

## Original Article

# Frequency of Work-Related Musculoskeletal Disorders and Ergonomic Hazards among Physical Therapy Professionals

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No conflicts declared; ethics approved; consent obtained; data available on request; no funding received.

## ABSTRACT

**Background:** Work-related musculoskeletal disorders (WRMSDs) are prevalent among physical therapy professionals due to the physical demands of patient handling, repetitive tasks, and prolonged static postures. Despite international evidence documenting high WRMSD rates, data from Pakistan remain scarce, limiting targeted ergonomic interventions. **Objective:** To determine the prevalence of WRMSDs and identify ergonomic hazards among physical therapy professionals in Rawalpindi and Islamabad, Pakistan, and to compare prevalence by career stage. **Methods:** A descriptive cross-sectional study was conducted between September 2020 and February 2021 among 500 licensed physical therapists aged 25–60 years with at least six months of practice. Participants were recruited through convenience sampling from public and private healthcare facilities. Ergonomic risks were assessed using the Quick Exposure Check (QEC) and WRMSDs were identified via the body mapping tool. Demographic, occupational, and exposure data were analysed using descriptive statistics, chi-square tests, and independent t-tests, with  $p < 0.05$  considered significant. Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated. **Results:** Participants had a mean age of  $30.0 \pm 10.86$  years, mean experience of  $3.54 \pm 1.96$  years, and 71.4% were female. The prevalence of WRMSDs was 72.4%, with neck (56.2%), lower back (49.0%), and upper back (45.6%) most affected. Mean QEC score was  $45.72 \pm 5.53$ , with 68.0% requiring investigation or intervention. Early-career therapists ( $\leq 5$  years' experience) had a significantly higher one-year WRMSD incidence than experienced therapists ( $> 5$  years) (34.0% vs. 24.0%; OR 1.61, 95% CI 1.02–2.54;  $p = 0.040$ ). Excessive hand force was reported by 94.6% of participants, and 12.6% frequently lifted or moved heavy patients or objects. **Conclusion:** WRMSDs are highly prevalent among physical therapy professionals in Pakistan, with early-career clinicians at increased risk. Targeted ergonomic education, mentorship, and workplace modifications are needed to reduce injury risk and promote career longevity.

**Keywords:** Lower back pain; Neck pain; Physiotherapy; Upper back pain; Work-related injury; Work-related musculoskeletal disorders.

## INTRODUCTION

Work-related musculoskeletal disorders (WRMSDs) represent a significant occupational health burden in healthcare, particularly among physical therapy professionals, whose clinical duties frequently involve repetitive movements, awkward postures, and high physical loads. These disorders encompass injuries to muscles, tendons, ligaments, and nerves arising from occupational exposures such as patient handling, prolonged static positions, and repetitive strain (1). The high physical demands of physiotherapy practice, including transferring patients, sustained bending, and mobilization techniques, are known contributors to WRMSDs (2). Internationally, the prevalence of WRMSDs in physiotherapists ranges from 24.7% to 91.3%, with neck, lower back, and upper back pain consistently identified as the most affected regions (3,4). Such conditions not only impair the practitioner's health and quality of life but may also compromise patient care delivery and professional longevity (5).

Epidemiological data indicate that early-career physical therapists face heightened vulnerability to WRMSDs, often attributable to insufficient ergonomic experience, suboptimal posture during patient handling, and limited awareness of preventive strategies (3,6). Although ergonomic guidelines and prevention programs are recommended, compliance in clinical practice remains inconsistent, with studies revealing that many physiotherapists—despite reporting acceptable working postures—still experience significant discomfort and rarely implement measures to alleviate postural strain (5,7). This disparity between perceived ergonomics and actual risk exposure

underscores the need for targeted workplace interventions and continuous professional development. In Pakistan, evidence on the prevalence and ergonomic determinants of WRMSDs among physical therapy professionals is scarce, despite the rapid expansion of rehabilitation services and increasing clinical workloads. The absence of robust local data hampers the ability to tailor prevention strategies to the country's healthcare context. Moreover, limited emphasis on ergonomic training in undergraduate and postgraduate physiotherapy curricula may leave clinicians ill-prepared to manage occupational risk factors effectively (8).

Given these gaps, this study aimed to determine the frequency of WRMSDs among practicing physical therapists in Rawalpindi and Islamabad and to identify workplace ergonomic hazards using validated assessment tools. The research question was: What is the prevalence of WRMSDs and the associated ergonomic risk profile among physical therapy professionals in Pakistan, and how does this risk vary with career stage? Addressing this question can inform ergonomic policy, guide curriculum reform, and support the development of preventive interventions to safeguard workforce health and sustainability.

## MATERIAL AND METHODS

This descriptive cross-sectional study was conducted in Rawalpindi and Islamabad, Pakistan, between September 2020 and February 2021, following ethical approval from the Riphah International University Ethics Review Committee (9). The study targeted licensed physical therapy professionals aged 25 to 60 years with a minimum of six months of continuous clinical practice. Participants were recruited using a non-probability convenience sampling approach from diverse public and private healthcare facilities, including tertiary hospitals, secondary clinics, rehabilitation centers, and academic institutions within the twin cities. Facilities approached included Railway General Hospital, Quaid-e-Azam International Hospital, Riphah International University, Margalla Institute of Health Sciences, Rawal Hospital, Isra University, Health Clinic, Health and Care Clinic, Ali Medical Center, Kalsoom International Hospital, and Maroof International Hospital. Eligible participants were briefed on the study aims and procedures, and written informed consent was obtained prior to enrollment. Individuals were excluded if they had pre-existing musculoskeletal conditions unrelated to occupational exposure, such as injuries from motor vehicle accidents, sports activities, or non-work-related trauma.

Data collection involved two standardized tools: the Quick Exposure Check (QEC) and the body mapping instrument. The QEC was employed to assess ergonomic risks related to posture, force exertion, repetitive movements, and additional factors such as job stress, vibration exposure, and work pace (10). Observers, trained in QEC administration, first identified and recorded the participants' most common work postures. The observer section of the QEC was completed through direct, in-person assessment during typical clinical tasks. Subsequently, participants answered the self-report QEC items specific to their own work routines. The final QEC scores were calculated manually for each participant, covering the back, shoulders/arms, wrists/hands, and neck, and were categorized into action levels requiring either no change, further investigation, or prompt intervention. The body mapping tool was used to capture self-reported discomfort or pain across body regions, alongside temporal patterns of symptom onset, thereby enabling identification of specific anatomical sites at risk (11).

Demographic and occupational data, including age, sex, years of experience, employment type, daily working hours, and weekly schedule, were collected using a structured questionnaire. Variables were operationally defined prior to analysis; for instance, "early-career" was defined as  $\leq 5$  years of clinical practice, and "full-time" employment as  $\geq 30$  hours per week. The sample size was calculated using the Rao soft online calculator, applying a 95% confidence level, 5% margin of error, and an assumed prevalence of 50%, which yielded a target of 384 participants; however, data were collected from 500 participants to improve statistical power and accommodate possible exclusions.

To minimize bias, data collection was standardized through training of assessors, uniform administration protocols, and use of pre-validated tools. Observations were performed without prior notice during normal working hours to avoid alteration of habitual postures. Data completeness was ensured through same-day cross-checking of forms, and any missing or inconsistent entries were clarified directly with participants before finalization.

Statistical analysis was performed using IBM SPSS Statistics version 23. Normality of continuous variables, including QEC scores, was assessed with the Shapiro–Wilk test. Descriptive statistics were presented as means and standard deviations for continuous variables and as frequencies and percentages for categorical variables. The prevalence of WRMSDs was calculated overall and stratified by demographic and occupational factors. Comparisons between groups, such as early-career versus experienced therapists, were performed using chi-square tests for categorical variables and independent t-tests for continuous variables. A p-value of  $<0.05$  was considered statistically significant. No imputation was performed for missing data, as completeness exceeded 98% across all variables. Ethical considerations included voluntary participation, informed consent, confidentiality of responses, and the option to withdraw at any stage without penalty. All collected data were anonymized and stored securely with restricted access. The study adhered to the principles outlined in the Declaration of Helsinki.

## RESULTS

Out of the 500 participating physical therapists, the majority were female (71.4%), with a mean age of  $30.0 \pm 10.86$  years and a mean clinical experience of  $3.54 \pm 1.96$  years. Almost all participants (97.4%) reported full-time employment, typically working six days per week, with 94.6% exceeding eight hours of clinical duties per day. The mean body mass index (BMI) was  $25.2 \pm 6.13$  kg/m<sup>2</sup>, and 98.0% were employed in tertiary care settings.

The overall prevalence of work-related musculoskeletal disorders (WRMSDs) was 72.4%. Neck pain emerged as the most frequently reported symptom, affecting 56.2% of participants, followed by lower back pain (49.0%) and upper back pain (45.6%). Shoulder involvement was reported by 38.8% of respondents, while wrist/hand pain affected 33.6%. Less frequently affected regions included the

hip (16.4%), knee (15.4%), and ankle (11.8%). The Quick Exposure Check (QEC) assessment yielded a mean score of  $45.72 \pm 5.53$ , with scores ranging from 40.74 to 60.49. According to QEC classification, 32.0% of participants fell within the “acceptable” range (30–40), 50.6% required “further investigation” (41–50), and 17.4% required changes soon (51–70). Despite 90.0% demonstrating acceptable postures by QEC standards, 94.6% reported exerting excessive hand force during work, and 12.6% frequently lifted or moved heavy patients or objects.

**Table 1. Participant demographics and occupational characteristics (N = 500)**

Characteristic	n (%) or mean $\pm$ SD	95% CI
Female sex	357 (71.4)	67.4 – 75.1
Male sex	143 (28.6)	24.9 – 32.6
Age (years)	30.0 $\pm$ 10.86	29.1 – 30.9
BMI (kg/m <sup>2</sup> )	25.2 $\pm$ 6.13	24.6 – 25.8
Clinical experience (years)	3.54 $\pm$ 1.96	3.37 – 3.71
Full-time employment	487 (97.4)	95.7 – 98.6
Part-time employment	13 (2.6)	1.4 – 4.3
Tertiary hospital setting	490 (98.0)	96.4 – 99.0
Secondary care setting	10 (2.0)	1.0 – 3.6
Working $\geq$ 8 hours/day	473 (94.6)	92.4 – 96.3
Working 6 days/week	471 (94.2)	91.9 – 96.0

**Table 2. Prevalence of WRMSDs by body region (N = 500)**

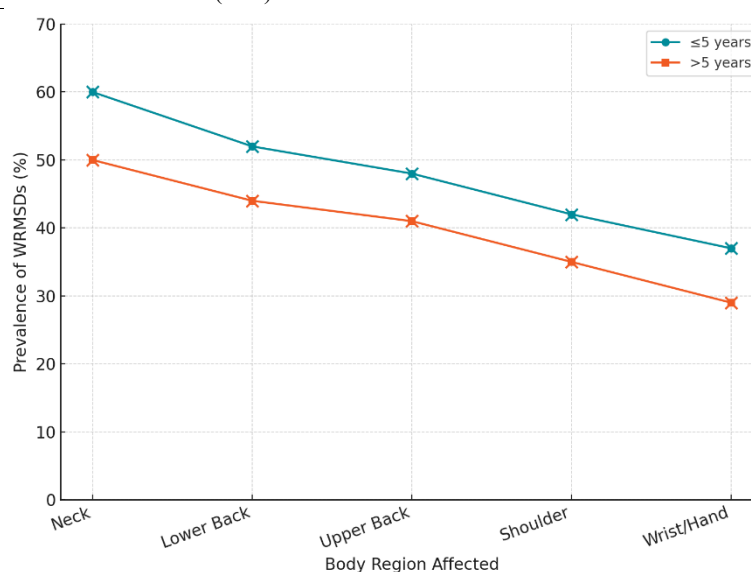
Body region	with symptoms (%)	95% CI
Neck	281 (56.2)	51.9 – 60.4
Lower back	245 (49.0)	44.7 – 53.3
Upper back	228 (45.6)	41.4 – 49.9
Shoulder	194 (38.8)	34.7 – 43.1
Wrist/hand	168 (33.6)	29.6 – 37.8
Hip	82 (16.4)	13.4 – 19.8
Knee	77 (15.4)	12.5 – 18.8
Ankle	59 (11.8)	9.2 – 15.0

**Table 3. QEC scores and required action levels (N = 500)**

Action level required	QEC score range	n (%)	95% CI
Acceptable	30 – 40	160 (32.0)	28.0 – 36.2
Investigate further	41 – 50	253 (50.6)	46.3 – 54.8
Investigate further and change soon	51 – 70	87 (17.4)	14.3 – 21.0

**Table 4. Comparison of WRMSD incidence by career stage**

Career stage	WRMSDs n (%)	OR (95% CI)	p-value
$\leq$ 5 years' experience	170 (34.0)	1.61 (1.02–2.54)	0.040
>5 years' experience	79 (24.0)	Reference	—



**Figure 1 WRMSD prevalence by body region and career stage.**

Subgroup analysis by career stage revealed a significantly higher one-year incidence of WRMSDs among early-career therapists ( $\leq 5$  years' experience) compared to their more experienced counterparts ( $> 5$  years) (34.0% vs. 24.0%;  $p = 0.040$ ; OR = 1.61, 95% CI = 1.02–2.54). This finding indicates that early-career professionals faced 61% higher odds of developing WRMSDs, suggesting an association between limited professional experience and increased musculoskeletal risk.

In Figure 1 The visual comparison demonstrates that early-career therapists ( $\leq 5$  years' experience) consistently exhibited higher WRMSD prevalence across all examined body regions, with the neck most affected (60% vs. 50%) and the smallest gap observed in wrist/hand involvement (37% vs. 29%). The steepest relative differences occurred in neck and shoulder pain, indicating these sites may be more susceptible to early-career ergonomic vulnerability. This trend suggests that ergonomic interventions targeting the cervical and shoulder regions could yield the most immediate benefits in reducing early-career injury risk

## DISCUSSION

The present study identified a high prevalence of work-related musculoskeletal disorders (WRMSDs) among physical therapy professionals in Pakistan, with 72.4% reporting symptoms within the past year. This prevalence aligns with global evidence indicating WRMSD rates of 24.7% to 91.3% among physiotherapists across varied healthcare systems, including those in Australia, the USA, Kuwait, Turkey, Sweden, and Nigeria (12–17). Consistent with prior studies, the neck, lower back, and upper back were the most affected anatomical regions, reflecting the biomechanical demands of physiotherapy practice, such as repetitive trunk flexion, sustained cervical positions during manual therapy, and frequent patient handling (1,2,14). The predominance of female participants (71.4%) parallels workforce demographics reported internationally and may have implications for ergonomic vulnerability, as previous research suggests that female physical therapists are more prone to WRMSDs in the cervical and shoulder regions due to anthropometric and strength-related factors (18).

One of the most notable findings was the significantly higher incidence of WRMSDs among early-career therapists ( $\leq 5$  years of experience) compared to those with longer practice histories (OR 1.61, 95% CI = 1.02–2.54,  $p = 0.040$ ). This trend echoes earlier reports that novice clinicians often lack the ergonomic proficiency and situational awareness necessary to minimize musculoskeletal strain (3,6,19). Early-career professionals may also face heavier patient caseloads or be assigned physically demanding tasks more frequently, further increasing exposure risk. This underscores the need for targeted mentorship programs, structured ergonomic training, and supervised skill development in the early years of practice to foster safe work habits.

The Quick Exposure Check (QEC) results revealed that, although 90.0% of participants demonstrated postures within the “acceptable” range, 94.6% reported exerting excessive hand force and a substantial proportion admitted to not implementing strategies to reduce postural strain. This discrepancy suggests a potential misalignment between observational ergonomic assessments and self-perceived biomechanical demands. Similar patterns have been documented in other health professions, where observational tools may underestimate the cumulative impact of micro-strain and force exertion in high-frequency manual tasks (20). The high proportion of therapists in the “investigate further” or “change soon” QEC action levels (68.0%) reinforces the need for proactive ergonomic interventions, even in those with ostensibly acceptable postural alignment.

The clinical and policy implications of these findings are multifaceted. Ergonomic risk mitigation in physiotherapy should extend beyond posture correction to include workload redistribution, scheduled rest breaks, and redesign of treatment spaces to facilitate safer patient transfers. Incorporating ergonomic competencies into undergraduate curricula and mandating periodic workplace assessments could further strengthen preventive efforts (5,7,21). At an institutional level, investment in assistive devices for patient handling and the promotion of a safety culture may help reduce long-term injury rates and support workforce retention.

Several limitations warrant consideration. The cross-sectional design precludes causal inference between ergonomic hazards and WRMSDs, and the use of convenience sampling may limit the generalizability of results beyond the study region. Self-reported symptoms are subject to recall bias and may under- or overestimate true prevalence. Additionally, the QEC and body mapping tools, while validated, are observational and may not capture all biomechanical risk factors, such as cumulative load exposure or psychosocial stressors that modulate musculoskeletal risk. Future research should employ longitudinal designs to track WRMSD onset over time and evaluate the effectiveness of targeted ergonomic interventions in reducing both prevalence and severity.

In summary, the high burden of WRMSDs observed in this study, particularly among early-career physical therapists, highlights an urgent need for integrated ergonomic strategies that address both physical and organizational determinants of occupational injury risk. The findings provide a foundation for evidence-informed interventions aimed at preserving clinician health, improving job satisfaction, and sustaining the delivery of high-quality rehabilitation services.

## CONCLUSIONS

This study demonstrates a high prevalence of work-related musculoskeletal disorders among physical therapy professionals in Pakistan, with early-career clinicians facing a significantly greater risk than their more experienced peers. The predominance of neck, lower back, and upper back involvement reflects the biomechanical demands inherent to physiotherapy practice, while the mismatch between observed postures and self-reported exertion underscores the complexity of ergonomic risk assessment. These findings emphasize the need for comprehensive preventive strategies, including enhanced ergonomic education, structured mentorship for novice practitioners, workplace modifications, and institutional investment in assistive technologies. Implementing such measures may reduce injury risk, promote professional longevity, and sustain the quality of patient care in the rehabilitation sector.

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