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Prevalence of musculoskeletal disorders amongst desktop users in corporate offices: A survey

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Abstract
Background: With the increasing dependence on visual display terminals (VDTs), prolonged computer usage has become a routine occupational demand, particularly in sectors such as administration, finance, education, and healthcare. Over the past two decades, research has consistently reported that VDT workers are at increased risk of musculoskeletal disorders (MSDs), particularly in the spine and upper limbs.
Aim: To determine the prevalence of musculoskeletal disorders among desktop users in corporate office settings.
Methodology: A cross-sectional survey was conducted among 253 corporate employees, selected through simple random sampling from an initial pool of 264 eligible participants. Inclusion criteria were individuals aged 25–50 years, engaged in desktop work for a minimum of 15 hours per week, and with at least one year of work experience. Exclusion criteria included history of recent trauma, orthopedic conditions unrelated to occupational exposure (e.g., road traffic accidents, fractures), and individuals above 50 years of age. Data on musculoskeletal complaints were collected using the Standardized Nordic Musculoskeletal Questionnaire after informed consent.
Results: MSD prevalence over the past 12 months was reported at 82.21%. The lower back was the most frequently affected region (58.65%), followed by the upper back, neck, and shoulders. A higher prevalence of MSDs was observed in individuals with elevated BMI and in those with less than 10 years of work experience. Younger participants also showed a higher rate of complaints compared to older counterparts within the study range.
Conclusion: There is a high prevalence of musculoskeletal disorders among corporate desktop users, predominantly affecting the lower back. Elevated BMI, shorter work experience, and younger age are significant risk factors contributing to MSD development in this population.

Keywords: Musculoskeletal Disorders, VDT Workers, Occupational Health, Prevalence, BMI, Corporate Employees

Introduction

In the current era of technological advancement, computers have emerged as essential instruments for maintaining efficiency and facilitating progress. A broad range of sectors including banking, governmental, private, and autonomous institutions have adopted computerized data management systems to enable seamless and rapid information processing. However, the widespread integration of computers into workplace environments has raised concerns regarding potential health risks associated with prolonged use. Notably, there has been a significant increase in reports of various symptoms among users, with work-related musculoskeletal disorders (WMSDs) constituting a major category of these complaints. [1]

The use of personal computers has become increasingly prevalent, particularly in sectors such as administration, finance, management, education, healthcare, and commerce. Over the past 25 years, numerous studies have investigated the health impacts of computer use, consistently reporting high incidences of visual strain and musculoskeletal disorders among computer-based workers. [2]

Occupational hazards are health risks arising from workplace exposures, including tasks, materials, substances, or conditions that can lead to injury or disease. Awareness of such hazards dates back to the 18th century, when Bernardino Ramazzini—regarded as the "Father of Occupational Medicine"—first identified the relationship between occupation and health outcomes. [3]

The World Health Organization (WHO) identifies work-related musculoskeletal disorders (WMSDs) as multifactorial conditions influenced by various risk factors that contribute to their onset and progression. The presence of these factors has led to a global rise in such injuries, establishing WMSDs as a significant public health concern. These soft tissue disorders are also termed repetitive strain injuries (RSIs), repetitive motion injuries (RMIs), or cumulative trauma disorders (CTDs). [4]

The workplace often poses significant health risks, with 30–50% of workers reporting exposure to physical, chemical, biological, or ergonomic hazards, as well as excessive physical or psychological demands leading to stress-related symptoms. Nearly one-third of adult life is spent in such environments. Globally, about 45% of the population—and 58% of those over age 10—are part of the workforce, making occupational health and safety a critical concern across multiple economic sectors. [5]

Several studies have highlighted the rising incidence of work-related musculoskeletal disorders (WMSDs) associated with increased computer use. Identified risk factors include prolonged static muscle loading, improper workstation design, sustained awkward postures, and repetitive tasks. In computing environments, extended keyboard use has been specifically linked to upper extremity musculoskeletal pain. [6]

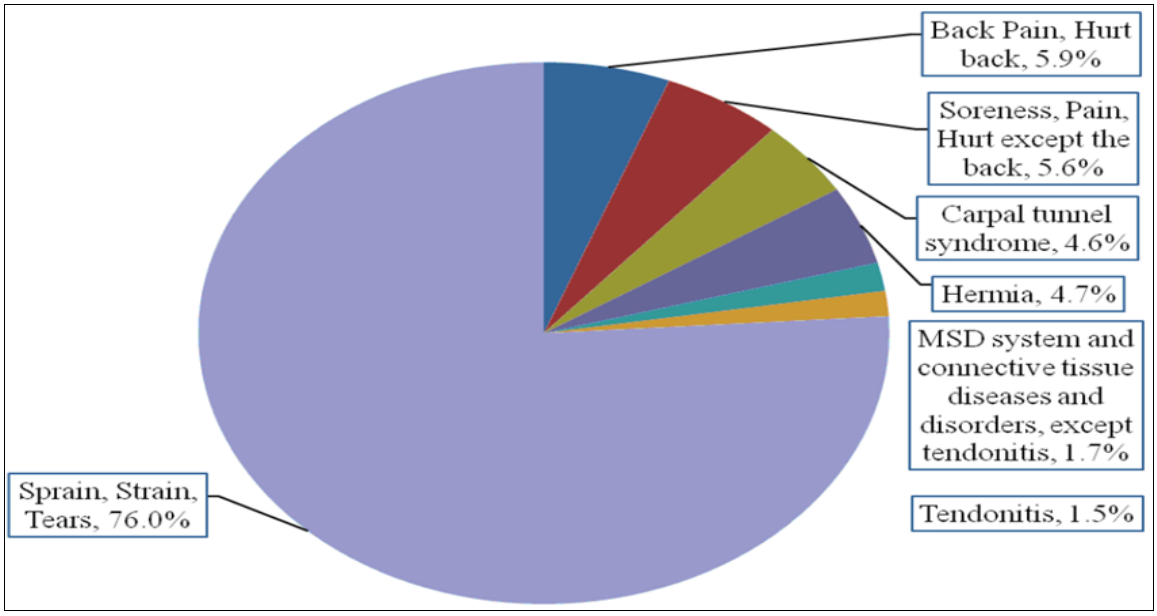


Fig 1: Nature of injury or illness, U.S. Bureau of Labor Statistics [7]

Non-specific forearm pain is commonly reported among computer users, with contributing risk factors including high job demands, time pressure, and female gender. Musculoskeletal issues are also associated with prolonged computer-related activities, particularly involving intensive mouse use, and to a lesser extent, keyboard use. In adolescents, computer use exceeding 2–3 hours daily are linked to neck and shoulder pain, while use beyond 5 hours is associated with low back pain. Given the widespread use of computers, even minor risks carry significant public health implications, emphasizing the importance of preventive interventions. [8]

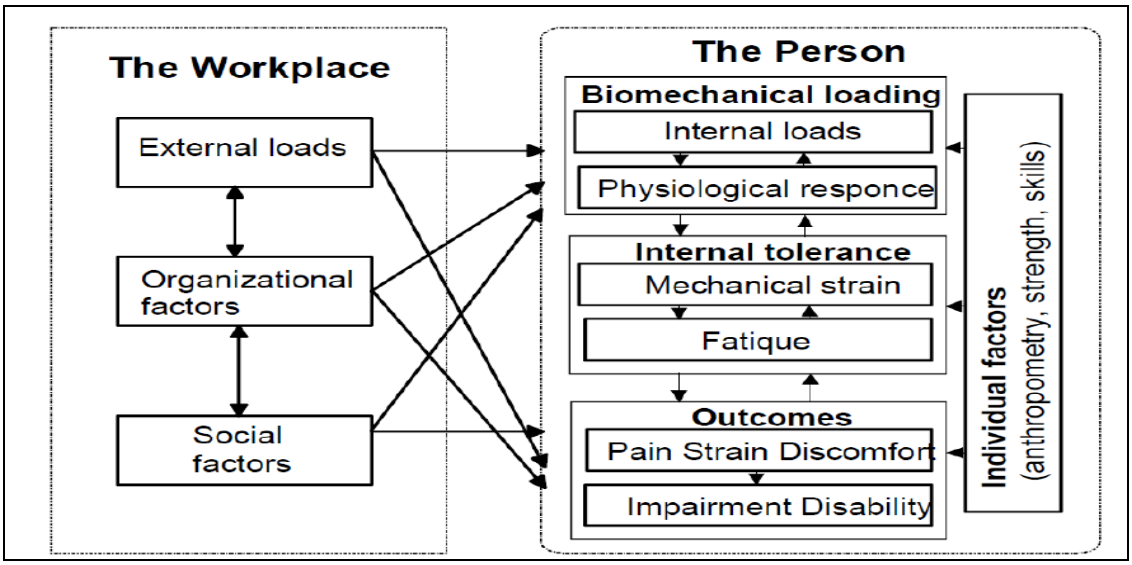


Fig 2: Conceptual model of work-related musculoskeletal disorder [9]

Early research on work-related neck and upper limb symptoms primarily emphasized physical exposures. However, recent evidence indicates that complaints of the arm, neck, and shoulder (CANS) have a multifactorial etiology, involving physical, psychosocial, and individual factors. Identifying and assessing these risk factors is essential for recognizing high-risk groups and formulating targeted, effective intervention strategies. [10]

From an epidemiological viewpoint, it is evident that Nordic musculoskeletal questionnaire is most applicable for cross-sectional studies. [11] Other studies indicated that Nordic Musculoskeletal Questionnaire tool is repeatable, sensitive and can be used for screening and surveillance purpose. [12] The Nordic Musculoskeletal Questionnaire (NMQ) has demonstrated reliability as a screening tool in previous studies employing test-retest methods, with response variation ranging from 0% to 23%. Validity assessments, comparing questionnaire responses to clinical history in studies involving medical secretaries and railway maintenance workers, reported non-identical responses ranging from 0% to 20%. [11]

Need of The Study

In the 21st century, computers have become integral to daily life, with increasing use linked to a rise in work-related musculoskeletal disorders (WRMSDs). These disorders are associated with poor posture, especially due to design limitations in laptops compared to desktops, such as fixed

screen-keyboard alignment. India's rapidly expanding IT sector has led to increased exposure to such risk factors, though data on WRMSDs remain limited. This study aims to determine the prevalence of musculoskeletal disorders among desktop users to support future physiotherapy-based interventions

Aim

To see the prevalence of musculoskeletal disorders amongst desktop users in corporate offices

Objectives

To see the prevalence of musculoskeletal disorders among desktop users to see the age group wise prevalence of the musculoskeletal disorders among desktop users to see the age group and region wise prevalence of musculoskeletal disorders among desktop users to determine the prevalence of musculoskeletal disorder according to work experience and BMI in desktop users.

Materials and Method

Ethical Approval: This study was approved by Institutional Ethical Committee.
Study Design: A Cross sectional study
Study Setting: Various Corporate offices in Ahmedabad and Vadodara
Sampling Design: Simple random sampling
Study Duration: 6 months
Sample Size: 263

Inclusion Crieteria

Persons who are working with laptop or desktop for at least 15 hrs per week Persons must be involved in such activity for at least 1 year with same or similar laptop or computer work task.

Age: 25-50 years
Gender: male and female both
Persons who were willing to participate in the study

Exclusion crieteria

Persons with recent injury Persons having disorders caused by slips, trips, falls, RTA, fracture Pregnant women Age more than to 50 years

Materials used in the study

Consent form
Questionnaire
Paper
Pen

Outcome Measure

Standardized Nordic questionnaire: Two types of questionnaire, one is General questionnaire and another is special questionnaire for low back, neck and shoulder symptoms. Nordic Musculoskeletal Questionnaire tool is repeatable, sensitive and can be used for screening and surveillance purpose. [12]

Method of collection of data

Data was collected using the Standardized Nordic Musculoskeletal Questionnaire. The survey was conducted among office employees who regularly use desktops, with prior permission from relevant authorities. Informed consent was obtained from participants after explaining the study purpose. Demographic and relevant data were recorded, followed by distribution of the general and specific Nordic questionnaires (targeting low back, neck, and shoulder regions). Completed questionnaires were collected and screened based on the inclusion and exclusion criteria.

Data Analysis and Results

The reporting of the occurrence of the musculoskeletal disorders among desktop users was analyzed using simple percentage techniques with 90% confidence interval. The prevalence of musculoskeletal disorders reported in this study was recorded through the questionnaire tool.
Statistical analysis was done using Microsoft Excel 2007.
Total 253 participants were recruited from different corporate offices of Ahmedabad and Vadodara, based on inclusion and exclusion criteria.
The age of the participants ranged from 25 – 50 years with the mean age of years 36.6 ± 9.51 for desktop user.
The work experience of the participants for desktop users ranged from 1-30 years with mean work experience of 12.14 ± 8.77 years.
The BMI of the subjects classified according to WHO classification and mean of the BMI is 23.64 kg/m^2 for desktop users.

Table 1: Demographic Characteristics of Desktop Users

Characteristics	Sub category	Number
Total sample size	Desktop users	253
Gender	Male	189
	Female	64
Age	25-29	94
	30-34	34
	35-39	19
	40-44	26
	45-50	80
Dominance	Right handed	236
	Left handed	17
BMI	<18.5	20
	18.5-24.9	137
	25-29.9	82
	30-34.9	14
Work experience (years)	1 to 5	87
	6 to 10	41
	11 to 15	32
	16 to 20	32
	21 to 25	45
	26 to 30	16

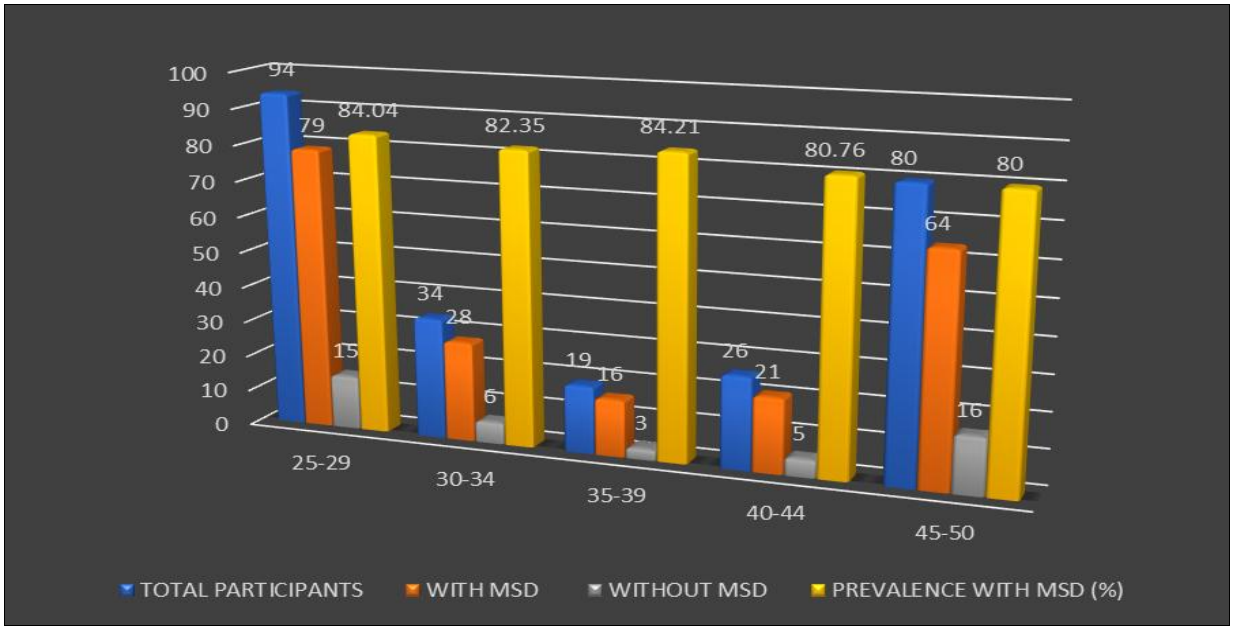
This table shows mean values of variables like age, work experience, BMI, working hours per week, working hours per day.

Table 2: Mean Values of Variables in Desktop Users

MEAN	DESKTOP USERS
Mean age (years)	36.6± 9.51
Mean of Work experience (years)	12.14± 8.77
Mean of BMI	23.64

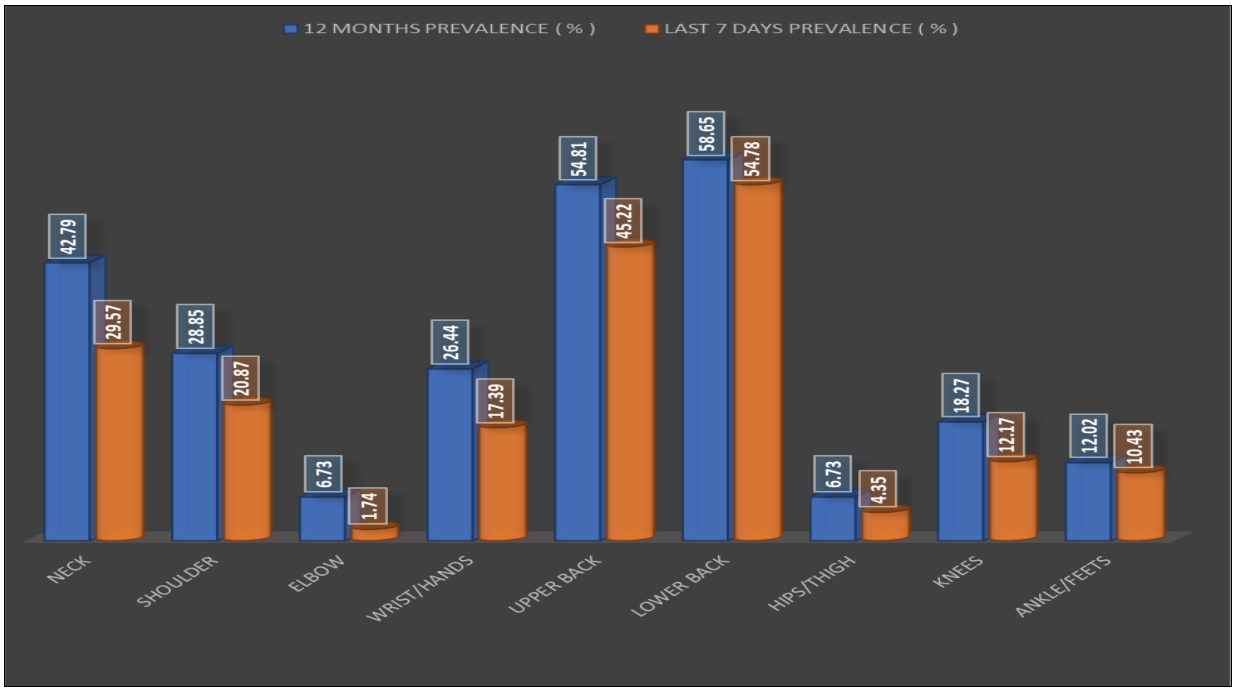
Mean of hours a week	46.36
Mean of hours a day	8.06

This shows the prevalence of musculoskeletal disorders among desktop users ranged from 80% to 84.21% across all age groups, with the highest in the 35–39 age group (84.21%) and the lowest in the 45–50 age group (80%).



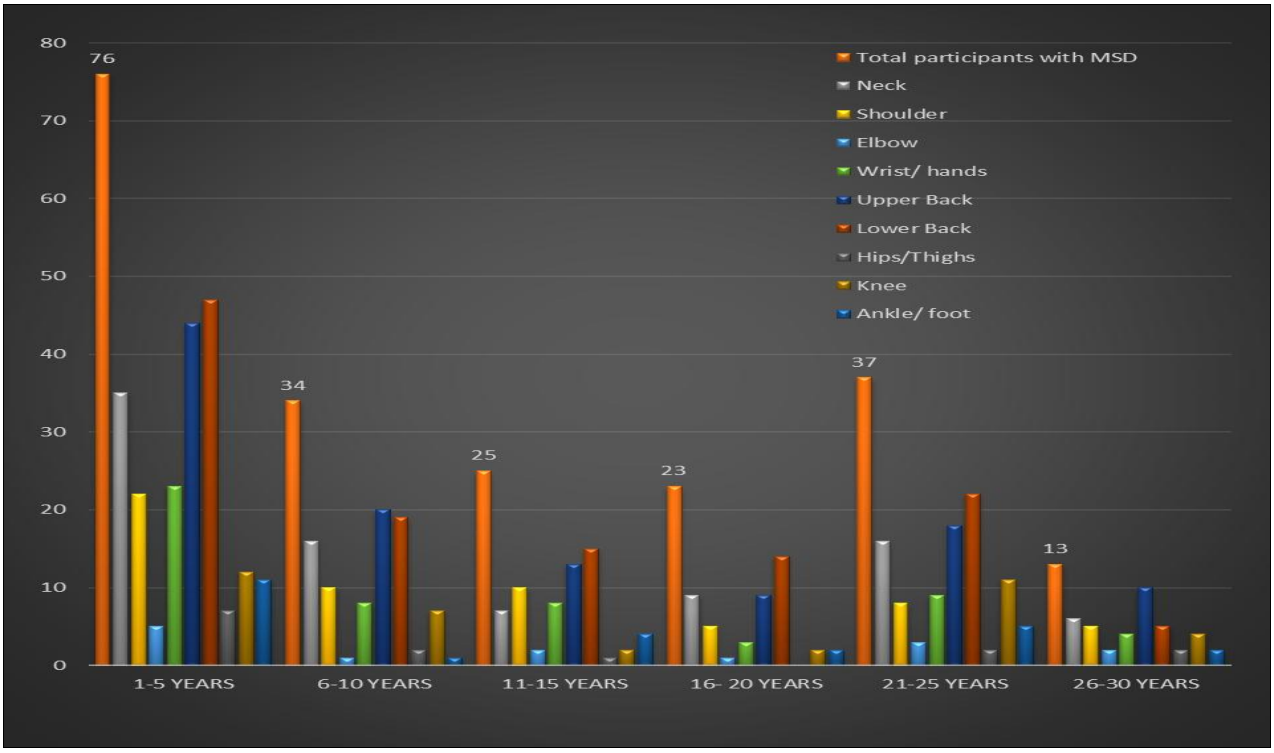
Graph 1: Age Group Wise Prevalence in Desktop Users

This graph shows region wise prevalence of musculoskeletal disorders in last 12 months and last 7 days. Greater prevalence was seen in lower back 58.65 % in last 12 months, followed by upper back (54.81%), neck (42.79 %), shoulder (28.85%), wrist/ hands (26.44 %), knees (18.27%), ankle (12.02%), and hips and elbow (6.73 %). Greater prevalence in last 7 days was seen in lower back (54.78%), followed by upper back (45.22%), neck (29.57 %), shoulder (20.87%), wrist/ hands (17.39 %), knees (12.17%), ankle (10.43 %) and lowest in hips/thigh (4.35 %) and 1.74% in elbow in last 7 days.



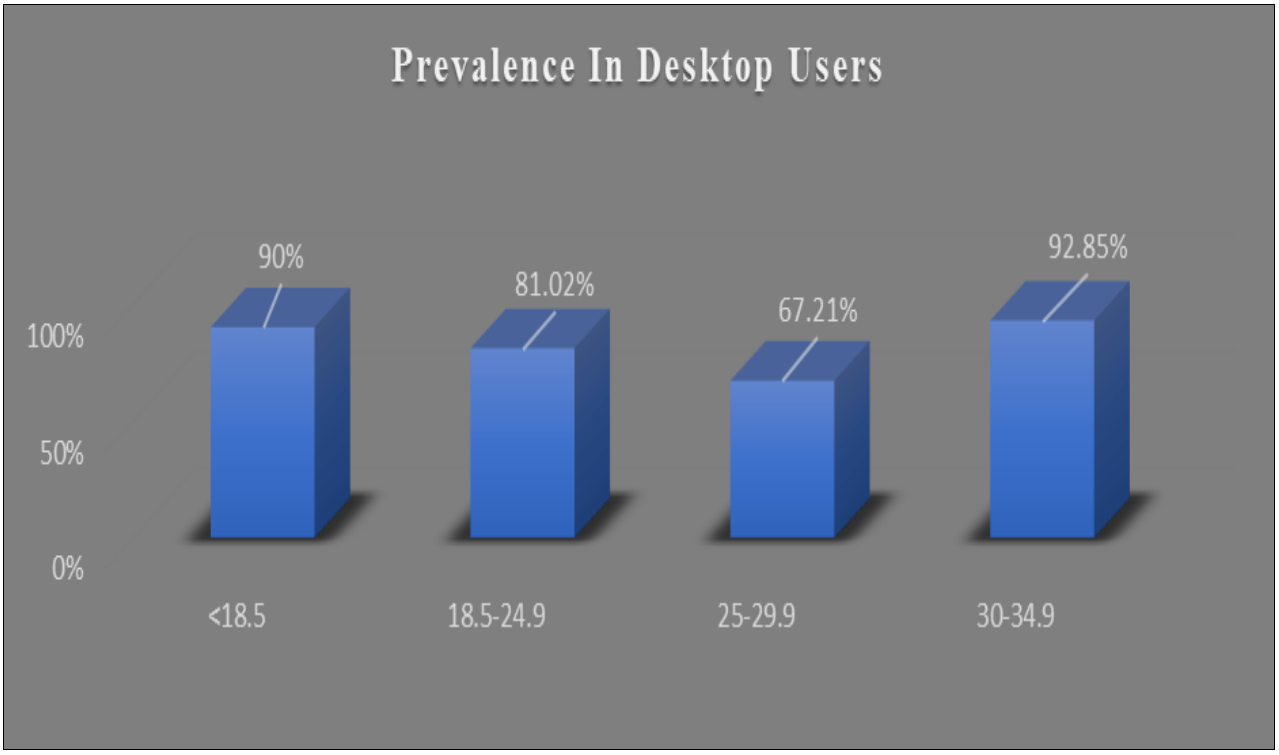
Graph 2: Region Wise Prevalence in Desktop Users

This graph shows total number of participants with MSD in different groups of work experience. Maximum affection seen in group having work experience of 1-5 years (76/87= 87.35 %) followed by 6-10 years (34/41= 82.92 %), 21-25 years (37/45= 82.22 %), 26-30 years (13/16= 81.25 %), 11-15 years (25/32 = 78.12 %) and 16-20 years (23/32= 71.87 %).



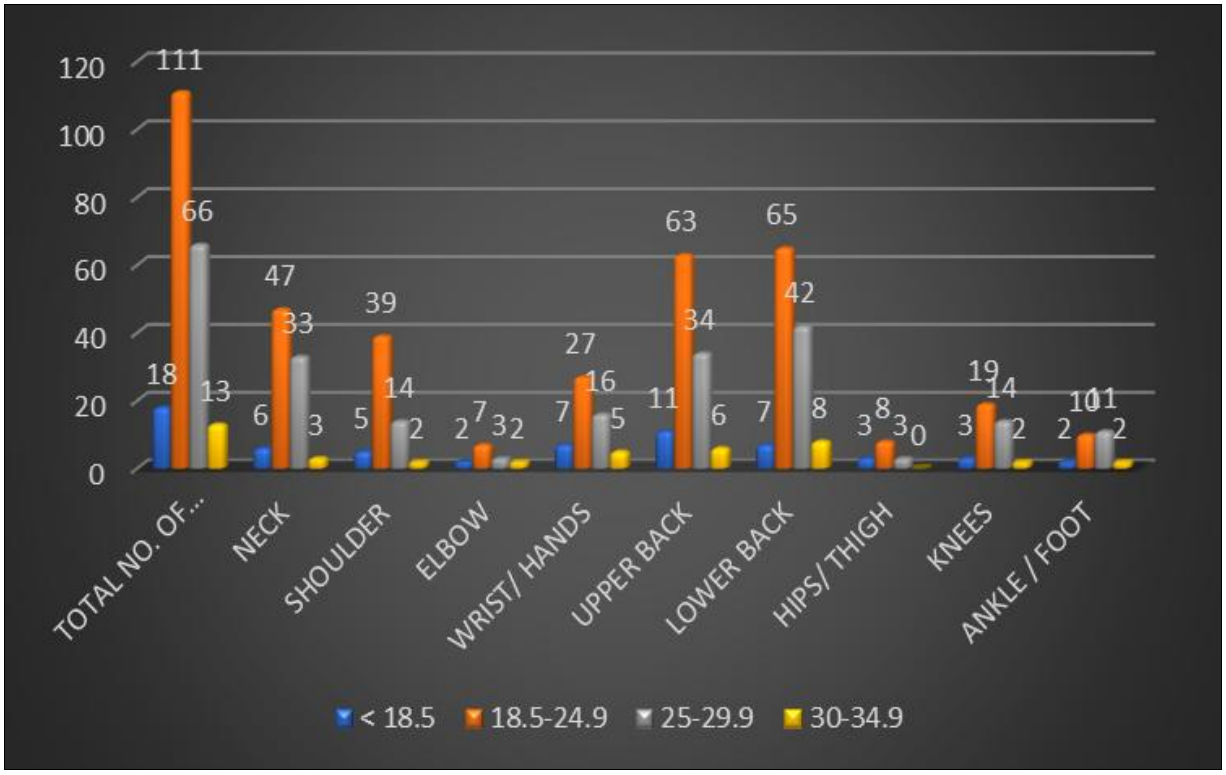
GRAPH 3: Work Experience Wise Prevalence in Desktop Users

High prevalence seen in 30-34.5 (obese) group about 13/14 (92.85 %), more prevalence in lower back and upper back; in < 18.5 (underweight) group of BMI about 18/20 (90 %), more prevalence in upper back, lower back and wrist followed by 18.5- 24.9 (normal) group about 111/137 (81.02 %) and least seen in 25-29.9 (obese) group of BMI about 66/ 82 (67.21 %) with more prevalence in lower back , upper back and neck in both the groups.



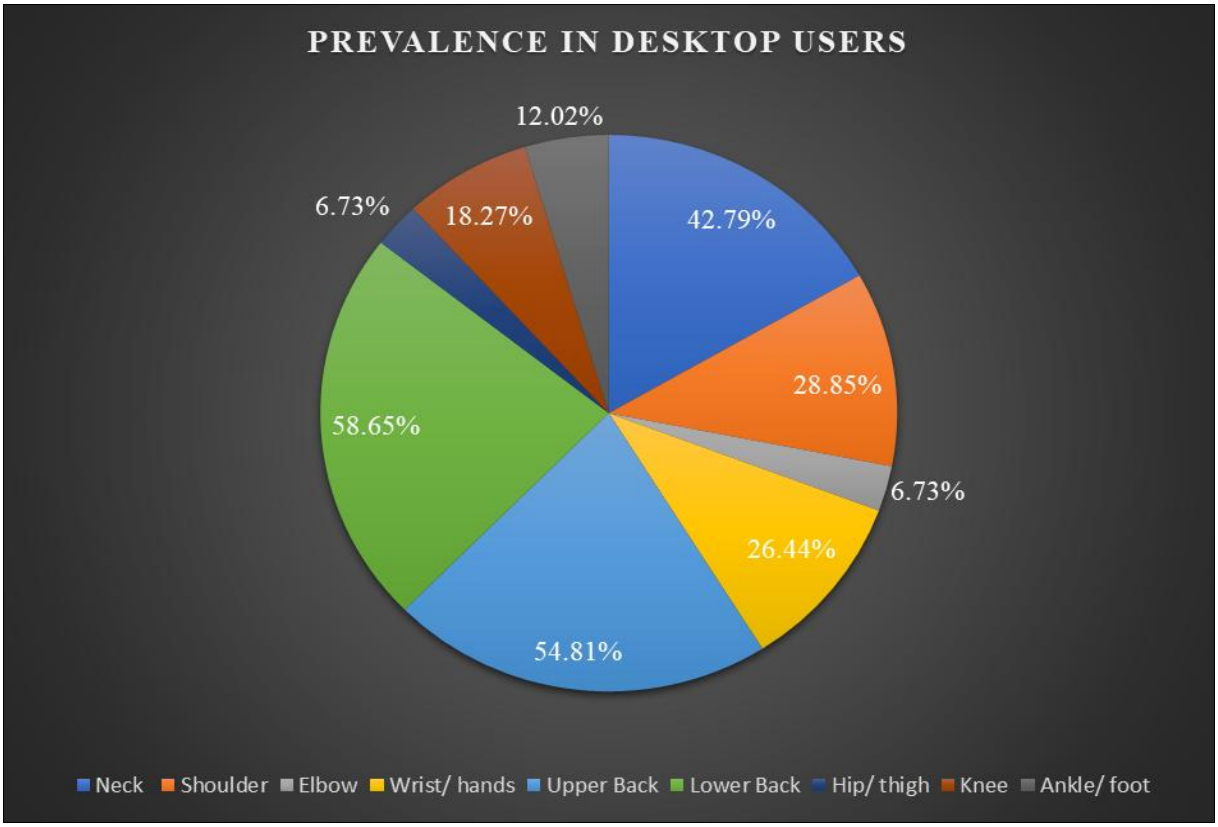
Graph 4: Prevalence According to Bmi

This graph shows prevalence of MSD in different BMI groups. High prevalence seen in 30-34.5 (obese) group, more prevalence in lower back and upper back; in < 18.5 (underweight) group of BMIs, more prevalence in upper back, lower back and wrist followed by 18.5- 24.9 (normal) group and least seen in 25-29.9 (obese) group of BMIs with more prevalence in lower back, upper back and neck in both the groups.



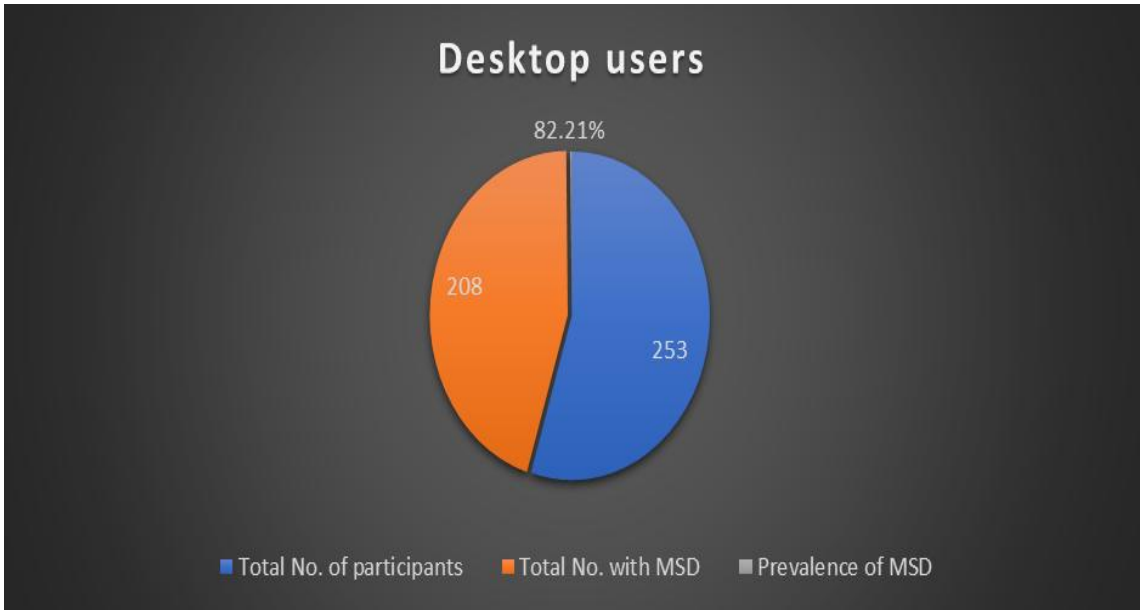
Graph 5: Bmi And Prevalence of Msd In Desktop Users

This graph shows region wise prevalence in which high prevalence in lower back region (58.65 %) in desktop users. Followed by upper back (54.81%) and neck (42.79%) in desktop users.



Graph 6: Region Wise Prevalence in Desktop Users

This graph shows over all 12-month prevalence in desktop users. Prevalence of MSD in last 12 month was 82.21 % in desktop users.



Graph 7: Prevalence of Msd In Desktop Users

Discussion

"Musculoskeletal disorders (MSDs) are frequently attributed to overexertion, muscle strain, and repetitive movements. Inadequate visual display terminal (VDT) workstation ergonomics are considered a significant contributing factor in the development of these conditions. The present study aims to document the prevalence of MSDs among desktop users employed in corporate environments."

A simple random sampling method was adopted to include the sample into the study which includes age, working hours and in corporate setup. The age group of all the subjects recruited for this study ranged from 25-50. Previous study had cited 4 hours per day [38, 13] and minimum 15 hour per week [39, 14] as being a critical time for development of musculoskeletal disorders in employees working with VDT.

Overall musculoskeletal disorders were widely reported by participating employees working in corporate offices in this study. Thus, 82.21% of Desktop users reported that they had experience one or more musculoskeletal disorder in past 12 months. In the support to these findings, the result of the other study done by Venkatesan Rajagopal *et al* (2012) [40, 15] reported that over 90% students who are using laptop and 86% who are using desktop had one or more musculoskeletal disorder. In contrary to this finding a study done by S Arun Vijay (2013) [12] on IT professional reported that only 59 % of IT professional had experience some form of Musculoskeletal disorders in last 12 months. Overall prevalence of MSD in last 7 days was found to be 45.45 % in desktop users in last 7 days. In support of this result study done by S Arun Vijay [12] also found similar prevalence of MSD in last 7 days. Another study done by Ayanniyi *et al* [8] also found high prevalence of MSD in last 12 months (93.2 %) and last 7 days (55.9 %) which supports the findings of this present study. The factors responsible for difference in prevalence rate in various studies of VDT workers might be work station environment, degree of mobilization, level of constrained posture, awareness and practices of workers regarding computer ergonomics.

Previous studies have reported musculoskeletal discomfort to be as prevalent as, or even more common than, visual discomfort, with rates ranging from 20% to 75% among computer users. [12] The variation in findings may be due to the present study's exclusive focus on musculoskeletal discomfort, whereas earlier studies assessed both musculoskeletal and visual symptoms.

In the present study, among desktop users, the most commonly affected regions with musculoskeletal disorders over a 12-month period were the upper back (54.81%), neck (42.79%), shoulder (28.85%), and wrist/hands (26.44%). These findings align with previous research, which identified significant associations between work-related physical factors—such as poor posture (e.g., bent or twisted head/trunk), prolonged static sitting, elevated shoulders, repetitive tasks, and inadequate workstation design—and increased prevalence of neck, shoulder, and upper limb complaints [31, 39, 42, 16, 17, 18]

In the present study, the lower back was the most commonly reported site of musculoskeletal disorders among desktop users, with a 12-month prevalence of 58.65%. Similar findings were reported by Hameed *et al* [43, 19] Rezaee M *et al*. [33, 20], and Das B *et al*. [21], the latter noting a lower back prevalence of 94% in females and 88% in males. Sharma A.K.44) [22] also identified the lower back as the second most affected region. This discomfort is likely linked to prolonged adoption of awkward postures. In contrast, a study by S. Arun Vijay [12] among IT professionals found the neck (30.33%) to be the most affected area, followed by the lower back (25.24%). Variations in prevalence may be due to differences in the operational definitions of musculoskeletal disorders across studies.

In the present study, the highest prevalence of musculoskeletal disorders among desktop users was observed in the 35–39-year age group (84.21%). Supporting this finding, studies by Srilatha *et al*. [1] and Javantanakul *et al*. [45, 23] reported greater MSD prevalence among younger and middle-aged individuals compared to older adults. Conversely, Das B *et al*. [12, 21] found higher MSD prevalence in individuals over 40 years, attributing it to prolonged work exposure. Increased computer uses among younger individuals, including non-occupational use, along with poor ergonomics and early-career job demands, may contribute to the elevated prevalence in these age groups.

In this study, participants with less than 10 years of work experience showed a higher prevalence of musculoskeletal

disorders among desktop users. This may be due to limited adaptation to the physical and psychosocial demands of the job in the early career phase. Supporting this, Ye Z *et al*. [46, 24] reported that younger individuals tend to use computers for longer durations, contributing to an increased risk of musculoskeletal disorders.

In this study, the average daily computer usage was 8.06 hours for desktop users, associated with a high prevalence of musculoskeletal disorders. Supporting this, Rezaee *et al*. [33, 20] reported increased MSD risk with computer use exceeding 5 hours per day. Similarly, Das B *et al*. [12, 21] identified keyboarding over 15 hours per week as a potential risk factor. Other studies suggest that daily computer use beyond 2–3 hours is linked to neck and shoulder symptoms, while usage over 5 hours is associated with lower back pain.

In this study, high prevalence was found with high BMI. According to BMI, high prevalence of MSD was found in 30-34.9 (obese) and < 18.5 (underweight) about 92.85 % and 90 % respectively. In support to these finding studies done by Nilsen T *et al* [47, 25] and Heuch I *et al*. [48, 26] found that subjects with high BMI had higher prevalence of MSD.

This study found that females reported a higher prevalence of musculoskeletal disorders compared to males among desktop users. Among desktop users, the prevalence was 100% in females and 76.19% in males. These findings are consistent with previous research indicating that females generally exhibit higher rates of repetitive strain injuries. [12, 30, 31, 49, 21, 16, 27, 28] Contributing factors may include a greater tendency among women to perform repetitive tasks, longer durations of sedentary work, and additional physical demands from household and caregiving responsibilities, which may increase musculoskeletal strain. [50, 51, 29, 30]

Conclusion

The findings of the present study involving 253 participants indicate a high prevalence of musculoskeletal disorders among desktop users. The lower back was the most commonly affected region, followed by the upper back, neck, shoulder, and other body regions. Additionally, a positive association was observed between higher BMI and increased prevalence of MSDs into the group. The study also revealed that MSDs were more common in younger individuals and those with less than 10 years of work experience.

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