



Original article

Assessment of post-stroke insomnia and quality of life among stroke survivors of Dhaka city: a cross-sectional study

Evaluación del insomnio y la calidad de vida entre los supervivientes de accidentes cerebrovasculares, Dhaka: un estudio transversal

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Key contribution of the study

Objective	To assess the prevalence of post-stroke insomnia and the status of QoL among stroke survivors
Study design	Descriptive Cross-sectional study
Source of information	Data were collected by face to face interviews. A semi-structured questionnaire was distributed among participants.
Population / sample	Sample size were 85 and target population were stroke survivors of CRP, Dhaka
Statistical analysis	SPSS version 25 and Excel were used for data analysis and interpretation
Main findings	Among respondents, 20% reported experiencing severe clinical insomnia, 24.7 % had clinical insomnia and 15.3% had sub-threshold insomnia. Regarding QoL, 36.5% needed 'Some Help', 32.9% needed 'A little Help' and 15.3% needed 'A lot of Help' from others. Insomnia was more prevalent among survivors aged 70 and above (OR: 11.28), and those who faced hemorrhagic stroke (OR: 0.15) and individuals with diabetic (OR: 3.08). QoL was significantly affected by age 57-69 years (OR: 0.79), full-time worker (OR: 0.22), hemorrhagic stroke (OR: 0.29), and diabetics (OR: 4.40)

Abstract

Background: Stroke is frequently a disastrous event that often leads to short or long-term neurological impairment and functional disability, affecting survivors' quality of life (QoL).

Objective: To assess the prevalence of post-stroke insomnia and the status of QoL among stroke survivors.

Methods: This study involved descriptive cross-sectional study using mixed methods among 85 stroke survivors at the Centre for the Rehabilitation of the Paralyzed (CRP) in Dhaka, Bangladesh. Convenience sampling was used for sample selection and data were collected by a self-reported semi-structured Bengali questionnaire from October 2019 to January 2020. Analysis was performed using SPSS and MS Excel.

Results: Among respondents, 20% reported experiencing severe clinical insomnia, 24.7 % had clinical insomnia and 15.3% had sub-threshold insomnia. Regarding QoL, 36.5% needed 'Some Help', 32.9% needed 'A little Help' and 15.3% needed 'A lot of Help' from others. Insomnia was more prevalent among survivors aged 70 and above (OR 11.28), and those who faced hemorrhagic stroke (OR 0.15) and individuals with diabetic (OR 3.08). QoL was significantly affected by age 57-69 years (OR 0.79), full-time worker (OR .22), hemorrhagic stroke (OR.29), and diabetics (OR 4.40).

Conclusion: The result indicates insomnia and reduced quality of life among stroke survivors were highly prevalent especially among older adults, diabetics, and patients affected by hemorrhagic stroke. These correlations highlight how urgently multidisciplinary therapies and focused screening are needed to treat sleep disorders and promote day-to-day functioning. Improving post-stroke care with customized rehabilitation techniques may greatly enhance this susceptible population's long-term results and general well-being.

Keywords: Stroke, insomnia, quality of life, center for the rehabilitation of the paralyzed, stroke survivors.

Conflict of interest: No conflicts of interest were shown or presented in the research study

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Resumen

Antecedentes: El accidente cerebrovascular suele ser un evento devastador que a menudo provoca trastornos neurológicos y discapacidades funcionales a corto o largo plazo, lo que afecta a la calidad de vida (CV) de los supervivientes.

Objetivo: Evaluar la prevalencia del insomnio tras un accidente cerebrovascular y el estado de la CV entre los supervivientes de un accidente cerebrovascular.

Métodos: Estudio transversal descriptivo. Se utilizaron métodos mixtos en 85 supervivientes de un accidente cerebrovascular en el Centre for the Rehabilitation of the Paralyzed (CRP) de Dacca, Bangladesh. Se utilizó un muestreo por conveniencia para la selección de la muestra y los datos se recopilaron mediante un cuestionario semiestructurado autoadministrado en bengalí entre octubre de 2019 y enero de 2020. El análisis se realizó utilizando SPSS y MS Excel.

Resultados: Entre los encuestados, el 20.0% informó que padecía insomnio clínico grave, el 24.7% insomnio clínico y el 15.3% insomnio subclínico. En calidad de vida, el 36.5% necesitó alguna ayuda, el 32.9% un poco de ayuda y el 15.3% mucha ayuda de otras personas. El insomnio era más frecuente entre los supervivientes de 70 años o más (OR: 11.28), los que habían sufrido un accidente cerebrovascular hemorrágico (OR: 0.15) y las personas con diabetes (OR: 3.08). La calidad de vida se vio significativamente afectada por la edad (57-69 años, OR: 0.79), el trabajo a tiempo completo (OR: 0.22), el accidente cerebrovascular hemorrágico (OR: 0.29) y la diabetes (OR 4.40).

Conclusión: El resultado indica que el insomnio y la reducción de la calidad de vida entre los supervivientes de un accidente cerebrovascular eran muy frecuentes, especialmente entre los adultos mayores, los diabéticos y los pacientes afectados por un accidente cerebrovascular hemorrágico. Estas correlaciones ponen de relieve la urgente necesidad de terapias multidisciplinarias y pruebas de detección específicas para tratar los trastornos del sueño y promover el funcionamiento diario. La mejora de la atención posterior al accidente cerebrovascular con técnicas de rehabilitación personalizadas puede mejorar en gran medida los resultados a largo plazo y el bienestar general de esta población vulnerable.

Palabras clave: Accidente cerebrovascular, insomnio, calidad de vida, centro de rehabilitación para personas con parálisis, supervivientes de accidentes cerebrovasculares.

Introduction

Stroke is predominantly affecting all aspects of an individual's life across the world. Stroke has a multitude of negative consequences on an individual's life from the loss of independence to cognitive and communication difficulties (1). According to World Health Organization (WHO) stroke is defined as "rapidly developing clinical signs of focal (or global) disturbance of cerebral function, with symptoms lasting 24 hours or longer or leading to death, with no apparent cause other than of vascular origin" (2). There are about 15 million people worldwide who suffer from stroke in a year. Among them, 5 million die, and another 5 million are left disabled for their lifetime becoming a burden for their family and community. This stroke burden is estimated to increase from around 18 million in 1990 to 61 million in 2020 globally (3). In the United States, there are 795,000 persons having a new or recurrent stroke every year (4). Stroke is the major cause of serious long-term disability that leaves less than half of survivors able to return directly home to the US (5).

Both ischemic and hemorrhagic strokes are frequent companions of sleeping disorders (SD). The increasing numbers of sleeping disorders (SD) include sleep-disordered breathing, insomnia, hypersomnia, parasomnia, and sleep-related movement disorders (6). Very recently, it has been recognized the scale of the health and social consequences of insufficient sleep and sleeping disorder due to stroke (7). Sleep loss is associated with disturbances in cognitive and psycho-motor function that includes mood, thinking, concentration, memory, learning, alertness, and reaction times. Among all the sleeping disorders, insomnia or excessive daytime sleepiness is widespread in the general population and about 1/3 of people suffer from it. Post-stroke insomnia may have significant and deleterious effects on personal health, safety, and well-being in the life of individuals (7,8). It also incorporates wider economic costs of disability and unemployment in younger stroke survivors (7). In previous studies, it is also stated that short sleep duration is associated with increased risks of mortality from stroke (9,10). Insomnia plays an essential role in the prognosis after a stroke which affects approximately 12%–57% of stroke survivors (11). There are links between post-stroke insomnia and more significant disabilities, including an increased risk of subsequent stroke (12). It indicates that patients with recurrent stroke have a 43% higher risk of dying than survivors with first-ever stroke (13). According to (5), the prevalence of sleep disorders after stroke is greater than 50%. Some studies have also reported that insomnia symptoms result in high indirect costs from loss of productivity (7). The sleep-related problems hold financial costs relating to health and other expenditures and non-financial costs relating to the loss of quality of life (14).

Stroke has an adverse effect on both short and long-term quality of life (QoL) (1). QoL is an individual's perceptions of their position in life in the context of culture, value system, goals, expectations, standards, and concerns. It can also be mentioned in terms of well-being, having a purpose in life, autonomy, assumption of meaningful roles, and participation in significant relationships. QoL in patients should encompass subjective aspects such as feelings and perceptions as well as physical functioning (15). A lot of stroke survivors have feelings of hopelessness, helplessness, anxiety, and dehumanization. After a stroke, QoL is estimated to have decreased by more than 40% compared with pre-stroke QoL (1). The reported prevalence rate of stroke-related disability is about 331 per 100,000; although the stroke mortality rate has been declining. Stroke disability and morbidity decrease the QoL among stroke survivors. While the disability is greater, the QoL is lower. Still, improvements in functional status and contribution to an increase in QoL are possible for stroke survivors with ongoing rehabilitation. Thus, the assessment of stroke rehabilitation should add QoL domains, which are influenced by the disease (16). Due to stroke, stroke survivors have to depend on others to perform their activities of daily living (ADLs). This reality has a negative impact not only on their QoL but also on their relatives, who normally are their main caregivers. This caregiving role is a significant source of stress which increases the risk of developing various physical and mental health problems of the caregivers (17).

Bangladesh is a densely populated developing country that faces the double burden of both communicable and non-communicable diseases. A rising prevalence of chronic diseases such as stroke is due to rapid urbanization, changing dietary habits, a lack of physical activity, consumption of tobacco, and a decline in communicable diseases. Stroke is considered to be the third leading cause of death in Bangladesh. According to World Health Organization (WHO), Bangladesh ranks 84 in the world due to the mortality rate by stroke, and the prevalence is estimated to be 0.3% (18). Stroke causes a significant and increasing burden from an economic and social perspective. Stroke patients frequently need individualized long-term care and rehabilitation services. In Bangladesh, facilities for acute stroke care have been developing, but rehabilitation services are lagging far behind primary care services (19). The capital of Bangladesh, Dhaka has a fair share of stroke cases while considering better rehabilitation services for stroke patients.

A few previous studies largely consider limited factors to evaluate the relationship between QOL and stroke with disputable conclusions (20-22). For instance, there are an inadequate number of studies investigating the effect of emotional status, functional health, and demographic properties on the QOL of patients with stroke (20-22). On that basis, we take a chance that a variety of factors, such as sociodemographic, disability level, and functional and emotional state, would have a significant influence on the QOL of patients with stroke. Thus, the paper aims to evaluate the physical and mental conditions of post-stroke patients in Dhaka City ultimately affecting the quality of life of the individuals by incorporating the Athens Insomnia Scale (AIS) and the Stroke Specific Quality of Life (SSQoL) scale. The specific objective of the study is to investigate the demographic and prevalence of insomnia among stroke patients in Dhaka, to assess the quality of their life, to discover the association between insomnia and QoL of the individual, and to recommend a few evidence-based policies for improving the QoL of the respondents.

Methods

Selection of study area and participants

The cross-sectional study was conducted with stroke survivors aged between 18 to 65 years. Other selection criteria were: 1. stroke patients who suffered from an ischemic or hemorrhagic stroke at any point in their life; 2. patients with single or recurrent stroke experience; 3. stroke patients who were mentally and physically stable; 4. stroke patients who were free from communication and cognitive impairments; and 5. stroke patients who were willing to participate in the study.

The study recruited 85 participants by convenience sampling technique attended at the Outpatient Unit, Occupational Therapy Department (OTD) of Center for the Rehabilitation of the Paralyzed (CRP), Mirpur, Dhaka. To meet the study objectives, data were collected from October 2019 to January 2020. Stroke patients who attended the center during the data collection period were closely observed and were selected as per convenience. A semi-structured Bengali questionnaire with both closed and open-ended questions was disseminated among the participants. Prior to data collection, informed consent forms mentioned study objectives and main details of the study were provided and voluntary permissions were taken. Participants' anonymity and confidentiality were taken into prioritization.

Data analysis statistical tools

The collected data were analyzed using SPSS, 25.0 versions. Descriptive statistics including frequencies and percentages means and standard deviation were used to analyze socio-demographic information. The prevalence of insomnia, 12 domains of QoL of stroke patients, and scoring of QoL were also calculated

by percentages and frequencies. Inferential statistics for associations between insomnia and demographic variables were estimated by odds ratio (OR). In addition, associations were observed between QoL and demographic characteristics using odds ratio (OR). Data were reported as OR with CI intervals (95%). Pearson Chi-square tests (χ^2) and cross-tabulations were also performed to assess the associated factors (insomnia, QoL, and demographic variables) and p-value of <0.05 was considered as a level of significance.

List of variables

Survey questionnaire

A standard semi-structured research questionnaire was used to conduct the research to assess post-stroke insomnia and quality of life among stroke patients. The survey questionnaire had three parts including demographic information, Athens Insomnia Scale (AIS), and Stroke Specific Quality of Life (SSQoL) Scale. Athens Insomnia Scale was used to estimate insomnia and the Stroke Specific Quality of Life Scale was used to assess QoL (Quality of Life) of stroke survivors.

Socio-demographic Information

Demographic information included age, gender (male/female), area of residence (rural/urban/semi-urban), marital status (married/unmarried/others), educational status (illiterate/completed primary/completed secondary/ completed higher secondary/undergraduate/masters and above), occupation (housewife/student/govt. job holder/retired/ business/unemployed), number of family members (1-5 members/6-10 members), and monthly family income (<411 USD / 411 USD - 823 USD/ >823 BDT).

Stroke-related indicators

Stroke information were observed based on stroke types (ischemic/hemorrhagic), stroke-affected side (left/right/bilateral), duration of post-stroke (acute/sub-acute/chronic), and associated past medical conditions (HTN/DM/HD/ Dyslipidemia/ CKD/ Bronchial asthma / Arthritis) relevant to stroke patients.

Athens Insomnia Scale (AIS)

This study incorporated Athens Insomnia Scale (AIS) to estimate the prevalence of insomnia. Previous studies stated that the AIS scale is a valid and reliable tool to assess the intensity of sleep difficulties for chronic patients or community screening (23-25). According to the International Statistical Classification of Disease and Related Health Problems-10th Revision (ICD-10) diagnostic criteria, the AIS-8 was an eight-item self-reported questionnaire that measures the intensity of sleep difficulties for insomnia. Among them, five items were assessed to measure difficulty in sleep introduction, awakening during the night, early morning awakening, total sleep duration, and overall sleep quality. The other three items consisted of the next-day consequences of insomnia (sense of well-being, physical and mental functioning, and sleepiness). The study participants needed to rate positively if they had experienced sleep difficulties at least thrice per week during the last month. Each item was rated on a 4-point numerical rating scale (NRS; where 0 = no problem at all and 3 = very serious problem). Total scores ranged from 0 to 24, where higher scores (19-24) in these AIS measures were indicators of having severe clinical insomnia symptoms (23); while a cut-off point of ≥ 6 represented a minimum criterion for the confirmation of insomnia symptoms. The other criteria are followed by: 7-12 (Sub-threshold Insomnia) and 13-18 (Clinical Insomnia of Moderate Severity) (24). For the study purpose, the insomnia rating scale of 24 was sub-grouped by (0-6: No insomnia) and (7-24: Insomnia Present) with the stroke survivors (7).

Stroke Specific Quality of Life (SSQoL) scale

This study used the Stroke Specific Quality of Life (SSQoL) scale to measure Quality of Life (QoL). The SSQoL was the primary underlying construct in stroke patients and a highly valid and reliable tool to assess the quality of life among stroke survivors (26). It is a patient-centered outcome measure intended to provide an assessment of the health-related quality of life specific to patients with stroke. It took about 10-15 minutes to complete. The items were rated on a 5-point Likert scale (27). The SSQoL was a self-reported questionnaire that contains 49 items in 12 domains of energy, family roles, language, mobility, mood, personality, self-care, social roles, thinking, upper extremity function, vision, and work/productivity. The domains were scored separately and a total score was also provided (16). The QoL cut-off points were followed as; 1-49: Total Help, 50-98: A lot of Help, 99-147: Some Help, 148-196: A Little Help, 197-245: No Help needed. In this study, the scores ranged from 50-245 (28). Furthermore, to observe association, QoL cut-off points were further sub-grouped as 50-196: Help needed and 197-245: No Help Needed, respectively.

Ethical considerations

The study received approval from the Asian Institute of Disability and Development as a part of the Institutional Review Board of the University of South Asia. Voluntary informed consent was taken from participants prior to data collection.

Results

Socio-demographic characteristics

Among 85 respondents, the majority of them were male (65.9%), age group of 44-56 years (37.6%), married (83.5%), living in urban areas (81.2%), having family members of 1-5 persons (74.1%), and the most educational attainment was masters and above (31.8%) respectively. By profession, most of the respondents were non-government organization (NGO) workers (22.4%) and had income of less than 50,000 Bangladeshi Taka (BDT) (64.7%) per month. Also, it was shown that most of the participants had an ischemic stroke (63.5%) on the right side (57.6%) of their brain while having a chronic condition (45.9%). The majority of them had hypertension (80.0%) in their previous medical record which somehow contributed to having a stroke. Among stroke patients, the prevalence of insomnia was described in four categories; 40.0% had no clinically significant insomnia, 15.3% had sub-threshold insomnia, 24.7 % had clinical insomnia and 20% had severe clinical insomnia. Quality of life was further analyzed to understand help requirements among respondents. Most of the stroke patients 36.5% needed 'some help', 15.3% needed 'a lot of help', and 15.3% of them needed 'no help' from others. Besides, 32.9% of the stroke patients needed 'a little help' (Table 1).

Table 1. Characteristics of the study participants (N=85)

Variables	n (%)	Variables	n (%)
Age (in years)		Monthly family income	
18-30	5 (5.9)	<411 USD	55 (64.7)
31-43	12 (14.1)	411USD -823 USD	23 (27.1)
44-56	32 (37.6)	>823 BDT	7 (8.2)
57-69	22 (25.9)	Types of strokes	
≥70	14 (16.5)	Ischemic	54 (63.5)
Gender		Hemorrhagic	31 (36.5)
Male	56 (65.9)	Affected side	
Female	29 (34.1)	Right	49 (57.6)
Area of residence		Left	34 (40.0)
Rural	12 (14.1)	Bilateral	2 (2.4)
Urban	69 (81.2)	Duration of post-stroke	
Semi-urban	4 (4.7)	Acute	17 (20.0)
Marital status		Sub-acute	29 (34.1)
Married	71 (83.5)	Chronic	39 (45.9)
Unmarried	5 (5.9)	Past medical condition	
Others	9 (10.6)	HTN	68 (80.0)
Educational status		DM	44 (51.8)
Illiterate	9 (10.6)	HD	14 (16.5)
Completed Primary	9 (10.6)	Dyslipidemia	12 (14.1)
Completed Secondary	14 (16.5)	CKD	8 (9.4)
Completed Higher Secondary	11 (12.9)	Bronchial asthma	5 (5.9)
Under-Graduate	15 (17.6)	Arthritis	5 (5.9)
Masters and above	27 (31.8)	Prevalence of Insomnia	
Occupation		No Clinically Significant Insomnia	34 (40)
Housewife	23 (27.1)	Sub-threshold Insomnia	13 (15.3)
Student	2 (2.4)	Clinical Insomnia of Moderate Severity	21 (24.7)
Govt. Job holder	3 (3.5)	Severe Clinical Insomnia	17 (20)
NGO worker	19 (22.4)	Quality of life of stroke patients	
Retired	16 (18.8)	A lot of Help	13 (15.3)
Business	11 (12.9)	Some Help	31 (36.5)
Unemployed	11 (12.9)	A Little Help	28 (32.9)
No. of family members		No Help needed	13 (15.3)
1-5 members	63 (74.1)		
6-10 members	22 (25.9)		

Quality of life of stroke patients

This study incorporated Stroke Specific Quality of Life (SSQoL) scale to assess the quality of life of stroke patients. There were 12 items to represent the quality of life, and the first 6 represented as mobility, mood, personality, self-care, thinking, and vision. It is observed that respondents had problems with mobility in which total help required by patients ranged from 23.5%-36.5%, whereas a lot of help, some help, and a little help ranged from 4.7%-47.1%, only a few (20.0%) reported not received any help at all. According to mood, total help ranged from 16.6%-27.1%, whereas some help and a little help ranged from 2.4%-15.3%, and almost 50.0% didn't require any help from others. In the case of personality and thinking, almost 50.0% reported required some sort of help, and the rest needed no help. However, a different scenario was observed regards to self-care. More than 70.0% of respondents required help from others and stroke patients' vision was not problematic at all (Table 2).

Table 2. Quality of Life (By each item) of stroke patients (study participants, N=85)

Items	Total Help (%)	A Lot of Help (%)	Some Help (%)	A Little Help (%)	No Help Needed (%)
Mobility					
1. Did you have trouble walking?	27.1	47.1	8.2	8.2	9.4
2. Did you lose your balance when bending over to or reaching for something?	31.8	37.6	4.7	11.8	14.1
3. Did you have trouble climbing stairs?	36.5	35.3	8.2	8.2	11.8
4. Did you have to stop and rest more than you would like when walking or using a wheelchair?	28.2	32.9	8.2	10.6	20.0
5. Did you have trouble standing?	28.2	34.1	5.9	11.8	20.0
6. Did you have trouble getting out of a chair?	23.5	29.4	7.1	14.1	25.9
Mood					
1. I was discouraged about my future.	27.1	10.6	2.4	4.7	55.3
2. I wasn't interested in other people or activities.	16.5	15.3	4.7	9.4	54.1
3. I felt withdrawn from other people.	18.8	11.8	3.5	5.9	58.8
4. I had little confidence in myself.	17.6	21.2	1.2	8.2	51.8
5. I was not interested in food.	16.5	15.3	3.5	4.7	60.0
Personality					
1. I was irritable.	25.9	31.8	1.2	1.2	40.0
2. I was impatient with others.	21.2	29.4	5.9	2.4	41.2
3. My personality has changed.	24.7	29.4	1.2	5.9	38.8
Self-care					
1. Did you need help preparing food?	76.5	9.4	2.4	1.2	10.6
2. Did you need help eating? For example, cutting food or preparing food?	27.1	15.3	1.2	11.8	44.7
3. Did you need help getting dressed? For example, putting on socks or shoes, buttoning buttons, or zipping?	35.3	23.5	5.9	10.6	24.7
4. Did you need help taking a bath or a shower?	43.5	15.3	2.4	11.8	27.1
5. Did you need help using the toilet?	28.2	24.7	4.7	9.4	32.9
Thinking					
1. It was hard for me to concentrate.	25.9	23.5	3.5	7.1	40.0
2. I had trouble remembering things.	20.0	29.4	7.1	7.1	36.5
3. I had to write things down to remember them.	2.4	5.9	51.8	4.7	35.3
Vision					
1. Did you have trouble seeing the television well enough to enjoy a show?	8.2	8.2	8.2	1.2	74.1
2. Did you have trouble reaching things because of poor eyesight?	4.7	2.4	4.7	5.9	82.4
3. Did you have trouble seeing things off to one side?	2.4	5.9	4.7	2.4	84.7

Among the 12 domains to assess SSQoL, the other 6 represented family roles, social roles, energy, productivity, upper extremity function, and language. In the case of family roles, total help ranged from 23.5%- 43.5%, whereas a lot of help, some help, and a little help ranged from 3.5%-27.0%, and almost 42% reported not needing any help from others. In the case of social roles, 40% needed some level of help and 30% didn't need any help. Furthermore, in the case of energy and productivity, around 30.0-40.0% required help, and the rest didn't need it. Help for upper extremity function ranged from 3.5%-49.4% and for language, almost 30.0% needed some sort of help from others (Table 3).

Table 3. Quality of Life (By each item) of stroke patients (study participants, N=85)

	Items	Total Help (%)	A Lot of Help (%)	Some Help (%)	A Little Help (%)	No Help Needed (%)
Family Roles						
1.	I didn't join in activities just for fun with my family	23.5	12.9	5.9	5.9	51.8
2.	I felt I was a burden to my family	27.1	12.9	3.5	2.4	54.1
3.	My physical condition interfered with my personal life	43.5	27.1	3.5	5.9	20.0
Social roles						
1.	I didn't go out as often as I would like.	41.2	14.1	5.9	7.1	31.8
2.	I did my hobbies and recreation for shorter periods of time than I would like.	40.0	23.5	5.9	3.5	27.1
3.	I didn't see as many of my friends as I would like.	44.7	17.6	10.6	9.4	17.6
4.	I had sex less often than I would like.	54.1	12.9	20.0	3.5	9.4
5.	My physical condition interfered with my social life.	44.7	14.1	3.5	10.6	27.1
Energy						
1.	I felt tired most of the time	38.8	16.5	8.2	2.4	34.1
2.	I had to stop and rest during the day	34.1	22.4	7.1	2.4	34.1
3.	I was too tired to do what I wanted to do	35.3	16.5	89.4	4.7	34.1
Work/Productivity						
1.	Did you have trouble doing daily work around the house?	35.3	37.6	4.7	8.2	14.1
2.	Did you have trouble finishing jobs that you started?	34.1	37.6	3.5	7.1	17.6
3.	Did you have trouble doing the work you used to do?	34.1	36.5	3.5	7.1	8.8
Upper Extremity Function						
1.	Did you have trouble writing or typing?	49.4	15.3	3.5	3.5	28.2
2.	Did you have trouble putting on socks?	47.1	12.9	10.6	4.7	24.7
3.	Did you have trouble buttoning buttons?	48.2	27.1	3.5	2.4	18.8
4.	Did you have trouble zipping a zipper?	37.6	21.2	3.5	4.7	32.9
5.	Did you have trouble opening a jar?	43.5	20.0	3.5	4.7	28.2
Language						
1.	Did you have trouble speaking? For example, get stuck, stutter, stammer, or slur your words.	9.4	38.8	4.7	4.7	42.4
2.	Did you have trouble speaking clearly enough to use the telephone?	12.9	31.8	1.2	9.4	44.7
3.	Did other people have trouble understanding what you said?	10.6	29.4	3.5	9.4	47.1
4.	Did you have trouble finding the word you wanted to say?	11.8	21.2	4.7	7.1	55.3
5.	Did you have to repeat yourself so others could understand you?	11.8	22.4	3.5	7.1	55.3

Association of insomnia of stroke survivors with baseline characteristics

Table 4 represented the association between insomnia and participants baseline characteristics. Insomnia was associated with age and occupation. Participants aged above 70 years (OR: 11.28, 95% CI: 1.40-90.97), and doing business as an occupation (OR: 8.04, 95% CI: 0.98- 66.13) were found to be at more insomnia risk than others. However, insomnia was not associated with gender, marital status, educational status, no. of family members, and monthly income.

Table 4. Association of insomnia of stroke survivors with baseline characteristics

Characteristics	No insomnia; n (%) (n=34)	Insomnia; n (%) (n=51)	OR (95% CI)	p-value
Age				
18-30 Years	5 (14.8)	0 (0)	Ref.	
31-43 Years	7 (20.5)	5 (9.8)	0.42 (0.12-1.45)	0.162
44-56 years	13 (38.2)	19 (37.3)	0.95 (0.39-2.34)	0.927
57-69 years	8 (23.5)	14 (27.5)	1.23 (0.45-3.35)	0.686
70 and above	1 (2.9)	13 (25.5)	11.28 (1.40-90.97)	0.006*
Gender				
Male	20 (58.8)	36 (70.6)	Ref.	
Female	14 (41.2)	15 (29.4)	0.59 (0.24-1.48)	0.262
Marital Status				
Unmarried	5 (14.7)	0 (0)	Ref.	
Married	27 (79.4)	44 (86.3)	1.63 (0.51-5.15)	0.403
Others	2 (5.9)	7 (13.7)	2.54 (0.49- 13.07)	0.250
Educational Status				
Illiterate	4 (11.8)	5 (9.8)	Ref.	
Completed Primary	2 (5.9)	7 (13.7)	2.54 (0.495-13.07)	0.250
Completed Secondary	4 (11.8)	10 (19.6)	1.82 (0.52-6.39)	0.340
Completed Higher Secondary	5 (14.7)	6 (11.8)	0.77 (0.21-2.76)	0.692
Undergraduate	5 (14.7)	10 (19.6)	1.41 (0.43-4.57)	0.561
Masters and above	14 (41.1)	13 (25.5)	0.48 (0.19-1.23)	0.128
No. of family members				
1-5 members	27 (79.5)	36 (70.6)	Ref.	
6-10 members	7 (20.5)	15 (29.4)	1.60 (0.57-4.48)	0.363
Occupation				
Unemployed (student, housewife)	17 (50)	19 (37.3)	Ref.	
Full-time job holder (govt. job, NGO worker)	12 (35.3)	10 (19.6)	0.44 (0.16-1.19)	0.106
Businessmen	1 (2.9)	10 (19.6)	8.04 (0.98- 66.13)	0.025*
Retired	4 (11.8)	12 (23.5)	2.30 (0.67-7.87)	0.174
Monthly income				
<50000 BDT	21 (61.8)	34 (66.7)	Ref.	
50000-100000 BDT	9 (26.5)	14 (27.5)	1.05 (0.39- 2.79)	0.921
>100000 BDT	4 (11.8)	3 (5.9)	0.469 (0.09- 2.24)	0.334

CI, confidence interval, Significant difference (*p-value<0.05); OR=Odds Ratio

Insomnia was more to be reported with stroke-related indicators of stroke survivors. The association observed that patients with hemorrhagic stroke (OR: 0.15, 95% CI: 0.05-0.40) and diabetics present (OR: 3.08, 95% CI: 1.25-7.62) were more at risk of insomnia than others (Table 4). However, insomnia was not associated with hypertension, Huntington's disease, kidney disease, and dyslipidemia (Table 5).

Association of Quality of life of stroke survivors with baseline characteristics

Table 6 represented the association between needed help and participants' baseline characteristics. Help was most needed by participants aged 57-69 years (OR: 0.79, 95% CI: 0.70-0.90), and among full-time job holders (OR: 0.22, 95% CI: 0.06 -0.77) than others. However, help was not needed for gender, marital status, educational status, no. of family members, and monthly income.

Help was more to be reported with stroke-related indicators of stroke survivors. The association observed that patients with hemorrhagic stroke (OR: 0.29, 95% CI: 0.08-0.99), and diabetics present (OR: 4.40, 95% CI: 1.11-17.38) were more needed with help than rest (Table 6). However, help was not associated with hypertension, Huntington's disease, kidney disease, and dyslipidemia (Table 7).

Table 5. Association of insomnia of stroke survivors with baseline characteristics

Characteristics	No insomnia; n (%) (n=34)	Insomnia; n (%) (n=51)	OR (95% CI)	p-value
Stroke type				
Ischemic	13 (38.2)	41 (80.4)	Ref.	
Hemorrhagic	21 (61.8)	10 (19.6)	0.15 (0.05-0.40)	0.000*
Hypertension				
No	10 (29.4)	7 (13.7)	Ref.	
Yes	24 (70.6)	44 (86.3)	2.61 (0.88-7.76)	0.077
Diabetics				
No	22 (64.7)	19 (37.3)	Ref.	
Yes	12 (35.3)	32 (62.3)	3.08 (1.25-7.62)	0.013*
Huntington's Disease				
No	30 (88.2)	41 (80.4)	Ref.	
Yes	4 (11.8)	10 (19.6)	1.82 (0.52-6.39)	0.340
Kidney Disease				
No	33 (97.1)	44 (86.3)	Ref.	
Yes	1 (2.9)	7 (13.7)	5.25 (0.61-44.77)	0.095
Dyslipidemia				
No	30 (88.2)	43 (84.3)	Ref.	
Yes	4 (11.8)	8 (15.7)	1.39 (0.38-5.05)	0.611

CI, confidence interval, Significant difference (*p-value<0.05); OR=Odds Ratio

Discussion

This study investigated the prevalence of post-stroke insomnia and quality of life among Bangladeshi adults in Dhaka City. In this study, we examined the association between insomnia and quality of life (QoL) with sociodemographic characteristics of post-stroke survivors.

The study observed that the majority of patients were diagnosed with insomnia (60%). Among them, the prevalence of clinical insomnia was 20% which was found more in other studies (29,31,32). The differences might be due to the respondents' characteristics, including gender, age, economic status, occupation, and geographical location. Moreover, old age has been recognized as an important risk factor for post-stroke insomnia and QoL. The study found a significant number of stroke patients (16.5%) were aged 70 years and above. According to the results, older aged stroke patients (26-31%) had a higher risk of insomnia and poor quality of life. Similarly, few previous studies observed that insomnia and low QoL were found to be higher among older aged stroke survivors (29,30).

In addition, the study observed a significant association between insomnia and diabetics ($p=0.013$). Similarly, another study represented that hypertension and diabetic mellitus might partially mediate the association between insomnia which led to death (9). Persons with insomnia suffer a higher recurrence of stroke during the first year of follow-up (11,12). Another study noted that insomnia is frequent in stroke survivors associated with diabetic-positive patients and 38-50% reported poor sleep quality and insomnia complaints of frequent early morning awakening issues (7). Suh et al. (34), showed a similar association between diabetes mellitus and insomnia among post-stroke patients. They showed that diabetes mellitus is responsible for the disruption of nighttime sleep quality in stroke patients. The activation of the hypothalamic-pituitary-adrenocortical axis and the sympathetic system to release extra glucocorticoids are the reasons for nighttime sleep disturbances in people with diabetics. Consequently, consumption decreases as glucose production increases and affects glycemic control which leads to hyperarousal and shorter sleep duration. In another study, research conducted at the University of Pittsburgh reported that more than half of the diabetes mellitus type-2 (DMT2) patients were suffering from poor sleep quality (35).

Primarily, it is observed that patients with a hemorrhagic stroke can suffer from several types of sleeping disorders (SD) like insomnia. However, the high prevalence of SD is considered to be infrequently diagnosed. Thus, insomnia is more frequent in hemorrhagic stroke and stroke in the right hemisphere (33). In contrast, the study identified a significant association between ischemic stroke and insomnia ($p=0.000$) in the left hemisphere among CRP stroke survivors. Among the study participants more reported single or recurrent ischemic stroke experience at any point in their life.

Table 6. Association of Quality of life of stroke survivors with baseline characteristics

Characteristics	No help needed; n (%) (n=13)	Help needed; n (%) (n=72)	OR (95% CI)	p-value
Age				
18-30 Years	3 (23.1)	2 (2.8)	Ref.	
31-43 Years	1 (7.7)	11 (15.3)	2.16 (0.25-18.36)	0.470
44-56 Years	8 (61.5)	24 (33.3)	0.31 (0.09-1.05)	0.053
57-69 Years	0 (0)	22 (30.5)	0.79 (0.70-0.90)	0.021*
70 and above	1 (7.7)	13 (18.1)	2.64 (0.31- 22.173)	0.354
Gender				
Male	9 (69.2)	47 (65.3)	Ref.	
Female	4 (30.8)	25 (34.7)	1.19 (0.33- 4.27)	0.782
Marital Status				
Unmarried	3 (23.1)	2 (2.8)	Ref.	
Married	9 (69.2)	62 (86.1)	2.75 (0.71-10.67)	0.131
Others	1 (7.7)	8 (11.1)	1.50 (0.17-13.11)	0.712
Educational Status				
Illiterate	0 (0)	9 (12.5)	Ref.	
Completed Primary	0 (0)	9 (12.5)	0.82 (0.74-0.91)	0.178
Completed Secondary	2 (15.4)	12 (16.7)	1.10 (0.21-5.60)	0.909
Completed Higher Secondary	1 (7.7)	10 (13.9)	1.93 (0.22-16.55)	0.540
Undergraduate	3 (23.1)	12 (16.7)	0.667 (0.159-2.79)	0.577
Masters and above	7 (53.9)	20 (27.7)	0.33 (0.09-1.10)	0.063
No. of Family Members				
1-5 members	10 (76.9)	53 (73.6)	Ref.	
6-10 members	3 (23.1)	19 (26.4)	1.19 (0.29-4.8)	0.802
Occupation				
Unemployed (student, housewife)	5 (38.4)	31 (43.1)	Ref.	
Full-time job holder (govt. job, NGO worker)	7 (53.9)	15 (20.8)	0.22 (0.06 -0.77)	0.012*
Businessmen	0 (0)	11 (15.3)	0.82 (0.74-0.91)	0.131
Retired	1 (7.7)	15 (20.8)	3.15 (0.38-26.25)	0.265
Monthly income				
<50000 BDT	5 (38.4)	50 (69.5)	Ref.	
50000-100000 BDT	6 (46.2)	17 (23.6)	0.36 (0.10-1.22)	0.092
>100000 BDT	2 (15.4)	5 (6.9)	0.41 (0.07-2.38)	0.308

CI, confidence interval, Significant difference (*p-value <0.05); OR= Odds Ratio

Chronic insomnia has been identified as a risk factor for subsequent disability. It considerably reduces the probability of returning to paid work by 12 months, after adjusting for age, sex, and psychiatric co-morbidity. As unemployment is itself associated with poorer health and mortality, a combination of these disabling outcomes has the potential for dramatic consequences for stroke patients, their families, and the wider community (7). The study observed that almost 94% of patients were physically disabled to perform daily activities and required a significant ($p=0.003$) amount of help from others to function.

However, to measure the quality of life, the help requirement of stroke patients was analyzed. The results showed that most of the stroke patients (36.5%) needed 'some help', 15.3% needed 'a lot of help', 32.9% needed 'a little help' and 15.3% needed 'no help' from others to function. Hence, it is evident that stroke survivors have significantly poor QoL than normal people. After stroke, the reduced QoL is related not only to the emotional state and physical disability but also to some demographic properties such as age, gender and education (36). Similarly, the study found a significant correlation of functional disability with adults ($p=0.021$). 57-69 years age group was in need of more support to function in daily activities than others.

Table 7. Association of Quality of life of stroke survivors with baseline characteristics

Characteristics	No help needed; n (%) (n=13)	Help needed; n (%) (n=72)	OR (95% CI)	p-value
Stroke type				
Ischemic	5 (38.4)	49 (68.1)	Ref.	
Hemorrhagic	8 (61.6)	23 (31.9)	0.29 (0.08-0.99)	0.041*
Hypertension				
No	13 (100)	58 (80.6)	Ref.	
Yes	0 (0)	14 (19.4)	0.81 (0.73-0.91)	0.082
Diabetics				
No	10 (76.9)	31 (43.1)	Ref.	
Yes	3 (23.1)	41 (56.9)	4.40 (1.11–17.38)	0.025*
Huntington's Disease				
No	4 (30.8)	13 (18.1)	Ref.	
Yes	9 (69.2)	59 (81.9)	2.01 (0.53-7.56)	0.292
Kidney Disease				
No	13 (100)	64 (88.9)	Ref.	
Yes	0 (0)	8 (11.1)	0.83 (0.75-0.91)	0.207
Dyslipidemia				
No	13 (100)	60 (83.3)	Ref.	
Yes	0 (0)	12 (16.7)	0.82 (0.73 -0.91)	0.112

CI, confidence interval, Significant difference (*p-value <0.05); OR= Odds Ratio

Moreover, to assess QoL after stroke, a study was conducted in Turkey. 80 geriatric stroke patients were assessed within the first week after stroke and reevaluated within 3 months and their QoL scores were found to be lower than those of the general population. Among them, work/productivity was the most affected sub-scale in the geriatric population, but mobility, self-care, and social roles were less too important items. In contrast with them, upper extremity function, work/productivity, energy, and self-care were the most affected sub-scale items in the group of stroke patients (23). In this study, the most stroke-affected sub-scale was self-care, social roles, upper extremity function, and work/productivity. The other sub-scale items like mobility, mood, personality, thinking, vision, energy, family roles, and language were less important among stroke survivors.

Furthermore, a study found that the patient with sub-acute stroke had worse QoL and functional independence compared to patients with chronic stroke (37). In contrast, the study identified chronic stroke was associated with poor QoL and functional difficulties than other stroke sides. The reason might be due to various adaptations and modifications in lifestyle implemented by survivors.

In the observed association between QoL and diabetics, the study found a significant association (p= 0.025). Stroke patients with diabetics had poor QoL than others. Similarly, in another study, it is observed that longer duration of diabetics (in months) is associated with poor or inadequate QoL. It is notable that persons with DM2 often feel challenged due to sickness which consequently lowers their QoL (38).

Strengths and weaknesses

The strength of the study identified a significant field for investigation. If the study could perform on a larger scale, it may highlight more stroke patients and associated co-morbidities in overall Bangladesh. The approach will definitely create more attention to the domain and will encourage more establishment of rehabilitation services regards to the specific field.

However, the limitations of the study included a limited budget and manpower, and the research was performed in a short time. This study was also limited to generalization due to its limited sample population.

Conclusion

The result indicates insomnia and reduced quality of life among stroke survivors were highly prevalent especially among older adults, diabetics, and patients affected by hemorrhagic stroke. These correlations highlight how urgently multidisciplinary therapies and focused screening are needed to treat sleep disorders

and promote day-to-day functioning. Improving post-stroke care with customized rehabilitation techniques may greatly enhance this susceptible population's long-term results and general well-being.

Recommendations

The findings of this study can be disseminated to stroke patients, their family members/caregivers/relatives, and multi-disciplinary health and public health professionals in gaining adequate concern regarding this domain. The patient's QoL and functional level would be improved through receiving various medical and rehabilitative services. It is highly recommended to address both issues of QoL and insomnia among stroke survivors for their better functional recovery and at the same time to reduce the caregivers' burden. In addition to, the study can be done in other out-patient and in-patient units of different Hospitals and Rehabilitation centers in Bangladesh to observe scenarios and for further research. Finally, the Government and the respective health and other professionals of Bangladesh should come forward to overcome this issue by making awareness campaign, providing interventions, and above all creating opportunities for the inclusion of stroke survivors contributing to the country's economy and strengthening them to be more productive for both national and international level.

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