ORIGINAL ARTICLE

The Association between Sleep Quality and Neck Pain among General Population of Rawalpindi: An Analytical Cross-Sectional Study

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ABSTRACT

Objective: To assess proportion and relationship of neck pain associated disability and poor quality of sleep in general population of Rawalpindi.
Methodology: An analytical cross-sectional study was carried out online over a period of six months in Rawalpindi employing non-probability consecutive sampling technique.
Any individual between the age of 16-60 years and willing to fill the questionnaire was enrolled. The "Pittsburgh Sleep Quality Index (PSQI)" and "The Northwick Park Neck Pain Questionnaire (NPQ)" were utilized to analyse sleep disturbances and neck pain associated disability respectively. The link to questionnaire was shared on WhatsApp. Scores were calculated for each participant. Then, the scores were categorized in four levels of neck pain associated disabilities and two categories of sleep as good vs poor sleep. SPSS 24.0 was used for data analysis at 5% alpha.
Results: A total 383 valid responses were analysed. Mean age of participants was 30.29±13.82 years. An extremely significant association of poor sleep quality and prevalence of neck pain associated disability was observed ($p<0.001$).
Conclusion: It was concluded that participants with poor sleep experienced moderate to complete neck pain associated disabilities more as compared to participants with good sleep, who predominantly reported no or mild disability. This suggests that poor sleep quality is strongly linked with increased severity of neck pain and functional impairment. Improving sleep quality in persons with neck pain can enhance the prognosis of neck pain-associated impairments in medical settings.
Keywords: Neck Pain Questionnaire, Pittsburgh Sleep Quality Index, Quality of Sleep

INTRODUCTION

Neck pain is a widespread musculoskeletal issue of public health importance, ranking as the fourth leading cause of years lived with disability (YLDs) globally, following lower back pain, depression, and osteoarthritis.[1] Affecting up to 70% of people during their lifetime, it is especially common in adults aged 30–50 years and more prevalent among women.[2] In urbanized areas like Rawalpindi, lifestyle factors such as prolonged sitting, excessive screen time, poor posture, and stress significantly contribute to the rise in neck pain cases.[3] These behaviours strain cervical muscles and lead to chronic discomfort, exacerbated by poor ergonomic practices and muscle imbalances.[4]

Crucially, poor sleep quality has emerged as an important determinant for neck pain. Inadequate or disturbed sleep impairs musculoskeletal recovery, heightens pain perception, and is linked to the onset and persistence of neck pain.[5] A study of over 1,000 chronic pain patients revealed that 42.22% experienced sleep deprivation despite medication, illustrating a bidirectional relationship where pain disrupts sleep and insomnia causes neck pain.[6] Additionally, poor sleep increases inflammatory markers like IL-6 and CRP, further aggravating pain sensitivity.[7,8] The operational definition of sleep quality is the total amount of time spent asleep during a

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designated sleep period, typically 7-9 hours and neck pain associated disability is a self-reported discomfort, soreness, or pain experienced in the cervical region (the neck area) where participants rate their pain intensity through "Northwick Park Neck Pain Questionnaire".

There is paucity of published studies assessing the association between neck pain associated disability and quality of sleep in Pakistan, and a few which have assessed the frequency of neck pain and sleep quality did not have any statistically significant results. Moreover, existing literature does not reflect these regional differences, creating a gap in understanding the local burden and its specific risk patterns. There is limited local data evaluating the link between quality of sleep and neck pain which hinders the relevant insights that can form public health policies and clinical practice. The present study was conducted to explore the association between quality of sleep and neck pain associated disabilities in Rawalpindi using the PSQI and NPQ tool respectively.

METHODOLOGY

An analytical cross sectional study was carried out in the general population resided in Rawalpindi, from March to August 2025. The Ethical consent was taken from the Institutional Review Board of Army Medical College, National University of Medical Sciences (ERC ID No: 03/2025/465).

Adults aged 18-60 years, experiencing sleep disturbances including insomnia or sleep apnea, reporting moderate neck pain (as assessed by the Neck Pain Questionnaire), otherwise healthy participants without significant comorbidities such as spinal deformities, advanced neurological or orthopaedic disorders that could independently cause neck pain and were willing to participate and able to provide informed consent, were included in the study.

Individuals with spinal injuries due to recent trauma or those who have undergone spinal surgeries, with severe psychiatric illness or cognitive impairments that hinder comprehension or voluntary participation, pregnant women or those who have given birth within last 06 months (due to physiological changes affecting both sleep and musculoskeletal pain), and individuals with a BMI >40 (as extreme obesity can be independent contributor to both poor sleep and neck pain) were excluded.

After calculating thorough Raosoft calculator, total 383 citizens of Rawalpindi were recruited in the study. This sample size was calculated with 95% confidence level and 5% margin of error at 50% prevalence to get largest sample size. Participants were recruited through consecutive sampling, a non-probability technique, after obtaining written informed consent.

The data was collected using two questionnaires i.e. "The Pittsburgh Sleep Quality Index (PSQI)" with sensitivity of 89%, specificity of 86.5% and Cronbach's alpha of 0.77, to analyse sleep disturbances. In PSQI, scores of seven component were calculated separately, with "0" represented no difficulty to "3" as severe difficulty. The score of seven components were then summed up to produce a global score (ranged from "0 to 21"). A Cut-off value of ≥ 5 represented poor sleep, whereas a score of <5 indicates good sleep. The higher the score, the worse the sleep quality.[7]

"The Northwick Park Neck Pain Questionnaire (NPQ)" was used to measure neck pain associated disability consisting of 09 questions related to pain intensity, duration of symptoms, nocturnal numbness, sleep affected by pain, effect on social life, carrying, reading/watching television, working/housework, and driving. There were five possible reply for each item, representing the various level of neck pain associated disability (0 representing no while 4 representing severe difficulty). It has maximum score 36 and minimum 0, with highest score directly proportional to neck pain associated disability. Neck pain associated disability was further divided into categories which are similar to neck disability index, (0-4%=no neck pain associated disability, 5-14%=Mild neck pain associated disability, 15-24%=Moderate neck

pain associated disability, 25-34%= Severe neck pain associated disability, >35%= Complete neck pain associated disability).[9] Qualitative data was presented in the form of frequencies and percentages. While mean and standard deviation (SD) were computed for continuous data. The chi-square test was used to assess the association of sleep disturbances with neck pain associated disability on SPSS version 24.0. The *p*-value <0.05 was considered statistically significant.

RESULTS

The mean age of participants was 30.29±13.82 years. Among 383 participants, 194 (50.7%) were males and 189 (49.3%) were females. A total of 127 (33.2%) were postgraduates, 218 (56.9%) were undergraduate, 29 (7.6%) had completed intermediate and only 9 (2.3%) completed their matriculation. Out of total participants, 158 (41.3%) were employed, 170 (44.4%) were unemployed and 55 (14.4%) belonged to other categories.

It was observed that majority of participants (55.1%) had no neck pain associated disabilities while 32.4% had mild disability as shown in Figure 1.

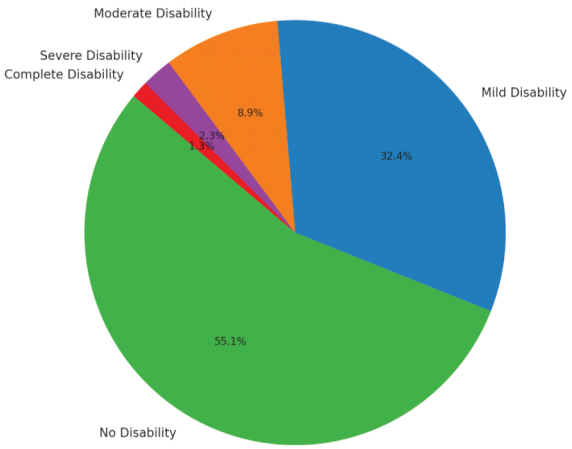

Figure 1: Distribution of Neck Pain Associated Disabilities

Among the respondents, Out of 211 (55%) with no neck pain associated disability, 203 (53%) had good quality sleep. While those 9 (2.3%) with severe disability, 7 (1.8%) had poor quality sleep. Among those with complete disability 5 (1.3%), 3 (0.8%) participants had poor sleep as shown in Figure 2.

There was an extremely significant association found between poor sleep quality and neck pain associated disability (p<0.001) as shown in Table 1.

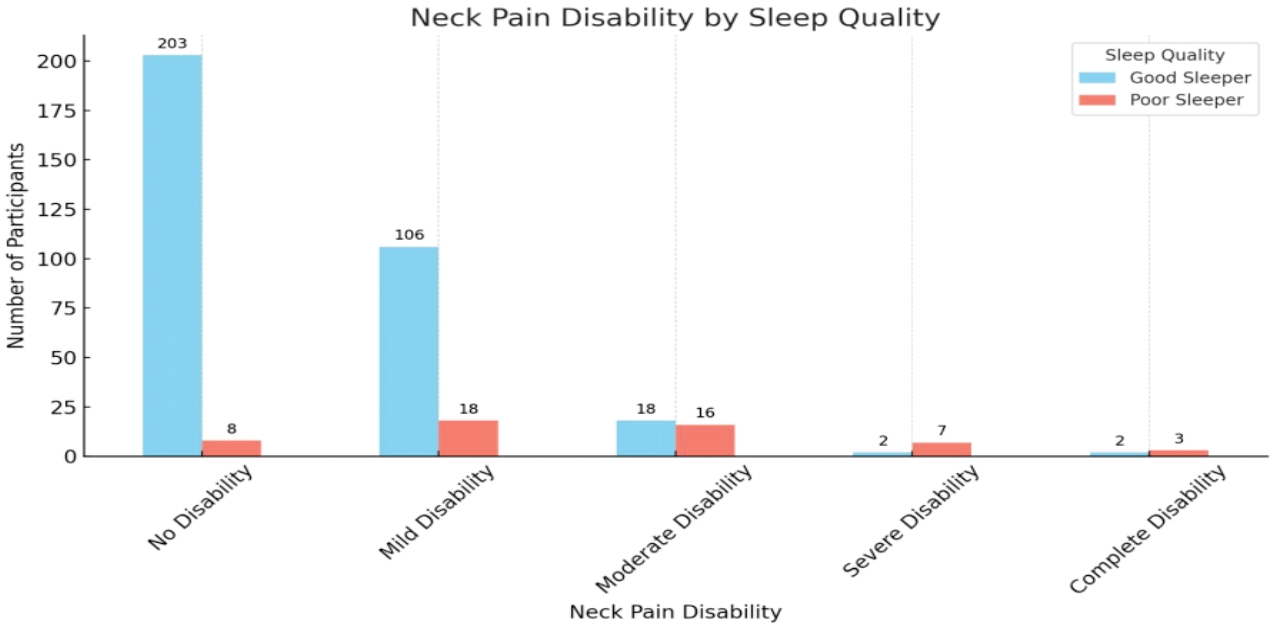

Figure 2: The cross tabulation between Sleep Quality and Neck Pain associated Disability

Table I. Association between Global PSQI score and Neck Pain associated Disability

Global PSQI Score	No Neck Pain associated Disability	Mild Neck Pain associated Disability	Moderate Neck Pain associated Disability	Severe Neck Pain associated Disability	Complete Neck Pain associated Disability	*p*-value
Good Sleeper	203(53%)	106(27.7%)	18(4.69%)	2(0.52%)	2(0.52%)	<0.001***
Poor Sleeper	8(2.08%)	18(4.69%)	16(4.17%)	7(1.82%)	3(0.78%)	

****p*-value extremely significant

DISCUSSION

We observed the association between quality of sleep and neck pain-associated disability in a sample of 383 individuals. Utilizing the "Pittsburgh Sleep Quality Index and The Northwick Park Neck Pain Questionnaire", the study found an extremely significant relationship between poor sleep quality and greater levels of neck pain associated disability (Pearson Chi-Square = 90.594, $p < 0.001$). Our study found that adults who had inadequate sleep reported with high levels of neck pain associated disability compared to participants with good sleep, hence defining a strong association between the two. Notably, the proportion of individuals with no disability was substantially greater in the good sleep category (203 out of 331), whereas the participants with poor sleep exhibited elevated frequencies in the moderate (16), severe (7), and complete (3) disability levels.

These results suggest that sleep quality may play a crucial role in the experience and severity of neck pain associated disability. Findings are consistent with previous research conducted in Tohoku region, Japan which represented a similar link between poor sleep quality and neck pain disability, however it was from disaster affected regions after Great East Japan Earthquake.[10]

Another research conducted at John Hopkins University School of Medicine, highlighted that poor sleep is a robust risk factor of future pain than pain is for poor sleep, especially in chronic conditions.[11] Moreover, research in Ireland found that poor sleep quality particularly disruptions in REM sleep, was associated with increased sensitivity to pain and heightened muscle tension which may exacerbate conditions such as neck disability.[12]

Results of study supported this by showing that participants who had poor sleep quality experienced higher levels of neck disability. A study conducted in Pakistan reported that there is no association occurring in persons who were having cervical pain with daily physical activities and sleep pattern disturbances which was dissimilar with present research[13].

Despite significant association, the study had limitations. The data was cross-sectional, limiting ability to conclude causality and was collected in a short span of 2-3 months. It remains unclear whether poor sleep leads to increased neck disability or whether chronic neck pain disrupts sleep or if a third factor contributes to both. Variables such as age, gender, occupation, comorbidities or psychological stress were not included in this analysis which could act as confounding variables. Both PSQI and NDI are validated instruments, but they do not replace objective measures such as actigraphy or clinical diagnosis. Cultural, environmental and lifestyle factors that influence both sleep and physical health were not accounted for in this dataset, which could impact generalizability of findings across different populations or regions. The data was collected by google forms which were filled on self-reported measures and can be subjected to bias.

CONCLUSION

It was concluded that participants with poor sleep experienced moderate to complete neck pain associated disabilities more as compared to the participants with good sleep, who predominantly reported no or mild disability. This suggests that poor sleep quality is strongly linked with increased severity of neck pain and functional impairment. Improving sleep quality in persons with neck pain can enhance the prognosis of neck pain-related impairments in medical settings.

Conflict of Interest: None

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