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PREVALENCE OF SCAPULAR DYSKINESIS AMONG PHYSICAL THERAPY PRACTITIONERS AN EPIDEMIOLOGICAL STUDY

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ABSTRACT

Objective: To determine the prevalence of scapular dyskinesis (SD) among Egyptian physical therapy practitioners and to examine its association with epidemiological factors, including age, sex, body mass index (BMI), musculoskeletal symptoms, and scapular stabilizer muscle strength.

Design: A cross-sectional observational study.

Methods: A total of 121 licensed Egyptian physical therapists aged 27–40 years were recruited and categorized into three age-based groups: Group A (27–31 years, 3–7 years of work experience), Group B (above 31–36 years, 7–12 years of work experience), and Group C (above 36–40 years, 12–16 years of work experience). Each participant was assessed for SD using the Scapular Dyskinesis Test (SDT) and the Lateral Scapular Slide Test (LSST). Pain intensity at the end of the ROM was measured by the Visual Analog Scale (VAS), and musculoskeletal symptoms were documented using the Nordic Musculoskeletal Questionnaire (NMQ). Shoulder range of motion (ROM) and the strength of scapular stabilizers (serratus anterior, middle trapezius, and lower trapezius) were evaluated through manual muscle testing. Statistical analysis included Chi-square tests and one-way ANOVA with a significance threshold of $p < 0.05$.

Results: Scapular dyskinesis was observed in all age groups, with subtle forms being more prevalent than obvious ones on SDT. No statistically significant differences in SD prevalence were detected among age groups. Right-sided pain and muscle weakness, particularly in the lower trapezius and serratus anterior, were commonly reported across groups. Although abnormal LSST was numerically more frequent in younger groups, this difference was not statistically significant.

Conclusion: Scapular dyskinesis is common among physical therapy practitioners, occurring independently of age and symptomatic presentation. Routine screening and preventive strengthening programs targeting scapular stabilizers are recommended to reduce the potential risk of future shoulder dysfunction.

Keywords: *Scapular Dyskinesis; Physical Therapists; Shoulder Pain; Muscle Weakness; Rehabilitation; Ergonomics*

1. Introduction

Work-related musculoskeletal disorders (WRMDs) are widespread across multiple professions and frequently involve the lower back, neck, shoulders, and upper extremities (Gorce & Jacquier-Bret, 2023). These disorders are highly prevalent among physical therapy practitioners, with a reported incidence of 69% in private and outpatient clinical settings where physical demands are substantial (Buddhadev & Kotecha, 2012).

Occupational activities with ergonomic risk factors—such as prolonged static positioning and repetitive upper limb use—are strongly linked to upper body pain. Examples include bus drivers, sewing machine operators, and mechanics. Risk factors for WRMDs include younger age (under 30 years), female gender, preexisting musculoskeletal or systemic conditions, extended work history, high physical exertion, and insufficient rest periods (Wang et al., 2007).

Scapular dyskinesis (SD) represents a specific form of altered scapular kinematics and is recognized as one of the most relevant WRMDs in physical therapy practice. It is frequently associated with prolonged forward head posture (FHP), which increases strain on cervical soft tissues and disrupts normal scapular control (Kashif et al., 2020; Silvian et al., 2011). SD is characterized by abnormal scapular motion during shoulder activity, impairing shoulder mechanics and often producing pain (Roche et al., 2015). Clinically, it may be identified by a prominence of the

medial border or inferior angle of the scapula during movement, reflecting a loss of normal rhythm and stability (Moghadam et al., 2017; Sciascia & Kibler, 2022).

Repetitive arm motions can fatigue the scapular stabilizers, altering kinematics and promoting the onset of SD (Andres et al., 2020). This abnormal motion may present as SICK scapula syndrome—a cluster of findings including scapular malposition, inferior border prominence, coracoid tenderness, and dysrhythmic movement (Struyf et al., 2014). Various occupational and psychosocial factors contribute to SD in physical therapists, such as work-related stress, inadequate breaks, heavy workload, cold working environments, BMI increase with age, and frequent use of manual therapy techniques like massage (Adegoke et al., 2008; Anyfantis & Biska, 2018).

Scapular dyskinesis (SD) can both result from and contribute to shoulder pathologies including labral injuries, glenohumeral instability, and acromioclavicular joint separation. It is classified into three primary types: Type I—posterior displacement of the inferior angle; Type II—posterior displacement of the medial border; and Type III—early scapular elevation or dysrhythmia (Giuseppe et al., 2020). Its association with disability has been reported in occupations such as teaching and military training, where repetitive upper limb use leads to muscle fatigue, pain, and functional decline (Andres et al., 2020).

Previous studies have explored the prevalence of WRMDs and their risk factors in physical therapy practitioners but have not specifically examined scapular dyskinesis in this population. The present study aims to address this gap by determining the prevalence of SD among Egyptian physical therapy practitioners and identifying epidemiological factors associated with its presence.

2. Material and methods

2.1. Study Design

This study was a cross-sectional observational study designed to investigate the prevalence of scapular dyskinesis (SD) among physical therapy practitioners and to explore associated epidemiological factors. The study was conducted between December 2024 and August 2025. Ethical approval was obtained from the Research Ethics Committee of the Faculty of Physical Therapy, Cairo University (P.T.REC/012/005755).

2.2. Participants

- Sample Size: The sample size of 121 was calculated assuming a prevalence of 40% scapular dyskinesis, a margin of error of 8%, and power of 80% at $\alpha = 0.05$ using SPSS sample size calculation module, using a one-sample t-test. The generated sample size was 121 physical therapy practitioners.
- Selection Criteria:
    - Inclusion Criteria:
        - Licensed physical therapy practitioners actively working in clinical settings (Soliño et al., 2024).
        - Age between 27 and 40 years (Jeong & Kim, 2023).
        - Minimum of one year of clinical experience or exposure to physical activity (Jeong & Kim, 2023).
        - No current shoulder pain or symptoms at the time of assessment (Soliño et al., 2024).
        - Willingness to participate and provide informed consent.
    - Exclusion Criteria:
        - Acute shoulder or neck injury within the last month (Jeong & Kim, 2023).
        - History of upper body orthopedic surgery (Jeong & Kim, 2023).
        - Known neurological or musculoskeletal disorders affecting shoulder mechanics (Burn et al., 2016).
        - Participation in overhead or collision sports with high scapular loading (Burn et al., 2016).
        - Inability to complete assessment procedures due to physical limitations (Soliño et al., 2024).
- Subgroups**:** Participants were divided into three age-based groups:
    - Group A (27–31 years, 3–7 years of work experience)
    - Group B (above 31–36 years, 7–12 years of work experience)
    - Group C (above 36–40 years, 12–16 years of work experience)

2.3. Instrumentation and Evaluation Procedures

1) Personal Data & Consent: Name, age, sex, weight, and height were recorded; informed consent obtained. (Abrantes et al., 2002).
2) Body Mass Index (BMI): Weight and height measured; BMI calculated as kg/m², with ≥30 considered obese (Romero et al., 2008) .
3) Pain Assessment (VAS): Pain intensity at the end of the ROM rated on a 10 cm visual analog scale from 0 (no pain) to 10 (worst pain). (Begum et al., 2019).
4) Scapular Dyskinesis Test (SDT): Visual observation of scapular movement during repeated shoulder flexion and abduction; classified as normal, subtle and obvious. (Plummer et al., 2017, Jayasinghe, 2018).
5) Lateral Scapular Slide Test (LSST): Distance from scapula's inferior angle to spinous process measured in different arm positions; >1.5 cm side-to-side difference marked as abnormal. (Curtis et al., 2006, Jayasinghe, 2018).
6) Shoulder Range of Motion (ROM): Measured with a digital goniometer aligned to anatomical landmarks; passive ROM assessed for pain and end-feel. (Norkin & White, 2016).
7) Manual Muscle Testing (MMT): Strength of middle trapezius, lower trapezius, and serratus anterior graded on the Oxford scale (0–5). For analysis, results were grouped into three categories: Normal (Grade 5), Reduced (Grades 3–4), and Markedly Reduced (Grades 0–2) (Vijian et al., 2023).
8) Nordic Musculoskeletal Questionnaire (NMQ): Arabic-adapted version used to assess musculoskeletal symptoms in specific body regions. (Aldhabi et al., 2024, Smith et al., 2006).

2.4. Statistical Analysis

Data were expressed as mean ± SD. The Shapiro–Wilk test was used for normality testing. ANOVA was applied to compare characteristics among the three subgroups, and the Chi-square test was used to compare categorical variables. Statistical analysis was performed using SPSS version 20 (SPSS Inc., Chicago, IL, USA), with significance set at $p \leq 0.05$.

3.Results

3.1. Demographic Characteristics

A total of three age-based groups of Egyptian physical therapy practitioners were analyzed Group A (27–31 years, 3–7 years of work experience), Group B (above 31–36 years, 7–12 years of work experience), and Group C (above 36–40 years, 12–16 years of work experience). There was a statistically significant difference in mean age between the groups ($p = 0.001$). No significant differences were observed for BMI or sex distribution.

Parameter	Group A (27–31 yrs)	Group B (>31–36 yrs)	Group C (>36–40 yrs)	F / χ^2 value	p-value	Significance
Mean Age (yrs)	29.20 ± 1.16	33.83 ± 1.34	38.47 ± 1.00	F = 620	0.001	S
BMI (kg/m²)	29.88 ± 6.22	29.48 ± 4.87	29.62 ± 5.21	F = 0.06	0.945	NS
Sex Distribution (% male / female)	25 / 75	30 / 70	35 / 65	$\chi^2 = 0.952$	0.621	NS

Table 1. Demographic characteristics of study participants

3.2. Shoulder Pain at the end of the ROM and Range of Motion

No statistically significant differences were found between groups for shoulder pain (VAS) or shoulder range of motion (ROM).

	Group A	Group B	Group C	f- value	P-value
Shoulder Pain (cm)	2.63±1.67	2.85±1.8	3.1±1.52	0.810	0.447
Shoulder ROM (degrees)	176±7.44	176±7.44	176.25±7.05	0.02	0.985

Table 2. Shoulder pain and ROM

3.3. Scapular Dyskinesis

The distribution of scapular dyskinesis patterns did not differ significantly between groups.

Scapular dyskinesis	Group A N (%)	Group B N (%)	Group C N (%)	Chi square	P-value
Normal	12 (30%)	9 (22.5%)	10 (25%)	1.43	0.840
Subtle	18 (45%)	23 (57.5%)	22 (55%)		
Obvious	10 (25%)	8 (20%)	8 (20%)		

Table 3. Scapular dyskinesis distribution

3.4. Scapular Muscle Strength

No significant between-group differences were observed for middle trapezius, lower trapezius, or serratus anterior muscle strength.

Muscle test of middle Trapezius	Group A N (%)	Group B N (%)	Group C N (%)	Chi square	P-value
Normal	14 (35%)	12 (30%)	13 (32.5%)	3	0.557
Reduced	20 (50%)	22 (55%)	25 (62.5%)		
Markedly reduced	6 (15%)	6 (15%)	2 (5%)		
Muscle test of lower Trapezius					
Normal	12 (30%)	12 (30%)	11 (27.5%)	1.56	0.816
Reduced	11 (27.5%)	14 (35%)	10 (25%)		
Markedly reduced	17 (42.5%)	14 (35%)	19 (47.5%)		
Muscle test of Serratus anterior					
Normal	4 (10%)	11 (27.5%)	9 (22.5%)	4.43	0.351
Reduced	20 (50%)	18 (45%)	19 (47.5%)		
Markedly reduced	16 (40%)	11 (27.5%)	12 (30%)		

Table 4. Middle trapezius, lower trapezius, or serratus anterior muscle strength.

3.5. Gleno-humeral Joint End Feel

No significant differences were found between groups.

Gleno-humeral joint end feel	Group A N (%)	Group B N (%)	Group C N (%)	Chi square	P-value
Normal	30 (75%)	31 (77.5%)	29 (72.5%)	0.27	0.875
Stiff	10 (25%)	9 (22.5%)	11 (27.5%)		

Table 5. Gleno-humeral joint end feel

3.6. Lateral Scapular Slide Test

No statistically significant differences were observed.

Lateral scapular slide test	**Group A** N (%)	**Group B** N (%)	**Group C** N (%)	**Chi square**	**P-value**
Normal	16 (40%)	15 (37.5%)	28 (70%)	0.942	0.624
Abnormal	24 (60%)	25 (62.5%)	12 (30%)		

Table 6. Lateral scapular slide test

3.7. Prevalence of Neck Dysfunction

Neck dysfunction prevalence was comparable between groups.

Neck		**Group A** N (%)	**Group B** N (%)	**Group C** N (%)	**Chi square**	**P-value**
Have you at any time during the last 12 months had trouble	Yes No	23 (57.5%) 17 (42.5%)	27 (67.5%) 13 (32.5%)	32 (80%) 8 (20%)	4.69	0.095
Have you at any time during the last 12 months been prevented from doing your normal work	Yes No	12 (30%) 28 (70%)	13 (32.5%) 27 (67.5%)	11 (27.5%) 29 (72.5%)	0.238	0.888
Have you had trouble at any time during the last 7 days?	Yes No	12 (30%) 28 (70%)	14 (35%) 26 (65%)	13 (32.5%) 27 (67.5%)	0.228	0.892

Table 7. Neck dysfunction prevalence

3.8. Prevalence of Shoulder Dysfunction

No significant differences were found for shoulder dysfunction parameters.

Shoulder		**Group A** N (%)	**Group B** N (%)	**Group C** N (%)	**Chi square**	**P-value**
Have you at any time during the last 12 months had trouble	Yes right shoulder Yes left shoulder Yes both shoulders No	15 (37.5%) 6 (15%) 5 (12.5%) 14 (35%)	21 (52.5%) 6 (15%) 3 (7.5%) 10 (25%)	18 (45%) 6 (15%) 9 (22.5%) 7 (17.5%)	6.68	0.351

Have you at any time during the last 12 months been prevented from doing your normal work	Yes No	7 (17.5%) 33 (82.5%)	9 (22.5%) 31 (77.5%)	8 (20%) 32 (80%)	0.313	0.855
Have you had trouble at any time during the last 7 days?	Yes No	9 (22.5%) 31 (77.5%)	14 (35%) 26 (65%)	8 (20%) 32 (80%)	2.69	0.260

Table 8. Shoulder dysfunction prevalence

3.9. Summary

Significant differences were observed only for age. All other parameters, including BMI, sex distribution, shoulder pain, ROM, scapular dyskinesis, muscle strength, joint end feel, lateral scapular slide test, and prevalence of neck and shoulder dysfunction, showed no statistically significant differences between the age groups.

4.Discussion

This study investigated the prevalence of scapular dyskinesis (SD) and its associated epidemiological factors among Egyptian physical therapy practitioners. Participants were categorized into three age-based groups, and assessments included scapular dyskinesis classification, pain intensity at the end of the ROM, shoulder range of motion (ROM), glenohumeral joint end feel, and muscle strength of the middle trapezius, lower trapezius, and serratus anterior. Additional variables included BMI, history of shoulder and neck symptoms, and occupational characteristics.

Participants' ages were comparable between the three groups: Group A (27–31 years, 3–7 years of work experience), Group B (above 31–36 years, 7–12 years of work experience), and Group C (above 36–40 years, 12–16 years of work experience). Demographic characteristics such as sex distribution and BMI were similar across groups, ensuring that any differences in outcomes could be attributed to occupational or biomechanical factors rather than demographic disparities. Data were collected through clinical tests, questionnaires, and muscle strength measurements in various outpatient and clinical settings.

Regarding the prevalence of scapular dyskinesis:

Scapular dyskinesis was highly prevalent across all age groups, was 70% (95% CI: 62–78%), with the subtle type being the most common presentation. Although prevalence varied slightly among groups, statistical analysis revealed no significant differences. These findings suggest that Repetitive occupational activities may contribute to scapular dyskinesis; however, the cross-sectional design prevents establishing causality. (Cools et al 2014)

Regarding pain intensity and shoulder range of motion (ROM):

Pain at the end of the ROM was assessed using the Visual Analog Scale (VAS). While shoulder and neck discomfort were reported in all groups, shoulder ROM—measured with a digital goniometer—remained relatively consistent across participants. This consistency suggests that SD can be present without obvious functional ROM deficits, likely due to muscular compensation masking underlying biomechanical inefficiencies. (Goetti et al 2020)

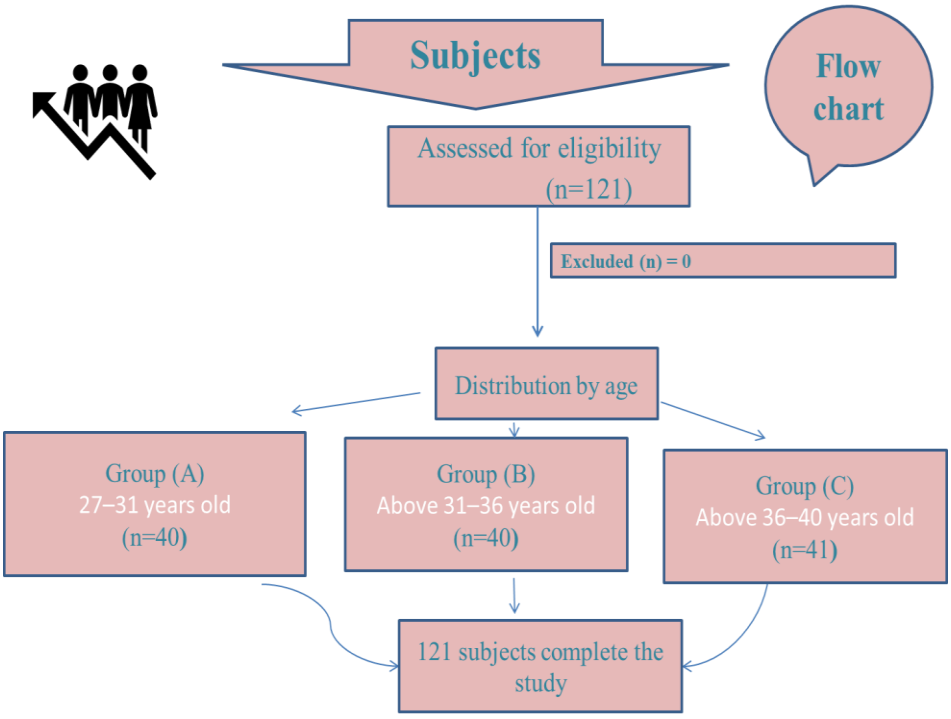
Regarding muscle strength deficits:

Deficits in the lower trapezius and serratus anterior were common in all age groups, with a considerable proportion of participants showing reduced or markedly reduced strength. No significant differences in strength measures were

found between groups, indicating that such imbalances are widespread within the profession and likely linked to occupational demands, poor postural habits, and insufficient scapular stabilizer training (Dickerson et al 2011)

Regarding glenohumeral joint end feel and scapular positioning:
The glenohumeral joint end feel was largely normal across all groups, indicating that capsular stiffness or mechanical restriction was not a major factor in scapular dyskinesis. Abnormal positioning on the Lateral Scapular Slide Test (LSST) was more common in younger practitioners (Groups A and B) than in Group C, though not statistically significant. This pattern may reflect that older practitioners adopt compensatory strategies, such as modifying posture or adjusting work demands, to limit static scapular malalignment (Snyder et al., 2019).

Regarding neck and shoulder symptoms:
Neck trouble in the past 12 months was frequent across groups, slightly higher in older participants, but differences were not statistically significant. Shoulder symptoms were also prevalent, with right-sided involvement more frequent—likely reflecting the handedness and repetitive upper limb use of practitioners during patient handling. (Greiner et al 2019)



Comparison with previous studies:
The high prevalence of SD observed aligns with Amin (2023), who reported similar findings in dentists, and Vongsirinavarat et al. (2023), who documented high rates of SD among office workers with neck and shoulder pain, often associated with forward head posture and rounded shoulders. These parallels support the role of repetitive movements and postural malalignment in the development of SD. The findings are also consistent with Depreli and Angın (2018) and Burn et al. (2016), who highlighted the role of occupational and repetitive load factors in scapular dysfunction across both professional and athletic populations. Notably, the link between SD and future shoulder pain risk—highlighted by Hickey et al. (2018)—reinforces the importance of early detection in clinical settings.

The clinical implications of these findings are considerable. The high prevalence of scapular dyskinesis among Egyptian physical therapy practitioners, regardless of age, highlights the urgent need for preventive screening in this professional population. Implementing early detection protocols—even for asymptomatic individuals—could help prevent the progression of SD to symptomatic shoulder or neck conditions. Targeted strengthening of scapular stabilizers, particularly the lower trapezius and serratus anterior, should be incorporated into workplace wellness programs and undergraduate training curricula for physical therapists.

Given that scapular dyskinesis often develops in response to repetitive occupational movements and sustained postures, ergonomic adjustments in treatment environments may reduce strain and improve musculoskeletal health. Because the assessment methods used (e.g., SDT, LSST, digital goniometer, and VAS) are cost-effective and easily implemented, they are especially suitable for routine clinical use in resource-limited settings. Moreover, early identification and correction of muscle imbalances could enhance practitioners' long-term work capacity, reduce sick leave, and improve quality of life.

Limitations:

- Assessment:
  Because scapular dyskinesis tests are subjective and no inter-rater reliability was formally assessed, this should be considered a study limitation
- Assessment Scope:
  The study relied on clinical assessments without incorporating advanced objective measures such as three-dimensional motion analysis or electromyography. Including these tools in future research could yield deeper insights into scapular kinematics and neuromuscular control.
- Bias:
  selection bias (volunteer participants may not represent all PTs).
  bias from self-reported symptoms.
- Cross-Sectional Design:
  The cross-sectional nature of the study restricts the ability to establish causality between occupational factors and scapular dyskinesis. Longitudinal studies are required to monitor progression and identify predictive risk factors over time.
- Sample Size:
  A relatively modest sample size limits the statistical power and generalizability of the findings. Future studies with larger, multi-center cohorts are needed to provide a more representative understanding of scapular dyskinesis prevalence among physical therapy practitioners.

5.Conclusion

The results of this study demonstrate that scapular dyskinesis is highly prevalent among Egyptian physical therapy practitioners across all age groups, with subtle dyskinesis being the most common presentation. Widespread weakness in the lower trapezius and serratus anterior, along with frequent reports of neck and shoulder discomfort, highlight the occupational demands and postural stresses inherent in the profession. Overall, early screening, targeted strengthening, and ergonomic interventions appear to be practical, cost-effective strategies that can be readily implemented in clinical and workplace settings to preserve musculoskeletal health and enhance the longevity of practitioners' careers.

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Disclosure

The authors have no conflicts of interest to declare.

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