

Frequency and relationship of sleep deprivation and disability in chronic neck pain

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Abstract

Objective: To evaluate the frequency and relationship of disability and sleep deprivation among individuals with chronic neck pain.

Method: The cross-sectional study was conducted at the Institute of Physical Medicine and Rehabilitation, Dow University of Health Sciences (DUHS), Ojha campus, Karachi, August 10 to November 26, 2021, and comprised diagnosed patients of either gender with chronic neck pain. After recording the demographics, validated Urdu versions of the Pittsburgh Sleep Quality Index, Neck Disability Index, and Numerical Pain Rating Scale were used to assess sleep deprivation, functional disability and pain intensity, respectively. Data was analysed using SPSS 21.

Result: Of the 71 patients, 45(63.4%) were females and 26(36.6%) were males with overall mean age 22.11±4.63 years. There was a strong positive correlation of Pittsburgh Sleep Quality Index with Numerical Pain Rating Scale and Neck Disability Index ($p<0.05$).

Conclusion: Sleep deprivation was associated with neck disability in individuals with chronic neck pain.

Keywords: Insomnia, neck pain, cervicalgia, sleep deprivation, prevalence. (JPMA 75: 739; 2025)

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Introduction

In recent years, the chronic neck pain (CNP) burden has been increasing very rapidly. It is a major problem that needs attention as it has a great impact on all aspects of the daily activities of patients, especially sleep. Literature shows an increased prevalence (53-90%) of sleep disturbance among people with chronic pain, with a clinically major degree of insomnia. Usually, sleep disturbance is reflected as a result of chronic pain, but the outcomes of research show that sleep disturbances may have a two-way connection with chronic pain.¹

They both interchangeably and in relationships can affect a person's physical and mental ability in different home chores or office work. This fact may be a supreme cause leading to medical leave of absence or disability. Individuals with complaints of neck pain might say that they do not draw their neck or shoulders equally, shorter, or longer than asymptomatic individuals.²

Neck pain is the pain present in the posterior neck region confined between boundaries of the superior nuchal line and the spine of the scapula, and the side region of the neck down to the superior border of the clavicle and the

suprasternal notch.³ Neck pain lasting <3 months is accounted as acute neck pain (ACP). Whereas, its chronicity is established by the presence of pain for 3 months or longer.⁴

CNP is the fourth-most common musculoskeletal condition that causes disability worldwide, affecting 4.8% of the global population.⁵ The chronicity of neck pain can be associated with a depressed mood leading to sleep disturbance, which needs multimodal management. However, sleep and depression both need to be evaluated. The risk of chronicity increases as physical, psychological and neurophysiological factors along with poor cervical extensor endurance.⁶ The key long-standing consequences of neck pain are individual disability, fatigue and job absenteeism, which are recognised as significant public health and socioeconomic problems.^{7,8} Furthermore, if it is associated with sleep deprivation, it results in disturbed functions, impairment in short-term memory affecting problem-solving skills, and impaired societal and family relations.⁷ Despair and risk of suicidal behaviour and death due to suicide are commonly exhibited by patients with sleep issues.² When it is a matter of quality of sleep, it is a strong risk factor for psychiatric ailments, like anxiety and common depressive complaints. This may occur in association with many types of metabolic illness, obstructive airway disease, and cancerous conditions. Dizziness with severity and problems accompanying sleep are closely related to each other and chronic pain.³

There is limited data available regarding the relationship

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between sleep deprivation and disability with CNP, especially in the Urdu-speaking population.⁹ One study revealed that the neck pain was moderately associated with sleep quality, but the results were confined to students, and neck pain classification was not taken into consideration.¹⁰

The current study was planned to fill the gap in literature by evaluating the frequency and relationship of disability and sleep deprivation among CNP individuals.

Patients and Methods

The cross-sectional study was conducted from August 10 to November 26, 2021, at the Institute of Physical Medicine and Rehabilitation, Dow University of Health Sciences (DUHS), Ojha campus, Karachi. The sample was raised using non-probability purposive sampling technique. The participants were invited by posting a note on the campus notice board, and through personal contacts of the researchers. The sample size was calculated using the World Health Organisation (WHO) OpenEpi version 3 at 95% confidence interval (CI) and 5% margin of error with a hypothesized CNP frequency of 4.8%.^{11,12}

Those included were individuals aged 18-40 years having neck pain for >3 weeks. Those with any neurological or musculoskeletal disorder, such as radiculopathy, herniated disc rupture, spondylolisthesis, or any neck surgery were excluded. Informed consent was taken from all the participants. The ethical approval was taken from Institutional Review Board of DUHS (reference number: IRB-1991/DUHS/Approval/2021/412).

After collecting demographic data of the participants, validated Urdu version of the Pittsburgh Sleep Quality Index (PSQI) was used to assess sleep deprivation, while the Urdu version of the Neck Disability Index (NDI) was used to functional disability.¹³⁻¹⁵ The PSQI a self-reporting questionnaire consisting of 19 items, including subjective sleep quality, latency, duration, efficacy, and use of any sleep medication, while the NDI is a self-administered tool consisting of 10 domains regarding the intensity of pain, personal care, lifting, work, headaches, concentration, sleeping, driving, reading and recreation. Each domain is scored on a 0-5 scale, with total score ranging 0-50. Higher scores indicate higher level of disability. The secured score is converted into a percentage.^{16,17} The intensity of neck pain was measured using the Numerical Pain Rating Scale with 0=no pain and 10=the most excruciating pain possible.¹⁵

Data was analysed using SPSS 21. Mean \pm standard deviation were calculated for quantitative variables, while frequencies and percentages were calculated for

descriptive variables. Data normality was checked using the Kolmogorov-Smirnov test. Asymmetrical data was subjected to Spearman's correlation test to evaluate correlation among of PSQI with NPRS and NDI. Multiple regression analysis was used to determine significance of relationship between dependent and independent variables. $P < 0.05$ was considered statistically significant.

Results

Of the 71 patients, 45(63.4%) were females and 26(36.6%) were males with overall mean age 22.11 ± 4.63 years. Most patients were married 48(67.6%) and 40(56.3%) were obese (Table 1).

The mean NPRS was 4.66 ± 1.13 , mean NDI was 32.04 ± 6.89 and mean PSQI was 15.16 ± 2.52 respectively. There was a strong positive correlation of PSQI with NPRS and NDI (Table 2).

An increase in the beta values of NPRS and NDI suggested an increase in PSQI, and both NPRS and NDI were significant positive predictors of PSQI (Table 3).

Table-1: Demographic characteristics.

Variables	n (%)
Gender	
Male	26 (36.6)
Female	45 (63.4)
Marital status	
Single	23 (32.4)
Married	48 (67.6)
Divorced	0 (0)
Onset of symptoms	
3 months – 1 year	11 (15.6)
1 – 2 years	21 (29.5)
2 years or more	39 (54.9)
Body mass index (BMI)	
Under weight	10 (14)
Normal weight	4 (5.6)
Overweight	17 (23.9)
Obese	40 (56.3)

Table-2: Correlation of Pittsburgh Sleep Quality Index (PSQI) with, Neck Numerical Pain Rating Scale (NPRS) and, Neck Disability Index (NDI).

Spearman correlation	Correlation Coefficient	p-value
NPRS	0.30	0.03
NDI	0.83	0.001

Table-3: Multiple regression analysis.

Variables	r ²	F	Standardised β	Unstandardised β	t-test	p-value
NPRS			0.073	0.182	1.131	< 0.001
NDI	0.054	4.688	0.169	0.281	0.597	<

0.001NPRS: Numerical Pain Rating Scale, NDI: Neck Disability Index.

Discussion

Sleep deprivation is becoming a more common problem in today's fast-paced technology-driven society as individuals sacrifice essential hours of sleep to meet the demands of their jobs and social life. The findings of the current study indicated a strong and positive association between the sleep quality and neck functionality of young adults.

Neck pain is growing increasingly common among young adults, having become one of the primary causes of musculoskeletal pain, and is ranked second most common reason among young adults.³

In the current study, the majority of the participants were females. This can be due to the fact that neck pain is more prevalent in females than males.³ Moreover, the current study had more married patients, which can be because married men and women are more engaged in strenuous physical activities than others.¹⁸

Furthermore, the current study had more patients with normal weight. Neck pain is more prevalent in overweight and obese individuals.¹⁹

A cohort study in 2023 reported that 44.9% of the participants who underwent comprehensive sleep assessment revealed that 21.7% had clinically severe sleep problems, most notably insomnia. The individuals with sleep disturbance had a 40% greater loss in workplace productivity. Moreover, poor sleep is associated with chronic pain, specifically musculoskeletal-related pain.^{20,21} Previous research has shown that inadequate sleep can lead to neurobiological changes, such as altered levels of endogenous substances, such as melanin, vitamin D, neurotransmitters, such as dopamine, serotonin and norepinephrine, and the immune system. These alterations can decrease the pain intensity threshold. It is highly possible that treating individuals with sleep deprivation may become an essential addition to neck pain management.²²

Yabe et al. conducted a longitudinal study that showed that individuals with sleep disturbance had a higher risk of developing neck pain compared to those without sleep disturbance, indicating a bidirectional impact between pain and sleep deprivation.²³

The present study has some limitations. The cross-sectional design did not allow for causality to be established. Besides, the small sample size may have limited the generalizability of the findings. Finally, the study relied on self-reported tools which may have allowed bias to creep in.

Conclusion

There was a strong correlation between neck impairment and sleep deprivation.

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Conflict of Interest: None.

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References

1. Nijs J, Mairesse O, Neu D, Leysen L, Danneels L, Cagnie B, et al. Sleep Disturbances in Chronic Pain: Neurobiology, Assessment, and Treatment in Physical Therapist Practice. *Phys Ther* 2018;98:325-35. doi: 10.1093/ptj/pzy020.
2. Webb CA, Cui R, Titus C, Fiske A, Nadorff MR. Sleep Disturbance, Activities of Daily Living, and Depressive Symptoms among Older Adults. *Clin Gerontol* 2018;41:172-80. doi: 10.1080/07317115.2017.1408733.
3. Park SJ, Lee R, Yoon DM, Yoon KB, Kim K, Kim SH. Factors associated with increased risk for pain catastrophizing in patients with chronic neck pain: A retrospective cross-sectional study. *Medicine (Baltimore)* 2016;95:e4698. doi: 10.1097/MD.0000000000004698.
4. Beinert K, Lutz B, Zieglgänsberger W, Diers M. Seeing the site of treatment improves habitual pain but not cervical joint position sense immediately after manual therapy in chronic neck pain patients. *Eur J Pain* 2019;23:117-23. doi: 10.1002/ejp.1290.
5. Shahidi B, Curran-Everett D, Maluf KS. Psychosocial, Physical, and Neurophysiological Risk Factors for Chronic Neck Pain: A Prospective Inception Cohort Study. *J Pain* 2015;16:1288-99. doi: 10.1016/j.jpain.2015.09.002.
6. Cerezo-Télez E, Torres-Lacombe M, Mayoral-Del Moral O, Sánchez-Sánchez B, Dommerholt J, Gutiérrez-Ortega C. Prevalence of Myofascial Pain Syndrome in Chronic Non-Specific Neck Pain: A Population-Based Cross-Sectional Descriptive Study. *Pain Med* 2016;17:2369-77. doi: 10.1093/pm/pnw114.
7. Churchill SS, Kieckhefer GM, Bjornson KF, Herting JR. Relationship between sleep disturbance and functional outcomes in daily life habits of children with Down syndrome. *Sleep* 2015;38:61-71. doi: 10.5665/sleep.4326.
8. Kim SK, Kim JH, Jeon SS, Hong SM. Relationship between sleep quality and dizziness. *PLoS One* 2018;13:e0192705. doi: 10.1371/journal.pone.0192705.
9. Aldabbas MM, Tanwar T, Iram I, Spence DW, Pandi-Perumal SR, Veqar Z. Sleep Disturbance in Neck Pain Patients: Implications to Pain Intensity and Disability. *Sleep Vigilance* 2022;6:349-57. Doi: 10.1007/s41782-022-00216-1
10. Ayaz SB, Malik R, Khan AA, Gill ZA, Akhtar N, Matee S. Intensity of neck pain secondary to excessive flexion posturing, its association with study activities and duration of posturing and impact on sleep in students of Women Medical College, Abbottabad. *Pak Armed Forces Med J* 2016;66(Suppl 1):s22-5.
11. Dean AG, Sullivan KM, Soe MM. OpenEpi: Open Source Epidemiologic Statistics for Public Health, Version: 3.01. [Online] 2013 [Cited 2025 April 04]. Available from URL: https://www.openepi.com/Menu/OE_Menu.htm
12. Valenza MC, Valenza G, González-Jiménez E, De-la-Llave-Rincón AI, Arroyo-Morales M, Fernández-de-Las-Peñas C. Alteration in sleep quality in patients with mechanical insidious neck pain and whiplash-associated neck pain. *Am J Phys Med Rehabil* 2012;91:584-91. doi: 10.1097/PHM.0b013e31823c757c.
13. Hashmi AM, Khawaja IS, Butt Z, Umair M, Naqvi SH, Jawad-Ul-Haq.

- The Pittsburgh Sleep Quality Index: validation of the Urdu translation. *J Coll Physicians Surg Pak* 2014;24:123-6.
14. Farooq MN, Mohseni-Bandpei MA, Gilani SA, Hafeez A. Urdu version of the neck disability index: a reliability and validity study. *BMC Musculoskelet Disord* 2017;18:149. doi: 10.1186/s12891-017-1469-5.
 15. Young IA, Dunning J, Butts R, Cleland JA, Fernández-de-Las-Peñas C. Psychometric properties of the Numeric Pain Rating Scale and Neck Disability Index in patients with cervicogenic headache. *Cephalalgia* 2019;39:44-51. doi: 10.1177/0333102418772584.
 16. Manzar MD, Moiz JA, Zannat W, Spence DW, Pandi-Perumal SR, Ahmed S, et al. Validity of the Pittsburgh Sleep Quality Index in Indian University Students. *Oman Med J* 2015;30:193-202. doi: 10.5001/omj.2015.41.
 17. Juul T, Sogaard K, Davis AM, Roos EM. Psychometric properties of the Neck Outcome Score, Neck Disability Index, and Short Form-36 were evaluated in patients with neck pain. *J Clin Epidemiol* 2016;79:31-40. doi: 10.1016/j.jclinepi.2016.03.015.
 18. Siddiqui M, Akhter S, Baig AAM. Effects of autogenic and reciprocal inhibition techniques with conventional therapy in mechanical neck pain - a randomized control trial. *BMC Musculoskelet Disord* 2022;23:704. doi: 10.1186/s12891-022-05668-0.
 19. Kääriä S, Laaksonen M, Rahkonen O, Lahelma E, Leino-Arjas P. Risk factors of chronic neck pain: a prospective study among middle-aged employees. *Eur J Pain* 2012;16:911-20. doi: 10.1002/j.1532-2149.2011.00065.x.
 20. Devnarain A. The epidemiology of work-related neck pain in diagnostic radiographers working in the eThekweni Municipality. [Online] 2023 [Cited 2025 April 04]. Available from URL: <https://openscholar.dut.ac.za/server/api/core/bitstreams/95866cc1-b3c6-427d-ae71-c7d362e2ccbd/content>. doi: 10.51415/10321/4924
 21. Reynolds AC, Coenen P, Lechat B, Straker L, Zabatiero J, Maddison KJ, et al. Insomnia and workplace productivity loss among young working adults: a prospective observational study of clinical sleep disorders in a community cohort. *Med J Aust* 2023;219:107-112. doi: 10.5694/mja2.52014.
 22. Shi T, Chen Z, Li W, Wang Z, Liu W. Prevalence of sleep disturbance in patients with cervical radiculopathy and an analysis of risk factors: a cross-sectional study. *Eur Spine J* 2023;32:1624-35. doi: 10.1007/s00586-023-07655-y.
 23. Yabe Y, Hagiwara Y, Sekiguchi T, Sugawara Y, Tsuchiya M, Yoshida S, et al. Tsuji I. Sleep disturbance is associated with neck pain: a 3-year longitudinal study after the Great East Japan Earthquake. *BMC Musculoskelet Disord* 2022;23:459. doi: 10.1186/s12891-022-05410-w.

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AAMB & FIK: Design, critical analysis, revision, writing and final approval.

HZA & HS: Data collection, writing and final approval.

SSW & RH: Writing and final approval.