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Original Article

Prevalence of Neck Pain and Awareness of Ergonomics among Microscope Users

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ABSTRACT

Background: Working with microscopes requires accuracy and the capacity for sustained concentration. Users of microscopes in this profession frequently need to maintain a static work position, which puts strain on the musculoskeletal system. Since pathologists frequently combine using a magnifying glass and a computer, in addition to the strain on the musculoskeletal system, magnifying lens work can cause eye strain, which is consequently known as strong strain. This can indicate an additional musculoskeletal risk. Arm, neck, and shoulder complaints cover a wide range of grievances with varying degrees of seriousness. **Objective:** The objective was to discover whether neck pain was common and whether microscope users were aware of ergonomics. **Methods:** 161 participants took part in this cross-sectional questionnaire-based study, which was executed in Lahore from February to July 2019. The participants including both men and women aged 25 to 55 were included following their signed informed consent. The study excluded those with any neck pathology, recent trauma, or surgery. Using SPSS 22.0, data analysis was carried out. The mean and standard deviation for quantitative variables were computed. Frequency and percentages were determined for qualitative variables. **Results:** Out of 161 survey participants, 150 (93.2%) were discovered to have musculoskeletal disorder, primarily affecting the neck region, 83 (51.6%), and only a few 53 (32.9%) were found to be aware of workplace ergonomics. **Conclusion:** There was a significant amount of neck pain between microscope users. Additionally, it was found that professionals generally have very little awareness of workplace ergonomics and sitting positions.

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INTRODUCTION

Numerous well-trained medical technicians and experts may aid professionals in making decisions and preserving lives. People that utilize magnifying lenses as a tool for examination make up one such group. Optical microscopes have been the primary tool used to aid pathological examination.[1] The strength of microscopy, electronic research, and mechanical examination are combined with cutting-edge advanced pathology.[2] Working with microscopes requires accuracy and the capacity for sustained concentration. In this line of employment, maintaining a static work position is frequently required, which puts stress on the musculoskeletal system.[3]

In addition to the strain it places on the musculoskeletal system, using a magnifying glass leads to eye strain, which is consequently associated with strong strain. Since pathologists frequently combine using a magnifying glass and a computer during their work, this can indicate an additional musculoskeletal risk.[4] Workplace health issues affecting employees are on the rise as a result of musculoskeletal problems. Up to 80% of clients experience neck discomfort, fibromyalgia, or pressure cerebral pain after working continuously for an extended period of time with a conventional magnifying lens.[5]

Users using microscopes report having a lot of musculoskeletal discomfort. Arm, neck, and shoulder complaints cover a wide range of grievances with varying degrees of seriousness.[6] After 4 hours of using an amplifying tool, electromyography studies of magnifying lenses have shown that muscular stress in the neck, back, and shoulders is 25%–65% more severe than it was at the start of the activity.[7] The significant prevalence of musculoskeletal pain among workers who make magnifying lenses was also documented in a later European investigation. Two reviews that found an increase in the prevalence of skeletal muscle problems among microscope users mentioned cytotechnologists.[8,9] After 1–5 years, only around half of the people experiencing neck/shoulder pain, were pain-free. The financial burden that pain places on its stakeholders is tremendous and contributes significantly to disability worldwide.[10] The majority of people of working age experience chronic neck pain, which is a frequent cause of impairment. In general, the outcome for severe neck pain is poor, and the accompanying impairment appears to last longer than low back pain. All across the world, neck pain is a growing problem. It significantly affects people, including families, communities, health care systems, and companies.[11,12]

As with other components, the intricacy of the normal neck architecture and physiology is really not realized until an associated medical disease arises, despite the high prevalence of neck and shoulder pain compared to pains in other limbs that cause sickness absence and impairment and reduce productivity.[13] The deterioration of cervical muscles has a complex, diverse nature. Excessive force, repetitive motion, bad posture or extended stationary position, and vibration are among the activities that might cause neck discomfort issues.[14,15]

The fourth most common cause of disability, neck discomfort, has a yearly prevalence rate of above 30%.[16] Whether the pain is mechanical or neuropathic can be determined by the history and physical examination. The majority of microscope users must flex their upper back and neck in order to view through the magnifying instrument's eyepieces.[12] The extensor muscles, ligaments, and tendons are stretched when the neck is in a flexed position for prolonged periods of time, which causes

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laxity and weakness. After a considerable develop a forward-leaning posture and extensor muscle breakdown along with signs of discomfort, stiffness, and muscle fatigue[17]. When performing normal laboratory tasks including pipetting, using microscopes, operating microtomes, using cell counters, computers, and video display terminals, laboratory researchers run the danger of developing repetitive motion injuries. In biological safety cabinets, standing and working in imbalanced positions can potentially cause ergonomic issues.[18,19]

Numerous investigations have led to the conclusion that workplaces with heavy usage of the microscope frequently experience occupational-based accidents.[20,21] It is noted that ergonomics is a developing field of study. Ergonomics application is aided by awareness of ergonomics, which is vital to human success and happiness in working contexts. While interest in ergonomics has expanded significantly in developed countries, it is still mostly unheard of in developing countries.[22,23]

Every career comes with a number of health issues, and using a microscope improperly comes with additional risks that are sometimes unrecognized. Therefore, the purpose of this study was to determine whether laboratory professionals who used microscopes had a high frequency of work-related musculoskeletal problems and whether they amount of this training, workers will typically were aware of proper ergonomics. This study also aimed to fulfill the research gap as according to the evidence, this is still an under explored area of research. The study will be beneficial for the future as it emphasized on increasing workplace ergonomics and decreasing the burden of work related musculoskeletal disorders.

METHODS

This descriptive cross-sectional study was carried out in two separate labs, Shaukat Khanum and the Chughtai laboratories of Lahore. The sample size for this study was 161. Formula for calculating sample size:

$$n = \frac{Z^2_{1-\alpha/2} P(1-P)}{d^2}$$

Participants including both men and women aged 25 to 55 were included after they fulfilled of the eligibility criteria. The study excluded those with any neck pathology, recent trauma, or surgery. A signed informed consent was taken before the collection of the data. By using an online questionnaire and the Neck Disability Index (NDI), all pertinent data about the participants was collected. Data analysis was carried out by SPSS 22.0. The mean and standard deviation for quantitative variables were computed. Frequency and percentages were determined for qualitative variables.

Table I: Age of Respondents

	Frequency	Percentage
25-35 Years	101	62.7
36-45 Years	47	29.2
46-55 Years	13	8.1
Total	161	100

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Table II: Descriptive Statistics of Respondents

Workplace Ergonomics	Frequency	Percentage
Yes	53	32.9
No	108	67.1
Total	161	100

Table III: Effects of Ergonomics on Musculoskeletal Problems of Respondents

Experience		Frequency	Percentage
Ergonomically Optimized Chairs/Microscopes Use	Yes	89	55.3
	No	72	44.7
	Total	161	100

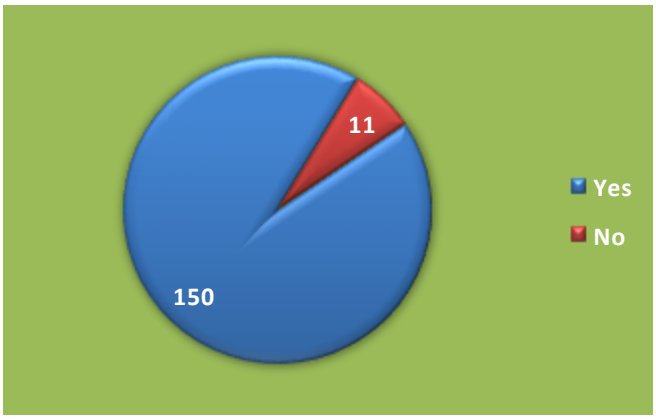

Figure 1: Work-Related Musculoskeletal Problems of Participants

RESULTS

Total 161 participants were recruited for this study. In the given sample (n) of 161 participants, there were 101 (62.7%) participants in the age group 25-35 years, 47 (29.2%), and 13 (8.1%) participants in the age groups 36-45 years and 46-55 years, respectively (Table I).

Table II demonstrates that 53 (32.9%) had ergonomics and seating positions introduced into the workplace, whereas 108 (67.1%) had

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not. Whereas table III showed that 89(55.3%) participants reported that they have always used ergonomically optimized chairs/microscopes, so no comparison was possible for them. However, 72(44.7%) participants reported that they never had any such problems, neither before nor after they started using ergonomically optimized chairs/microscopes. In figure I 150 (93.2%) out of the sample size of 161 individuals had musculoskeletal issues related to their jobs.

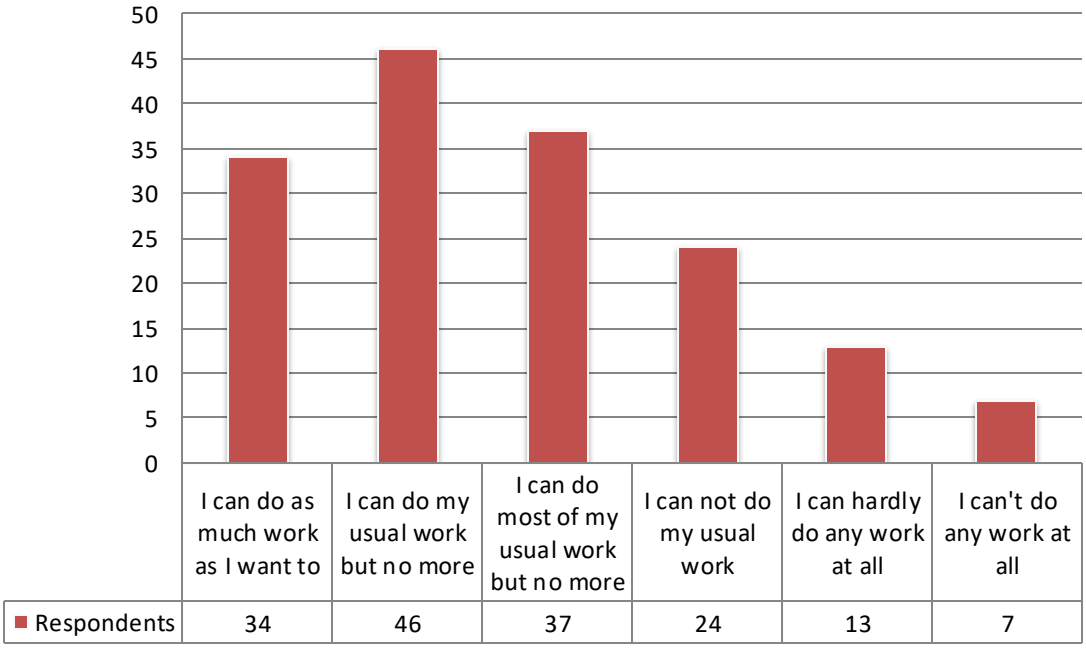

Figure II: Descriptive Statistics of Work Related Questions

This graph showed that 34 (21.1%) participants out of the 161 Participants in the sample were capable of working as much as they wanted, 46 (28.6%) participants said they can only do their usual work but no more, 37 (22.98%) participants said they can do most of their usual work but no more, 24 (14.9%) participants cannot do their usual work, 13 (8.07%) participants can barely complete any work, and 7 (4.35%) participants reported that they cannot do any work (Figure II).

DISCUSSION

In Ireland, a survey using questionnaires was carried out by Richard John Flavin et al. There were 62 respondents, including both men and women, and the median number of hours spent performing microscopy each week was 20.5; this led to the conclusion that 40% of respondents experienced neck and upper shoulder pain as a result of spending extended amounts of time performing microscopy.

According to this study with a sample size of 161 participants- male and female participants who spent an average of 50 hours per week performing microscopy, 83% and 31% of respondents reported experiencing neck and upper shoulder pain respectively as a result of their prolonged microscopy use. In a study, Hetal Patel et al. came to the conclusion that

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there were 120 participants overall, 73 females, and 47 males, with an average age of 28 years. About 82.5% of the people in that group reported having neck pain. Neck pain was more common in women than in men. A recent study with 161 participants, 7 men and 74 women and a mean age of 25 years revealed that 83% of the population had neck pain. As compared to women, men experienced more neck pain.

Yassi et al. found that 48% of work-related illnesses and disorders among patients who visited a general practitioner had musculoskeletal disorders. Musculoskeletal disorders at work result from repetitive tasks that are typically safe but turn dangerous when tissue loading goes beyond physiological and anatomical thresholds. Workplace ergonomics are frequently mentioned as a risk factor for musculoskeletal conditions. The current study finds that due to repetitive activities and participants' ignorance of an ergonomically stable sitting or having to stand working position or posture, musculoskeletal disorders affecting the neck and shoulder region are prevalent in 71% of participants.

Anish Ashok and colleagues conducted studies on the different musculoskeletal problems brought on by traditional microscopes in order to determine whether or not professionals were well-versed in ergonomics. They came to the conclusion that professionals, even those in the health professions, were unaware of the negative effects of conventional microscope usage.

Particularly in comparison to 54.7% of general pathologists, the findings showed that only 34.1% of oral pathologists understood the value of ergonomics. The study also found that only 32.9% of pathologists-out of a total of 161 respondents knew about workplace ergonomics and seated body position, while the remaining 67.1% had never heard of them. Gopinadh A et al. found that the back and neck were the most frequently affected musculoskeletal sites in 73.9% of the participants. The current study was also concerned with this issue and found that 150 participants (93.2%) had musculoskeletal disorders, with the neck and back being the most frequently affected areas (51.6% and 35.5% respectively).

The sample size of this study was very small. If there had been a larger number of people and sample size available, the results might have been more accurate. Due to a lack of time, only a small amount of effort could be made, and more extensive research could not be done. Since it was an exploratory research, only a questionnaire survey was carried out as part of the research, which led to small-scale and constrained findings. The results and progress, however, would have been impressive and more precise and accurate if it had been an experimental or cohort study.

However, a study needs to be carried out on a larger scale across the various cities in Punjab so that the desired population can provide more pertinent and important data and microscope users of all types must be taken into consideration in experimental studies involving a number of musculoskeletal disorders. Finally, action should be taken to raise professional awareness of and introduce proper sitting postures and work-related ergonomics.

CONCLUSION

According to the results of this study, neck pain is very common among people who use microscopes. Professionals have very little knowledge of sitting positions and workplace ergonomics. Hence, there is a great need of creating awareness about them. As a result, pathologists are strongly urged to take preventative measures before symptoms

appear and to get evaluated right away if they do.

DECLARATIONS

Consent to participate: Written consent had been taken from patients. All methods were performed following the relevant guidelines and regulations.
Availability of data and materials: Data will be available on request. The corresponding author will submit all dataset files.
Competing interests: None
Funding: No funding source is involved.
Authors' contributions: All authors read and approved the final manuscript.

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