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Prevalence of Upper Cross Syndrome and Its Association with Work-Related Musculoskeletal Pain Among Physiotherapists in Hebron, Palestine: A Cross-Sectional Study

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Abstract: ***Upper Cross Syndrome (UCS) is a common postural dysfunction characterized by muscle imbalance in the cervicothoracic and shoulder regions and is frequently associated with neck and shoulder pain. Physiotherapists are at increased risk due to prolonged standing, repetitive manual therapy, and sustained static postures during clinical practice. This study aimed to determine the prevalence of Upper Cross Syndrome and examine its association with work-related musculoskeletal pain among physiotherapists in Hebron. A cross-sectional survey was conducted among licensed physiotherapists practicing in Hebron. Data were collected using a structured online questionnaire covering demographic and work-related characteristics, ergonomic habits, UCS-related postural signs and symptoms, and work-related musculoskeletal pain. Neck-related disability was assessed using the Modified Oswestry Neck Disability Index (MONDI). A total population sampling approach was used. Descriptive and inferential statistical analyses were performed to assess prevalence and associations via SPSS v26 ($p < 0.05$). A high prevalence of Upper Cross Syndrome (UCS) was observed among physiotherapists (80.5%), with 82.8% reporting work-related neck or shoulder pain. Physiotherapists with UCS demonstrated significantly higher neck disability scores (MONDI mean = 27.65) compared to those without UCS (mean = 9.80; $p < 0.001$). UCS was significantly associated with work-related musculoskeletal pain ($p = 0.001$), prolonged pain duration ($p = 0.003$), and prolonged treatment while standing ($p = 0.046$). Upper Cross Syndrome is highly prevalent among physiotherapists in Hebron and is significantly associated with work-related musculoskeletal pain. Implementing ergonomic interventions, preventive exercise programs, and early screening strategies is essential to reduce occupational risk and improve musculoskeletal health in this population.***

Keywords: Cross-Sectional Study; Neck Pain; Physiotherapists; Upper Cross Syndrome; Work-Related Musculoskeletal Disorders.

1. Introduction

The term “musculoskeletal disorders” (MSDs) refers to a broad spectrum of conditions that impact the bones, muscles, connective tissues, and joints [1]. Among young individuals, several work-related risk factors have been identified, including physical factors such as heavy workloads, poor posture, and suboptimal ergonomics, as well as psychosocial, socioeconomic, environmental, and individual factors, including gender. Stress, in this context, is considered both a psychological and physical response to the increasing demands of daily life [21]. MSDs cause pain as well as limitations in movement and dexterity and can lead to a lifetime of permanent or temporary disability for an individual, thus resulting in a reduction in their ability to earn an income and contribute to society [2]. MSDs also have serious consequences for employers and public health systems, as MSDs place a great deal of financial pressure on both types of organizations [Greggi, et al. 2024].

Work-related Musculoskeletal Disorders (WMSDs) are MSDs that may be caused, aggravated, accelerated, or exacerbated by interaction with known or unknown factors in the workplace. WMSDs are a group of painful disorders of muscles, tendons, and nerves [3]. Repetitive movements, awkward postures as well as continuous and excessive use of force might overload the musculoskeletal system, enhancing the risk of developing WMSDs. MSDs and WMSDs may impair work capacity, increase the risk of sickness and absence from work [4].

Neck pain is a multifactorial musculoskeletal condition influenced by a combination of physical, psychological, and occupational factors. Although it may not be the most prevalent musculoskeletal disorder, neck pain, also known as cervicalgia, is characterized by pain and discomfort in the cervical spine, the region responsible for supporting the head [5]. Beyond localized pain, it may result in functional limitations such as reduced range of motion and varying degrees of disability, ultimately affecting daily activities and overall quality of life [22].

Upper Crossed Syndrome (UCS), described by Janda, is a condition characterized by tightness and weakness of the neck, shoulders, and upper back that cross between the dorsal and the ventral sides of the body. In UCS, neck and chest muscles, such as the suboccipitalis, sternocleidomastoid (SCM), levator scapulae, pectoralis major and minor, scalenes, and upper trapezius (UT), are tightened or shortened. Conversely, muscles of the neck and posterior upper back, such as the deep neck flexors (DNFs), serratus anterior (SA), rhomboids, middle

trapezius (MT), and lower trapezius (LT), are weakened, stretched, and strained. The tightness of the suboccipitalis, levator scapulae, and UT on the dorsal side is crossed by the tightness of the pectoralis major and minor, SCM, and scalenes on the ventral side; the weakness of DNFs on the ventral side is crossed by the weakness of the SA, rhomboids, MT, and LT [6].

Opposite-group muscle imbalances in UCS bring postural disturbances, misalignments in the upper limbs, and atlanto-occipital, cervicothoracic, and glenohumeral joint dysfunction [7]. Postural abnormalities associated with UCS include a forward head posture (FHP), cervical lordosis, thoracic hyperkyphosis, protracted and elevated shoulders (rounded shoulders), and scapular winging with increased internal rotation and abduction [8]. If a muscle imbalance continues and progresses, this may lead to altered movement patterns and joint damage, creating further dysfunction [9]. A strong correlation has been found between Work-Related Musculoskeletal Disorders (WRMSDs) and Upper Cross Syndrome (UCS) [10].

Physiotherapists suffer from high rates of work-related musculoskeletal discomfort because of the physically demanding nature of their jobs, which includes handling patients, bending frequently, and sustaining extended postures. According to recent data, the neck, shoulders, and lower back are the most commonly affected locations, and over half of physiotherapists worldwide report experiencing at least one MSD episode throughout their careers [11]. Physiotherapists frequently perform manual therapy techniques and assist patients with movements, leading to repetitive strain and poor postural habits that predispose them to UCS, such as prolonged standing, patient handling, repetitive movements, and maintaining awkward postures for extended periods [12].

The prevalence of UCS is rising as a result of sedentary lifestyles, heavy clinical workloads, and inadequate ergonomics, according to recent research conducted among students and healthcare workers. For example, a 2023 study revealed that about one-third of participants had symptoms of UCS, suggesting that occupational health issues are becoming more prevalent [de-la-Iglesia et al., 2023]. Most studies on physiotherapists have focused on the general prevalence of pain (such as back or neck pain) without diagnosing or measuring the prevalence of UCS as a specific causative entity. Furthermore, there is a clear lack of data from the Middle East, and specifically from Hebron, Palestine [23]. Knowing its frequency and effects could help develop preventative measures and enhance occupational health programs for physiotherapists who operate in settings with limited resources. Therefore, this study aimed to narrow this gap by identifying the prevalence of UCS and examining its association with work-related musculoskeletal pain among physiotherapists in Hebron, Palestine.

2. Methodology

This study employed a cross-sectional research design to determine the prevalence of Upper Cross Syndrome and to examine its association with work-related musculoskeletal pain among physiotherapists in Hebron, Palestine. Data were collected at a single point in time using a self-administered structured online questionnaire via Google Forms.

The source population for this study consisted of all licensed physiotherapists practicing in Hebron Governorate, Palestine. This included physiotherapists working in governmental hospitals, private clinics, rehabilitation centers, and non-governmental organizations (NGOs) who were actively engaged in clinical practice during the data collection period. A convenience sampling method with a total population approach was adopted. The questionnaire was distributed electronically via professional networks and social media groups to the largest number of physiotherapists reachable. Out of those contacted, a total of 87 licensed physiotherapists completed and returned the questionnaire.

Inclusion criteria were: licensed physiotherapists practicing in Hebron with at least six months of clinical work experience, and actively engaged in patient care during the study period. Exclusion criteria included: participants on prolonged leave, those with pre-existing musculoskeletal disorders unrelated to work, incomplete questionnaire responses, or physiotherapists operating outside Hebron city.

Data were collected using a structured questionnaire divided into seven key sections: (1) Demographic characteristics (age, sex, workplace, years of experience, weekly hours); (2) Work ergonomics and occupational habits (hands-on time, standing treatment frequency, screen time, ergonomic training, exercise habits); (3) Upper Cross Syndrome (UCS) screening checklist (self-reported assessment of forward head posture, rounded shoulders, chest tightness, upper trapezius/levator scapulae tightness, scapular winging, and difficulty maintaining upright posture); (4) Work-related musculoskeletal pain characteristics; (5) Pain and functional disability assessment using the Modified Oswestry Neck Disability Index (MONDI), consisting of 10 items scored 0 to 5 (higher scores indicating greater disability); (6) Pain intensity measurement using the Numerical Pain Rating Scale (NPRS); (7) Perceived contributing work factors.

The study was ethically approved by the local Institutional Ethical Committee of Palestine Ahliya University prior to data collection. All participants were informed about the purpose and procedures of the study, and informed electronic consent was obtained prior to participation. Confidentiality and anonymity were strictly maintained.

Statistical analysis was conducted using IBM SPSS Statistics version 26. Descriptive statistics (frequencies, percentages, means, and standard deviations) were calculated. Inferential analyses were executed using independent samples t-tests to compare continuous variables (age, working hours, MONDI scores) between

UCS and non-UCS groups, and Chi-square tests to determine associations between categorical risk factors and the presence of UCS. Statistical significance was defined as a p-value < 0.05.

3. Results

The sample comprised 87 physiotherapists with a mean age of 34.2 years, indicative of a mostly youthful professional demographic. The majority of participants were female (59.8%) and were employed in private clinics (54%). Participants indicated an average of 27.7 working hours per week, with almost half possessing 1-3 years of experience (46%), suggesting that most were early-career clinicians (Table 1).

Table 1. Demographic and Professional Characteristics of Participants

Characteristics	Category	N (%)	Mean (SD)
Age	-	-	34.2 (17.8)
Working hours per week	-	-	27.7 (8.2)
Gender	Male	35 (40.2%)	-
	Female	52 (59.8%)	-
Type of workplace	Government	18 (20.7%)	-
	Private	47 (54.0%)	-
	Hospital or other	22 (25.2%)	-
Years of experience	<1 year	22 (25.3%)	-
	1-3 years	40 (46.0%)	-
	4-6 years	10 (11.5%)	-
	>6 years	15 (17.2%)	-

Work characteristics showed that physiotherapists frequently perform physically demanding tasks, with 92.0% treating patients directly for over 50% of their working time. Additionally, 72.3% execute treatment while standing all or most of the time. While 74.7% reported receiving ergonomic training, only 51.7% engaged in regular exercise (Table 2).

Table 2. Work Characteristics and Ergonomic Practices

Work Characteristics	Category	N (%)
Hands-on treatment >50% of time	Yes	80 (92.0%)
	No	7 (8.0%)
Treatment while standing	Always	25 (28.7%)
	Often	38 (43.6%)
	Sometimes	19 (21.7%)
	Rarely / Never	5 (5.7%)
Screen time per day	<1 hour	23 (26.4%)
	1-2 hours	41 (47.1%)
	>4 hours	23 (26.4%)
Ergonomics training (last 3 years)	Yes	65 (74.7%)
	No	22 (25.3%)
Exercise habits	Regular (>=3x/week)	45 (51.7%)
	Occasional (<3x/week)	28 (32.2%)
	None	14 (16.1%)

Assessment of individual postural features revealed a remarkably high incidence of musculoskeletal and postural impairments. Forward head posture was the most prevalent sign (83.9%), followed by upper trapezius tightness (78.2%) and difficulty maintaining an upright posture (67.8%) (Table 3).

Table 3. Prevalence of Upper Cross Syndrome-Related Postural Features

UCS Postural Feature	Present N (%)	Absent N (%)
Forward head posture	73 (83.9%)	14 (16.1%)
Rounded shoulders	48 (55.2%)	39 (44.8%)
Chest tightness (pectoralis)	54 (62.1%)	33 (37.9%)
Upper trapezius tightness	68 (78.2%)	19 (21.8%)
Scapular winging	40 (46.0%)	47 (54.0%)
Difficulty maintaining upright posture	59 (67.8%)	28 (32.2%)

Based on the diagnostic screening parameters, the overall prevalence of Upper Cross Syndrome (UCS) among the surveyed physiotherapists was 80.5% (Table 4).

Table 4. Prevalence of Upper Cross Syndrome Among Participants

Condition Status	N	%
UCS Present	70	80.5%
UCS Absent	17	19.5%

A substantial majority of the participants (82.8%) reported experiencing work-related neck or shoulder pain during or subsequent to clinical duties. In terms of pain chronicity, 35.6% reported symptoms lasting less than a month, whereas 16.1% suffered from persistent pain exceeding 12 months. Over half of the sample (54.0%) definitely believed their pain was work-related (Table 5).

Table 5. Work-Related Pain Characteristics

Pain Characteristics	Category	N (%)
Pain during or after work	Yes	72 (82.8%)
	No	15 (17.2%)
Pain duration	<1 month	31 (35.6%)
	1-3 months	19 (21.8%)
	4-6 months	13 (14.9%)
	7-12 months	10 (11.5%)
	>12 months	14 (16.1%)
Previous cervical diagnosis	Yes	37 (42.5%)
	No	50 (57.5%)
Treatment sought	Physiotherapy	42 (48.3%)
	Medical Doctor / Meds	8 (9.2%)
	Both	14 (16.1%)
	None	23 (26.4%)
Perceived work-relatedness	Definitely	47 (54.0%)
	Probably / Unsure / No	40 (46.0%)

Functional disability evaluated via MONDI revealed a mean sample score of 24.16, indicating mild to moderate neck impairment overall. Severe disability was observed in 16.1% of the practicing clinicians (Table 6).

Table 6. Neck Disability Scores and Disability Levels Based on MONDI

Index	Mean (SD)	Range	Disability Level	N	%
MONDI	24.16 (16.40)	0.00 - 80.00	Minimal (0-20)	41	47.1%
			Moderate (21-40)	32	36.8%
			Severe (>40)	14	16.1%

Inferential comparison between physiotherapists with UCS and those without revealed no significant differences regarding age ($p = 0.21$) or weekly working hours ($p = 0.90$). Crucially, subjects presenting with

UCS demonstrated highly significant and markedly elevated neck disability index scores (27.65 vs. 9.80; $p < 0.001$) compared to the non-UCS group (Table 7).

Table 7. Comparison of Age, Weekly Working Hours, and MONDI Scores by UCS Status

Variable	UCS Present (Mean ± SD)	UCS Absent (Mean ± SD)	p-value
Age (years)	27.14 ± 7.60	29.94 ± 10.60	0.21
Working hours weekly	34.13 ± 18.69	34.71 ± 14.58	0.90
MONDI Score	27.65 ± 15.65	9.80 ± 10.80	<0.001

Chi-square analysis identified several parameters significantly associated with the development of UCS. Performing treatments while standing demonstrated a significant correlation ($p = 0.046$). Work-related musculoskeletal pain ($p = 0.001$) and prolonged pain duration ($p = 0.003$) were strongly correlated with the presence of UCS. Conversely, gender, type of workplace, years of experience, ergonomics training, and exercise routines did not yield statistically significant correlations (Table 8).

Table 8. Associations Between Participant and Occupational Factors and UCS Status

Risk Factor	Category	UCS Yes (n)	UCS No (n)	p-value
Gender	Male	25	10	0.07
	Female	45	7	
Type of workplace	Government	17	1	0.11
	Private	38	9	
	Hospital or Other	15	7	
Years of experience	<1 year	20	2	0.25
	1-3 years	33	7	
	4-6 years	7	3	
	>6 years	10	5	
Hands-on treatment >50%	Yes	64	16	0.59
	No	6	1	
Screen time per day	<1 hour	17	6	0.70
	1-2 hours	33	8	
	>4 hours	20	3	
Treatment while standing	Always	23	2	0.046
	Often	30	8	
	Sometimes	15	4	
	Rarely / Never	2	3	
Ergonomics training	Yes	50	15	0.13
	No	20	2	
Exercise habits	Regular	35	10	0.78
	Occasional	23	5	
	None	12	2	
Pain during/after work	Yes	65	7	0.001
	No	5	10	

4. Discussion

The primary finding of this cross-sectional study is the exceptionally high prevalence of Upper Cross Syndrome (80.5%) among practicing physiotherapists in Hebron, Palestine. This finding markedly exceeds the prevalence reported in other recent populations, such as a study among Pakistani physiotherapists which reported a UCS prevalence of 27% [10] and an observational study among college students indicating a prevalence of 2.8% [13]. The highly youthful nature of the professional demographic surveyed in this study (mean age 34.2 years, with 46% possessing 1-3 years of experience) combined with intensive occupational workloads offers a compelling explanation. Early-career physical therapists are prone to poor ergonomic adaptations, maintaining awkward forward postures, and engaging in demanding clinical patient handling techniques that directly strain the cervicothoracic region.

A profound 'knowledge-practice gap' was identified within our cohort. Although 74.7% of the respondents had received formal ergonomic or postural training within the past three years, only 51.7% engaged in regular physical exercise to prevent musculoskeletal deficits. This highlights that clinical knowledge regarding posture does not automatically translate into personal protective actions, rendering clinicians vulnerable to the structural muscle imbalances defined by Janda.

Biomechanically, the significant association identified between UCS and prolonged standing during patient treatment ($p = 0.046$) underlines the severe physical burden placed on the posterior stabilizers. Standing for extended durations while performing manual therapy induces persistent muscle activation of the upper trapezius and levator scapulae while stretching and inhibiting the middle and lower trapezius. This triggers a forward head posture and rounded shoulders, increasing the mechanical moment arm acting on the cervical spine and predisposing individuals to severe neck pain [14, 15]. This is corroborated by the strong correlation found between UCS and work-related musculoskeletal pain ($p = 0.001$) as well as prolonged pain durations ($p = 0.003$), illustrating that chronic postural dysfunction delays soft-tissue recovery and induces persistent nociceptive stress [16].

The clinical severity of this postural dysfunction is directly reflected in the functional disability data. Physical therapists with UCS demonstrated vastly higher neck disability scores on the Modified Oswestry Index (mean = 27.65) compared to their unaffected peers (mean = 9.80; $p < 0.001$). This stark contrast indicates that UCS is not merely a cosmetic or asymptomatic structural deviation, but a limiting disorder that significantly restricts functional tasks, daily living activities, and clinical manual performance [14]. The contextual occupational environment within resource-limited clinical settings in Palestine likely exacerbates this burden, as physical therapists handle large patient volumes with limited access to height-adjustable plinths or optimized ergonomic setups [17].

Several limitations must be acknowledged. First, the cross-sectional nature restricts the capacity to draw firm causal relationships between occupational demands and UCS. Second, postural parameters were evaluated using a self-reported screening tool rather than gold-standard objective photogrammetry or electromyography. Finally, convenience sampling within a single governorate limits generalization to the wider population of physical therapists across Palestine.

5. Conclusion

In conclusion, Upper Cross Syndrome is highly prevalent (80.5%) among physiotherapists in Hebron, Palestine, and exhibits a strong, clinically significant association with work-related musculoskeletal pain, prolonged pain durations, and functional disability. The high physical handling demands and extensive standing hours inherent to the profession, combined with a distinct knowledge-practice gap regarding protective exercise habits, place early-career physical therapists at a heightened occupational risk.

6. Recommendations

Based on these insights, the following multi-tiered recommendations are proposed:

- Practical Ergonomic Interventions: Clinical institutions should enforce mandatory, hands-on ergonomic workshops focusing on optimal posture during manual techniques, the utilization of height-adjustable treatment plinths, and active patient-handling modifications.
- Target Corrective Exercise Programs: Clinicians must integrate tailored rehabilitation programs targeting the specific 'crossed' imbalances, including strengthening exercises for the deep neck flexors, lower/middle trapezius, and serratus anterior, alongside targeted stretching for the pectoralis major/minor, sternocleidomastoid, and upper trapezius.
- Early Postural Screening: Professional associations should implement routine screening protocols (e.g., forward head posture tests, scapular dyskinesis assessments) for early clinical detection of asymptomatic muscle imbalances.
- Administrative Work Organization: Implementing structured clinical scheduling that allows clinicians to alternate between standing manual therapy and sitting administrative/documentation duties can decrease localized fatigue.
- Longitudinal Multicenter Research: Future research should focus on longitudinal designs utilizing objective digital photogrammetry and electromyographic measures across multiple clinical settings in Palestine to evaluate the efficacy of preventative exercise protocols.

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