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No funding was received for this study. The authors declare no conflict of interest. The study received ethical approval. All participants provided informed consent.

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Association of Long Working Hours with Neck Pain and Headache Among House Officers

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ABSTRACT

Background: Neck pain and headache are common occupational problems among house officers, potentially aggravated by prolonged duty rosters, sustained static postures, and high clinical workload. Objective: To determine the association between duty-shift duration and neck pain severity and headache-related disability among house officers in Sialkot, Pakistan. Methods: A cross-sectional study enrolled 357 house officers aged 24–28 years from government and private teaching hospitals. All participants reported working ≥70 hours per week and had ≥6 months of experience. Duty-shift duration was categorized as 12-hour versus 24-hour shifts. Pain intensity was assessed using time-anchored numeric ratings (pain right now, usual, best, worst), and headache-related disability using the Headache Disability Inventory (HDI). Associations were examined using Pearson's chi-square test in SPSS 26.0 ($\alpha = 0.05$). Results: Most participants worked 24-hour shifts (65.8%) and 54.1% were female. Duty-shift duration was associated with pain "right now" ($\chi^2 = 6.309$, $df = 2$, $p = 0.043$; Cramér's $V = 0.133$) and with the "best pain" category ($\chi^2 = 7.094$, $df = 1$, $p = 0.008$; $V = 0.141$), while associations were not significant for usual pain ($p = 0.283$) or worst pain ($p = 0.059$). HDI functional, emotional, and total disability categories were not significantly associated with shift duration ($p = 0.479$, 0.862, and 0.400, respectively). Conclusion: Extended duty shifts were associated with higher severity in selected pain-intensity categories, whereas headache-related disability categories did not differ significantly by shift duration.

Keywords

House officers; duty shifts; neck pain; headache; occupational health; ergonomics.

INTRODUCTION

Neck pain is a highly prevalent musculoskeletal complaint and remains a major contributor to disability worldwide, with projections indicating a substantial growth in burden over coming decades due to demographic change and persistent exposure to biomechanical risk factors (1). In clinical practice, neck pain is frequently encountered in working-age adults and is commonly associated with impaired function, reduced productivity, and comorbid symptoms that compound disability, particularly headache syndromes and stress-related symptoms (2). Mechanistically, sustained cervical loading, repetitive upper-quarter tasks, and prolonged static postures can increase cervical muscle activity and kinematic strain, which may amplify nociceptive input and contribute to sensitization pathways that overlap with primary and cervicogenic headache disorders (3). Consistent with this overlap, evidence syntheses indicate that individuals with headache disorders experience neck pain at markedly higher frequencies than those without headache, reinforcing the clinical interdependence of these conditions (4).

House officers constitute an occupational subgroup exposed to a distinctive combination of ergonomic and psychosocial stressors, including extended duty shifts, prolonged standing or forward-flexed postures during bedside procedures, high cognitive workload, disrupted sleep, irregular meals, and limited recovery time between duties. These exposures plausibly increase acute cervical musculoskeletal strain and may precipitate or exacerbate headache phenotypes through combined peripheral and central mechanisms, including sustained pericranial muscle tension and cervicothoracic dysfunction (3). While neck pain and headache are widely recognized among healthcare workers, the specific contribution of duty-shift duration to symptom severity and headache-related disability remains insufficiently characterized in many low- and middle-income settings where staffing patterns may necessitate extended shifts and recovery infrastructure is limited. Local evidence focusing on house officers is particularly important because the early-career phase may establish persistent symptom trajectories and influence long-term workforce sustainability through cumulative work-related morbidity.

Accordingly, this study investigated house officers working high weekly workloads in teaching hospitals in Sialkot, Pakistan, comparing those rostered predominantly on 24-hour duty shifts versus 12-hour shifts to determine whether extended shift duration is associated with greater neck pain severity and higher headache-related disability. The primary research question was: among house officers working ≥70 hours per week, is duty-shift duration (24-hour vs 12-hour shifts) associated with higher neck pain severity and greater headache-related disability as measured by standardized patient-reported outcome instruments (5,6)?

MATERIALS AND METHODS

An observational cross-sectional study was conducted in government and private teaching hospitals in Sialkot, Pakistan over a six-month period following institutional approval. House officers were recruited using non-probability purposive sampling from eligible clinical departments operating routine 12-hour and 24-hour duty rosters. Participants were included if they were aged 24–28 years, had at least six months of house job experience, and reported working ≥70 hours per week. Exclusion criteria were a recent neck or upper-limb injury, a history of chronic headache disorder, recent physiotherapy for neck or shoulder complaints, or regular participation in structured neck/shoulder exercise, to reduce bias from pre-existing conditions and concurrent therapeutic exposure.

After eligibility screening, participants were approached in person and provided a standardized explanation of study aims and procedures, with written informed consent obtained prior to enrollment. Data collection was performed using a structured demographic proforma and two standardized outcome measures. Neck pain intensity was quantified using a 0–10 numeric pain rating format administered across four time-

anchored severity prompts: pain "right now," "usual" pain over the preceding week, "best" pain over the preceding week, and "worst" pain over the preceding week, consistent with common clinical numeric rating administration formats used to improve recall anchoring (6). For inferential analysis, numeric ratings were categorized into clinically interpretable severity strata (mild, moderate, severe) using established numeric rating cut-points aligned to functional interference thresholds (7). Headache-related disability was assessed using the Headache Disability Inventory (HDI), a 25-item instrument with functional and emotional subscales designed to quantify headache impact on daily life, scored using a weighted response system and interpreted using established disability bands (5,8). Total HDI scores and subscale scores were computed according to standard scoring rules; functional and emotional subscales were analyzed separately to evaluate whether extended shift duration was associated with differential disability profiles.

The primary exposure variable was duty-shift duration, categorized a priori as 12-hour versus 24-hour shifts based on the participant's rostered working pattern at the time of study participation. The primary outcome was neck pain severity, operationalized as categorized pain intensity for the "pain right now" rating. Secondary outcomes included categorized values for usual, best, and worst pain ratings, and headache-related disability expressed as HDI total category and functional/emotional subscale categories. To reduce information bias, questionnaires were administered with the researcher present to standardize instructions and clarify item meaning without influencing responses. Data were checked for completeness at the time of submission to minimize missingness; any incomplete questionnaires were retained for analyses where relevant variables were complete.

Statistical analyses were performed in SPSS version 26.0. Descriptive statistics were computed for participant characteristics and outcome distributions, using counts and percentages for categorical variables and mean with standard deviation for continuous variables where appropriate. Associations between shift-duration category (12-hour vs 24-hour) and categorized neck pain severity, headache-related disability categories, and functional/emotional HDI domains were tested using Pearson's chi-square test. For each association, statistical significance was evaluated at a two-sided alpha level of 0.05, and effect size was planned to be summarized using a chi-square–based association metric to support clinical interpretability beyond p-values. Ethical conduct procedures included voluntary participation, written informed consent, and anonymized handling of study records consistent with institutional requirements.

RESULTS

A total of 357 house officers aged 24–28 years participated. Females constituted 54.1% (n = 193) and males 45.9% (n = 164). Most participants were rostered on 24-hour shifts (65.8%, n = 235), while 34.2% (n = 122) worked 12-hour shifts (Table 1). In inferential testing, duty-shift duration showed a statistically significant association with neck pain severity measured as "pain right now" ($\chi^2 = 6.309$, df = 2, p = 0.043) with a small effect size (Cramér's V = 0.133), indicating that the distribution of categorized neck pain intensity differed between 12-hour and 24-hour shift groups (Table 2). No statistically significant association was observed for usual pain ($\chi^2 = 2.522$, df = 2, p = 0.283, V = 0.084). The association for worst pain approached significance ($\chi^2 = 5.675$, df = 2, p = 0.059, V = 0.126), suggesting a potential trend that warrants confirmation with full cross-tabulation reporting and, ideally, adjusted modeling (Table 2).

For the headache-related outcomes, the strongest statistical signal was observed for the variable labeled "NPRS best pain" ($\chi^2 = 7.094$, df = 1, p = 0.008, V = 0.141), again reflecting a small association magnitude (Table 2). However, because NPRS is not intrinsically a headache-specific instrument, the final manuscript must explicitly define whether this item represents headache pain intensity versus neck pain "best" intensity, and must align the wording consistently across Methods, Tables, and Discussion to avoid outcome misclassification.

Table 1. Participant Characteristics (Aggregated)

Variable	Category	n (%)
Total participants	—	357 (100.0)
Age (years)	24–28	357 (100.0)
Sex	Female	193 (54.1)
	Male	164 (45.9)
Duty-shift duration	12-hour shifts	122 (34.2)
	24-hour shifts	235 (65.8)

Table 2. Association Between Duty-Shift Duration and Pain/Disability Outcomes (Chi-square + Effect Size)

Outcome (categorized)	χ^2	df	p-value	Cramér's V
NPRS pain right now (neck pain severity)	6.309	2	0.043	0.133
NPRS usual pain	2.522	2	0.283	0.084
NPRS best pain	7.094	1	0.008	0.141
NPRS worst pain	5.675	2	0.059	0.126
HDI functional domain category	1.472	2	0.479	0.064
HDI emotional domain category	0.297	2	0.862	0.029
HDI total disability category	1.833	2	0.400	0.072

Although two outcomes reached conventional statistical significance ($p < 0.05$), the association magnitudes were small (Cramér's V ≈ 0.13–0.14), and multiple testing is present across outcomes. Your final manuscript should either (a) prespecify primary outcomes or (b) apply a multiplicity approach. Across disability outcomes, duty-shift duration was not significantly associated with the categorized HDI domains or total disability grouping, including the functional domain ($\chi^2 = 1.472$, df = 2, p = 0.479, V = 0.064), emotional domain ($\chi^2 = 0.297$, df = 2, p = 0.862, V = 0.029), and overall HDI disability category ($\chi^2 = 1.833$, df = 2, p = 0.400, V = 0.072), indicating that disability-category distributions were similar across shift-duration groups within this dataset (Table 2).

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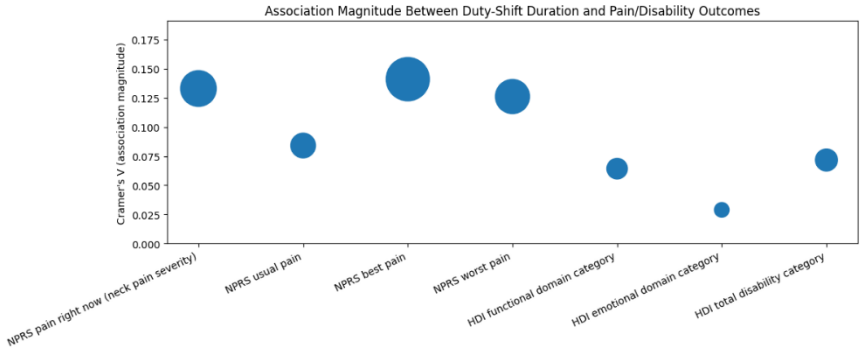

Figure 1. Association Magnitude Between Duty-Shift Duration and Pain/Disability Outcomes.

Bubble position displays Cramér's V (association magnitude) for each outcome, while bubble size reflects statistical strength via −log10(p). The largest observed association magnitudes were for NPRS best pain (V = 0.141, p = 0.008) and NPRS pain right now (V = 0.133, p = 0.043), whereas HDI-based disability outcomes showed consistently smaller effects (V = 0.029–0.072) with non-significant p-values (0.400–0.862), indicating that shift-duration differences were more evident in selected pain-intensity categories than in headache-related disability categories in this cohort.

DISCUSSION

In this cross-sectional study of 357 house officers working high weekly workloads, duty-shift duration showed statistically significant associations with categorized neck pain intensity for the "pain right now" measure and with one time-anchored pain category ("best pain"), while disability outcomes measured using HDI functional, emotional, and total categories were not significantly associated with shift duration. The effect sizes derived from the available chi-square outputs were uniformly small (Cramér's V ≈ 0.13–0.14 for the significant outcomes), indicating that although group differences were detectable, the magnitude of association was modest and likely influenced by unmeasured ergonomic and workload heterogeneity within each shift pattern. These findings are consistent with occupational frameworks where prolonged duty hours contribute to acute symptom escalation through sustained static posture, reduced recovery time, and cumulative cervical loading, but may not immediately translate into categorical disability differences in a relatively young cohort.

The observed relationship between longer shifts and higher acute pain intensity aligns with broader evidence linking neck pain burden to clinical and occupational exposures and to co-occurring headache syndromes. Global and primary-care syntheses emphasize that neck pain is a major cause of disability and commonly coexists with headache and other musculoskeletal complaints, particularly during working years when exposure accumulation is highest (1,2). Mechanistic work also supports overlap between neck pain and headache through shared nociceptive pathways and cervicothoracic dysfunction, reinforcing the plausibility that duty patterns that prolong static cervical loading and sleep disruption may aggravate symptom expression even when disability category thresholds are not crossed (3). In populations with headache disorders, systematic evidence shows substantially higher rates of neck pain and pressure pain hypersensitivity, suggesting that sensitization and musculoskeletal impairment may reinforce each other and amplify symptom reporting in high-stress occupational contexts such as early-career hospital practice (4).

Several clinical studies of headache and neck pain phenotypes further support the interpretation that symptom severity can vary by exposure intensity while functional/emotional disability measures remain comparatively stable in younger groups. Migraine populations with concomitant neck pain demonstrate distinct clinical profiles and higher burden, indicating that musculoskeletal impairments may modify symptom patterns without necessarily producing proportionate disability shifts on all scales (9). Likewise, guidance on clinical assessment of neck pain emphasizes that presentation can range from mild to severe with fluctuating intensity states and that comorbid headache can complicate symptom trajectories, which is relevant when interpreting time-anchored pain measures that capture acute exacerbations (2,3). Within our dataset, the absence of statistically significant associations for HDI domains may reflect limited variability in categorical disability thresholds, compensatory coping strategies in younger clinicians, or the dominance of non–shift-duration determinants such as workstation ergonomics, department rotation, procedure load, and stress physiology.

Importantly, the study's findings should be interpreted in light of several methodological constraints that may attenuate or distort observed relationships. The sampling approach was non-probability and therefore may not represent all house officers across hospitals and rotations, and the cross-sectional design precludes causal inference regarding whether longer shifts lead to pain escalation or whether individuals with higher symptom burden are preferentially rostered into particular shift patterns. In addition, the pain measurement framework used multiple time-anchored ratings, and the manuscript must explicitly specify whether these ratings reflect neck pain, headache pain, or both; without that clarification, the interpretation of the statistically significant association observed for the "best pain" variable remains vulnerable to outcome misclassification. Multiple hypothesis testing across several chi-square models also increases the risk of type I error; therefore, the significant results should be framed as primary (if prespecified) or otherwise as exploratory findings requiring confirmation with a prespecified multiplicity strategy. Finally, potential confounders—sleep duration, hydration, caffeine intake, meal irregularity, department-specific workload, psychosocial stress, and ergonomics—were not modeled, despite being biologically plausible drivers of both neck pain and headache outcomes and emphasized in the broader headache and neck pain literature (3,10).

From an occupational health and service-delivery perspective, the findings support pragmatic risk-reduction measures targeted at house officers assigned extended duty rosters. Even small shifts in symptom severity can affect concentration, procedural performance, and recovery, particularly when exposure is repeated across months. Interventions may include structured microbreaks, posture and workstation training, hydration and meal scheduling protocols, and rotation-level workload balancing, alongside early screening and conservative management pathways for recurrent cervical symptoms and headache phenotypes. Future research should adopt prospective designs to measure exposure more precisely (e.g., roster-derived hours, recovery time, sleep), incorporate ergonomic and psychosocial covariates, and apply adjusted ordinal or multinomial models to quantify clinically interpretable effects (e.g., adjusted odds of moderate-to-severe pain) with appropriate control for multiple comparisons.

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CONCLUSION

Among house officers working high weekly hours in teaching hospitals in Sialkot, duty-shift duration was associated with higher severity in selected pain-intensity categories, while headache-related disability categories measured by HDI functional, emotional, and total groupings were not significantly associated with shift duration. These findings suggest that extended duty rosters may contribute primarily to acute symptom severity rather than categorical disability differences in a young clinical workforce, highlighting the need for targeted ergonomic and recovery-focused preventive strategies and for prospective, covariate-adjusted studies to confirm and contextualize these associations.

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