EVALUATION OF ERGONOMIC RISK AMONG DESK JOB WORKERS USING RAPID OFFICE STRAIN ASSESSMENT (ROSA) SCALE: AN OBSERVATIONAL STUDY

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ABSTRACT

Office desk workers spend prolonged hours in static, seated postures, which predisposes them to musculoskeletal discomfort. Poorly designed workstations and awkward postures are well-recognised contributors to work-related musculoskeletal disorders (MSDs), particularly affecting the neck, shoulder and back regions, making systematic ergonomic risk assessment essential for early identification and prevention of these problems. This study aimed to evaluate the level of ergonomic risk among desk job workers using the Rapid Office Strain Assessment (ROSA) scale. An observational study was conducted among 78 desk job workers (age 18–55 years, minimum 7–8 hours of daily computer-based work, 1–2 years of work experience) at the B.K.L. Walawalkar campus, selected through simple random sampling over a study duration of three months. Following informed consent, ergonomic risk was assessed using the ROSA scale, which evaluates chair configuration, monitor and telephone placement, and mouse and keyboard use, with data analysed using R software (version 4.0.2); continuous variables were expressed as mean and standard deviation, and categorical variables as frequencies and percentages. Of the 78 participants, 51.3% were female and 48.7% were male, and based on ROSA scores, 32.1% of participants fell into the low-risk category, 34.6% into the low-risk-needs-improvement category, and 33.3% into the high-risk category. Ergonomic risk was found to be prevalent among desk job workers, with roughly two-thirds of participants showing at least some need for workstation improvement and one-third at high risk; improper workstation setup, prolonged sitting and poor posture were the principal contributing factors to musculoskeletal discomfort involving the neck, shoulder and back. Early identification using the ROSA scale, combined with ergonomic correction and awareness programmes, can help reduce discomfort and prevent long-term musculoskeletal disorders.

Keywords: Ergonomics, ROSA scale, Desk job workers, Musculoskeletal disorders, Occupational health, Posture
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1. INTRODUCTION

An office is a workspace within an organisation where administrative and professional tasks are carried out. At present, a substantial proportion of the world's working population is employed in some form of office role, and many spend more than 40 hours a week seated at computer workstations. For such individuals, the physical environment of the workplace has a considerable influence on daily wellbeing. Workstation layout and furniture design directly affect posture, which in turn influences the development of physical symptoms.[1, 2]

Ergonomics is the applied science of designing or adapting a workspace to fit the worker, with the goal

of improving comfort, safety and productivity. Prolonged and awkward static postures are well established as aggravating factors for musculoskeletal discomfort among office desk workers. [3] Correctly configured workstations, including properly positioned monitor arms and chairs, help organisations meet ergonomic safety standards and reduce the risk of employee injury. Musculoskeletal disorders (MSDs) remain a common problem among office workers worldwide and can adversely affect both productivity and general wellbeing. The likelihood of developing an MSD is generally attributed to three broad categories of risk factors: individual, ergonomic and psychosocial.[4] Longitudinal studies with follow-up periods ranging from three months to 5.4 years have shown that workers who experience high work strain, prolonged mouse and keyboard use, high perceived muscle tension, and a prior history of neck or shoulder complaints are at greater risk of developing MSDs.[5]

Despite the widespread adoption of computer-based work in offices across emerging economies, this has often not been matched by corresponding attention to ergonomic principles in workstation design. Prolonged screen use is additionally associated with visual strain arising from poor lighting, screen glare and incorrect viewing distance, while inadequate ventilation and unregulated temperature or humidity can contribute to headaches, fatigue, reduced concentration and irritation of the eyes, nose and throat. Raising awareness of the relationship between computer use and musculoskeletal health, most effectively through structured ergonomics education, is considered an important preventive strategy. Prior research on office ergonomics training has demonstrated measurable improvements in workstation habits and reductions in MSD prevalence, with both participatory (discussion-based) and traditional (lecture-based) training formats associated with reduced pain, discomfort, and improved perception of psychosocial work stress compared with untrained controls.[6,7]

Desk job workers typically spend 7–8 hours a day in a seated position, often adopting poor or abnormal postures. Prolonged exposure to such conditions can result in forward head posture, neck pain and back discomfort, which, combined with psychological stress, can reduce overall work efficiency. Systematic assessment and correction of ergonomic risk is therefore essential to prevent long-term musculoskeletal health problems and to support workplace productivity. This need forms the basis of the present study, which used the ROSA scale to evaluate ergonomic risk among desk job workers.

2. METHODOLOGY

2.1 Study Design, Setting and Duration

This was an observational study conducted among desk job workers at the B.K.L. Walawalkar campus. The study was approved by the Institutional Review Board prior to commencement. Participants were recruited using consecutive sampling over a study duration of three months.

2.2 Study Population, Sampling and Eligibility Criteria

The study population comprised desk job workers meeting the inclusion criteria. A sample size of 78 was calculated using the standard formula for estimating a population proportion:

$$n = (Z1-\alpha/2)^2 \times p \times (1-p) / d^2$$

where $Z1-\alpha/2 = 1.96$ (standard normal variate at 5% type I error, $p<0.05$), p = prevalence of relevant musculoskeletal complaints among desk job workers reported in prior literature (lower back pain 68.5%, neck pain 64.2%, upper back pain 45.7%, shoulder pain 44.2%), and d = relative precision of 25%.

The study included desk job workers between 18 and 55 years of age who were engaged in computer-based work for at least 7–8 hours per day and had 1–2 years of work experience. Individuals working from home were excluded, as were those with a history of surgical procedures involving the neck or lumbar region.

2.3 Ethical Considerations and Data Collection Procedure

Prior to the commencement of the study, ethical clearance was obtained from the Institutional Review Board. Participants were recruited by consecutive sampling based on the inclusion and exclusion criteria. Eligible participants were approached and provided with a participant information sheet outlining the purpose of the study, the assessment procedure, the expected outcome, the voluntary nature of participation, and the confidentiality of the data collected. Written informed consent was obtained from each participant prior to enrolment. The ROSA scale and its assessment procedure were then explained in detail to each participant, following which the scale was administered and scored based on observation of the participant's workstation and posture. All data were entered into Microsoft Excel and subsequently analysed using R software (version 4.0.2).

2.4 Outcome Measure

The Rapid Office Strain Assessment (ROSA) scale was used as the primary outcome measure. ROSA is an ergonomic assessment tool designed to evaluate the risk of musculoskeletal strain among individuals working in office or computer-based environments. It assesses three broad components of workstation ergonomics: chair configuration (seat height, seat

pan depth, armrests and back support), monitor and telephone placement, and mouse and keyboard use, with duration of use incorporated into the final scoring. The composite ROSA score is interpreted as follows: a score of 1–2 indicates low risk, where the workstation is generally well designed and the worker is not experiencing significant discomfort; a score of 3–4 indicates low risk but with scope for improvement, where minor adjustments to the workstation or work practices are recommended; and a score of 5–10 indicates high risk, where the workstation is contributing to musculoskeletal strain and discomfort, and significant modification is required to reduce the risk of developing a musculoskeletal disorder.[8,9]

2.5 Data Management and Statistical Analysis

Collected data were entered into Microsoft Excel and analysed using R software (version 4.0.2). Continuous variables were expressed as mean and standard deviation, while categorical variables were expressed as frequencies and percentages. A boxplot was constructed for continuous variables to allow visual comparison of ROSA scores across the sample.

3. RESULTS

A total of 78 desk job workers participated in the study.

3.1 Gender Distribution

Of the 78 participants, 40 (51.3%) were female and 38 (48.7%) were male (Table 1, Figure 1).

Table 1: Gender-wise distribution of participants (N=78)

Gender	Frequency	Percentage (%)
Female	40	51.3
Male	38	48.7
Total	78	100.0

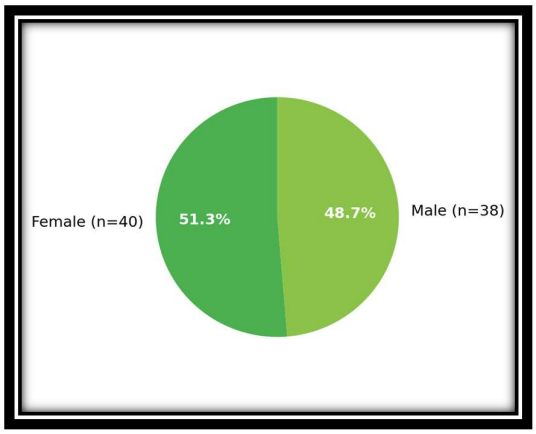

Figure 1. Gender-wise distribution of participants.

3.2 ROSA Score Distribution

Based on ROSA scale scoring, 25 participants (32.1%) fell into the low-risk category, 27 participants (34.6%) fell into the low-risk-needs-improvement category, and 26 participants (33.3%) fell into the high-risk category (Table 2, Figure 2). Taken together, 67.9% of participants showed some degree of ergonomic risk warranting attention, of whom nearly half were classified as high risk.

Table 2: Distribution of ROSA risk categories among participants (N=78)

ROSA Risk Category	Frequency	Percentage (%)
Low Risk	25	32.1
Low Risk, Needs Improvement	27	34.6
High Risk	26	33.3
Total	78	100.0

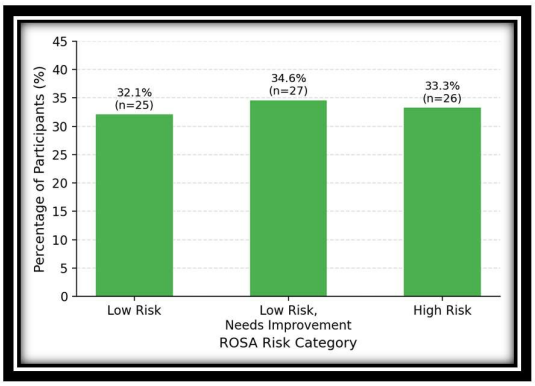

Figure 2. Distribution of participants across ROSA risk categories.

4. DISCUSSION

The present study evaluated ergonomic risk among desk job workers using the ROSA scale, an assessment tool originally developed and validated by Sonne, Villalta and Andrews to quantify risks associated with computer-based work and to establish an action level for change based on worker discomfort.[21] The findings indicate that a substantial proportion of desk job workers are exposed to a level of ergonomic risk that requires workstation modification, with approximately one-third of the sample falling into the high-risk category. This is consistent with the broader literature on office ergonomics, which has repeatedly identified prolonged sitting, improper workstation setup and poor posture as principal contributors to musculoskeletal discomfort among computer-based workers.[10,11]

Common postural deviations observed in this population, such as forward head posture, rounded shoulders and inadequate lumbar support, are recognised contributors to neck, shoulder and back discomfort. The ROSA scale proved useful in systematically capturing these risk factors across the chair, monitor/telephone and mouse/keyboard domains, allowing risk to be quantified rather than relying on subjective complaint alone. This is in line with previous work demonstrating that structured ergonomic assessment tools can effectively flag workers at elevated risk before symptoms become established.[12] More recently, de Barros et al. demonstrated in a randomised controlled study that ROSA scores are sensitive enough to detect measurable reductions in risk factor exposure following a workstation-based ergonomic intervention, reinforcing the tool's value not only for baseline screening, as performed in the present study, but also for monitoring the effectiveness of corrective action over time.[22]

The magnitude of ergonomic risk identified in the present sample is comparable to that reported in other recent cross-sectional investigations. Mohammadian et al. found an 80.8% prevalence of work-related musculoskeletal disorders among office workers, with a mean ROSA score of 5.40 (indicating suboptimal workstation ergonomics) and significant associations between chair configuration and shoulder, knee and upper back pain, findings broadly consistent with the high proportion of at-risk workers identified in the present study.[23] Similarly, Cho, Hwang and Cherng reported that office workers with high daily computer workload experienced significantly greater musculoskeletal symptom burden than those with lower workload, lending support to the present finding that desk job workers who spend 7–8 hours daily at a computer workstation are particularly vulnerable to ergonomic risk.[27]

Prolonged, uninterrupted sitting is itself an important contributor to this risk profile. Putsa et al., in a large cross-sectional study of Thai office workers, found that infrequent breaks from sitting were associated with a greater likelihood of musculoskeletal disorders, independent of overall physical fitness, underscoring that risk in desk-based occupations arises not only from workstation configuration but also from the behavioural pattern of sustained static posture that the ROSA scale partly captures through its scoring of duration of use.[24] This reinforces the relevance of the present study's finding that a considerable proportion of participants fell into risk categories warranting workstation or behavioural modification.

Prior studies have shown that ergonomic education and workstation modification programmes can meaningfully reduce musculoskeletal discomfort and improve workstation habits over time.[6,13] Complementary evidence from intervention research further strengthens this picture: a systematic review by Radwan et al. found that short, active microbreaks of two to three minutes performed at regular intervals throughout the workday reduced musculoskeletal discomfort and improved markers of fatigue and stress among office workers without negatively affecting productivity.[25] Likewise, a randomised controlled trial by Shariat et al. found that a structured stretching exercise programme, both alone and combined with ergonomic modification, produced statistically significant reductions in neck, shoulder and lower back pain among office workers over a six-month period.[26] Taken together, this evidence suggests that the workstation-focused risk identified by ROSA in the present study could be meaningfully addressed through a combination of ergonomic correction and structured movement-based interventions, rather than workstation modification alone.

Environmental and psychosocial factors also appear relevant to the broader ergonomic risk picture. Workplace noise, for example, has been reported to affect worker comfort and productivity, with occupants of open-plan offices frequently rating ambient noise as high.[14] Taken together with the present findings, this reinforces that a lack of awareness about ergonomic principles remains a persistent issue among office-based workers, echoing observations from earlier studies conducted in similar occupational settings.[15,16] Addressing this gap through targeted ergonomic interventions, informed by validated tools such as ROSA and supported by evidence-based movement interventions, has the potential to improve both employee musculoskeletal health and overall workplace productivity.

4.1 Clinical Implications

The findings of this study carry several clinical implications for occupational health practice. First, ROSA-based screening allows early identification of workers at high ergonomic risk before the onset of symptomatic musculoskeletal complaints, particularly neck, shoulder and low back pain. Second, the domain-wise scoring generated by ROSA supports individualised, targeted ergonomic intervention planning, including specific recommendations regarding chair height, monitor position and keyboard alignment. Third, given the demonstrated effectiveness of active microbreaks and structured stretching programmes in reducing musculoskeletal discomfort among office-based populations,[25,26] these findings support the wider implementation of workplace-based preventive strategies, including structured exercise programmes and scheduled micro-breaks, to reduce the cumulative burden of prolonged static postures on

the musculoskeletal system. Fourth, because ROSA has been shown capable of detecting change following intervention,[22] it may also serve as a practical outcome measure for evaluating the success of workplace ergonomic correction programmes over time.

4.2 Limitations

This study has certain limitations. Psychological and environmental factors, such as workplace stress, lighting and noise, were not evaluated in depth, despite their recognised influence on musculoskeletal comfort. The exclusion of work-from-home employees may limit the generalisability of the findings to current, more flexible work arrangements. Additionally, the relatively short study duration may not adequately capture the long-term effects of ergonomic risk exposure on musculoskeletal health.

4.3 Suggestions for Future Research

Future studies could incorporate structured awareness programmes to improve ergonomic knowledge among desk job workers and evaluate their impact on ROSA scores over time. Combining ROSA with complementary assessment tools, such as the Rapid Upper Limb Assessment (RULA), the Rapid Entire Body Assessment (REBA), or the Visual Analogue Scale (VAS) for pain, may allow a more comprehensive evaluation of both postural risk and symptomatic burden.

5. CONCLUSION

This study concludes that ergonomic risk is prevalent among desk job workers, with a considerable proportion of individuals falling into moderate-to-high-risk categories on the ROSA scale. Improper workstation setup, prolonged sitting and poor posture were identified as major contributing factors to musculoskeletal discomfort, particularly in the neck, shoulder and back regions. Early identification of ergonomic risk using tools such as ROSA is essential for timely intervention. Implementation of ergonomic corrections alongside structured awareness programmes can significantly reduce discomfort, help prevent long-term musculoskeletal disorders, and improve overall workplace efficiency.

ETHICAL CLERANCE –

A letter from the institutional Review Board was obtained. The letter number is SVJCT/BORS/266/2025

CONFLICT OF INTEREST

The authors declare no conflict of interest.

SOURCE OF FUNDING

None declared.

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