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Cross-Sectional Study on the Prevalence and Associated Risk Factors of Work-Related Musculoskeletal Symptoms among IT Professionals in Bengaluru

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Abstract

Background: The IT sector plays a vital role in fostering technological progress and boosting global economy. However sedentary nature of work and extended computer usage associated with IT job can contribute to strain and discomfort especially in the neck, shoulder and lower back leading to Work Related Musculoskeletal Disorders (WRMS). **Objective**: The objectives of the study were to determine the prevalence and risk factors of WRMS among IT professionals. **Methods**: This cross-sectional descriptive study was conducted between 2ndJanuary and 31st March 2025, involving a cohort of 300 information technology professionals employed in Bangalore. Participants of male and female employees were selected through purposive sampling. Data collection encompassed demographic data Extended Nordic Musculoskeletal Questionnaire, and Rapid Office Strain Assessment (ROSA) Scale. The descriptive and inferential analysis were used for analysis. **Results**: A high prevalence of WRMS was observed, with 82.7% of participants reporting symptoms in at least one body region. The lower back (68.3%), shoulder (34.0%), and upper back (28.7%) were the most prevalent locations affected. Additionally, 22.0% of participants reported that their symptoms prevented them from performing normal work, and 18.0% experienced trouble during the past 7 days. 68.3% of the participants were in action level 1 (low MSDs risk), Male participants (OR = 2.54, 95% CI: 1.38–4.69, $p < 0.01$), commuting by car (OR = 2.46, $p < 0.01$) or by two-wheelers (OR = 4.36, $p < 0.01$), and those with weekly computer usage exceeding 40 hours (OR = 2.46, $p < 0.01$) had significantly higher odds of developing work-related musculoskeletal symptoms (WRMS). Additional significant associations were observed for years of working ($p < 0.01$), monitor type used ($p < 0.01$), mode of transportation ($p < 0.01$), and frequency of rest breaks during work ($p < 0.01$). **Conclusion**: These findings indicate that both individual and workplace-related factors contribute to the risk of WRMS among office employees.

Major Findings: A high prevalence of work-related musculoskeletal symptoms (82.7%) was observed, with the lower back, shoulder, and upper back being the most affected regions; 22% of participants reported difficulty in performing normal work and 18% experienced recent symptoms, while most (68.3%) were in the low-risk category, and significant risk factors included male gender, commuting by car or two-wheeler, prolonged computer use (>40 hours/week), along with work experience, monitor type, mode of transportation, and frequency of rest breaks, indicating that both individual and workplace factors contribute to WRMS risk.

Keywords: Extended Nordic Musculoskeletal Questionnaire, ROSA, WRMS

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1. Introduction

After the onset of the SARS-CoV-2 pandemic most Information Technology (IT) professionals have been working in hybrid mode, often with suboptimal workstations[1]. Work-Related Musculoskeletal Symptoms (WRMS) are the second leading cause of disability globally. The physical demands inherent in various professions have been identified as contributing risk factors for the development of Work-Related Musculoskeletal disorders (WRMSs)[2]. Pain and discomfort caused by work-related conditions can interfere with everyday tasks, reduce productivity, and negatively impact overall quality of life[3]. Work related musculoskeletal disorders are defined as widespread range of inflammatory and degenerative disease conditions which result in pain and functional loss disturbing the body part like especially upper extremity for example shoulder, neck and hands this are commonly affected[4].

Occupational demand for long hours of static position contributes largely to increased incidence of musculoskeletal problems, such as repetitive strain injury, Carpal Tunnel Syndrome, Tendonitis and Tension Neck Syndrome etc. Additionally, IT users have a heavy workload and must finish tasks quickly, which has led to an increase in the occurrence of musculoskeletal problem among this population[5].

The Extended Nordic Musculoskeletal Questionnaire and Rapid Office Strain Assessment (ROSA) are validated tools widely used to assess musculoskeletal symptoms and ergonomic risk in office environments. Their use is appropriate in the Indian IT context due to similar workstation designs, continuous computer-based tasks, and prolonged sitting demands[6].

Extended working hours and poorly designed workstations are among the most critical contributors to Musculoskeletal Disorders (MSDs)[7]. In high-pressure professional environments—particularly within the software industry—physical well-being is often subordinated to productivity demands, thereby exacerbating the risk of long-term health complications. Consequently, the integration of ergonomic interventions, including adjustable seating, optimized workstation layouts, and scheduled rest breaks, has been emphasized as a vital strategy to safeguard employee health and sustain organizational productivity[8]. Additionally, the lack of tailored prevention and management strategies for this group highlights a crucial gap in current occupational health practices[5].

Tackling this issue demands immediate and coordinated action from researchers, employers, and policymakers. Despite the growing concern, there remains a significant gap in research addressing ergonomic risk factors within India's IT sector. To develop effective prevention strategies, it is essential to understand how workplace environments impact musculoskeletal health. Therefore, this study aims to investigate the prevalence of Work-Related Musculoskeletal Symptoms (WRMS) and identify associated risk factors among IT professionals in Bangalore.

2. Materials and Methods

2.1 Design and Samples

This study used a cross-sectional descriptive research design and a non-experimental survey approach. The research was conducted at Nixserv IT Technology Pvt. Ltd. in Bangalore, spanning from 2nd January to 31st March 2025. The sample size was calculated using a prevalence of 50% based on a prior study conducted in Chennai, with a 95% confidence level and 5% allowable error. The sample size was calculated[9] using the formula $n = Z^2\ p\ (1\text{-}p)/e^2$, with Z = 1.96(50%), p = 0.5 (conservative estimate), and e = 0.05, yielding a minimum required sample of 300. The final sample size was N=300. A total of 316 employees were invited and 16 declined. The sample included both male and female IT professionals. A single-company purposive sampling approach was used. Participants were selected according to inclusion and exclusion criteria. Those who working more than four hours a day, and had over two years of experience in the IT field were included in the study. Participants with musculoskeletal conditions resulting from accidents, traumatic injuries, neurological disorders, spinal fractures or surgeries, and degenerative or inflammatory diseases such as osteoarthritis and rheumatoid arthritis were excluded, as well as BMI greater than 30 kg/m² were also excluded, as obesity is a known confounder for musculoskeletal symptoms and could influence the relationship between workstation ergonomics and WRMS. This criterion has reduced variability in musculoskeletal outcomes and limits generalizability. Participants were informed about the study's purpose and were only added to the survey after giving informed consent. The purposive sampling technique was employed to select the sample. The tool consists of 3 sections

Section-1: Baseline data includes employee Id, designation, gender, age, BMI, years of working experience, types of monitors used, mode of transportation, number of hours working at home, working hours /week, working hours/day, rest hours between the work.

Section-2: Extended Nordic Musculoskeletal Questionnaire: To determine the prevalence of WRMS among the IT professionals[10].

This instrument includes a posterior view of human figure divided into nine anatomical areas.

It comprises question on presence of musculoskeletal pain in the past 12 months and past 7 days as well as on severity.

Scoring of the questionnaire presence of problem subject has to answer "Yes" those who are answering yes, obtaining score of 1 if subject not having problem, it has been marked as "NO" and getting score of 0

Section-3: ROSA checklist to identify the ergonomic risk factors among IT professionals. (ROSA) was created using postures that were described in the CSA Z412 guidelines for office ergonomics (Canadian Standards Association (CSA), 2000)[11]. ROSA is a picture-based posture checklist designed to quantify exposure to risk factors in an office work environment. This technique was developed by Sonne *et al*. to determine the level of MSDs risk[12]. In this technique, three general parts (A, B and C) of the office work environment are assessed as follows:

- Part A: Chair (height, depth, armrest, and backrest).
- Part B: Monitor and telephone.
- Part C: Mouse and keyboard.

After completing the ROSA checklist, the related tables are used to calculate the score from each part, and eventually the final ROSA score is derived. Then, based on the final ROSA score, each case was interpreted in accordance to the action levels described below:

Level-1 MSD (low MSDs risk), level 2 (high MSDs risk level -3 very high risk, level 4 extreme high risk.

The Extended Nordic questionnaire demonstrates high reliability (Cronbach α >0.8) and is widely used in MSD surveillance. The ROSA tool has demonstrated good inter-rater reliability and validity for office ergonomic assessment[13,14].

2.2 Data Collection Method

Nixserv Technology Private Limited in Bangalore approved the researcher's request to conduct the study. The researcher presented the proposal to the institutional ethics committee for approval. IHEC-II/0735/24. The company manager provided formal written permission. Before collecting data, the researcher introduced herself and explained the study's objectives to the participants. Following obtaining consent, the researcher provided Google Forms for prevalence to participants via WhatsApp and email. The prevalence of WRMS were self-reported. The risk factors were evaluated by researcher assisted.

Participants provided subjective responses based on their personal insights and experiences. The researcher collected data by the Modified Nordic Musculoskeletal Questionnaire and the Rapid Office Strain Assessment (ROSA) scale.

2.3 Statistical Interpretation

Jamovi 2.6.26 was used to enter and analyse the obtained details. Demographic data were summarized using descriptive analysis. Although normality is not a strict assumption for logistic regression, we assessed the distribution of continuous predictors using Shapiro–Wilk tests, Q–Q plots, and boxplots. These diagnostics guided our decision to retain variables as continuous or recode them if they showed extreme skewness. No transformation was applied as variables were approximately symmetrically distributed. For missing data, a complete case analysis was performed since the proportion of missing data was not there. Multivariable modelling and collinearity check We used multivariable logistic regression to estimate adjusted Odds Ratios (ORs) and 95% confidence intervals for the association between potential risk factors and the presence of WRMS. Identify the association between demographic, occupational and ergonomic factors the researcher used the Karl Pearson's Chi-square test, Wilcoxon rank sum test were used.

3. Results

3.1 Demographic Characteristics

Table 1 depicts that majority of the participants (47.3%) fall within the 36-40 years age group, with a mean age likely around 37.6±5.1, and most of participants were male (66%). The most common designation is Senior Engineer (52%), followed by Engineer (19.7%) and Lead Engineer (17.3%) and majority of the participants have a BMI (using WHO criteria) between 25.0-29.9 (51.8%) with the mean BMI likely around 25.8±2.9 indicating a slightly overweight population.

Table 1. Descriptive statistics for demographic variables, N = 300

Baseline characteristics	Frequency	Percentage
Age in years		
25-30years	14	4.7%
31-35 years	66	22%
36-40 years	142	47.3%
41-45 years	59	19.7%
46- 50 years	19	6.3%
Gender		
Male	198	66%
Female	102	34%
Designation		
Staff Engineer	14	4.70%
Lead Engineer	52	17.30%
Senior Engineer	156	52.00%
Engineer	59	19.70%
Associate Engineer	19	63%
BMI		
18.5-24.9	134	44.8%
25.0-29.9	155	51.8%
<30	10	3.3%

Table 2. Distribution of work-related characteristics based on frequency and percentage, N = 300

Work Related Characteristics	Frequency	Percentage
Years of Working		
2-5 years	112	37.3%
6-10 years	110	36.7%
11-15 years	42	14%
Above 15 years	36	12%
Monitor Used		
Laptop	233	77.7%
Desktop	67	22.3%
Mode of Transportation		
Bus	5	1.7%
Two-wheeler	140	46.7%
Car	106	35.3%
Walk	49	16.3%
Working Hours in Office		
5-6 hours	89	29.7%
7-8hours	203	67.7%
9-10hour	8	2.7%
Working Hours in Home After Office		
1hour	34	11.3%
2hours	181	60.4%
3 hours	85	28.3%
Rest Hours Between Work		
10minutes	191	63.7%
20minutes	67	22.3%
no rest	42	14%
Weekly Computer Usage		
40hours/day	190	63.4%
50hours/day	103	34.3%
60hours/day	6	2%
70hours/day	1	0.3%
Hourly Computer Usage		
8hours/day	201	67%
9 hours/day	80	26.7%
10hours/day	18	6%
11hours/day	1	0.3%

Table 2 depicts that the majority of participants have 2-5 years (37.3%) or 6-10 years (36.7%) of working experience. Most participants work 7-8 hours in the office (67.7%) and 2 hours at home after office (60.3%). And majority of participants use computers for 40 hours/week (63.3%) with the mean average 44.3±6.8 and 8 hours/day (67%) and participants take a 10-minute rest between work (63.7%). Most participants use laptops (77.7%) rather than desktops (22.3%) and commonly they were mode of transportation is two-wheelers (46.7%)

The highest prevalence was observed in the lower back (205/300; 68.3%), followed by shoulders (101/300; 33.7%), upper back (86/300; 28.7%), and neck (70/300; 23%). Other regions such as the wrist/hand 62/300 (20.7%), ankle/foot 62/300 (20.7%), and knees 54/300 (18%) also showed notable prevalence (Table 3). Less commonly reported areas included the elbow 20/300 (7%) and hip 25/300 (8.3%). Additionally, 65/300 (21.7%) of participants reported that their symptoms prevented them from performing normal work, and 54/300 (18%) experienced trouble during the past 7 days. About one-fifth 65/100 (21.7%) attributed their symptoms to a prior accident, and 76/300 25.3% had consulted a doctor. These findings highlight a high burden of musculoskeletal symptoms in this occupational group, emphasizing the importance of ergonomic interventions and preventive strategies.

Table 3. Prevalence of musculoskeletal symptoms most frequently reported by IT professionals, N=300

Variables	Frequency	Percentage
1.Shoudler pain		
No	199	66.3%
Yes	101	33.7%
2. Upper back		
No	214	71.3%
Yes	86	28.7%
3.Neck		
No	230	77%
Yes	70	23%
4.Elbow		
No	280	93%
Yes	20	7%
5.Hip		
No	275	91.7%
Yes	25	8.3%
6.Lower back		
No	95	31.7%
Yes	205	68.3%
7.Wrist/hand		
No	238	79.3%
Yes	62	20.7%
8.Knees		
No	246	82%
Yes	54	18%
9.Ankle/Foot		
No	238	79.3%
Yes	62	20.7%
10. Had trouble last 7 days		
No	247	82.3%
Yes	53	17.7%
11.Trouble last 7days		
No	246	82%
Yes	54	18%
12.Accident		
No	235	78.3%
Yes	65	21.7%
13.prevented from normal work		
No	235	78.3%
Yes	65	21.7%
14.Visited doctor		
No	224	74.7%
Yes	76	25.3%

Figure 1 depicts the prevalence of work-related musculoskeletal symptoms among IT professionals, showing that 83% of participants experienced symptoms in at least one body region, while 17% reported no symptoms. This finding indicates a high prevalence of WRMS in the study population.

Table- 4. Frequency percentage of risk factors associated with WRMS among IT professionals, N = 300

Rosa total	Range	Frequency	Percentage
Extreme risk	9 to10	7	2.3%
very high risk	7 to 8	12	4%
high risk	5 to6	76	25.3%
low risk	2to 4	205	68.3%

Table-5. Identifying potential risk factors associated with Work-Related Musculoskeletal Symptoms (WRMS) among IT professionals. Unadjusted regression analysis, N = 300

Characteristic	N	OR[1]	95% CI[1]	p-value
Gender	300	—	—	—
Female	—	—	—	—
Male	—	2.54	1.38, 4.69	0.05
Work experience	300	—	—	—
2-5 years	—	7.33	1,44, 134	0.05
6-10 years	—	0.51	0.23,1.16	0.10
11-15 years	—	—	—	—
Above 15 years	—	1.54	0.77, 3.16	0.2
Mode of transportation	300	—	—	—
Bus	—	—	—	—
Car	—	2.46	1.14, 5.25	0.05
Two-wheeler	—	4.36	1.81, 11.0	0.05
Walk	—	0	—	>0.9
weekly computer usage	300	—	—	—
40 hours/week	—	—	—	—
50 hours/week	—	2.46	1.22, 5.42	0.017
60 hours/week	—	0.40	0.06, 3.09	0.3
70 hours/week	—	561,107	0.00, NA	>0.9
Rosa score	—	0.83	0.65.109	0.2
Chair and seat pan total	—	0.91	0.791.05	0.2
Arm rest and back rest	—	0.79	0.63.0.99	0.05
[1]OR = Odds Ratio, CI = Confidence Interval				

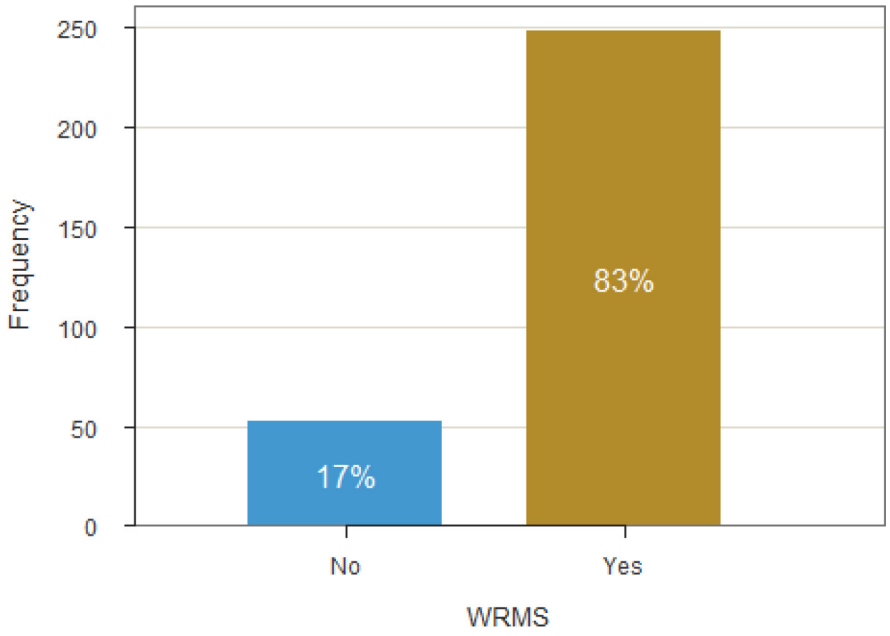


Figure 1. Presence of work-related musculoskeletal symptoms among IT professionals

Table 4 describes that 68.3% of the participants were in action level 1 (low MSDs risk) (25.3%) were in action level 2 (high MSDs risk and 6.3% (extreme and very high) of the participants were in extreme and very high-risk factors associated with WRMS among IT professionals.

Table 5 shows the univariate logistic regression analyses identifying potential risk factors associated with Work-Related Musculoskeletal Symptoms (WRMS) among IT professionals' Male participants had significantly higher odds of reporting WRMS compared to females (OR = 2.54, 95% CI: 1.38–4.69, p = 0.05). Among work experience categories, those with only 2–5 years of experience showed notably elevated odds (OR = 7.33), although the association was marginally non-significant (p = 0.05). Compared to bus users, those commuting by car (OR = 2.46, p = 0.05) and two-wheelers (OR = 4.36, p = 0.05) had significantly higher odds of WRMS. Weekly computer usage exceeding 40 hours was also associated with greater odds (OR = 2.46, p = 0.05). Among ergonomic factors, only the arm and back rest total score was significantly associated, with a protective effect (OR = 0.79, 95% CI: 0.63–0.99, p = 0.05). These findings suggest that demographic and occupational factors play a stronger role in WRMS risk than most individual ergonomic scores.

To identify independent predictors of Work-Related Musculoskeletal Symptoms (WRMS), a multivariable logistic regression model was constructed, including variables that were either statistically significant (p < 0.10) in the univariate analysis or conceptually relevant based on existing literature.

Specifically, gender, years of working, monitor type, mode of transportation, weekly computer usage, daily working hours, and the arm and back rest ergonomic score were selected from the univariate model. Additional key predictors—ROSA score (a composite ergonomic risk score) and BMI category—were also included to account for overall ergonomic exposure and individual health status, even though they were not statistically significant in the univariate model.

4. Discussion

A current study on Bengaluru's IT workforce found that 83% experienced work-related musculoskeletal symptoms. The lower back (68.3%), shoulders (34.0%), and upper back (28.7%) were the most affected areas. Most cases were rated Action Level 1, meaning the overall risk of developing serious musculoskeletal problems was low. the findings suggest that workers remain vulnerable to progression toward higher levels of musculoskeletal disorders if preventive measures are not implemented.

In our study, nearly half of the participants (47.3%) were aged 36–40 years (mean age ~37–38), indicating that middle-aged professionals may experience a higher burden of WRMSDs, possibly due to cumulative occupational exposure and prolonged work stressors.

A similar pattern was observed in a study among office workers, where nearly half of the participants also belonged to the middle-age group, reinforcing the notion that musculoskeletal symptoms tend to cluster in this demographic across different occupational settings[15].

More than half of our participants (51.8%) were overweight (BMI 25–29.9), a known risk factor for musculoskeletal problems. This aligns with prior research that found a mean BMI of 26.1 (SD±5.5) among software professionals. The consistent trend of overweight status across studies highlights the sedentary nature of IT work and the need for workplace wellness and ergonomic interventions to reduce musculoskeletal risks[6].

Participants with a BMI above 30 kg/m² were excluded to minimise confounding effects of obesity on musculoskeletal symptoms. Restricting the BMI range helped maintain a more homogeneous sample and strengthened internal validity; however, this approach limits the generalizability of the findings to populations that include individuals with obesity, who are known to be at elevated risk for musculoskeletal complaints. This exclusion contrasts with evidence from a large-scale study using data from the Netherlands Working Conditions Survey (n = 44,793), where logistic regression analyses demonstrated a significant positive association between higher BMI and the 12-month prevalence of musculoskeletal symptoms (overweight: OR 1.13, 95% CI 1.08–1.19; obesity: OR 1.28, 95% CI 1.19–1.39)[16].

The current study found a high prevalence of WRMS, affecting 82.7% of the participants in at least one body area. The lower back (68.3%), shoulder (34.0%), and upper back (28.7%) were the most prevalent locations affected. These outcomes were consistent with the study conducted among 271 employees from a Bangladeshi engineering university. It reported that the MSDs in different body regions during the last 12 months including lower back (62 %), upper back (53 %), shoulders (47 %) These findings suggest that WRMS is a widespread issue, potentially impacting productivity and employee well-being[17].

In current study, findings on risk factors revealed that 68.3% of participants were categorized under Action Level 1, indicating a low risk of developing Musculoskeletal Disorders (MSDs). Meanwhile, 25.3% fell into Action Level 2, suggesting a high risk, and 6.3% were identified as being at an extreme or very high risk. These results are inconsistent with a study conducted among 359 Iranian office workers, which reported a higher proportion of participants (46.2%) in action level 2, indicating a high risk of MSDs. Although the majority are presently at a lower risk level, without timely intervention or corrective measures, many of them may progress to higher risk categories over time. Specifically, targeting workstations with high ROSA scores and providing training on proper ergonomics and posture could help mitigate the risk of MSDs[18].

The current study found that Male participants, (OR = 2.54, 95% CI: 1.38–4.69, p = 0.05), with greater odds of developing WRMS. The results were inconsistent with study conducted among Healthcare Workers of Northern Saudi Arabia suggested that the presence of MSDs was significantly associated with gender specifically male participants OR = 2.72, 95% CI= 1.38–4.17, p = 0.05). Male participants may be more likely to engage in physically demanding tasks or have different work responsibilities that increase their risk of WRMS. Promoting workplace health and wellness programs that address the specific needs of male workers may help reduce the risk of WRMS and improve overall health outcomes[19].

The arm and backrest total score and weekly computer usage exceeding 40 hours are associated with greater odds of developing WRMS. Specifically, working more than 40 hours per week increased the odds of WRMS by 2.46 times (p = 0.05). These results are consistent with a cross-sectional study conducted among software professionals in Kolkata, which found that individual ergonomic factors, such as non-comfortable placement of low back support and inadequate space under the table, significantly increased the likelihood of Musculoskeletal Disorders (MSDs). Additionally, working ≥8 hours per day was associated with a higher risk of MSDs (OR = 3.175, 95% CI: 1.454-6.931; p = 0.05). Furthermore, inadequate ergonomic setup, such as poor arm and backrest support, can exacerbate the risk of WRMS. Managing workload and reducing prolonged computer usage and proper rest breaks can also help mitigate the risk of WRMS[20]. Importantly, ROSA score and arm and back rest ergonomic scores, while conceptually relevant, were not statistically significant predictors after adjustment, implying that ergonomic configuration alone may not fully explain WRMS risk without considering behavioural and contextual factors.

In current study work experience categories, those with only 2–5 years of experience showed notably elevated odds (OR = 7.33) of developing WRMS. Compared to participants with 2–5 years of experience,

those with longer experience had substantially lower odds of reporting WRMS, with odds ratios ranging from 0.02 to 0.04 (all $p < 0.01$), suggesting that early-career professionals are more vulnerable to musculoskeletal complaints—possibly due to poorer ergonomic habits or initial adjustment stressors[21].

The current study found significant associations found in including years of working ($p = 0.05$) and monitor type, rest breaks during work (p 0.05) and study conducted among workers in Ahmedabad supports these findings, revealing that Musculoskeletal Disorders (MSDs) are accentuated by long durations of work with infrequent relaxing breaks. This highlights the importance of regular breaks and adequate rest periods in reducing the risk of WRMS. Incorporating scheduled breaks, including micro-pauses and the "20–8–2" sitting guideline, may alleviate muscle fatigue associated with sustained sitting[22].

The study employed purposive sampling from a single institution to access a specific population with similar work environments, workstation setups, and job roles. This approach allowed for controlled comparisons and ensured that contextual variables—such as organizational ergonomics, workflow, and equipment standards—remained relatively consistent. While purposive sampling strengthens internal validity and relevance to the target population, it limits external validity. Findings cannot be generalized to broader or diverse occupational groups. A single-site design may also reflect unique institutional practices that differ from other settings.

Building on the current study's methodological limitations, several directions for future research are suggested. Including a broader BMI range would help examine whether ergonomic risks and musculoskeletal symptoms vary across different body compositions, especially considering existing evidence that overweight and obesity increase discomfort prevalence.

The findings of this study highlight the importance of improving workstation ergonomics and reducing prolonged static postures to minimise musculoskeletal discomfort among office employees. Adjustments to workstation components—such as ensuring adequate lumbar support, positioning monitors at eye level, maintaining appropriate elbow angles, and keeping frequently used items within easy reach—can help promote neutral postures and reduce strain on the upper body. At the employer level, regular ergonomic audits, staff training programmes, and access to adjustable furniture can foster a supportive environment that prioritizes employee health and comfort. These measures collectively reinforce the need for systematic ergonomics practices within organisations.

5. Conclusion

The present study identified a high prevalence of Work-Related Musculoskeletal Symptoms (WRMS), with 83% of participants reporting at least one symptom. The most commonly affected regions were the lower back (68.3%), shoulders (34.0%), and upper back (28.7%). Although the majority of cases were classified as Action Level 1, these findings underscore the occupational health risks faced by IT professionals in Bengaluru, particularly those arising from prolonged sitting and suboptimal ergonomic practices. The results further indicate that weekly computer usage exceeding 40 hours, inadequate workstation design—especially improper backrest and armrest support—and poor working posture were significantly associated with musculoskeletal discomfort, predominantly in the shoulders, upper back, and lower back. Collectively, these findings highlight the need for targeted ergonomic interventions, promotion of regular physical activity, and the implementation of organizational policies aimed at fostering healthier and ergonomically supportive work environments.

6. Acknowledgement

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6.1 Limitation

The study was conducted in a single organization using purposive sampling, which limits generalizability. Musculoskeletal symptoms were self-reported and may be subject to recall bias. Exclusion of participants with BMI >30 kg/m², while reducing confounding, may underestimate symptom prevalence and limits applicability to populations including individuals with obesity.

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Author Contribution

Saranya S conceptualized and designed the study, collected the data, performed the analysis, and drafted the manuscript. Mayilananthi K provided methodological guidance, supervised the study, and critically reviewed the manuscript. Prabha L Thomas contributed to statistical interpretation, manuscript revision, and final approval. All authors read and approved the final manuscript.

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