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Prevalence of Neck Pain and Risk of Trapezitis Occuring in Beauticians

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ABSTRACT

Background: Beauticians are exposed to sustained neck flexion, prolonged standing, and repetitive upper-limb tasks that may increase neck pain and trapezius muscle overload risk, yet combined profiling of pain severity and ergonomic risk remains limited in local occupational settings. Objective: To determine the prevalence and severity of neck pain and evaluate ergonomic postural risk related to trapezius overload among beauticians in Sialkot, Pakistan, and to assess the association between ergonomic risk and pain severity. Methods: This observational cross-sectional study included 287 male and female beauticians recruited through purposive sampling from beauty salons in Sialkot. Neck pain severity was assessed using the Numeric Pain Rating Scale (NPRS) and categorized as no pain, mild, moderate, or severe. Ergonomic postural risk was evaluated using the Rapid Upper Limb Assessment (RULA) and categorized into four action levels. Associations were tested using Pearson chi-square with $p<0.05$ significance. Results: Neck pain was reported by 94.4% of participants, with 43.6% reporting moderate pain and 28.9% severe pain. Only 11.1% demonstrated acceptable posture, whereas 44.9% required posture change soon and 6.6% required immediate action. Higher RULA risk was strongly associated with higher NPRS severity ($\chi^2(9)=166.79$, $p<0.001$; Cramer's $V=0.44$). Conclusion: Neck pain is highly prevalent among beauticians and is significantly associated with elevated ergonomic postural risk, supporting urgent ergonomic modification and preventive rehabilitation strategies.

Keywords

Neck pain; Trapezitis; Upper trapezius overload; Ergonomics; RULA; NPRS.

INTRODUCTION

Neck pain is one of the most prevalent work-related musculoskeletal complaints worldwide and remains a major contributor to disability, reduced productivity, and healthcare utilization, particularly among working-age adults and women (1). Its multifactorial nature involves biomechanical overload, postural stress, and neuromuscular dysfunction, with the upper trapezius muscle frequently implicated through sustained activation, altered stiffness, and myofascial pain mechanisms (2–4). Myofascial trigger points within the trapezius and adjacent cervical–scapular musculature can amplify pain, reduce functional capacity, and contribute to chronic symptom persistence, particularly when occupational exposures continuously reinforce sustained contraction and ischemic loading (2,3). Contemporary objective assessment methods further support this pathophysiological model, demonstrating that trapezius muscle stiffness is measurably elevated in symptomatic individuals and correlates with pain intensity and functional impairment, reinforcing the relevance of muscular overload in neck pain syndromes (4).

Beauticians represent an occupational group with distinct and repeated exposure to ergonomic risk factors due to prolonged standing, sustained neck flexion during close visual work, repetitive upper-limb movements, and frequent shoulder elevation while performing hairdressing, makeup, threading, waxing, and related tasks (5–8). These repetitive demands increase cervical and scapular loading, predisposing to upper trapezius fatigue and pain, and may plausibly elevate risk of trapezius muscle overload conditions commonly described clinically as trapezitis or trapezius myalgia (6–8). Evidence from occupational surveys indicates that musculoskeletal pain is common among beauty service workers, with neck and shoulder regions reported among the most frequently affected anatomical sites, often with measurable functional limitation and reduced work performance (5,7). Regional studies from Pakistan and similar settings have also reported substantial prevalence of cervical pain and postural deviations among beauticians, makeup artists, and hairdressers, suggesting that local ergonomic conditions and long working hours may magnify the burden of cervical–trapezius symptoms (8,9).

Despite accumulating evidence of musculoskeletal complaints in this workforce, there remains a practical gap in studies that simultaneously quantify neck pain severity and objectively grade ergonomic postural risk for cervical–trapezius overload using structured observational tools. Quantifying pain alone does not capture the underlying ergonomic exposures that sustain muscular overload, while postural risk assessment without pain profiling may fail to reflect clinical impact. The Rapid Upper Limb Assessment (RULA) provides a standardized approach to evaluate workplace postural load and classify risk levels requiring ergonomic intervention, while the Numeric Pain Rating Scale (NPRS) offers a valid, quick method for grading pain intensity and severity distribution at population level (10,11). Integrating these measures allows a clinically interpretable profile of symptom burden alongside modifiable ergonomic risk, strengthening the evidence base for preventive and corrective workplace strategies. Therefore, this cross-sectional study aimed to determine the prevalence and severity of neck pain among beauticians in Sialkot, Pakistan, and to assess ergonomic postural risk related to trapezius overload using RULA. Additionally, the study evaluated the association between RULA risk categories and NPRS pain severity, hypothesizing that higher ergonomic risk levels would be significantly associated with higher pain severity (5,10,11).

MATERIALS AND METHODS

This observational cross-sectional study was conducted among beauticians working in the Sialkot region of Punjab, Pakistan. Data were collected from multiple beauty salons over a six-month period following institutional approval. A non-probability purposive sampling strategy was used to recruit eligible participants from selected salons, based on feasibility and access to working beauticians during routine duty hours. The study targeted professional beauticians involved in services requiring sustained upper-limb activity and prolonged static postures, including hairdressing, makeup, threading, waxing, and manicure/pedicure tasks, because these work demands are consistently linked with work-related musculoskeletal disorders in beauty service workers (5–7).

Participants were eligible if they were male or female beauticians aged 25–35 years, with at least 6 months of work experience, and routinely working approximately 6–9 hours per day. Beauticians were excluded if they reported conditions that could confound occupational neck pain interpretation, including cervical radiculopathy or cervical spondylosis with neurological features, tumors, or a history of surgery involving the neck or shoulder region. Individuals with systemic illnesses that could substantially affect musculoskeletal pain perception or physical performance (e.g., significant cardiovascular disease, epilepsy, asthma) were also excluded. All participants provided written informed consent prior to enrollment, and confidentiality of collected data was ensured throughout data handling and reporting in accordance with ethical research standards.

Data collection included demographic and occupational information (gender and primary work specialty), pain assessment using the Numeric Pain Rating Scale (NPRS), and ergonomic postural risk assessment using the Rapid Upper Limb Assessment (RULA). The NPRS is a validated unidimensional pain intensity scale ranging from 0 (no pain) to 10 (worst imaginable pain), widely used for musculoskeletal pain quantification and suitable for rapid occupational screening (10). For categorical interpretation, NPRS was classified as no pain (0), mild pain (1–3), moderate pain (4–6), and severe pain (7–10), allowing prevalence estimates across clinically meaningful severity strata. Postural and ergonomic risk was evaluated using the RULA worksheet, which grades biomechanical and postural loading of the upper limbs, neck, trunk, and legs during work tasks. RULA yields an action-level classification commonly interpreted as acceptable posture, posture may need change, change posture soon, and immediate action required, thereby enabling practical workplace recommendations (11). RULA observations were performed during participants' typical service activities, focusing on work posture patterns known to contribute to neck and trapezius loading in beauty service professions (5–7). The sample size was set at 287 participants as per prior occupational prevalence work in similar populations (11). Data were entered and analyzed using SPSS version 26. Descriptive statistics were computed as frequencies and percentages for categorical variables, including gender, work specialty, NPRS severity categories, and RULA risk levels. The association between RULA risk level and NPRS severity category was assessed using the Pearson chi-square test, with statistical significance set at $p < 0.05$. Given the multi-category contingency table, strength of association was quantified using Cramer's V to support clinical interpretation of effect magnitude. Where chi-square assumptions were potentially impacted by small, expected counts, results were interpreted cautiously while retaining the overall inference of association. Data integrity procedures included consistent coding definitions for NPRS and RULA categories and verification of frequency totals to match the final sample size.

RESULTS

A total of 287 beauticians were included, comprising 202 females (70.4%) and 85 males (29.6%), indicating a predominantly female workforce in the sampled beauty industry settings (Table 1). Regarding work experience, 130 participants (45.3%) were classified as expert-level workers, 98 (34.1%) were intermediate, and 59 (20.6%) were beginners, meaning that nearly four-fifths of the sample (79.4%) had moderate to advanced experience exposure to occupational demands (Table 2). In terms of work specialization, hair dressing represented the largest category with 113 participants (39.4%), followed by makeup with 84 participants (29.3%). Facial services accounted for 36 participants (12.5%), threading 25 (8.7%), waxing 17 (5.9%), and manicure/pedicure 12 (4.2%), with hair dressing plus makeup together comprising 68.7% of all specialties (Table 3).

Table 1. Gender Distribution of Beauticians (N = 287)

Gender	n	%
Male	85	29.6
Female	202	70.4
Total	287	100.0

Table 2. Working Experience Level of Beauticians (N = 287)

Experience Level	n	%
Beginner	59	20.6
Intermediate	98	34.1
Expert	130	45.3
Total	287	100.0

Table 3. Specialty of Work Among Beauticians (N = 287)

Specialty	n	%
Waxing	17	5.9
Threading	25	8.7
Facial	36	12.5
Hair Dressing	113	39.4
Makeup	84	29.3
Manicure/Pedicure	12	4.2
Total	287	100.0

Ergonomic postural risk assessment using RULA demonstrated that only 32 participants (11.1%) exhibited acceptable posture during work tasks, whereas 107 (37.3%) were categorized as having posture that may need change, and 129 (44.9%) required posture change soon. A further 19 participants (6.6%) fell into the immediate action required category, indicating that 88.9% of beauticians had some degree of postural risk warranting ergonomic modification, with more than half (51.5%) needing urgent or near-term posture correction (Table 4). Pain severity profiling using NPRS showed that only 16 participants (5.6%) reported no pain, whereas 63 (22.0%) had mild pain, 125 (43.6%) reported moderate pain, and 83 (28.9%) reported severe pain. Overall, 94.4% of participants experienced some level of neck pain, and 72.5% reported moderate-to-severe pain intensity (Table 5).

Table 4. RULA Postural Risk Categories (N = 287)

RULA Risk Category	n	%
Acceptable posture	32	11.1
Posture may need change	107	37.3
Change posture soon	129	44.9
Immediate action required	19	6.6
Total	287	100.0

Table 5. NPRS Pain Severity Categories (N = 287)

NPRS Severity Category	n	%
No pain (0)	16	5.6
Mild (1–3)	63	22.0
Moderate (4–6)	125	43.6
Severe (7–10)	83	28.9
Total	287	100.0

Table 6. Association Between RULA Risk Category and NPRS Severity (Cross-tabulation) with Inferential Statistics (N = 287)

RULA Risk Category	No Pain n	Mild n	Moderate n	Severe n	Row Total n
Acceptable posture	15	12	5	0	32
Posture may need change	1	36	53	17	107
Change posture soon	0	13	56	60	129
Immediate action required	0	2	11	6	19
Column total	16	63	125	83	287

Chi-square test (Pearson): $\chi^2(9) = 166.79$, $p < 0.001$ Effect size: Cramer's V = 0.44 (moderate-to-strong association)

The cross-tabulation of RULA categories with NPRS severity revealed a clear exposure–symptom gradient (Table 6). Among participants with acceptable posture (n = 32), most were classified in the no-pain (n = 15) or mild pain (n = 12) categories, and none reported severe pain. In contrast, among those requiring posture change soon (n = 129), severe pain was reported by 60 participants (46.5%), while moderate pain was reported by 56 (43.4%), meaning almost 9 in 10 participants (89.9%) in this group had moderate-to-severe pain. Similarly, among those requiring immediate action (n = 19), 6 participants (31.6%) reported severe pain and 11 (57.9%) reported moderate pain, indicating that 89.5% of this highest-risk group experienced moderate-to-severe pain. The Pearson chi-square test confirmed a statistically significant association between ergonomic risk level and pain severity ($\chi^2(9) = 166.79$, $p < 0.001$), with Cramer's V = 0.44 indicating a moderate-to-strong relationship between worsening posture risk and increasing pain severity.

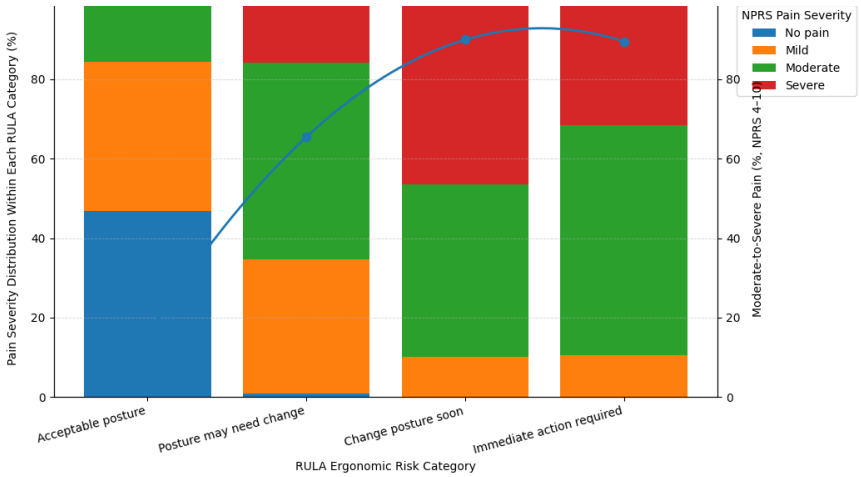

Figure 1 Pain Severity Distribution Across RULA Ergonomic Risk Categories with Moderate-to-Severe Pain Gradient

The figure presents a 100% stacked distribution of NPRS pain severity (no pain, mild, moderate, severe) within each RULA ergonomic risk category, with an overlaid moderate-to-severe pain gradient (NPRS 4–10) to highlight clinically meaningful escalation in pain burden across posture-risk strata. From the aggregated cross-tabulation (Table 6), the within-category severity profile was: acceptable posture—no pain 46.9%, mild 37.5%, moderate 15.6%, severe 0%; posture may need change—no pain 0.9%, mild 33.6%, moderate 49.5%, severe 15.9%; change posture soon—no pain 0%, mild 10.1%, moderate 43.4%, severe 46.5%; immediate action required—no pain 0%, mild 10.5%, moderate 57.9%, severe

31.6%. The overlaid moderate-to-severe gradient rises sharply from 15.6% in the acceptable posture group to 65.4% in posture may need change, and reaches approximately 89.9% and 89.5% in the "change posture soon" and "immediate action required" categories, respectively, demonstrating a pronounced escalation of clinically significant pain as ergonomic risk increases.

DISCUSSION

The present study evaluated neck pain prevalence and ergonomic postural risk related to trapezius muscle overload among beauticians in Sialkot, Pakistan, and demonstrated a high symptom burden alongside substantial ergonomic exposure. Neck pain was reported by 94.4% of participants, with 72.5% experiencing moderate-to-severe pain, while 88.9% exhibited RULA risk levels indicating a need for postural modification. Importantly, pain severity increased progressively across worsening RULA categories, and the association between ergonomic risk and pain severity was statistically significant with a moderate-to-strong effect magnitude. These findings reinforce the concept that sustained awkward postures and repetitive upper limb tasks—core features of beauticians' work—are strongly linked with clinically meaningful neck pain and likely trapezius overload.

The prevalence observed in this study is higher than that reported in several regional and international surveys of beauty professionals, but remains directionally consistent with the occupational vulnerability of this group. Prior observational work among beauty service workers has reported frequent musculoskeletal pain, often involving the neck and shoulder regions, with impaired work capacity and daily activity limitations (12). Regional evidence from Pakistan among makeup artists and hairdressers similarly supports the presence of a substantial cervical pain burden associated with prolonged working hours and poor posture, though reported prevalence varies by setting and measurement approach (13). The high prevalence in the present study may reflect the sampling frame of active workers during duty hours, prolonged daily exposure (6–9 hours), and potential underutilization of ergonomic supports in local salons. Moreover, because pain was categorized using NPRS severity thresholds, even low-level ongoing pain was captured, which may identify early-stage occupational strain rather than only clinically diagnosed neck disorders.

A clinically important contribution of this study is the demonstration of an exposure–symptom gradient between RULA risk and NPRS severity. Participants with acceptable posture largely reported no or mild pain and none reported severe pain, while those in the "change posture soon" and "immediate action required" categories almost exclusively reported moderate-to-severe pain. This aligns with mechanistic evidence indicating that sustained neck flexion and shoulder elevation increase trapezius activation, reduce perfusion, promote fatigue-related metabolic stress, and contribute to pain amplification through myofascial trigger points and neuromuscular dysfunction (14,15). Studies examining trapezius stiffness further support that symptomatic individuals show measurable mechanical changes in the trapezius that correlate with pain intensity and functional limitation, suggesting that repetitive occupational loading can contribute to persistent muscle dysfunction (16). Postural demands also modulate trapezius stiffness and activation during task performance, and sustained cervicothoracic postures are known to influence trapezius mechanical properties, supporting a plausible pathway between poor workplace posture and pain severity (17).

The distribution of job specialties provides additional context for exposure risk. Hair dressing and makeup together accounted for more than two-thirds of participants, and these tasks commonly require sustained forward head posture, repetitive upper limb activity, close visual focus, and prolonged standing. Such work patterns have been associated with elevated trapezius muscle load, particularly when work height is not optimized and when fine motor demands require sustained shoulder abduction and elevation. Experimental studies show that head and neck position and seating configuration can alter upper trapezius activation and stiffness, and occupational settings lacking ergonomic adjustment may therefore intensify loading during prolonged work cycles (18). Although the present analysis did not stratify outcomes by specialty, the predominance of high-exposure tasks suggests that targeted ergonomic interventions should prioritize these service domains.

These findings have meaningful occupational health implications. RULA risk categories indicating "change posture soon" or "immediate action required" were observed in 51.5% of beauticians, and these groups demonstrated the highest proportions of severe pain. Such risk stratification provides a clear framework for implementing prevention strategies, including workstation height optimization, arm support, tool redesign, task rotation, and scheduled micro-breaks. From a clinical perspective, strengthening of cervical and scapular stabilizers and early management of trapezius myofascial pain may prevent progression from mild strain to persistent pain syndromes. Evidence from clinical trials indicates that interventions for trapezius-related pain—such as muscle energy technique, stabilization approaches, and other physiotherapy modalities—can reduce pain and improve function in trapezitis-related conditions, supporting the feasibility of workplace-linked rehabilitation programs (19).

Several limitations should be considered when interpreting these results. The cross-sectional design prevents causal inference, and pain and posture were assessed at a single time point rather than longitudinally. Purposive sampling may limit generalizability beyond the sampled salons, and unmeasured psychosocial factors such as job stress, workload variability, and sleep quality could confound the relationship between posture and pain. Additionally, although RULA is a validated ergonomic assessment tool, observational scoring may be influenced by intra-rater or inter-rater variability. Future research should incorporate longitudinal follow-up, incorporate objective measures such as electromyography or muscle stiffness imaging, and evaluate whether targeted ergonomic and rehabilitation interventions reduce pain severity and improve posture risk profiles in this workforce (16,20).

CONCLUSION

This cross-sectional study identified a very high prevalence of neck pain among beauticians in Sialkot, Pakistan (94.4%), with nearly three-quarters reporting moderate-to-severe pain (72.5%). Ergonomic assessment showed that 88.9% of participants had RULA risk levels requiring postural modification, and more than half required urgent or near-term corrective action. A statistically significant, moderate-to-strong association was observed between worsening RULA risk category and increasing pain severity, indicating that poor work posture and ergonomic loading patterns are closely linked with clinically meaningful neck pain and probable trapezius muscle overload in beauticians, supporting the need for immediate ergonomic interventions and preventive workplace rehabilitation programs.

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