

Article

Effects of Cervical Radiculopathy on Upper Limb Function in Nurses Working in ICU

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ABSTRACT

Background: Cervical radiculopathy, a condition characterized by nerve root compression in the cervical spine, commonly affects individuals in physically demanding professions. ICU nurses, due to prolonged shifts and repetitive upper limb activity, are particularly vulnerable, yet limited research has focused on its specific impact on upper limb function in this high-risk population. **Objective:** This study aimed to assess the extent of upper limb dysfunction caused by cervical radiculopathy among female ICU nurses, using validated disability measures to quantify clinical impairment and explore age-related trends. **Methods:** A cross-sectional observational study was conducted among ICU nurses in private hospitals across Lahore (n = 108). Participants were selected using non-probability purposive sampling, meeting criteria of female gender, age 25–45 years, minimum six-hour shifts, and positive Spurling's test. Exclusion criteria included pregnancy, cervical trauma, or surgical history. Data were collected using the QuickDASH questionnaire, and statistical analysis was performed using SPSS v25. Ethical approval was obtained in accordance with the Declaration of Helsinki, and informed consent was secured. **Results:** Among 108 nurses, 99.1% reported some degree of upper limb disability, with a mean QuickDASH score of 34.01 ± 19.76 . Mild, moderate, and severe disability were observed in 54.6%, 30.6%, and 13.9% of participants, respectively. Functional limitations and pain were more severe in older nurses, suggesting age-related vulnerability. **Conclusion:** Cervical radiculopathy significantly impairs upper limb function in ICU nurses, impacting occupational performance and quality of life. Early ergonomic interventions and routine screening are crucial to mitigate disability and preserve workforce health.

Keywords: Cervical Radiculopathy, Intensive Care Units, Upper Extremity Function, QuickDASH, Occupational Health, Nursing Staff, Musculoskeletal Disorders

INTRODUCTION

The cervical spine, due to its complex structure and high degree of mobility, is particularly vulnerable to mechanical stress, often resulting in degenerative changes over time (1). Among the clinical syndromes associated with such degeneration, cervical radiculopathy is a prevalent condition characterized by compression or irritation of nerve roots, which manifests as radiating pain, muscle weakness, and sensory disturbances extending from the neck to the upper extremities (2,3). The condition is often exacerbated by poor posture, repetitive strain, trauma, and anatomical narrowing such as spinal stenosis, all of which are frequently encountered in physically demanding occupational settings (4).

Nursing professionals, especially those assigned to intensive care units (ICUs), are consistently exposed to a multitude of

occupational stressors. These include extended shifts, irregular working hours, patient handling, and the necessity for rapid, precise physical interventions, all contributing to a high risk of musculoskeletal disorders (MSDs) (5,6). Previous studies have identified a correlation between such occupational demands and the prevalence of cervical and lumbar spine issues among healthcare workers globally, including back and neck pain (7). However, much of the existing literature has primarily focused on general musculoskeletal complaints without isolating the effects of cervical radiculopathy on specific upper limb functions, particularly in high-risk subpopulations like ICU nurses (8,9).

The global increase in ICU admissions and the consequent pressure on healthcare staffing have further compounded the physical burdens placed on ICU nurses. These professionals often

neglect their physical wellbeing due to the demanding nature of their roles, leading to a cycle of chronic strain and insufficient recovery. This environment fosters a higher risk for conditions such as cervical radiculopathy, especially among aging nurses or those with longer job tenure (10,11). Despite this evident risk, there remains a gap in focused research examining how cervical radiculopathy impacts specific functional domains such as dexterity, strength, and the ability to perform daily and occupational upper limb tasks in nurses.

While broader epidemiological data exist regarding the prevalence and management of cervical radiculopathy in the general population, there is a lack of granular, occupation-specific investigations targeting ICU nurses, whose physical tasks directly depend on upper limb efficiency (12,13). This limitation in the literature undermines the development of preventative strategies and ergonomic interventions aimed at preserving the health and functional independence of a critical segment of the healthcare workforce.

Therefore, this study aims to investigate the effects of cervical radiculopathy on upper limb function specifically in ICU nurses, using a validated functional assessment tool—the QuickDASH questionnaire. The research intends to quantify the degree of disability, explore its relationship with age, and highlight the need for tailored occupational health interventions. It is hypothesized that cervical radiculopathy significantly impairs upper limb functionality among ICU nurses, with severity correlating positively with increasing age and occupational exposure.

MATERIALS AND METHODS

The present study employed a cross-sectional observational design to assess the effects of cervical radiculopathy on upper limb function in female nurses working in intensive care units (ICUs) across various private hospitals in Lahore. Participants were recruited using a non-probability purposive sampling technique over a six-month period following the approval of the study protocol. A total of 108 ICU nurses, aged between 25 and 45 years, were included based on the following criteria: female gender, a minimum of six working hours per shift, and a positive Spurling's test indicating cervical nerve root involvement. Nurses were excluded if they had a history of whiplash or traumatic injuries to the cervical spine, prior cervical fractures or surgeries, or were pregnant at the time of the study. All participants voluntarily provided written informed consent after being briefed about the study's objectives, procedures, and confidentiality safeguards.

Table 1. Distribution of ICU Nurses by Disability Level (QuickDASH Categories)

Disability Level	Frequency (n)	Percentage (%)
No Disability	1	0.9
Mild Disability	59	54.6
Moderate Disability	33	30.6
Severe Disability	15	13.9
Total	108	100.0

Analysis of the QuickDASH scores revealed that nearly all participants (99.1%) experienced some level of upper limb

Upper limb function, the primary outcome of interest, was measured using the Quick Disabilities of the Arm, Shoulder, and Hand (QuickDASH) questionnaire, a validated self-report instrument designed to assess physical function and symptoms in people with upper limb musculoskeletal disorders. The questionnaire was administered once during the study period to each participant. The QuickDASH includes 11 items that evaluate the degree of difficulty in performing physical activities and the severity of symptoms such as pain, tingling, and sleep disturbances associated with upper limb dysfunction. Scores range from 0 (no disability) to 100 (most severe disability), with higher scores indicating greater impairment. Participants were instructed to complete the questionnaire independently, and researchers ensured the confidentiality of responses by assigning coded identifiers without collecting any personally identifying data.

The study protocol was designed in accordance with the principles of the Declaration of Helsinki. Informed consent was obtained from all participants, and the confidentiality of collected data was maintained throughout the study. No identifying information was shared, and all data were stored securely and used solely for the purposes of this research.

Data were analyzed using the Statistical Package for the Social Sciences (SPSS), version 25. Descriptive statistics, including means, medians, standard deviations, and ranges, were calculated to summarize the distribution of QuickDASH scores and demographic variables. The prevalence of disability was categorized into no, mild, moderate, and severe levels based on score cut-offs. Additionally, age-related patterns were examined to determine whether older nurses reported higher levels of disability. The relationship between age and QuickDASH score was visually assessed using scatter plots. As there were no missing data in the dataset, all 108 cases were included in the final analysis without the need for imputation or sensitivity testing. All statistical findings were reported in accordance with standard reporting guidelines (12).

RESULTS

A total of 108 female ICU nurses, aged 25 to 45 years, were enrolled in this study. All participants completed the assessment without any missing data. The primary outcome—upper limb disability—was measured using the Quick Disabilities of the Arm, Shoulder, and Hand (QuickDASH) questionnaire.

disability attributable to cervical radiculopathy. Among them, 54.6% reported mild disability, 30.6% moderate disability, and

13.9% severe disability. Only one participant (0.9%) reported no disability. The mean QuickDASH score was 34.01 ± 19.76 , with a median of 27.27. Scores ranged from 9.09 to 77.30, indicating

substantial variability in the degree of disability across participants. This distribution reflects a predominantly mild to moderate disability pattern in the study population.

Table 2. Descriptive Statistics for QuickDASH Scores

Statistic	Value
N (Valid)	108
Mean \pm SD	34.01 ± 19.76
Median	27.27
Minimum	9.09
Maximum	77.30
Range	68.21

Task-Specific Impairments and Pain

Functional limitations were particularly evident in physically demanding tasks. Moderate to severe difficulty was reported by 51.8% of nurses for heavy household chores and by 39.9% for recreational activities. Regarding symptomatology, 78.6% of participants experienced some degree of pain, with 31.4% reporting moderate to severe levels. Sleep disturbance due to pain was prevalent in 83.4% of the sample, suggesting a clinically significant impact on quality of life.

These findings underscore the widespread functional limitations and symptom burden experienced by ICU nurses with cervical radiculopathy. The wide range in QuickDASH scores indicates considerable inter-individual variability, possibly influenced by age, duration of exposure to ICU duties, and underlying ergonomic risk factors. A visual inspection of the relationship between age and QuickDASH scores (Figure 1) demonstrated a trend where upper limb disability severity increased with age. Younger nurses (approximately 25 years) predominantly exhibited no or mild disability, while older participants (approaching 45 years) were more likely to experience moderate to severe impairment. Though formal regression analysis was not performed, the graphical trend suggests a potential age-related interaction effect worth investigating in future studies.

These results reflect a clinically meaningful correlation between aging and worsening upper limb function among ICU nurses with cervical radiculopathy, reinforcing the importance of early ergonomic intervention and age-specific occupational support.

DISCUSSION

The findings of this study reveal a high prevalence of upper limb dysfunction due to cervical radiculopathy among ICU nurses, with 99.1% of participants reporting some level of disability based on QuickDASH scores. This is a significant observation, particularly in a population consistently exposed to occupational risk factors such as prolonged standing, patient handling, and repetitive upper limb tasks. The average disability score of 34.01 suggests a moderate level of impairment, which, while not debilitating in most cases, is sufficiently impactful to affect work performance, task efficiency, and quality of life. These findings align with prior epidemiological studies that identified cervical radiculopathy as a notable musculoskeletal burden among healthcare professionals, especially nurses working in physically and psychologically demanding environments (1,5).

This study's results are consistent with those reported by Joseph and Roy, who observed neck disability in 42.4% of their sample and arm pain in 80.4% of participants with cervical radiculopathy (12). Notably, our sample demonstrated even higher levels of impairment, with 44.5% of ICU nurses reporting moderate to severe disability. The discrepancy could be attributed to the difference in population focus; while Joseph and Roy included a broader group of professionals, our study specifically assessed ICU nurses, whose high patient contact and acute care responsibilities intensify ergonomic stressors. Furthermore, both studies found a predominant impact in younger professionals aged 25–35, suggesting that cervical spine issues may emerge earlier than traditionally assumed in physically demanding occupations.

In comparison to other studies examining general musculoskeletal disorders among healthcare workers, such as that by Ou et al., which reported MSDs in 56% of nursing staff, our findings emphasize a more localized and severe functional impact in the upper extremities linked specifically to cervical pathology (11). The integration of the QuickDASH tool enabled a more nuanced evaluation of task-specific limitations—such as difficulties with heavy household chores and recreational activities—highlighting the practical challenges these nurses face beyond the workplace. These specific deficits may be attributed to nerve root impingement, poor postural ergonomics, and sustained cervical flexion or loading during bedside care, which are common in ICU settings (4,6).

Age-related worsening of QuickDASH scores observed in our cohort suggests a possible cumulative effect of occupational stress and age-related degenerative changes. The increase in functional impairment with age is likely due to progressive disc degeneration, osteophyte formation, and reduced adaptive capacity of the neuromuscular system. These pathophysiological mechanisms are well-documented in the literature and provide a plausible explanation for the trends observed in our study (2,3). Additionally, the role of inflammation and neural sensitization in chronic cervical radiculopathy may exacerbate pain perception and functional decline in older individuals, compounding the physical strain associated with ICU duties.

The clinical implications of these findings are considerable. Given that ICU nurses form a critical component of the healthcare workforce, compromised upper limb function may not only affect their personal health but also influence patient safety and care quality. Sleep disturbances and pain-related limitations, as

reported by over 80% of participants, further suggest an intersection between musculoskeletal and psychological health burdens, which can lead to burnout, reduced job satisfaction, and high attrition rates. These concerns underscore the need for integrated occupational health programs that incorporate ergonomic education, early screening for cervical spine dysfunction, and workplace modifications such as adjustable workstations, frequent rest breaks, and targeted physiotherapy interventions.

Despite the valuable insights offered, this study is not without limitations. The use of a non-probability purposive sampling method and restriction to female nurses in Lahore limits the generalizability of findings to broader populations, including male nurses or healthcare workers in rural or public settings. Moreover, while the QuickDASH is a validated tool, the reliance on self-reported data introduces the potential for response bias. The cross-sectional nature of the study precludes causal inference; thus, while associations between cervical radiculopathy and upper limb dysfunction are evident, longitudinal studies are needed to explore progression over time and effectiveness of interventions. Furthermore, no formal statistical modeling was conducted to account for potential confounders such as body mass index, years of experience, or comorbidities, which may influence disability scores.

Future research should consider multi-center longitudinal designs with larger, more diverse cohorts to validate these findings and assess intervention outcomes. Randomized controlled trials evaluating ergonomic training, workplace redesign, or physiotherapeutic strategies in preventing or mitigating cervical radiculopathy among ICU staff could provide practical, evidence-based solutions. Moreover, incorporating objective assessments such as cervical range of motion testing or electromyography could enhance the accuracy of diagnosing functional limitations.

In conclusion, this study highlights a significant burden of upper limb disability associated with cervical radiculopathy among ICU nurses. The results emphasize the occupational hazards inherent in critical care environments and the urgent need for targeted ergonomic and rehabilitative interventions. Strengthening preventive healthcare systems for frontline providers will not only improve their quality of life but also ensure the continuity of safe and effective patient care.

CONCLUSION

This study concludes that cervical radiculopathy significantly impairs upper limb function in ICU nurses, with 99.1% of participants experiencing some level of disability, predominantly in tasks requiring strength, dexterity, and endurance. These findings directly align with the study's objective to evaluate the impact of cervical radiculopathy on upper limb function among nurses in high-demand critical care settings. The high prevalence of functional limitations emphasizes the urgent need for ergonomic interventions, routine musculoskeletal screening, and workplace health strategies tailored for ICU environments. Clinically, addressing cervical radiculopathy early can preserve functional capacity, reduce absenteeism, and improve quality of care, while future research should explore longitudinal outcomes

and the efficacy of preventive and rehabilitative protocols in similar high-risk healthcare populations.

REFERENCES

1. Keskin I, Cinar E, Guvercin EY, Baklaci M, Kirazli Y. Assessment of Prevalence of Neck Pain and Related Factors in Nurses Working in a University Hospital. *Turk J Osteoporos.* 2024;30(1):55-63.
2. Magnus W, Viswanathan VK. Cervical Radiculopathy. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2024.
3. Shahid Z, Mouzam H, Subhani A, Maqsood U, Sheraz H. Frequency of Cervical Radiculopathy Among Patients With Chronic Cervical Pain in Lahore, Pakistan. *J Pak Med Assoc.* 2020;70(10):1720-2.
4. Chu ECP, Lo FS, Bhaumik A. Plausible Impact of Forward Head Posture on Upper Cervical Spine Stability. *J Family Med Prim Care.* 2020;9(5):2369-73.
5. Adams AMN, Chamberlain D, Giles TM. The Perceived and Experienced Role of the Nurse Unit Manager in Supporting the Wellbeing of Intensive Care Unit Nurses: An Integrative Literature Review. *Aust Crit Care.* 2019;32(4):319-29.
6. Mansfield M, Smith T, Spahr N, Thacker M. Cervical Spine Radiculopathy Epidemiology: A Systematic Review. *Musculoskelet Care.* 2020;18(4):555-67.
7. Bryndal A, Glowinski S, Hebel K, Grochulska J, Grochulska A. The Prevalence of Neck and Back Pain Among Paramedics in Poland. *J Clin Med.* 2023;12(22):1-13.
8. Alomari AH, Collison J, Hunt L, Wilson NJ. Stressors for Emergency Department Nurses: Insights From a Cross-Sectional Survey. *J Clin Nurs.* 2021;30(7-8):975-85.
9. AlMarzooq AM. Emergency Department Nurses' Knowledge Regarding Triage. *Int J Nurs.* 2020;7(2):29-44.
10. Ou YK, Liu Y, Chang YP, Lee BO. Relationship Between Musculoskeletal Disorders and Work Performance of Nursing Staff: A Comparison of Hospital Nursing Departments. *Int J Environ Res Public Health.* 2021;18(13):7085.
11. Ou YK, Liu Y, Chang YP, Lee BO. Relationship Between Musculoskeletal Disorders and Work Performance of Nursing Staff: A Comparison of Hospital Nursing Departments. *Int J Environ Res Public Health.* 2021;18(13):7085. (Duplicate removed from final list)
12. Joseph R, Roy F. Prevalence of Cervical Radiculopathy Among Information Technology Professionals With Neck Pain. *Indian J Pain.* 2023;37:169-72.
13. Gane EM, McPhail SM, Hatton AL, Panizza BJ, O'Leary SP. The Relationship Between Physical Impairments, Quality of Life and Disability of the Neck and Upper Limb in Patients Following Neck Dissection. *J Cancer Surviv.* 2018;12(5):619-31.

14. Daliri BO, Khorasani HM, Olia NDB, Azhari A, Shakeri M, Moradi A. Association of Psychological Factors With Limb Disability in Patients With Cervical Radiculopathy: Comparison With Carpal Tunnel Syndrome. *BMC Musculoskelet Disord.* 2022;23(1):667.
15. Taso M, Sommernes JH, Kolstad F, Sundseth J, Bjorland S, Pripp AH, et al. A Randomised Controlled Trial Comparing the Effectiveness of Surgical and Nonsurgical Treatment for Cervical Radiculopathy. *BMC Musculoskelet Disord.* 2020;21(1):171.
16. Clari M, Garzaro G, Di Maso M, Donato F, Godono A, Paleologo M, et al. Upper Limb Work-Related Musculoskeletal Disorders in Operating Room Nurses: A Multicenter Cross-Sectional Study. *Int J Environ Res Public Health.* 2019;16(16):2931.
17. Apaydin AS, Gunes M, Yana M. Investigation of Functional Disability, Pain, and Quality of Life in Patients With Cervical Radiculopathy by Gender. *Med Records.* 2024;6(1):14–9.
18. Singh S, Sathe PK, Sathe A, Kumar DV. Evaluation of Functional Disability in Cervical Radiculopathy Patients. *Indian J Health Sci Biomed Res KLEU.* 2023;16(1):103–10.