nap	5(11.6%)	21(19.3%)	Reference			
Short nap	1(2.3%)	5(4.6%)	.230(.224_2.819)	.722	.656(.247_15.068)	.531
Moderate duration nap	30(69.8%)	46(42.2%)	.056(.095_9.378)	.962	1.770(.254_135.560)	.269
Extended duration nap	7(16.3%)	37(33.9%)	1.238(.115_735)	.009	.576(.112_2.830)	.485
Comorbidities disease						
Diabetes						
No	21(48.8%)	27(24.8%)	Reference		Reference	
Yes	22(51.2%)	82(75.2%)	1.064(.165_.723)	.005	.789(.142_1.453)	.183
Mental health issues						
No	22(51.2%)	33(30.3%)	Reference		Reference	
Yes	21(48.8%)	76(69.7%)	.881(.201_.885)	.017	.043(.239_3.836)	.951
Immobility						
No	33(76.7%)	59(64.1%)	Reference		Reference	
Yes	10(23.3%)	50(45.9%)	1.028(.160_.797)	.012	.583(.153_2.034)	.377

Shoulder subluxation						
No	36(83.7%)	74(67.9%)	Reference		Reference	
Yes	7(16.3%)	35(32.1%)	.889(.166_1.015)	.054	0.25(.184_5.180)	.977
Type of sleep disorder						
Insomnia						
No	40(93.0%)	28(25.7%)	Reference		Reference	
Yes	3(7%)	81(74.3%)	3.653(.007_.090)	.001	3.426(5.886_160.705)	.001
None						
No	20(46.5%)	98(89.9%)	Reference		Reference	
Yes	23(53.5%)	11(10.1%)	2.327(4.316_24.323)	.001	-.736(.126_1.820)	.280
Pre bed time behavior						
None of the above before bedtime						
No	28(65.1%)	96(88.1%)	Reference		Reference	
Yes	15(34.9%)	13(11.9%)	1.375(1.685_9.290)	.002	1.031(.079_1.617)	.181
Sleep Quality Influences						
Psychological and behavior factors						
No	24(55.8%)	34(31.2%)	Reference		Reference	
Yes	19(44.2%)	75(68.8%)	1.025(.174_.741)	.006	1.596(.036_1.153)	.072

Pain locations during Sleep						
No pain						
No	19(44.2%)	77(70.6%)	Reference		Reference	
Yes	24(55.8%)	32(29.4%)	1.112(1.465_6.304)	.003	.464(.102_3.889)	.618
Upper limb						
No	25(58.1%)	41(37.6%)	Reference		Reference	
Yes	18(41.9%)	68(62.4%)	.834(.211_ .891)	.023	.009(.171_5.747)	.992

Note: Binary and multivariate logistic regression analysis was used to examine.

Table 4.16 shows the identified factors related to quality of sleep measured by Pittsburgh Sleep Quality Index (PSQI) of participants. The adjusted models contain only those variables that had a significant association in the binary logistic regression analysis. In the adjusted model, participants who reported that they were tired but able to start their day were 2.7 times more likely to have poor sleep than those who woke up feeling refreshed (AOR [Adjusted odds ratio] = 2.698, 95% CI [Confidence interval] = 0.659-1.711, $P = 0.020$). Similarly, poor sleep quality among patients with compared to those without insomnia was 3.43 (AOR = 3.426, CI = 1.886-160.705, $P < 0.001$). Participants who mentioned upper limbs pain were 0.83 less likely to have poor sleep (AOR = 0.834, 95% CI=0.211-0.891, $P = 0.023$) than no pain. In the adjusted models, only age, gender and daytime sleep duration were not significantly linked to poor sleep quality ($P > 0.05$). Finally, co-morbidities including diabetes and mental health were also not significantly associated with sleep quality ($P > 0.05$). These findings indicate that morning alertness and insomnia are the most important variables that influence sleep quality.

CHAPTER V: DISCUSSION

The study aimed to measure sleep quality status and associated factors among persons with stroke at a rehabilitation center in Bangladesh. A face-to-face survey was conducted to collect information from the participants, but it was difficult to reach all of the participants and gather data because more time was needed to take part in this study. Although 152 persons, 74.3% (n=113) male and 25.7% (n=39) female, with stroke participated. The results show several important socio-demographic factors that influence the sleep quality of persons with stroke. The demographic variables analyzed in this study, particularly age, gender, and socio-economic conditions, allow for an in-depth understanding of post-stroke sleep disorders.

One of the major findings in this particular study is the alarmingly high prevalence of poor sleep quality in stroke survivors, where 71.7% (n=109) of persons, 68.9% (n=75) male and 31.2% (n=34) female, with stroke were found to be poor sleepers according to PSQI criteria. This figure is in remarkable agreement with the 70.6% prevalence reported in an Ethiopian study (Mansour et al., 2020). Given that both studies were carried out in developing countries, which tend to have similar socioeconomic difficulties and healthcare resource limitations, this consistency is of great significance. Global estimates show a high incidence of poor sleep at 50.26% in patients who are survivors of stroke (Y. Wang, Li, et al., 2025). However, large geographical differences exist, with some prevalence rates as high as 84% in Iran (Khazaei et al., 2021) and 60.0% in Saudi Arabia (Alabdali et al., 2025), where as a much lower prevalence of 15.6% was reported in Central Taiwan (Tsai et al., 2022). These differences are probably due to variations in sampling, assessment methods, cut-off points, and population characteristics.

The alertness in the morning between the two groups one being tired but still able to start their day and another feeling refreshed. Furthermore, the adjusted odds ratio (AOR = 2.698, CI = 0.659-1.711, $P = 0.020$). People who reported being tired but still able to start their day was 2.7 times higher for poor sleep quality, as opposed to those who woke up feeling refreshed. This finding highlights the significance of morning alertness as a predictor of sleep quality, which is also reflected in the results of prior research, where morning alertness is associated with better sleep quality (Hasan et al., 2021; Zhao et al., 2021).

In this study, the sleep disorder most commonly reported by the participants was insomnia 55.3% (n=84); sleep disordered breathing 44.7% (n=68) and hypersomnia 22.4% (n=34). These findings are consistent with the literature, which highlights the most common disorders in stroke survivors to being insomnia and sleep disordered breathing (Hasan et al., 2021). The presence of sleep disordered breathing in particular is of concern as other studies are associated with worse long-term outcome, including increased mortality rates (Fulk et al., 2020). In the present study it was found that insomnia was a significant risk factor for a person to develop poor sleep since the prevalence of people experiencing insomnia was noted 3.43 times more likely to have poor sleep than people without insomnia (AOR = 3.426, CI = 5.886-160.705, $P < 0.001$). This result concurs with global research which highlighted the high prevalence of insomnia after stroke, and its negative effect on recovery (Tsai et al., 2022; Cai et al., 2021).

A significant relationship between age and sleep quality ($P = .007$), in which the age group of 61-70 years had a significant difference with sleep quality. Studies which have found that ageing is one of the major factors that affects sleep quality after stroke.

The higher prevalence of poor sleep in this age group other studies strengthening the claim that elderly stroke survivors experience more significant sleep disorders (Hasan et al., 2021; Kim et al., 2017).

The sociodemographic factor male gender that was statistically significantly related to the post-stroke sleep disorder in this study analysis is gender ($P = .013$). which supports the findings in the review of having more severe sleep disordered breathing in males after stroke (McDermott et al., 2018).

The neurological correlates of sleep disorder, stroke type (ischemic vs. hemorrhagic), affected side of the brain (right vs left) hemisphere, and occurrence of a third stroke were not associated with sleep quality. Similarly, some studies reported no have correlation between lesion side and sleep quality, supporting findings that lesion location may not be as significant as other factors (Kojic et al., 2022).

The prevalence of daytime napping was also high with 82.9% (n=126) of the participants reporting napping and 50.0% (n=76) of them taking moderate-length naps. The duration and type of the daytime sleep also had a significant effect on sleep quality ($P = .023$). Moderate daytime nap being more frequent in good sleepers 69.8% (n=30) than poor sleepers 42.2% (n=46), while an extended daytime nap was higher in the poor sleep group 33.9% (n=37), than in the good sleep group 16.3% (n=7) have shorter duration of naps. These results are in line with the review's conclusion that sleep disorder is more common in stroke survivors with abnormal sleep pathology and too much sleep during the day (Hasan et al., 2021). Another research shows that short to moderate naps (30-90 minutes) might have a positive effect on cognitive health, while other studies identified longer naps

(>90 minutes) were associated with poor outcomes, including more sleep fragmentation (Li, et al., 2022).

78.8% (n=82) Diabetes, 78.4% (n=76) Mental Health Issues, 83.3% (n=50) Immobility, and 83.3% (n=35) Shoulder Subluxation these factors were significantly linked with poor sleep quality (P values ranging from .004 to .049), indicating the importance of comorbid conditions on post-stroke poor sleep quality. These results are familiar in studies related to the high occurrence of insomnia and other sleep disorders in people with chronic conditions such as diabetes and mental health disorder (Cai et al., 2021). It is highly important to note the relationship between shoulder subluxation and poor quality of sleep which highlights the importance of treating pain-related problems, such as Hemiplegic Shoulder Pain (HSP) which is known to disrupt sleep (Khatooni et al., 2025). Other hand hypertension, Cardiovascular disease, Urinary/bowel disorder were not significantly associated (all $P > .05$) and were not linked to poor sleep quality.

A strong correlation between stress and irregular sleep patterns ($P = .005$) and poor sleep quality demands a focus on psychological factors, specifically post-stroke depression (PSD), in the rehabilitation of stroke patients. This review highlights the bi-directional relationship between insomnia and depression, where both conditions exacerbate each other (Cai et al., 2021).

Participants who had upper limbs pain were 0.83 less likely to have poor sleep (AOR = 0.834, 95% CI=0.211-0.891, $P = 0.023$) than no pain. Pain locations during sleep showed that no pain ($P = .002$) was significantly associated with good quality of sleep and pain located in the upper limbs ($P = .021$) was associated with poor quality of sleep. However, axial skeleton pain ($P = .061$) and lower limbs pain ($P = .114$) did not show a

significant relationship to sleep quality. The findings support other studies which have quoted that pain has a heavy interference on the quality of sleep it indicates that pain has a more diverse effect (Khatooni et al., 2025; Fulk et al., 2020).

The study corroborates findings by Komleva et al. (2024), that nocturia is associated with poor sleep quality and shorter sleep duration, this study shows a significant correlation ($P = 0.011$) between nighttime bathroom visits and sleep quality. Participants who did not wake at night reported better sleep quality 25.6% (n=11) compared to those waking less frequently 25.6% (n=11) good for less than once per week, 16.5% (n=18) poor. However, those waking three or more times weekly experienced significantly poorer sleep, with 64.2% (n=70) reporting poor quality.

Previous studies have reported that living in larger households can be protective against post-stroke sleep disturbances, whereas living alone or in smaller households is associated with higher risk (Cahuiche et al., 2025; Dong et al., 2020). Similarly, higher educational level and income have been linked to better sleep quality, greater engagement in rehabilitation, and improved overall recovery (Zamzam et al., 2020; Butsing et al., 2025). In the present study, living arrangement, number of family members, education, and family income/expenditure were not significantly (all $P > 0.05$) related to sleep status.

Some studies have found no significant association between hemispheric lesion location and sleep disorders (Kojić et al., 2022), whereas others have suggested that left-hemisphere lesions may be protective against poor sleep quality (Wang et al., 2025). This result found that stroke type, lesion side and recurrence had no impact on sleep.

Reviews have highlighted a significant gap between the recognized importance of sleep and the quality and consistency of sleep care provided, effectiveness of current treatments (Benca et al., 2023). Affini et al., (2022) said that a lack of institutional systems to promote sleep in hospital settings. A limited sleep-specific knowledge among Occupational Therapists (Ludwig et al., 2022). This Study showed that the majority of the 77.0% (n=117) respondents reported that they never received sleep rest advice from an Occupational Therapist and a small proportion of participants, 23.0% (n=35), responded confirmed to the question on having received such advice. But this study also found that receiving sleep-rest guidance from an Occupational Therapist were not significantly associated to sleep outcomes.

In addition, individual lifestyle and environmental factors such as mobile phone use before bed, stimulant intake, unhealthy bedtime eating, bedroom comfort, and external disruptions at night were also not independently linked with sleep quality. But evidence showed that where late-night technology use has been linked with excessive daytime sleepiness and impaired daytime function (Hartley et al., 2022), and substances such as caffeine and alcohol have been shown to alter sleep architecture, reduce sleep efficiency, and disrupt REM sleep (Gardiner et al., 2023; McCullar et al., 2024). Likewise, smoking and poor diet are reported to worsen insomnia and are themselves influenced by sleep quality in a bidirectional fashion (Nuñez et al., 2020; Zuraikat et al., 2020).

CHAPTER VI: CONCLUSION

6.1 Strength and Limitation

6.1.1 Strength

- Data was collected through a face-to-face survey using a standardized scale, eliminating the possibility of bias during both data collection and data entry processes.
- The researcher received permission to use the Bangla adopted version PSQI questionnaire.
- There was no unauthorized access to the data, which was used without any modifications.
- Study-related data was securely stored in Google Drive with a strong password.
- To ensure data validity, all data used in this study will be destroyed after a certain period.
- This was the first study about PSQI among persons with stroke in Bangladesh.

6.1.2 Limitation

There are some limitations of the study. They are,

- Insufficient time for data collection may have restricted sample representation and depth of understanding.
- The participants were based in a specific rehabilitation centre, which cannot be generalised.
- Some participants were disinterested to participate.

6.2 Practice Implication

6.2.1 Recommendation for future clinical practice

Sleep disorders affect stroke patients affecting their recovery and quality of life. Sleep quality should be measured frequently in the rehabilitation setting using a reliable and valid scale capable of detecting changes such as the Pittsburgh Sleep Quality Index (PSQI). It is important to include sleep education in rehabilitation programs for stroke patients and caregivers. A person can understand the importance of sleep and how it can help him recover faster. Therefore, this lesson aims to improve their sleep.

A good treatment plan will address the psychological and physical factors affecting sleep. Shoulder subluxation and musculoskeletal pain due to poor sleep quality should be addressed with appropriate pain management strategies, including therapeutic treatment and pain medication. Stress and post-stroke depression can induce sleep disturbances. This shows that the inclusion of mental health care in stroke rehab like counselling, support groups and psychotropic medications must be vital to improve sleep.

Home-based rehabilitation (HBR) programs can help with recovery. They can work with patients on their lifestyle and improving sleep hygiene. They can also use Cognitive Behavioral Therapy for Insomnia (CBT-I) to help patients sleep better. Napping time, specifically for shorter naps lasting 30 to 90 minutes, should not be too long.

There is a strong association between poor sleep and other health conditions like diabetes, mental health issues, disability. A multidisciplinary team can work together to resolve these issues using this approach.

In Bangladesh, stroke policymakers should include sleep management protocols in care. This involves health professionals training, patient counselling, and effective sleep disorder management as a proper stroke management plan for better outcomes in health and quality of life. In addition, technological solutions like sleep monitors and mobile-based monitoring applications provide continuous feedback on sleeping habits and therapy guidance.

6.2.2 Recommendation for future Research

Future research on sleep problems in stroke survivors should prioritize several key areas to enhance understanding and treatment. It is essential to monitor changes in sleep quality over time and its impact on recovery. Exploring potential treatments, such as sleep hygiene routine, Cognitive Behavioral Therapy for Insomnia (CBT-I), medications, and rehabilitation programs, is critical. Additionally, investigating how mental health conditions, particularly depression and stress, impair sleep issues can lead to improved therapeutic strategies. Addressing pain management, especially shoulder pain, is also vital for enhancing sleep quality. Furthermore, larger and more diverse sample populations is necessary to enhance the generalizability of findings to influenced by culture, income, and healthcare accessibility. The effects of comorbidities like diabetes and hypertension on sleep should also be examined. Finally, studying the impacts of nocturia and good sleep hygiene on sleep could produce valuable insights. By targeting these areas, we can better improve care and treatment options for stroke survivors.

6.3 Conclusion

The findings of this study have addressed the research aim and existing literature there was a very high prevalence 71.7% (n=109) of poor sleep quality among persons with stroke

attending rehabilitation centre in Bangladesh. Insomnia was the most common sleep disorder, sleep-disordered breathing and hypersomnia. Researchers found strong associations between insomnia and waking up tired with poor sleep. Older age (61 to 70 years), male gender, longer daytime naps, diabetes, mental health problems, immobility, shoulder subluxation, upper limb pain, higher stress, irregular sleep patterns, and frequent going to toilet at night was associated with poor sleep. Other hand hypertension, cardiovascular disease, urinary or bowel disorders were not associated with sleep quality. Pain in the axial skeleton or lower limbs did not differ between good and poor sleepers. In this study, socio-demographic variables, marital status, current living arrangement, number of family members, educational level, employment status, and indicators of socio-economic status were not related to being classified as a good or poor sleeper. Similarly, Stroke type, lesion side and stroke recurrence were not associated with poor sleep. Receiving sleep-rest advice from an OT were not significantly linked to sleep outcomes. In addition, individual lifestyle and environmental factors such as mobile phone use before bed, stimulant intake, unhealthy bedtime eating, bedroom comfort, and external interruptions at night were also not associated with sleep quality. Together, these findings suggest that many socio-economic, structural stroke characteristics, medical comorbidities, isolated and lifestyle or environmental factors played a comparatively limited role in determining sleep quality after stroke. These findings show that there's a need for an assessment of sleep quality using valid tools such as PSQI and sleep education of stroke patients and caregivers. The pain management (especially hemiplegic shoulder pain) stress and post-stroke depression should be addressed through counselling training support groups and psychotropic medication. Home-based rehabilitation can support lifestyle

change, better sleep hygiene, the use of CBT-I, and limiting daytime naps to about 30–90 minutes. Comorbid diabetes, hypertension, disability, and mental health issues should also be addressed by a multidisciplinary team. Lastly, national policy in Bangladesh should incorporate sleep management protocols, staff training, patient counselling, and simple technologies like sleep monitors and mobile apps. With consideration of its limitations, suggest practical lifestyle changes and highlight future studies should have bigger and more diverse samples. In addition, such studies should also trial sleep intervention after stroke.

CHAPTER IV: REFERENCE

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APPENDICES

Appendix A: Ethical Approval Form



বাংলাদেশ হেলথ প্রফেশন্স ইনস্টিটিউট (বিএইচপিআই) Bangladesh Health Professions Institute (BHPI)

(The Academic Institute of CRP)

Ref: CRP-BHPI/IRB/05/2025/1082

Date: 13.05.2025

To
Shihabul Hasan,
M.Sc. in Occupational Therapy, Part-II
Roll: 07, Student ID:121230017
BHPI, CRP, Savar, Dhaka-1343.

Subject: Approval of the thesis proposal "Sleep Quality Status and its Associated Factors among the Person with Stroke at a Rehabilitation Center in Bangladesh: A Cross-Sectional Study" by ethics committee.

Dear Shihabul Hasan,
Congratulations.

The Institutional Review Board (IRB) of BHPI has reviewed and discussed your application to conduct the above-mentioned dissertation, with yourself, as the principal investigator and Associate Professor Muhammad Millat Hossain, Department of Rehabilitation Science, Project & Course Coordinator, MRS Program, BHPI, CRP as my thesis supervisor. The Following documents have been reviewed and approved:

Sr. No.	Name of the Documents
1	Dissertation/thesis/research Proposal
2	Questionnaire (English & / or Bengali version)
3	Information sheet & consent form.

The aim of this study is to measuring sleep quality status and its associated factors among the person with stroke in Bangladesh. The study involves use of an Adopted Bengali Version of the Pittsburgh Sleep Quality Index (PSQI) to measuring sleep quality status and its associated factors among the person with stroke in Bangladesh. That may take 20 to 25 minutes to answer the questionnaire and there is no likelihood of any harm to the participants and participation in the study may benefit the participants. The members of the Ethics committee have approved the study to be conducted in the presented form at the meeting held at 09:00 AM on 13/04/ 2025 at BHPI (48th IRB Meeting).

The institutional Ethics committee expects to be informed about the progress of the study, any changes occurring in the course of the study, any revision in the protocol and patient information or informed consent and ask to be provided a copy of the final report. This Ethics committee is working accordance to Nuremberg Code 1947, World Medical Association Declaration of Helsinki, 1964 - 2013 and other applicable regulation.

Best regards,


Muhammad Millat Hossain
Member Secretary, Institutional Review Board (IRB)
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

Appendix B: Permission Letter for Scale

Request for Pittsburgh Sleep Quality Index, Bangla Version Inbox x



shihabul hasan

Dear sir, I hope this email finds you well. My name is Shihabul Hasan, and I am an Occupational Therapist working in the Neurological Rehabilitation Unit at the



Himel Mondal

to me ▾

Dear Shihabul Hasan,

Thank you for your interest in Bangla PSQI. I am sending the questionnaire attached to this email. You will get three files.

- (1) BPSQI in Microsoft Word format which you can edit according to your need with Avro keyboard (<https://www.omicronlab.com/avro-keyboard.html>).
- (2) The font we used to type the document. If you have a problem viewing the Word file, you may think of installing the font.
- (3) BPSQI in portable document format (PDF) which you cannot edit without a dedicated PDF editor.

The scoring and analysis method is the same as the original PSQI.

Best of luck with your research.

With personal regards,

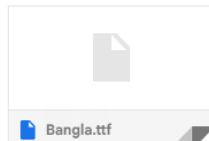
Dr. Himel Mondal

MBBS, MD (Physiology)

Assistant Professor, Physiology, AIIMS Deoghar

<https://scholar.google.com/citations?user=aqQyXT8AAAAJ&hl=en>

3 Attachments • Scanned by Gmail



Appendix C: Permission Letter for Data Collection

05 June, 2025

To
Head of the Department
Department of Occupational Therapy
Bangladesh Health Professions Institute (BHPI)
CRP-Chapain, Savar, Dhaka-1343.

Subject: Prayer for permission to collect data for the research project.

Sir,

With due respect, I would like to draw your kind attention that I am a student of M.Sc. in Occupational Therapy, Part-II at Bangladesh Health Professions Institute (BHPI), Centre for the Rehabilitation of the Paralysed (CRP). In this Master's Program, I have to submit a research project to the University of Dhaka in partial fulfillment of recruitments of the degree of Master of Science in Occupational Therapy. The area of my research title is "Sleep Quality Status and its associated factors among the person with stroke at rehabilitation center in Bangladesh: A Cross-Sectional Study". As it is Quantitative research, I would like to conduct the interview of patient's sleep quality status and its associated factors among the person with stroke.

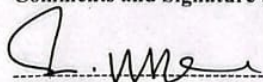
So, I therefore, pray and hope that you would be kind enough to grant me permission to collect data for my study and oblige thereby.

Sincerely yours,



Shihabul Hasan
M.Sc. in Occupational Therapy, Part-II
Roll: 07, Student ID: 121230017
BHPI, CRP, Savar, Dhaka-1343.

Comments and Signature of Head of the department:



Prof. Sk. Moniruzzaman
Professor & Head of the Department
Dept. of Occupational Therapy
Bangladesh Health Professions Institute (BHPI)
CRP-Chapain, Savar, Dhaka-1343.

Appendix D: Information Sheet and Consent Form [English Version]

Consent Form for Participation in the Study

Title: Sleep Quality Status and its associated factors among the person with stroke at a rehabilitation center in Bangladesh: A Cross-Sectional Study

Researcher:

Shihabul Hasan,
Masters in Occupational Therapy
Department of Occupational Therapy, Bangladesh Health Professions Institute (BHPI)
Centre for the Rehabilitation of Paralyzed (CRP)

Purpose of the Study:

You are being invited to participate in a research study 'Sleep Quality Status and its associated factors among the person with stroke at a rehabilitation center in Bangladesh: A Cross-Sectional Study. This study aims to strengthen knowledge, inform better service delivery, and promote evidence-based practice, benefiting hospitals and rehabilitation organizations in Bangladesh.

Study Procedures:

The participants will be required to answer a standardized questionnaire, which may take them 15 minutes to complete. Questions about sociodemographic characteristics will be included in this questionnaire (for example: age, sex, etc.), which may take an additional 05 minutes. The data collection period will be two months. The investigator will contact the participant to conduct a face-to-face survey. The participant's name will not be on the survey forms, and only a number will be used to identify them. Only the research team will have access to the information gathered.

Potential Risks:

There are no anticipated risks associated with the participant's participation in this study. If the participant feels discomfort or distress at any time during the study, participant may withdraw without any consequences.

Potential Benefits:

Conducting this study in Bangladesh can provide valuable insights into the sleep quality of stroke patients in a local context, where research on this topic is limited. It will help identify factors that affect sleep quality. Additionally, the findings could serve as a foundation for future research on stroke rehabilitation and sleep intervention in hospitals and rehabilitation organizations in Bangladesh.

Confidentiality:

Participation is confidential. No personal identifying information will be shared with anyone outside of the research team, except as required by law. All data collected will be stored securely and only used for the purposes of this study. No individual data will be disclosed in any reports, publications, or presentation.

Voluntary Participation:

Participation in this study is entirely voluntary. Participants are free to withdraw at any time, without any penalty or loss of benefits to which they are otherwise entitled. Their decision will not affect the quality of care they receive at the Center for the Rehabilitation of Paralyzed (CRP).

Consent to participate:

By signing this form, the participant confirms that they:

1. Have read and understood the information provided in this form.
2. Agree to participate in the study.
3. Understand that they can withdraw from the study at any time without penalty.

If the participant has any questions regarding this study, they are encouraged to ask. If they have any concerns about their rights as a participant or any ethical aspects of this study, they may contact the Institutional Review Board (IRB) at the Department of Occupational Therapy, Bangladesh Health Professions Institute (BHPI).

Contact Information:

Researcher: Shihabul Hasan
 Institution: Center for the Rehabilitation of Paralyzed (CRP)
 Email: Shihabul71@gmail.com
 Phone: 01679002278
 Institutional Review Board (IRB) Contact:

Participant's Statement:

I have read and understood the information provided in this consent form. I have had the opportunity to ask questions, and I voluntarily agree to participate in the study.

- Name of Participant: _____
- Signature of Participant: _____
- Date: _____

Researcher's Statement:

I have explained the study and answered all questions raised by the participant. I confirm that the participant has provided informed consent to participate in the study.

- Name of Researcher: _____
- Signature of Researcher: _____
- Date: _____

Withdrawal of Consent Form

Study Title: Sleep Quality Status and its associated factors among the person with stroke at a rehabilitation center in Bangladesh: A Cross-Sectional Study

Student Investigator: Shihabul Hasan

I, _____ (the participant), here by **withdraw my consent** to participate in the above-mentioned study. I request that any data collected from my participation **not be used** in this research project, as detailed in the Information and Consent Form provided.

I understand that if this withdrawal request is received within **four weeks** of completing my participation, all data related to my involvement will be **destroyed**. Furthermore, I acknowledge that this withdrawal notice will be retained alongside my original consent form as evidence of my decision to retract my consent for the use of my data in this study.

Name of Participant:

Signature of Participant:

Date:

Appendix E: Information Sheet and Consent Form [Bangla Version]

ক্রমিক নং:

বাংলাদেশ হেলথ প্রফেশন ইনস্টিটিউট (বিএইচপিআই)
Bangladesh Health Professions Institute (BHPI)
(The academic institute of CRP)
CRP, Chapain, Savar, Dhaka, Tel: 02224445464, Website: www.bhpi.edu.bd

গবেষণায় অংশগ্রহণের বিবৃতি পত্র

শিরোনাম:

"বাংলাদেশের একটি পুনর্বাসন কেন্দ্রে স্ট্রোক আক্রান্ত ব্যক্তিদের ঘুমের গুণগতমান ও এর সাথে সম্পর্কিত কারণসমূহ: একটি ক্রস-সেকশনাল গবেষণা"

গবেষক:

শিহাবুল হাসান,
মাস্টার্স ইন অকুপেশনাল থেরাপি,
অকুপেশনাল থেরাপি বিভাগ, বাংলাদেশ হেলথ প্রফেশনস ইনস্টিটিউট (বিএইচপিআই)
সেন্টার ফর দ্য রিহ্যাবিলিটেশন অফ দ্য প্যারালাইজড (সিআরপি)

গবেষণার উদ্দেশ্য:

অংশগ্রহণকারীকে “বাংলাদেশের একটি পুনর্বাসন কেন্দ্রে স্ট্রোক আক্রান্ত ব্যক্তিদের ঘুমের গুণগতমান ও এর সাথে সম্পর্কিত কারণসমূহ: একটি ক্রস-সেকশনাল গবেষণা” শীর্ষক গবেষণায় অংশগ্রহণ করার জন্য আমন্ত্রণ জানানো হচ্ছে। এই গবেষণার লক্ষ্য হলো, স্ট্রোক আক্রান্ত ব্যক্তিদের ঘুমের গুণগতমানে ওপর প্রভাব ফেলতে পারে এমন বিভিন্ন উপাদান সম্পর্কে জ্ঞান বৃদ্ধি করা এবং প্রমাণভিত্তিক সেবা প্রদান নিশ্চিত করা। এতে বাংলাদেশের হাসপাতাল এবং পুনর্বাসন সংস্থাগুলির জন্য সহায়ক তথ্য পাওয়া যাবে।

গবেষণার পদ্ধতি:

গবেষণায় অংশগ্রহণকারীকে একটি মানসম্মত প্রশ্নপত্র পূরণ করতে হবে, যা প্রায় ১৫ মিনিট সময় নিবে। এতে কিছু সাধারণ তথ্য যেমন: বয়স, লিঙ্গ ইত্যাদি সম্পর্কে প্রশ্ন থাকবে, যা পূর্ণ করতে অতিরিক্ত ৫ মিনিট সময় প্রয়োজন। গবেষক অংশগ্রহণকারীকে সাক্ষাৎকারের জন্য যোগাযোগ করবেন এবং অংশগ্রহণকারীর নাম কখনোই প্রশ্নপত্রে উল্লেখ থাকবে না, শুধুমাত্র একটি নম্বর দিয়ে অংশগ্রহণকারীকে চিহ্নিত করা হবে। তথ্য সংগ্রহের সময়কাল হবে দুই মাস এবং শুধুমাত্র গবেষণা দলের সদস্যরা অংশগ্রহণকারীর তথ্যের অ্যাক্সেস পাবেন।

সম্ভাব্য ঝুঁকি:

গবেষণায় অংশগ্রহণের সাথে কোনো ধরনের ঝুঁকি আশা করা হচ্ছে না। যদি অংশগ্রহণকারী কোনো সময়ে অস্বস্তি বা চাপ অনুভব করেন, তবে অংশগ্রহণকারী বিনা শর্তে অংশগ্রহণ থেকে বেরিয়ে আসতে পারবেন।

সম্ভাব্য সুবিধা:

বাংলাদেশে এই গবেষণাটি স্ট্রোক রোগীদের ঘুমের গুণগতমান সম্পর্কে স্থানীয় পর্যায়ে গুরুত্বপূর্ণ তথ্য দিতে পারে, যেখানে এই বিষয়ে তেমন গবেষণা নেই। এটি ঘুমের গুণগতমানকে প্রভাবিত করে এমন বিভিন্ন কারসমূহ চিহ্নিত করতে সাহায্য করবে। পাশাপাশি, এর ফলাফলগুলো বাংলাদেশের হাসপাতাল এবং পুনর্বাসন কেন্দ্রে স্ট্রোক রোগীদের পুনর্বাসন এবং ঘুমের উন্নতির চিকিৎসার জন্য ভবিষ্যতের গবেষণার ভিত্তি হতে পারে।

গোপনীয়তা:

অংশগ্রহণকারীর ব্যক্তিগত তথ্য গোপন রাখা হবে। গবেষণা দলের বাইরের কারো সাথে অংশগ্রহণকারীর তথ্য শেয়ার করা হবে না, তবে আইনগত প্রয়োজন হলে তা করা হতে পারে। সমস্ত তথ্য নিরাপদে সংরক্ষণ করা হবে এবং শুধুমাত্র এই গবেষণার উদ্দেশ্যে ব্যবহৃত হবে। কোনো ব্যক্তিগত তথ্য কোনো প্রকাশনা বা উপস্থাপনায় প্রকাশিত হবে না।

স্বৈচ্ছাচারী অংশগ্রহণ:

এই গবেষণায় অংশগ্রহণকারীর অংশগ্রহণ সম্পূর্ণভাবে স্বৈচ্ছায়। অংশগ্রহণকারী যেকোনো সময় অংশগ্রহণ থেকে সরে আসতে পারেন এবং এর জন্য কোনো শাস্তি বা সুবিধা হারানোর শঙ্কা নেই।

অংশগ্রহণের সম্মতি:

এই ফর্মে স্বাক্ষর করে অংশগ্রহণকারী নিশ্চিত করেন যে সে:

১. এই ফর্মে প্রদত্ত তথ্য পড়েছেন এবং বুঝেছেন।
২. গবেষণায় অংশগ্রহণের জন্য সম্মতি দিয়েছেন।
৩. অংশগ্রহণকারী বুঝতে পারছেন যে সে যেকোনো সময় বিনা শর্তে গবেষণাটি থেকে সরে আসতে পারেন।

যদি এই গবেষণার সম্পর্কে কোনো প্রশ্ন থাকে, তাহলে দয়া করে জিজ্ঞাসা করুন। যদি তাদের অংশগ্রহণকারী হিসেবে তাদের অধিকার বা এই গবেষণার কোনো নৈতিক দিক নিয়ে কোনো উদ্বেগ থাকে, তবে আপনি বাংলাদেশ হেলথ প্রফেশনস ইনস্টিটিউট (বিএইচপিআই)-এর অকুপেশনাল থেরাপি বিভাগের ইনস্টিটিউশনাল রিভিউ বোর্ড (আইআরবি) এর সাথে যোগাযোগ করতে পারবেন। আইআরবিঃ CRP-BHPI/IRB/05/2025/1082

যোগাযোগের তথ্য:

গবেষক: শিহাবুল হাসান

প্রতিষ্ঠান: সেন্টার ফর দ্য রিহ্যাবিলিটেশন অফ দ্য প্যারালাইজড (সিআরপি)

ইমেইল: Shihabul71@gmail.com

ফোন: 01679002278

অংশগ্রহণকারীর সম্মতিপত্র:

আমি এই সম্মতি ফর্মে প্রদত্ত তথ্য পড়েছি এবং বুঝেছি। আমি প্রশ্ন করার সুযোগ পেয়েছি, এবং আমি স্বেচ্ছায়

এই গবেষণায় অংশগ্রহণ করতে সম্মতি জানাচ্ছি।

• অংশগ্রহণকারীর নাম: _____

• অংশগ্রহণকারীর স্বাক্ষর: _____

• তারিখ: _____

গবেষকের বিবৃতি:

আমি গবেষণাটি ব্যাখ্যা করেছি এবং অংশগ্রহণকারীর সমস্ত প্রশ্নের উত্তর দিয়েছি। আমি নিশ্চিত করছি যে

অংশগ্রহণকারী এই গবেষণায় অংশগ্রহণের জন্য সম্মতি প্রদান করেছেন।

• গবেষকের নাম: _____

• গবেষকের স্বাক্ষর: _____

• তারিখ: _____

সম্মতি প্রত্যাহারের ফর্ম

গবেষণার শিরোনাম:

"বাংলাদেশের একটি পুনর্বাসন কেন্দ্রে স্ট্রোক আক্রান্ত ব্যক্তিদের ঘুমের গুণগতমান ও এর সাথে সম্পর্কিত কারণসমূহ: একটি ক্রস-সেকশনাল গবেষণা" ।

গবেষক:

শিহাবুল হাসান

আমি, _____ (অংশগ্রহণকারী), এই গবেষণায় অংশগ্রহণের জন্য প্রদত্ত সম্মতি প্রত্যাহার করছি। আমি অনুরোধ করছি যে আমার অংশগ্রহণ থেকে সংগৃহীত কোনো তথ্য এই গবেষণার জন্য ব্যবহার না করা হোক।

- অংশগ্রহণকারীর নাম: _____
- অংশগ্রহণকারীর স্বাক্ষর / আঙুলের ছাপ: _____
- তারিখ: _____

Appendix F: Questionnaire [English Version]

Questionnaire Demographic Information (English)

1.Age..... in (Years)

2.Gender:

1. Male
2. Female
3. Others

3. What type is your residence:

1. Rural
2. Semi urban
3. Urban/Town

4.Marital Status:

1. Single
2. Married
3. Divorced
4. Separated
5. Widow/Widower

5.Present living arrangement:

1. Living alone
2. Living with spouse/partner
3. Living with family
4. Living in a care facility

6.Number of Family Members

..... persons

7.Educational Level:

1. No formal education
2. Primary school
3. Secondary school
4. High school
5. Bachelor's degree
6. Master's / PhD or higher

8.Employment Status:

1. Government Job
2. Private Job
3. Teacher
4. Doctor
5. Nurse
6. Business/Self-employment
7. Abroad
8. Home wife
9. Driver
10. Freelancer
11. Day Laborer
12. Laborer
13. Farmer
14. Retired
15. Student
16. Unemployed
17. Others.....

9.Monthly Net Income:

..... BDT
Prefer not to say

10. Monthly Family expenditure

..... BDT

11.Time Since Stroke

First stroke..... in (months)
Second stroke..... in (months)
Third stroke..... in (months)
.....

12. Type of stroke did you have (if known):

1. Ischemic Strokes
2. Hemorrhagic Stroke
3. Unknown

13. Which side of the brain affected in stroke

1. Right Hemisphere
2. Left Hemisphere
3. Both Hemispheres
4. Unknown

14. Other current health problems (besides stroke): Check all that apply:

1. Diabetes
2. Hypertension
3. Mental health issues (e.g., depression, anxiety)
4. Immobility (Loss of movement)
5. Shoulder subluxation
6. Contracture
7. Urinary or bowel problems (e.g., difficulty urinating or bowel):
8. Swallowing difficulty
9. Cardiovascular Disease
10. Blood Lipid Issues (e.g., high cholesterol)
11. Vision Problems (e.g., blurry or loss of vision)
12. Hearing Problems (e.g., partial or total hearing loss)
13. Metabolic Diseases (e.g., thyroid disorders, obesity)
14. None
15. Other (please specify)

15. General knowledge about importance of sleep

1. Little to no knowledge
2. Basic knowledge
3. Moderate knowledge
4. Good knowledge
5. Very detailed knowledge

16. Did your occupational therapist give you any advice about sleep or rest during your OT sessions?

1. Yes
2. No
3. Not sure

17. Type of Sleep: Please select all that apply:

1. Insomnia
2. Hypersomnia
3. Sleep-disordered Breathing
4. Sleep-related Movement Disorder
5. None
6. Other (please specify)

18. How do you feel after waking up from sleep?

1. I feel refreshed and energetic when I wake up
2. I feel tired, but it's easy to start my day when I wake up
3. I feel a little sleepy when I wake up
4. I feel very tired and need more rest when I wake up

19. Which of the following activities are applicable for you before bedtime? Please select all that apply:

1. I use phone or screen, TV, Computer 2 hours before bed
2. Consuming caffeine (e.g., coffee, tea, energy drinks) 8 hours before bedtime
3. Smoking cigarettes or using tobacco products 2-4 hour before bedtime
4. Having heavy meals or large portions of food 3 hours before bedtime
5. Feeling hungry before going to bed
6. Intake poor or unbalanced diet that may contribute to malnutrition
7. I drink more water 1-2 hours before bedtime
8. Consuming alcohol 3 hours before bedtime
9. None

20.Environment and personal habits that influence sleep quality: Please select all that apply:

1. I face sleep difficulties in unfamiliar or new environments (e.g., hospital, rehab facility)
2. I often feel mental stressed or worried when trying to sleep.
3. My bed and pillow make me feel uncomfortable.
4. My room temperature is too cold or too hot
5. My room lighting is too bright at night
6. My room's air flow isn't good
7. Other distractions (e.g., noise, pets) interrupt my sleep
8. I sleep at different times every day.
9. My husband/wife's sleep habits (e.g., snoring, movement) disturb my sleep.
10. Enough sunlight doesn't enter my room
11. None
12. Other (please specify):
[What barriers are patient facing to solving this issue?]

21.Do you share a bed with anyone else?

1. Alone
2. husband/wife only
3. husband/wife and children
4. caregiver
5. Pets

22.Based on bed partner observations, do you move in your sleep?

1. No
2. Yes
3. Sometimes, but not often

10. Other (please specify):

[What barriers are patient facing to change these activities?]

23.Do you sleep during the daytime?

1. No
2. Yes, If yes, Time..... Min

24.Do you exercise regularly?

1. No
2. Yes

If yes,

Type of exercise _____

Frequency: _____ (e.g., 05 min/daily, week)

25.Where are you feel pain in your body during sleep?

Please select all that apply:

1. No pain
2. Head
3. Neck
4. Shoulder
5. Elbow
6. Wrist
7. Fingers
8. Chest
9. Upper Back
10. Lower Back
11. Abdomen
12. Pelvis
13. Hip
14. Knee
15. Ankle
16. Foot
17. Other Specific Location:

PITTSBURGH SLEEP QUALITY INDEX (PSQI)

INSTRUCTIONS: The following questions relate to your usual sleep habits during the past month only. Your answers should indicate the most accurate reply for the majority of days and nights in the past month. Please answer all questions.

1. During the past month, when have you usually gone to bed at night?
USUAL BED TIME _____
2. During the past month, how long (in minutes) has it usually take you to fall asleep each night?
NUMBER OF MINUTES _____
3. During the past month, when have you usually gotten up in the morning?
USUAL GETTING UP TIME _____
4. During the past month, how many hours of actual sleep did you get at night? (This may be different than the number of hours you spend in bed.)
HOURS OF SLEEP PER NIGHT _____

INSTRUCTIONS: For each of the remaining questions, check the one best response. Please answer all questions.

5. During the past month, how often have you had trouble sleeping because you...

	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
(a) ...cannot get to sleep within 30 minutes	☐	☐	☐	☐
(b) ...wake up in the middle of the night or early morning	☐	☐	☐	☐
(c) ...have to get up to use the bathroom	☐	☐	☐	☐
(d) ...cannot breathe comfortably	☐	☐	☐	☐
(e) ...cough or snore loudly	☐	☐	☐	☐
(f) ...feel too cold	☐	☐	☐	☐
(g) ...feel too hot	☐	☐	☐	☐
(h) ...had bad dreams	☐	☐	☐	☐
(i) ...have pain	☐	☐	☐	☐
(j) Other reason(s), please describe				
How often during the past month have you had trouble sleeping because of this?	☐	☐	☐	☐

	Very good	Fairly good	Fairly bad	very bad
6. During the past month, how would you rate your sleep quality overall?	☐	☐	☐	☐
	Not during the past month	Less than once a week	Once or twice a week	Three or more times a week
7. During the past month, how often have you taken medicine (prescribed or "over the counter") to help you sleep?	☐	☐	☐	☐
8. During the past month, how often have you had trouble staying awake while driving, eating meals, or engaging in social activity?	☐	☐	☐	☐
	No problem at all	Only a very slight problem	Somewhat of a problem	A very big problem
9. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?	☐	☐	☐	☐
	No bed partner or roommate	Partner/roommate in other room	Partner in same room, but not same bed	Partner in same bed
10. During the past month, how much of a problem has it been for you to keep up enough enthusiasm to get things done?	☐	☐	☐	☐

Appendix G: Questionnaire [Bangla Version]

নামঃ

মোবাইল নম্বরঃ

কোডঃ.....

Questionnaire

Demographic Information (Bangla)

প্রশ্নগুলী মনোযোগ দিয়ে পড়ুন ও উত্তরের ডান পাশে টিক (✓) চিহ্ন দিন

1. বয়স:..... বছর (সংখ্যায় লিখুন)

2. লিঙ্গ:

1. পুরুষ
2. মহিলা
3. অন্যান্য

3. আপনার স্থানীয় এলাকা কোন ধরনের?

1. গ্রামে
2. প্রায় শহর এলাকা
3. শহর/শহরে

4. বৈবাহিক অবস্থা:

1. অবিবাহিত
2. বিবাহিত
3. তালাকপ্রাপ্ত
4. পৃথক
5. বিধবা/বিপত্নীক

5. বর্তমান বসবাসের ধরন কোনটি:

1. একা থাকেন
2. স্ত্রী/স্বামীর সাথে থাকেন
3. পরিবারের সাথে থাকেন
4. কেয়ার ফ্যাসিলিটিতে থাকেন

6. আপনার পরিবারে সদস্য সংখ্যা
..... জন

7. শিক্ষাগত যোগ্যতা:

1. কোনো প্রাতিষ্ঠানিক শিক্ষা নেই
2. প্রাথমিক বিদ্যালয় (শ্রেণী ১-৫)
3. মাধ্যমিক বিদ্যালয় (শ্রেণী ৬-১০)
4. উচ্চ মাধ্যমিক বিদ্যালয় (শ্রেণী ১১-১২)
5. ব্যাচেলর ডিগ্রী
6. মাস্টার্স, পিএইচডি বা তার উর্ধ্বের ডিগ্রি

8. আপনার চাকরি বা কর্মসংস্থানের ধরণ:

1. সরকারি চাকরি
2. বেসরকারি চাকরি
3. শিক্ষক
4. ডাক্তার
5. নার্স
6. ব্যবসা/স্ব-কর্মসংস্থান
7. প্রবাসী
8. গৃহিণী
9. ড্রাইভার
10. ফ্রিল্যান্সার
11. দিনমজুর
12. শ্রমিক
13. কৃষক
14. অবসরপ্রাপ্ত
15. ছাত্র
16. বেকার
17. অনন্য.....

9. আপনার মাসিক আয় কত..... টাকা

* বলতে ইচ্ছুক নন

10. পরিবারের মাসিক খরচ কত
..... টাকা

11. স্ট্রোকের সময়কাল:

1. প্রথম স্ট্রোক..... মাস আগে
2. দ্বিতীয় স্ট্রোক..... মাস আগে
3. তৃতীয় স্ট্রোক..... মাস আগে
4.

12. স্ট্রোকের ধরণ কী ছিল (যদি জানা থাকে):

1. ইস্কেমিক স্ট্রোক (মস্তিষ্কের রক্তনালী বন্ধ হওয়ার)
2. হেমোরাজিক স্ট্রোক (মস্তিষ্কে রক্তক্ষরণ হওয়ার)
3. জানা নেই

13. আপনার স্ট্রোক মস্তিষ্কের কোন পাশে হয়েছিল?

1. ডান মস্তিষ্কে (শরীরের বাম পাশ দুর্বল হলে)
2. বাম মস্তিষ্কে (শরীরের ডান পাশ দুর্বল হলে)
3. উভয় মস্তিষ্কে (পুরো শরীর দুর্বল হলে)
4. জানা নেই

14. বর্তমানে অন্যান্য স্বাস্থ্যগত সমস্যা গুলো (স্ট্রোক ছাড়া): নিচের যেগুলো আপনার সাথে মিলে, সেগুলোতে টিক (✓) দিন

1. ডায়াবেটিস
2. উচ্চ রক্তচাপ
3. মানসিক স্বাস্থ্য সমস্যা (যেমন বেশি দুঃখ লাগা, অতিরিক্ত দুশ্চিন্তা, মানসিক চাপ)
4. হাঁটাচলা বা নড়াচড়ায় সমস্যা (প্যারালাইসিস)
5. কাঁধের হাড় সামান্য সরে গেছে
6. মাংস-পেশি বা জয়েন্ট শক্ত হয়ে গেছে
7. মল-মূত্রসংক্রান্ত সমস্যা (যেমন, প্রস্রাব-পায়খানায় কষ্ট বা অনিয়মিত, ঘন ঘন প্রস্রাব)
8. খাবার গিলতে সমস্যা হয়
9. হৃদরোগ (যেমন: হার্ট অ্যাটাক, ব্লক)
10. রক্তের চর্বি সমস্যা (যেমন, উচ্চ কোলেস্টেরল)
11. দৃষ্টিশক্তি সমস্যা (যেমন: চোখে ঝাপসা দেখা, অন্ধত্ব)
12. শ্রবণ সমস্যা (যেমন: কানে কম শোনা, বধিরতা)
13. বিপাকীয় রোগ (যেমন:, অতিরিক্ত ওজন থাইরয়েড)
14. কোনোটিই নয়
15. অন্যান্য: _____

15. ঘুমের গুরুত্ব সম্পর্কে আপনার সাধারণ জ্ঞান:

(ঘুম কতটা জরুরি, কম ঘুমালে কী ক্ষতি হয়, ঘুম না হলে করণীয়?— আপনি কতটা জানেন বা বুঝেন)

1. একেবারেই জানি না
2. অল্প কিছু জানি
3. মোটামুটি জানি
4. ভালো জানি
5. খুব বিস্তারিত জ্ঞান

16. আপনার অকুপেশনাল থেরাপিস্ট কি আপনাকে ঘুম বা বিশ্রাম সম্পর্কে কোন পরামর্শ দিয়েছেন?

1. না
2. হ্যাঁ
3. মনে নেই

17. ঘুম বিষয়ক নিচের কোন সমস্যা গুলো আপনার আছে? নিচের যেগুলো আপনার সাথে মিলে, সেগুলোতে টিক (✓) দিন

1. ঘুম আসে না / কম ঘুম আসে
2. অতিরিক্ত ঘুমাই (যেমন: দিনে অতিরিক্ত ঘুম ঘুম ভাব)
3. ঘুমের মধ্যে শ্বাসকষ্ট (যেমন: নাক ডাকা, শ্বাস বন্ধ হওয়া, মুখ খুলে ঘুমানো)
4. ঘুমের সময় অঙ্গ-প্রত্যঙ্গ নড়াচড়া (যেমন: হাত-পা বাঁকানো, অস্থিরতা)
5. কোন সমস্যা নেই
6. অন্যান্য: _____

18. ঘুম থেকে ওঠার পর আপনি কেমন অনুভব করেন:

1. আমি যখন ঘুম থেকে উঠি, তখন পুরোপুরি সতেজ ও প্রাণবন্ত বোধ করি
2. আমি ক্লান্ত বোধ করলেও দিন শুরু করতে আমার অসুবিধা হয় না
3. ঘুম থেকে ওঠার পর আমার একটু ঘোর ঘোর ভাব/বিমূর্নি, মাথা ভারী লাগে
4. আমি খুব ক্লান্ত বোধ করি এবং আরও ঘুমের প্রয়োজন মনে করি

19. ঘুমানোর ঠিক আগে আপনি সাধারণত নিচের কোন কাজগুলো করেন? নিচের যেগুলো আপনার সাথে মিলে, সেগুলোতে টিক (✓) দিন

1. ঘুমানোর ২ ঘণ্টা ফোন বা টিভি বা কম্পিউটার ব্যবহার করি
2. ঘুমানোর ৮ ঘণ্টা আগে ক্যাফেইন আছে এমন পানীয় পান করি (যেমন: কফি, চা, এনার্জি ড্রিংক)
3. ঘুমানোর ২-৪ ঘণ্টা আগে সিগারেট বা তামাকজাত পণ্য সেবন করি
4. ঘুমানোর ৩ ঘণ্টা আগে ভারী খাবার বা বেশি পরিমানে খাবার খাই
5. ঘুমানোর আগে ক্ষুধা অনুভব করি
6. অস্বাস্থ্যকর বা অস্বাভাবিক খাদ্যাভ্যাস গ্রহণ করি, যা পুষ্টিহীনতার কারণ হতে পারে (যেমন: ফাস্ট ফুড, অতিরিক্ত তেলে ভাজা খাবার)
7. আমি ঘুমানোর ১-২ ঘণ্টা আগে বেশি পানি পান করি
8. মদ্যপান করি ঘুমানোর ৩ ঘণ্টা
9. কোনোটিই করি না
10. অন্যান্য _____

‘এই অভ্যাস বদলানোর সময় আপনি কী ধরনের সমস্যা বা বাধার সম্মুখীন হচ্ছেন? দয়া করে বিস্তারিত বলুন’ _____

20. পরিবেশ ও ব্যক্তিগত অভ্যাস যা ঘুমের গুণমানকে প্রভাবিত করে: নিচের যেগুলো আপনার সাথে মিলে, সেগুলোতে টিক (✓) দিন

1. অপরিচিত বা নতুন জায়গায় আমার ঘুমের সমস্যা হয়
2. ঘুমানোর সময় প্রায়ই মানুষিক চাপ বা দুশ্চিন্তা বোধ করি (যেমন: কাজের চিন্তা, টাকাপয়সা বা পারিবারিক সমস্যা)
3. আমার বিছানা ও বালিশ আমাকে অস্বস্তিকর অনুভূতি দেয় (যেমন: বালিশ খুব উঁচু/নিচু, শক্ত তেঁষক)
4. ঘরের তাপমাত্রা খুব বেশি ঠান্ডা বা গরম
5. রাতে শোবার ঘরে খুব বেশি আলো থাকে
6. শোবার ঘরে বাতাস প্রবাহ ভাল না (যেমন: বন্ধ ঘর, জানালা খোলা না)
7. বিভিন্ন রকম বিষ (যেমন: গাড়ির হর্ন, কুকুরের ডাক, মশা)
8. আমার ঘুমের সময়সূচি অনিয়মিত (যেমন: কখনও রাত ১০টা, ১২টা বা ২টা)
9. আমার স্বামী/স্ত্রীর ঘুমের অভ্যাস যেমন: নাক ডাকা, নড়াচড়ার জন্য ঘুম ভেঙে যায়
10. ঘরে পর্যাপ্ত সূর্যের আলো আসে না (যেমন: ঘর অন্ধকার, জানালায় পর্দা ঢাকা)
11. কোনটাই প্রভাবিত করে না
12. অন্যান্য _____

‘ঘুমের গুণমান উন্নয়নে পরিবেশ ও ব্যক্তিগত অভ্যাস পরিবর্তনের সময় আপনি কোন বাধাগুলো অনুভব করছেন? দয়া করে বিস্তারিত বলুন’ _____

21. আপনি কি অন্য কারও সাথে বিছানা শেয়ার করেন?

1. একা ঘুমাই
2. শুধুমাত্র স্বামী/স্ত্রীর সাথে
3. স্বামী/স্ত্রী ও সন্তানের সাথে
4. যত্নকারীর সাথে (যেমনঃ স্বামী/স্ত্রী/সন্তান ছাড়া অন্য কোন সেবক/সেবিকা)
5. পোষা প্রাণীর সাথে

22. আপনার ঘুমের সঙ্গীর পর্যবেক্ষণ অনুযায়ী, আপনি কি ঘুমের মধ্যে নড়াচড়া করেন?

1. না
2. হ্যাঁ
3. মাঝে মাঝে করি

23. আপনি কি দিনে ঘুমান?

1. না
 2. হ্যাঁ
- যদি হ্যাঁ হয়, কত সময় ঘুমান মিনিট

24. আপনি কি ঘরে নিয়মিত থেরাপি বা ব্যায়াম করেন:

1. না
2. হ্যাঁ

যদি হ্যাঁ হয়, কী ধরনের থেরাপি বা ব্যায়াম করেন
:.....

কত সময়: _____

(উদাহরণঃ ৫ মিনিট, প্রতিদিন/সপ্তাহে)

25. ঘুমের সময় আপনি শরীরের কোন কোন স্থানে ব্যথা অনুভব করেন? নিচের যেগুলো আপনার সাথে মিলে, সেগুলোতে টিক (✓) দিন

1. ব্যথা নেই
2. মাথা
3. ঘাড়
4. কাঁধ
5. কনুই
6. কজি
7. আঙুল
8. বুক
9. পিঠের উপর ভাগ
10. কোমরের নিচের অংশ
11. পেট
12. কোমরের হাড়
13. নিতম্ব
14. হাঁটু
15. গোড়ালি
16. পা
17. অন্যান্য নির্দিষ্ট স্থান: _____

পিটসবার্গ ঘুমের গুণমান সূচক

বিসগত এক মাসে আপনার স্বাভাবিক ঘুমের অভ্যাসের বিষয়ে তথ্য নেওয়ার জন্য নিচের প্রশ্নগুলো দেওয়া হল। অনুগ্রহ করে সব প্রশ্নের উত্তর দিবেন।

১-৪ নম্বর প্রশ্নের উত্তর এর জন্য “শূন্য স্থান পূরণ” করবেন।

৫-৯ নম্বর প্রশ্নের উত্তর এর জন্য “সঠিক উত্তরে টিক (✓) চিহ্ন” দেবেন।

(১) গত মাসে, আপনি সাধারণত রাতের বেলায় কয়টার সময় ঘুমানোর জন্য বিছানায় যেতেন?

বিছানায় ঘুমাতে যাবার সময়

(২) গত মাসে, সাধারণত বিছানায় শোবার পর কত মিনিট পর ঘুমিয়ে পড়তেন? মিনিট

(৩) গত মাসে, সাধারণত কয়টার সময় সকালে ঘুম থেকে উঠতেন? ঘুম থেকে ওঠার সময়

(৪) গত মাসে, প্রতিরাতে প্রকৃতপক্ষে আপনি কত ঘন্টা ঘুমাতে? (বিছানায় শুয়ে থাকার সময় এবং প্রকৃত ঘুমের সময় আলাদা হতে পারে) প্রতিরাতে প্রকৃতপক্ষে ঘুমানোর সময়: ঘন্টা

(৫) নিচের প্রতিটি প্রশ্নের উত্তরে, আপনার অবস্থার সাথে খুব ভালোভাবে মিলে যায় - এমন একটি উত্তরের পাশে ✓ (টিক) চিহ্ন দিন। দয়া করে সবকটি প্রশ্নের উত্তর দিন।

গত মাসে, আপনি কতবার ঘুমের সমস্যায় ভুগেছেন তার সম্পর্কে তথ্য জানার জন্য প্রশ্নঃ				
	গত মাসে একবারও এমন হয় নি	সপ্তাহে এক বারেরও কম এমন হয়েছিল	সপ্তাহে এক বা দু'বার এমন হয়েছে	সপ্তাহে তিন বার বা তার বেশি এমন হয়েছে
(ক) বিছানায় শোয়ার ত্রিশ মিনিটের মধ্যে ঘুমাতে পারেন নি				
(খ) মাঝরাতে বা খুব ভোরে ঘুম ভেঙ্গে গেছে				
(গ) বাথরুমে যাবার জন্য ঘুম থেকে উঠতে হয়েছে				
(ঘ) শ্বাস নিতে কষ্ট হয়েছিল				
(ঙ) কাশি হয়েছিল বা জোরে নাক ডেকেছেন				
(চ) খুব ঠান্ডা লেগেছিল				
(ছ) খুব গরম লেগেছিল				
(জ) খারাপ স্বপ্ন দেখেছেন				
(ঝ) শরীরে ব্যথা হয়েছিল				
(ঞ) অন্য কোনও কারণ (যদি থাকে)				

(৬) গত মাসে, কিভাবে আপনি আপনার ঘুমের গুণমানের সামগ্রিক মূল্যায়ন করবেন? (যথাযথ একটি উত্তরে টিক (✓) চিহ্ন দিন)

- (ক) খুব ভাল
(খ) মোটামুটি ভাল
(গ) মোটামুটি খারাপ
(ঘ) খুব খারাপ

নিচের (৭) এবং (৮) প্রশ্নের উত্তরে, আপনার অবস্থার সাথে খুব ভালোভাবে মিলে যায় - এমন একটি উত্তরের পাশে ✓ (টিক) চিহ্ন দিন। দয়া করে সবকটি প্রশ্নের উত্তর দিন।

	গত মাসে একবারও এমন হয় নি	সপ্তাহে এক বারেরও কম এমন হয়েছিল	সপ্তাহে এক বা দু'বার এমন হয়েছে	সপ্তাহে তিন বার বা তার বেশি এমন হয়েছে
(৭) গত মাসে, আপনি কতবার ঘুমের ওষুধ খেয়েছেন (ডাক্তারের প্রেসক্রিপশন অনুযায়ী বা নিজে দোকান থেকে কিনে)				
(৮) গত মাসে, কত বার গাড়ী চালানোর সময় বা খাবার খাওয়ার সময় বা সামাজিক কার্যকলাপ (আড্ডা দেওয়া, সামাজিক অনুষ্ঠানে অংশগ্রহণ করা) করার সময় জেগে থাকতে সমস্যা হয়েছে?				

(৯) গত মাসে, যথেষ্ট উৎসাহ বা আগ্রহের সাথে কাজ কর্ম করতে কতটা সমস্যা হয়েছিল? (যথাযথ একটি উত্তরে টিক চিহ্ন দিন)

- (ক) কোনও সমস্যা হয় নি
(খ) খুব সামান্য সমস্যা হয়েছিল
(গ) একটু সমস্যা হয়েছিল
(ঘ) খুব সমস্যা হয়েছিল

Original survey instrument (i.e., Pittsburgh Sleep Quality Index) was developed by Buysse DJ, Reynolds CF, Monk TH, Berman SR, and Kupfer DJ and the article is cited as: Buysse DJ, Reynolds CF, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Res* 1989;28:193-213.

Bengali Pittsburgh Sleep Quality Index (BPSQI) was adapted from the original instrument by Dr. Himel Mondal and Dr. Shaikat Mondal and the paper is cited as: Mondal H, Mondal S, Baidya C. Comparison of perceived sleep quality among urban and rural adult population by Bengali Pittsburgh Sleep Quality Index. *Adv Hum Biol* 2018;3:36-40.