



Evaluating the potential ergonomic hazards associated with posture and musculoskeletal problems among customer service representative.

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Abstract

BACKGROUND: - Ergonomics encompasses the process of creating and arranging work environments, products, and systems in a way that caters to the requirements of the individuals utilizing them. When discussing ergonomic risk factors, we are referring to the elements that raise the chances of users experiencing work-related musculoskeletal disorders (WRMSDs). These risk factors include repetitive actions, extended periods of working in uncomfortable or unchanging positions. Work-related musculoskeletal disorders (WRMSDs) are injuries that affect muscles, nerves, tendons, ligaments, joints, or spinal discs.

OBJECTIVE: - To assess the ergonomics risks for postural or musculoskeletal issues in working environment among call center employees

METHODOLOGY: - Following ethical approval, a cross sectional study was conducted on 267 call center employees, through convenience sampling. Self-formulated questionnaires as well as other questionnaire such as, Rapid Office Strain Assessment (ROSA) was used to assess the ergonomics risk factors among call center employees that might cause postural and musculoskeletal disorders.

RESULTS: - The study concluded 45.7% employees were at high risk level, 24% employees were at medium risk level and 24% were at very high risk level for development of postural and musculoskeletal disorders (MSDs). The major ergonomic risk factor reported was inappropriate Chair design (Mean Score: 5.60 ± 2.14) which exposed employees to High ergonomics risk for postural or musculoskeletal issues development. ROSA final scoring (Mean Score: 5.69 ± 1.98) also showed high ergonomics risk among the participants.

CONCLUSION: - The result of this study showed that most of the call center employees were exposed to medium to very high ergonomics risk for postural and musculoskeletal disorders development.

KEYWORDS: Ergonomics, ROSA, Risk factors, Musculoskeletal disorders

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INTRODUCTION

Ergonomics is the scientific study of how people interact with their work environment. It encompasses both the practical and artistic aspects of adjusting job tasks and the workplace to meet the specific needs of workers. Its primary objective is to prevent injuries and illnesses associated with poorly designed physical work settings, while also improving employee safety, comfort, and overall work performance and quality. Inadequate ergonomics can have detrimental effects on workers, leading to issues like eye strain, shoulder, back, arm, wrist, and neck pain. Consequently, this negatively impacts a company's productivity by causing lower quality output, increased absenteeism, higher costs, elevated employee turnover, and greater training requirements. Therefore, prioritizing proper ergonomics in the workplace is crucial to ensure employee well-being, optimize performance, and mitigate the negative consequences on productivity and expenses. (1) As per the International Ergonomics Association (IEA), ergonomics encompasses various factors such as physical, cognitive, social, organizational, environmental, and other relevant elements that influence human work. Its primary aim is to create conditions that align with the needs, capabilities, and limitations of individuals. These factors can be broadly classified into three categories: physical ergonomics, cognitive ergonomics, and organizational ergonomics. (2)

An ergonomics risk factor (ERF) refers to situations that may arise either intentionally or unintentionally and have the potential to contradict or undermine the principles or philosophy of ergonomics. These situations can pose a risk to the health and well-being of workers or users, both during work and after work hours. It is important to identify and address these risk factors in order to ensure a safe and healthy working environment (3). Ergonomics risk factors encompass various elements that have the potential to cause harm

or discomfort to workers. These factors include maintaining uncomfortable body positions, exerting excessive force, performing repetitive tasks, staying in static positions, experiencing pressure on body parts, being exposed to vibrations, engaging in frequent hand movements, holding arms extended, repeatedly bending or twisting the body, working in extreme temperatures, being exposed to noise, and experiencing fatigue. (4). There are several work activities that can lead to awkward postures, including bending down to work at a low level, bending the wrist during object movement or keyboarding (creating an awkward wrist posture), and twisting parts of the body, such as the neck, to view documents while engaging in prolonged keyboarding (causing an awkward neck posture). The risk of injury becomes higher when these risk factors are present for extended periods or when multiple risk factors exist within a single job task. (5).

When office and industrial tasks are performed with improper posture, it can lead to a range of MSDs. These disorders may manifest as damage, pain, and sprains in areas such as the lower back, shoulders, upper limbs, wrists, and fingers. The resulting pain and disability can persist over a prolonged period, necessitating medical treatment to alleviate symptoms and facilitate recovery. It is crucial to promote proper ergonomics and posture in the workplace to mitigate the risk of MSDs and their associated consequences. (6). Work-related musculoskeletal disorders (WMSD) occur when the work environment and the tasks performed contribute significantly to the onset or worsening of the disorder. These conditions are influenced by various factors within the workplace that can prolong the duration or increase the severity of the disorder. The physical demands, repetitive motions, awkward postures, and other work-related factors play a significant role in the development and persistence of WMSDs. It is crucial to identify and address these

contributing factors in order to prevent and manage work-related musculoskeletal disorders effectively. (7). Prolonged forward head posture can contribute to the development of musculoskeletal disorders, including a condition known as "upper crossed syndrome." This syndrome is characterized by a reduction in the natural curvature (lordosis) of the lower cervical spine, coupled with an increased rounding (kyphosis) of the upper thoracic vertebrae. This imbalance in the alignment of the spine and associated muscle imbalances can lead to discomfort, pain, and restricted range of motion in the affected areas. It is important to maintain proper posture and address any postural imbalances to prevent the onset or progression of such musculoskeletal disorders. (8). Research conducted in the past has indicated that maintaining a static posture for an extended period of time and using inappropriate furniture can contribute to the development of musculoskeletal disorders. Remaining in the same position for prolonged durations without sufficient movement or postural changes can lead to strain and fatigue in the muscles and joints. Additionally, using furniture that is not ergonomically designed or properly adjusted to individual needs can further exacerbate the risk of musculoskeletal issues. It is essential to promote regular movement, incorporate ergonomic principles in furniture design, and provide proper workstation setups to minimize the occurrence of musculoskeletal disorders in the workplace. (9).

METHODOLOGY

This descriptive cross sectional study carried out in different call centers of twin cities i.e., Rawalpindi and Islamabad from 2022 to January 2023. The sample size was 267. Non-probability

Convenient sampling technique was employed. Inclusion criteria was individuals with 18-35 years old, Greater than 8 working hours/day and Job experience of more than 12 months. Participants were excluded on basis of following criteria: Call Center Employees who had musculoskeletal, postural or neurological issues prior to enrolling in this job, Pregnant Women and Recent history of trauma. Data was collected by self-structured questionnaire to collect information regarding demographics, working shift and working hours per day of the workers and job duration. Ergonomics risk assessment was done through an observation technique by Rapid Office Strain Assessment (ROSA) among call center employees which is a picturebased posture checklist designed to quantify exposure to risk factors in an office work environment. The ROSA final scoring ranges from 1 to 10, with the higher score indicating an increased risk for work related musculoskeletal disorders. Risk levels according to ROSA were low risk level (Score 1 and 2 points), medium risk level (Score 3 and 4 points), high risk level (Score 5, 6 and 7 points) and very high risk level (Score 8 and 9 points). SPSS 21.0 was used for data analysis

RESULTS

Two hundred and sixty-seven call center employees were included in the study. A large number of participants were males (249) and only few participants were females (18), with the ages between 18-35 years old. (Mean 21.84 ± 2.827) and were over-weight with BMI (Mean 25.860 ± 4.9160). Majority of employees had job duration of less than 5 years (94.8%) and work duration of 9 hours per day (65.2%). Most of them were working in the evening shifts (79%).

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Table1:Demographics of Participants

DemographicVariables	CallCenterEmployees (n=267)
Age(years)	21.84 ± 2.82
Weight(kg)	71.28 ± 13.53
Height(m)	1.65 ± 0.06

BMI	25.86 ± 4.91
WorkingHours/day	9.38 ± 0.57
JobDuration(months)	27.47±14.11

Figure 1.Gender. This graph shows two qualitative categories male and female. There were total 267participants,out of which 249 weremales and18were females.

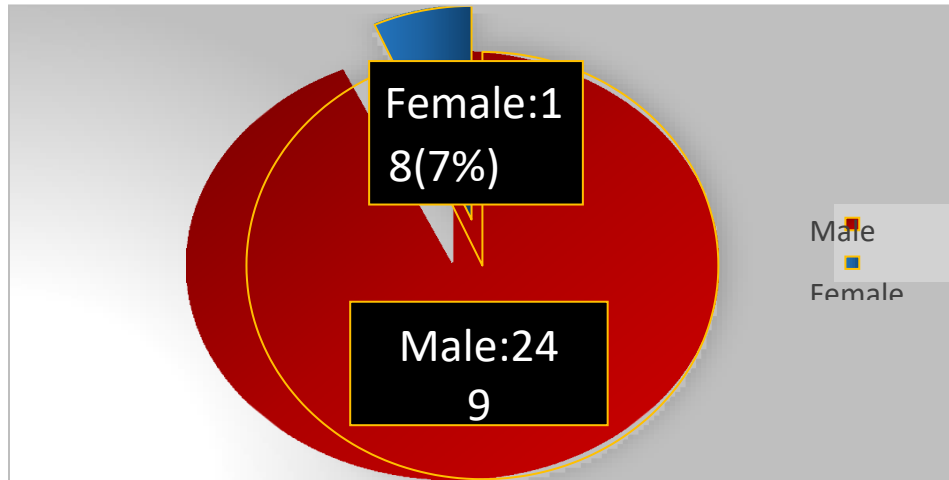
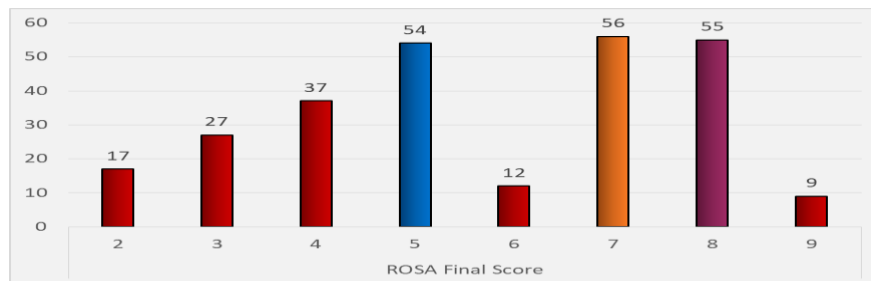


Figure 2. ROSAFINAL SCORE



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The highest reported frequency of ROSA final scores was at two risk levels High Risk Level with scores 7 (56 participants) and 5 (54 participants), followed by VeryHighRisk Level with score8 (55 participants)

Table2:ROSA mean and standard deviation

SECTION	Rosa Scores(N=267) Mean ± StandardDeviation
Section-A(TheChair)	5.60±2.14
Section-B(MonitorAndTelephone)	3.10±0.98

Section-C(MouseAndKeyboard)	2.96±1.32
FinalScoring	5.69±1.98

The major risk factor observed was inappropriate chair design (mean score: 5.60±2.14) and ROSA final scoring (mean score: 5.69±1.98) represents high ergonomics risk.

Table3 Ergonomics Risk Level

ERGONOMICS RISK LEVEL	FREQUENCY	PERCENTAGE
Low Risk(Score1-2)	17	6.3
Medium Risk (3-4)	64	24
High Risk(Score5-7)	122	45.7
Very High Risk(Score8-9)	64	24
Total	267	100

DISCUSSION

Conducting ergonomic studies among workers can be instrumental in reducing the occurrence of work-related musculoskeletal discomfort. Thus, the primary objective of this study was to evaluate the ergonomic risk factors present in the working environment of call center employees in Rawalpindi and Islamabad.

In a study conducted by Alireza Besharati et al. in 2020, it was reported that 53.8% of the participants were classified as being at a low risk level, while 46.2% were categorized as being at a high risk level. This disparity in risk levels could potentially be attributed to factors such as variations in the number of working hours and differences in age among the participants. The average number of working hours per day was found to be 8.13 ± 1.88 , and the average age of the participants was 34.54 ± 7.41 .(10)

According to a study conducted by RK Moon et al. in 2015, musculoskeletal disorders (MSD) were found to be highly prevalent among bank office employees who use computers. Participants who experienced MSD within the past 12 months reported various issues,

including low-back pain (40.4%), upper back pain (39.5%), neck pain (38.6%), hand/wrist discomfort (36.8%), and shoulder pain (15.2%)(11)

In a study conducted by Ardahan et al. in 2016, the researchers examined the prevalence of work-related musculoskeletal discomforts among computer users. They also investigated the personal and computer-related risk factors associated with these discomforts. The participants reported experiencing musculoskeletal symptoms in various areas, with the highest prevalence in the neck (67.85%), followed by the back (66.33%), lower back (59.49%), right shoulder (45.32%), and left shoulder (43.54%) during the past week. Additionally, the study found that work interference due to musculoskeletal discomfort was reported by 33.6% of the participants. These findings shed light on the significant impact of computer use on the occurrence of musculoskeletal discomfort and highlight the need for preventive measures and interventions to address these issues in the workplace. (12).

Saeidi et al. (2016) the aim of study was to investigate risk factor of MSD and its relation to

employee's workload at 118 call center in sanabdaj, Iran. The ROSA was used to evaluate the risk factor of work station. Nordic and NASATLX was used to find the MSD in employees. The result shows a high mean of workload. The MSD in neck and lower back, gender, BMI, work shift, and ROSA final score were significantly related with MSD. (13)

Fariborz Mohammadipour et al. conducted a study in 2018 and found that 82.8% workstations were at medium (55.2%) and high (27.6%) ergonomics risk level. The difference in results might be due to the facts that there was less number of males (48%) while in our study there was more number of males (93%). (14)

Sunsia Chalking et al. (2021) conducted the study on muscle fatigue and potential health risk of low back pain among call center employees. The evaluated risk of low back pain. He concluded that the majority of the participants (43.3%) were exposed to moderate to high ergonomics risk level and was significant associated with low back pain. (15)

Conclusion

The findings of the study revealed that a majority of the call center employees were exposed to a medium to very high level of ergonomic risk, indicating a heightened susceptibility to developing postural and musculoskeletal disorders. The analysis conducted using SPSS indicated that one significant ergonomic risk factor was the office ergonomic furniture, particularly the chair. Factors such as the provision of lower back support, the ability to sit without experiencing pressure, and the presence of armrests that allowed for close proximity to the workstation were identified as significant contributors to reducing the risk of musculoskeletal issues. These results underscore the importance of implementing proper ergonomic furniture in call center work environments to minimize the potential for posture-related problems and associated discomfort.

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