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Original Article

Physiotherapy Section

Prevalence of Scapular Dyskinesia among Bank Employees in Belagavi, Karnataka, India: A Cross-sectional Study

ANJANA JAVALI[1], TEJASWI VARUTE[2], GV KRUTHI[3], JANHAVI JAYVANTRAO JADHAV[4], HIBAH SANADI[5]

ABSTRACT

Introduction: Scapular Dyskinesis (SD) is an abnormal movement or positioning of the scapula, often resulting from muscular imbalance and poor posture. Office-based professionals, such as bank employees, are at increased risk due to prolonged sedentary work.

Aim: To estimate the prevalence of SD among bankers in Belagavi using the Scapular Dyskinesis Test (SDT) and Lateral Scapular Slide Test (LSST) and to explore associated demographic characteristics.

Materials and Methods: A cross-sectional observational study was conducted on 131 employees (aged 20-45 years) from 40 banks in Belagavi, Karnataka, India between February 2024-August 2024. SDT and LSST were used to assess scapular motion on both sides. Data were analysed using Statistical Package for Social Sciences (SPSS) v29.0.10. Chi-square tests were applied, with a p-value < 0.05 considered significant.

Results: A total of 131 bankers, 77 males (58.8%) and 54 females (41.2%) were included. The mean age was 35.5±7.75 years (range: 23-45 years). On the SDT, dyskinesis was present in 86 (65.6%) dominant and 69 (52.7%) non dominant limbs; of the dominant-side findings, 70 (53.4%) were subtle and 16 (12.2%) were obvious. On the LSST, 112 (85.5%) dominant and 103 (78.6%) non dominant limbs showed positive findings. Higher prevalence by LSST may detect static scapular asymmetry more readily than SDT, which evaluates dynamic movement patterns. Considering either test, the overall prevalence was 115 (87.8%). Chi-square analysis showed no significant difference between dominant and non dominant limbs for both SDT (χ^2=0.52, p=0.472) and LSST (χ^2=0.25, p=0.619). Prevalence did not differ statistically between males and females on SDT (51/77, 66.2% vs 35/54, 64.8%; p=0.884) or LSST (67/77, 87.0% vs 45/54, 83.3%; p=0.583). No significant associations were observed with age, work experience, or daily working hours (p>0.05)

Conclusion: The study demonstrated a high prevalence of SD among bankers in Belagavi, particularly in the dominant limb. These findings suggest the potential value of early detection and ergonomic interventions, and preventive strategies to reduce the risk of Musculoskeletal Disorders (MSD) in sedentary occupational settings, particularly those related to the shoulder. Early physiotherapy-based interventions focusing on muscle re-education, ergonomic workstation adjustments, and activity modification can help prevent shoulder dysfunction and enhance occupational performance.

Keywords: Bankers, Ergonomics, Lateral scapular slide test, Scapula, Scapular dyskinesis test

INTRODUCTION

The SD refers to abnormal position and motion of the scapula during shoulder movements, which increases the risk of shoulder dysfunction and injury [1]. It has been increasingly recognised as a contributing factor in a variety of shoulder pathologies, often leading to pain, reduced mobility, and functional impairment [2]. SD is commonly associated with poor posture, muscular imbalance, and repetitive strain on the shoulder complex. Individuals engaged in occupations involving repetitive upper limb movements or prolonged static posture, such as office workers, are particularly vulnerable to developing SD [3,4].

The severity of SD can be graded as subtle or obvious based on visual observation during arm movement [5]. According to Kibler BW and McMullen J subtle dyskinesis refers to minimal asymmetry or early scapular elevation during motion, while obvious dyskinesis denotes pronounced winging or gross deviation of the scapular border during elevation or lowering of the arm. Recognising these distinctions is important for accurately identifying dysfunction severity and guiding clinical intervention [3].

The SDT is visual assessment of dynamic scapular motion during repeated arm elevation and classifies movement as normal, subtle or obvious [5]. LSST is static measurement of side-to-side scapular position in three arm positions; >1.5 cm difference indicates asymmetry [5]. LSST has shown high reliability (ICC >0.87) and is more sensitive to static asymmetries, while SDT identifies dynamic movement deviations [5].

The prevalence of work-related MSDs in office-based professions is well-documented. Prolonged computer use, suboptimal ergonomic set-ups, and static sitting postures contribute to neck and shoulder pain, with scapular dysfunction being a key underlying factor [6,7]. Office workers, including those in banking, frequently perform tasks that place continuous strain on the upper body, increasing their susceptibility to MSDs [8].

In Belagavi, Karnataka, the banking sector has expanded significantly, employing a large number of individuals in sedentary, desk-based roles. Daily tasks such as typing, prolonged computer usage, and document handling expose bankers to poor posture and upper body fatigue—recognised risk factors for scapular dysfunction [9]. Despite these occupational hazards, there is limited literature on the prevalence of SD among bankers, particularly within the Indian context.

Globally, the prevalence of SD varies widely depending on population and assessment method. Systematic reviews have reported rates ranging from 33% to 74% in athletic and non-athletic groups, with higher values observed in occupations involving repetitive or static upper-limb postures [7,8]. Despite growing international evidence linking prolonged computer work and poor ergonomics to scapular dysfunction, data from developing nations remain scarce. Few studies have examined office-based workers in India [9-11], and none to date have focused on the banking profession- a sector with comparable ergonomic risk exposure.

Cools AM et al., emphasised that individuals with desk-based occupations are more prone to SD due to repetitive overhead tasks, postural deviations, and muscular fatigue [6]. Similarly, previous studies [10-13], have reported a high frequency of neck and shoulder discomfort among computer users [12], and among bankers working extended hours without adjustable workstations [10]. Naqvi M et al., also demonstrated a strong association between prolonged sitting and MSDs in banking professionals [11].

Despite accumulating international evidence, the specific burden and patterns of SD among Indian Bank employees remain undocumented. Addressing this gap is crucial to understanding occupational musculoskeletal health in sedentary populations. Hence, the present study aimed to estimate the prevalence of SD among bank employees in Belagavi using the SDT and the LSST, and to compare findings across dominant and non dominant limbs.

MATERIALS AND METHODS

A cross-sectional observational study was conducted at banking branches located in Belagavi Karnataka, India, between February 2024 and August 2024. Ethical clearance was obtained from the Institutional Ethics Committee of KLE Academy of Higher Education Institute of Physiotherapy (Ref: KIPT/653/03.04.2024). All procedures adhered to the Declaration of Helsinki (2013 revision).

Sample size calculation: The sample size was calculated using the formula for prevalence studies:

$n=Z^2\times P\times(1-P)/d^2$

where,

Z=1.96 (for 95% confidence),

P=0.257

d=0.075 (precision).

The required sample size, based on this calculation, was 131. This prevalence was based on a previous study among bankers that reported 25.7% SD prevalence using LSST [14]. Written informed consent was obtained from all participants prior to data collection.

Inclusion criteria: Bank employees aged 20-45 year, with a minimum of one year of work experience, and who were engaged in atleast six hours of work per day

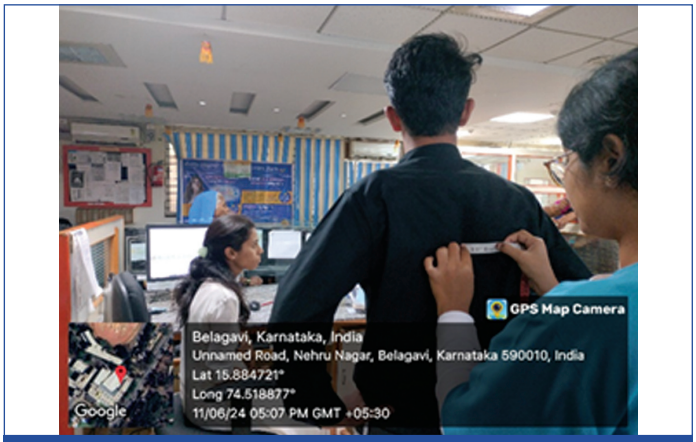
Exclusion criteria: History of upper limb fracture, scoliosis, or shoulder/neck trauma or surgery within preceding six months.

A total of 55 banks were approached (North Belagavi: 27; South Belagavi: 28), of which 40 banks (North: 19; South: 21) granted permission to conduct the study. A total of 145 employees were screened, of whom 131 met the inclusion criteria and were recruited for the study. Although the inclusion criteria specified 20-45 years, no eligible participants aged 20-23 years were identified during recruitment. Hence, the final study sample represented an observed age range of 24-45 years.

Study Procedure

A comprehensive list of all operational public and private banks in Belagavi was compiled from local bank directories and official branch listings and stratified by geographic zone (North and South Belagavi). Banks were selected for recruitment on a purposive basis based on accessibility and administrative consent: 55 banks (North: 27; South: 28) were approached, and 40 banks (North: 19; South: 21) granted permission to participate. Within each consenting bank, study personnel visited during prearranged time slots and screened employees for eligibility. A total of 145 employees were screened; 14 were excluded (did not meet inclusion criteria or declined participation), and 131 employees met eligibility criteria and were recruited (consecutive sampling of eligible, consenting employees within each bank). Reasons for exclusion were recorded as: age outside the specified range, insufficient work experience, current/ recent neck or shoulder surgery or trauma, or refusal to consent.

All assessments were performed within the bank premises in a well-lit, ventilated room to ensure privacy and standardisation. Stage 1 comprised the collection of demographic and occupational data (age, gender, years of experience, daily working hours). Stage 2 comprised a clinical assessment of the shoulder complex, where the SDT and LSST were performed by a single trained therapist using standardised procedures to minimise observer variation. The testing for SDT is shown in [Table/Fig-1].



[Table/Fig-1]: The assessment of Scapular Dyskinesis (SD).

For SDT, participants stood in an erect standing position with feet shoulder-width apart. Each participant performed five repetitions of shoulder flexion with dumbbells (1.4 kg for individuals weighing < 68 kg; 2.3 kg for ≥ 68 kg), and scapular motion was visually graded as normal, subtle, or obvious as per Kibler BW and McMullen J [3]. The test has shown good inter-rater reliability (k=0.61- 0.81) [4].

For LSST, participants maintained an upright standing position while distances from T7 to the inferior angle of the scapula were measured bilaterally using a flexible tape in three positions (arms by the side, hands on the hips to 45°, and 90° abduction); a side-to-side difference ≥1.5 cm was considered positive, consistent with Kibler BW and McMullen J and Struyf F et al., [3,5]. The LSST demonstrates high test-retest reliability (ICC >0.87). Both dominant and non dominant sides were evaluated, and findings were recorded immediately. The cluster and zone for each participant were documented to allow descriptive reporting by region. Since the banks were selected based on accessibility and managerial consent, and participants were recruited consecutively within consenting banks, there is a potential for selection bias due to purposive bank selection and consent-based participant recruitment; this is acknowledged and discussed in the limitations.

STATISTICAL ANALYSIS

The data were analysed using IBM SPSS Statistics for Windows, version 29.0.10. Descriptive statistics were expressed as Mean±Standard Deviation (SD) for continuous variables and frequency (percentage) for categorical variables. The prevalence of SD was determined separately for the SDT and LSST for both dominant and non dominant limbs. To minimise assessment bias, the same trained physiotherapist performed all measurements using standardised procedures. The Chi-square test was used to test associations between SD (presence or absence) and gender or limb dominance, while the Independent t-test compared continuous variables (age, work experience, daily working hours) between groups. Statistical significance was set at $p<0.05$.

RESULTS

The present study included 131 bankers, comprising 77 males (58.8%) and 54 females (41.2%). The mean age of the participants was 35.5±7.75 years, with a mean work experience of 8.37±4.52

years, an average daily working duration of 8.5±1.21 hours, and a mean body weight of 65.5±9.55 kg. The demographic characteristics of the participants are summarised in [Table/Fig-2]. The observed age range was 23-45 years, as no eligible participants below 23 years were identified during recruitment. No missing data were observed for any participant or recorded variable.

Variables	Range	Mean±SD
Age (in years)	23-45	35.50±7.75
Years of experience (in years)	2-20	8.37±4.52
Hours of work	6-12	8.50±1.21
Weight (kg)	42-94	65.50±9.55

[Table/Fig-2]: Demographic characteristics for age, years of experience, hours of work, and weight (N=131).

Prevalence of Scapular Dyskinesis (SD)

Based on the SDT, SD was present in 86 (65.6%) participants on the dominant limb and 69 (52.7%) on the non dominant limb. Among these, 70 (53.4%) exhibited subtle and 16 (12.2%) exhibited obvious dyskinesis on the dominant side. According to the LSST, 112 (85.5%) participants showed a positive finding on the dominant limb, and 103 (78.6%) on the non dominant limb. The same has been depicted in [Table/Fig-3].

Test	Dominant limb n (%)	Non dominant limb n (%)
Scapular Dyskinesis Test (SDT)	86 (65.6%)	69 (52.7%)
Lateral Scapular Slide Test (LSST)	112 (85.5%)	103 (78.6%)

[Table/Fig-3]: Prevalence of Scapular Dyskinesis (SD).

To represent the combined burden, the overall prevalence was calculated by considering a participant positive if dyskinesis was detected on either SDT or LSST for at least one limb-yielding an overall prevalence of 87.8% (115 of 131). This combined measure reflects both dynamic (SDT) and static (LSST) components of scapular control, consistent with previous recommendations [5,8].

Comparison between Dominant and Non Dominant Limbs

Although SD was more frequent on the dominant limb for both SDT and LSST, the difference between sides was not statistically significant (SDT: χ^2=0.52, p=0.472); LSST: χ^2=0.25, p=0.619). Mean differences between dominant and non dominant measurements on LSST were less than 1.5 cm for most participants, indicating mild asymmetry without clinical significance.

Association with Gender and Occupational Factors

The prevalence of SD did not differ significantly between males and females. The association of SD with gender and limb dominance are depicted in [Table/Fig-4].

- SDT: 51 (66.2%) males vs 35 (64.8%) females (χ^2=0.02, p=0.884)
- LSST: 67 (87.0%) males vs 45 (83.3%) females (χ^2=0.30, p=0.583)

Variables	Test	χ^2	p-value
Gender (male vs female)	Scapular Dyskinesis Test (SDT)	0.02	0.884
Gender (male vs female)	Lateral Scapular Slide Test (LSST)	0.30	0.583
Limb dominance (dominant vs non dominant)	Scapular Dyskinesis Test (SDT)	0.52	0.472
Limb dominance (dominant vs non dominant)	Lateral Scapular Slide Test (LSST)	0.25	0.619

[Table/Fig-4]: Association of Scapular Dyskinesis (SD) with gender and limb dominance (Chi-square analysis).

No significant differences were observed in age, years of work experience, or daily working hours between participants with or without SD (p>0.05, Independent t-test).

DISCUSSION

In this cross-sectional study of bank employees in Belagavi, the presence of SD was found to be markedly high - 87.8% overall, when a positive finding on either the SDT or LSST was considered. This finding directly supports the study's aim of estimating the burden of SD among bank employees in Belagavi.

The observed prevalence of SD (65.6% by SDT and 85.5% by LSST on the dominant limb) exceeds the anticipated prevalence of 26% used for sample-size calculation [14]. Such differences can be attributed to variation in the population characteristics and operational definitions. While Yaqub S et al., evaluated symptomatic bankers using only the LSST, the present study included both symptomatic and asymptomatic employees and combined results from two validated tests, potentially identifying earlier or subclinical dysfunctions [14].

Comparable findings have been reported among office-based and computer-using populations, where SD prevalence ranged between 70-90% [5,8]. Vongsirinavarat M et al., observed that nearly 90% of office workers with neck and shoulder discomfort exhibited some form of scapular asymmetry [8]. Similarly, Ozdemir F and Toy S (2021) reported a statistically significant positive association between ergonomic risk exposure and scapular dyskinesis in office workers [13]. These parallels suggest that sedentary work and repetitive upper-limb tasks are key contributors to scapular control deficits, even in individuals without overt pain.

The LSST identified a greater proportion of SD (85.5%) than the SDT (65.5%), a difference consistent with prior literature [5]. The LSST primarily quantifies static scapular asymmetry, which may be more prevalent in desk-bound employees maintaining prolonged postures. In contrast, the SDT assesses dynamic control during arm movement and may miss subtle positional deviations. Hence, LSST can be considered more sensitive for screening early, posture-related scapular deviations, where SDT may better reflect clinically observable movement dysfunctions.

The operational definition of "overall prevalence" - counting a participant as positive if dyskinesis was present on either test - integrates both static and dynamic aspects of scapular motion, similar to approaches used by Vongsirinavarat M et al., [8].

Although SD was more frequent on the dominant side, the difference was not statistically significant (p=0.472 for SDT; p=0.619 for LSST). Dominant-limb overuse during tasks such as mouse operation, document handling, and one-sided posture may explain the higher raw percentages, though symmetrical desk work likely reduces large side-to-side variation. Comparable non significant dominance effects were reported by McClure P et al., and Vongsirinavarat M et al., in non athletic office worker samples [4,8].

Gender, age, years of experience, and daily working hours showed no significant association with SD. This pattern has also been reported in recent occupational studies, suggesting that in homogeneous sedentary workforces, ergonomic exposure outweighs demographic variables as a determinant of scapular posture [10,13].

The high prevalence of SD among bankers highlights a major yet modifiable ergonomic concern. Physiotherapists and occupational health professionals should incorporate routine scapular screening, preferably using LSST for its simplicity, during periodic employee health assessments. Early identification can guide preventive strategies focused on postural correction, scapular stabiliser strengthening, and workstation ergonomics.

Evidence from office-based populations shows that monitor repositioning, adjustable seating, and regular micro-breaks significantly reduce neck and shoulder strain [13,15]. Incorporating brief exercise breaks every 30-45 minutes, targeting the serratus anterior, lower trapezius, and thoracic extensors, is recommended. Periodic re-screening every 6-12 months can help identify progressive scapular deviations before symptoms develop [16].

Given that nearly 80-90% of employees demonstrated dyskinesis, this should be viewed as an occupationally significant issue, warranting organisation-level ergonomic reforms rather than isolated individual interventions.

Although no universal "normal" prevalence of SD exists, studies in asymptomatic populations report rates of about 20-30% [5,14]. The higher rates in the present study likely reflect the combined impact of sedentary posture and repetitive upper-limb use. Potential unmeasured confounders- such as BMI, physical activity, workstation design, and seasonal recruitment variation- may have contributed and should be addressed in future research.

Future studies should be conducted with a larger sample size to enhance statistical power and generalisability. Additional variables such as age and ergonomic risk factors can be included to explore potential associations with SD. Interventional or experimental research designs may also be considered to evaluate the effectiveness of ergonomic modifications or scapular stabilisation exercises in reducing SD prevalence among bankers.

Limitation(s)

The present study has certain limitations. This being a cross-sectional study, causal relationships between occupational exposure and SD cannot be established. The analysis was limited to univariate comparisons, and future research should include multivariable models to adjust for confounding variables such as body mass index and physical activity. Although cluster sampling was adopted at the bank level, no design-effect adjustment was applied, which may have influenced. Finally, neck pain data were recorded but not used as an inclusion criterion- a measure intended to minimise selection bias, though it limits interpretation specific to symptomatic participants. Similar methodological constraints have been noted in previous biomechanical research.

CONCLUSION(S)

The present study identified a high prevalence of SD among bankers in Belagavi. More than half of the participants showed subtle or obvious SD based on the SDT, and LSST. These results highlight the need for early screening, ergonomic corrections, and preventive strategies in sedentary occupational environments.

REFERENCES

[1] Verma CV, Bhosale KS. Evaluation of neck pain and scapular stability in graduate dental students: A cross-sectional study. Indian J Dent Sci. 2021;13(4):260-66.
[2] Kibler BW, Sciascia A, Wilkes T. Scapular dyskinesis and its relation to shoulder injury. J Am Acad Orthop Surg. 2012;20(6):364-72.
[3] Kibler BW, McMullen J. Scapular dyskinesis and its relation to shoulder pain. J Am Acad Orthop Surg. 2003;11(2):142-51.
[4] McClure P, Tate AR, Kareha S, Irwin D, Zlupko E. A clinical method for identifying scapular dyskinesis. Part 1: Reliability. J Athl Train. 2009;44(2):160-64.
[5] Struyf F, Nijs J, Mottram S, Meeusen R. Scapular dyskinesis: A contemporary review of its relation to shoulder pain. Phys Ther Sport. 2014;15(1):12-18.
[6] Cools AM, Struyf F, De Mey K, Maenhout A, Castelein B, Cagnie B. Rehabilitation of scapular dyskinesis: From the office worker to the elite overhead athlete. Br J Sports Med. 2014;48(8):692-97.
[7] Shih YF, Wang JH. Prevalence and risk factors of scapular dyskinesis: A systematic review. Musculoskelet Sci Pract. 2023;64:102769.
[8] Vongsirinavarat M, Wangbunkhong S, Sakulsriprasert P, Petviset H. Prevalence of scapular dyskinesis in office workers with neck and scapular pain. Int J Occup Saf Ergon. 2023;29(1):50-55.
[9] Cagnie B, Danneels L, Van Tiggelen D, De Loose V, Cambier D. Individual and work-related risk factors for neck pain among office workers: A cross-sectional study. Eur Spine J. 2007;16(5):679-86.
[10] Marzban H, Rezaei E, Shahmahmoudi F, Zangiabadi Z, Sahebi A, Makki F. Musculoskeletal disorders among bank workers: A systematic review and meta-analysis. BMC Musculoskelet Disord. 2024;25(1):951.
[11] Naqvi M, Zehra M, Nizami GN. Association of prolonged sitting with common musculoskeletal disorders among private and public sector bankers. Pak J Rehabil. 2013;2(2):48-56.
[12] Ludewig PM, Reynolds JF. The association of scapular kinematics and glenohumeral joint pathologies. J Orthop Sports Phys Ther. 2009;39(2):90-104.
[13] Ozdemir F, Toy S. Evaluation of scapular dyskinesis and ergonomic risk level in office workers. Int J Occup Saf Ergon. 2021;27(4):1193-98.
[14] Yaqub S, Paroya AS, Islam F, Sabir Z, Arooj A. Prevalence of scapular dyskinesia in bankers. Physiother Rehabil. 2021;6:215.
[15] Ting JZ, Chen X, Johnston V. Workplace-based exercise intervention improves work ability in office workers: A cluster randomised controlled trial. Int J Environ Res Public Health. 2019;16(15):2633.
[16] McQuade KJ, Smidt GL. Dynamic scapulohumeral rhythm: Effects of external resistance during elevation of the arm in the scapular plane. J Orthop Sports Phys Ther. 1998;27(2):125-33.

PARTICULARS OF CONTRIBUTORS:
1. Assistant Professor, Department of Paediatric Physiotherapy, KAHER Institute of Physiotherapy Belagavi, Karnataka, India.
2. Assistant Professor, Department of Geriatric Physiotherapy, KAHER Institute of Physiotherapy Belagavi, Karnataka, India.
3. Intern, Department of Physiotherapy, KAHER Institute of Physiotherapy Belagavi, Karnataka, India.
4. Intern, Department of Physiotherapy, KAHER Institute of Physiotherapy Belagavi, Karnataka, India.
5. Intern, Department of Physiotherapy, KAHER Institute of Physiotherapy Belagavi, Karnataka, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Anjana Javali,
Assistant Professor, Department of Paediatric Physiotherapy, KAHER Institute of Physiotherapy, JNMC Campus, Nehru Nagar, Belagavi-590010, Karnataka, India.
E-mail: anjanajavali@klekipt.edu.in

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