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Corelation of differential pattern of laptop use and associated musculoskeletal discomfort among students and academicians in Surat

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Abstract

Introduction: The prevalence of musculoskeletal discomfort resulting from musculoskeletal disorders is on the increase especially with increased use of laptops. Neck pain and laptop users are clearly connected due to extended periods of sitting in a certain position with no breaks to stretch the neck muscles. Prolong laptop use with neck bend forward, will cause the anterior neck muscles to gradually get shorter and tighter, while the muscles in the back of neck will grow longer and weaker. These changes will lead to development of the neck pain.

Materials and Methodology: For this study, data was collected by using slump questionnaire from 107 students pursuing graduation, Post-graduation and academicians using laptop. Google form was made up with slump Questionnaire. The link was shared to the participants via e-mail and responses were collected. Pearson correlation test was performed to identify relationship between musculoskeletal disorder and different patterns of laptop use.

Result: Result showed that there is high prevalence of neck pain due to laptop use among student's and academicians.

Conclusion: There was positive correlation between differential patterns of laptop use and musculoskeletal discomfort.

Keywords: neck pain, laptop users, prevalence, students' and academicians, musculoskeletal discomfort

Introduction

Musculoskeletal pain is a significant health problem not only in adults but also in the young [1]. A laptop is more convenient to carry due to its light weight, but students and academicians have been found to be predisposed to neck and shoulder problems. However, the use of laptop is increasingly prevalent in educational environments. Laptops are becoming so fast and powerful nowadays, that they are replacing desktop computers even in educational environments [2]. Problems that occur are pain & discomfort over neck, shoulder, elbow, forearms, wrist, fingers, upper and lower back as well as eye irritation and headaches. Neck pain is a common problem for people who spend a great deal of time using laptops. Duration of laptop use, frequency of breaks, method of key-board operation, and position of computer monitors, type and use of input devices are also associated with neck pain at work [3]. Most laptops have its screen hinged to the keyboard and it is not detachable, which may also result in awkward body postures, especially to the neck when in use. Because of its portability, the laptop can be used in various sitting and lying positions [4]. This leads to prolonged flexion at cervical spine with consequent higher activity in the cervical erector spinae and upper trapezius muscles, with a posture in which the trunk is slightly inclined backward. This leads to a consequent forward head and trunk flexion adopted as a fixed postural habit [6]. Poor posture and repetitive movement are often the source of laptop users' aches and pains. The fact that a laptop keyboard and monitor are attached and do not adjust independently of one another may force a user to choose between comfortable hand/wrist or head/neck postures [5].

The Student Laptop Use and Neck Pain Risk Questionnaire (SLUNPRQ) evaluates laptop use associated with neck pain risk in university students. It includes questions related to postures used for academic, recreational, and employment activities. The SLUNPRQ also measures duration of laptop use, frequency of breaks, and the use of external accessories. The test-retest reliability of the SLUNPRQ was evaluated in a sample of UOIT undergraduate students with a one-week interval between questionnaire administrations [7]. To my knowledge, the SLUNPRQ is the only questionnaire that focuses on ergonomic risk factors.

Several studies have been conducted on musculoskeletal discomfort on laptop use in various student and academicians in India. But very less study has been conducted which may highlight correlation of the musculoskeletal discomfort with the differential patterns of laptop use association among student's and academicians. Hence there is need of study, so we can assess the prevalence of musculoskeletal discomfort and its association with differential patterns of laptop use in quality of life in laptop users.

Aims and Objective

To find the prevalence of musculoskeletal discomfort in laptop users among students and academicians and to find correlation between musculoskeletal discomfort and differential patterns of laptop use.

Material and Methodology

Study design was Correlational study, Sampling technique used was convenient sampling .the study population comprised of normal, healthy individuals of either sex of 18-40 years of age. Sample size was 105 .Study duration was of 6 months. Study setting was Spb physiotherapy college, Surat.

Inclusion Criteria consisted of age group 18 to 40 years of both sexes. Students and academicians pursuing graduation & post-graduation in college using laptop.

Exclusion Criteria: Students who were not belonging to University, .Students who were not using laptop, .Uncooperative students any restriction of movement in upper limbs. Any history of Rheumatoid Arthritis. History of inflammatory joint disease, neurological disorder, injury to upper extremity by self-report, pregnant females were excluded from the study.

Materials and tools used were: Google forms for slump questionnaire Outcome measure

- Were prevalence of musculoskeletal discomfort via slump questionaerre
- Pain percentage via slump questionaerre
- Correlation between musculoskeletal discomfort and use of different type of laptop positions.

Procedure: 300 participants were invited for the study. Complete preliminary examinations were done for the subjects using self-administered questionnaire. The subjects were screened on basis of inclusion and exclusion criteria. The procedure was fully explained to the subjects in simple language which he/she could understand and written informed consent for the same was taken .Then google form was made which included slump questionnaire. The link was shared to the participants via e mail and the responses were collected. Total 107 responses were collected and evaluated.

Statistical Analysis: The statistical analysis was performed using SPSS version 20 .Descriptive statistics were carried out for the age, sex and outcome measures in the google form itself. Prevalence of musculoskeletal disorder was evaluated. Pearson correlation test was performed to identify the relationship between musculoskeletal disorders and differential pattern of laptop use. The level of significance was kept at $p \leq 0.05$.



Fig 1: Neutral

Fig 2: facing down

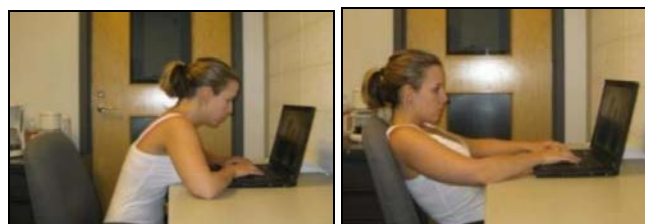


Fig 3: Slouching forward

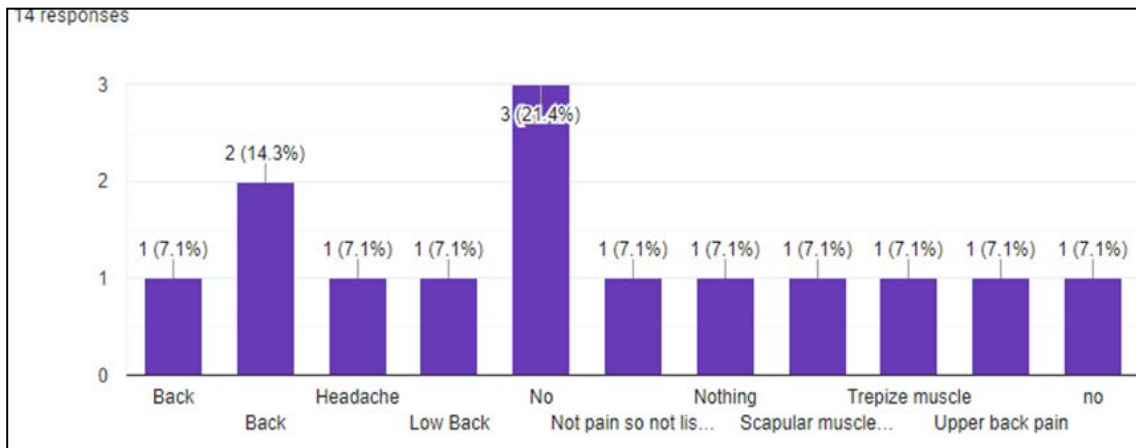
Fig 4: Slouching backwards



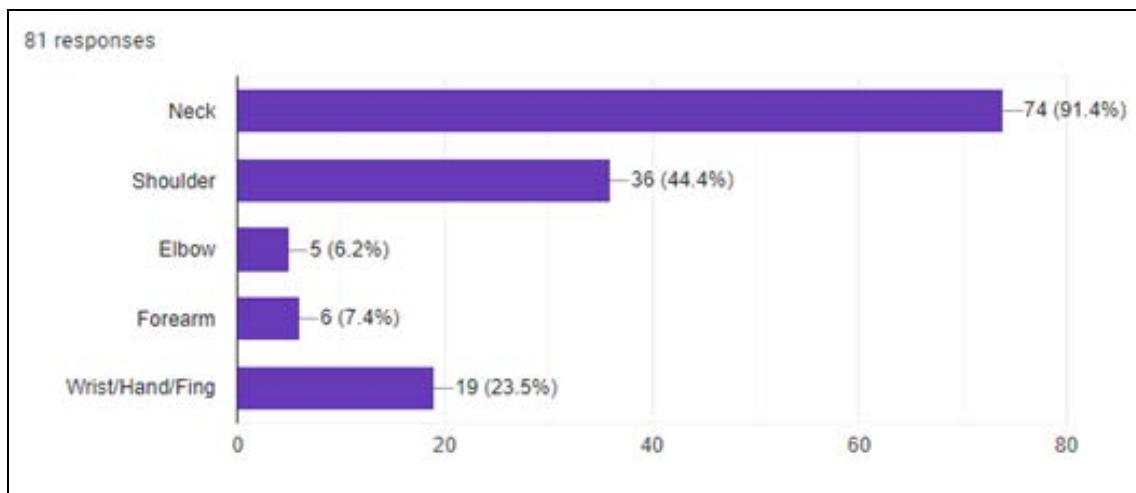
Fig 5: lying down

Result

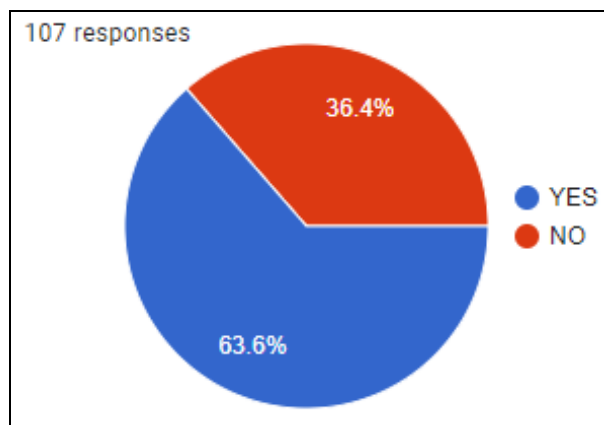
The study population comprised of 107 normal, healthy individuals of either sex of 18-40 years of age. The distribution of males (76.6%) and females (23.4%) in the study GRAPH 1. illustrates List of commonly affected areas of musculoskeletal discomfort. Graph 2.illustrates Region of pain or discomfort present after the use of a laptop. Graph 4. illustrates experience of pain or discomfort after using a laptop and how long do these symptoms last. Graph 3.illustrates -After using your laptop, do you experience pain or discomfort in your neck or upper extremities. Table 1. illustrates musculoskeletal disorder in different laptop use positions. Table 2 Illustrates percentage of subjects experiencing pain after using laptop. Table 3.illustrates correlation between musculoskeletal disorders and type of different laptop positions. Graph. 5. illustrates positive correlation between musculoskeletal discomfort and use of different type of laptop positions.



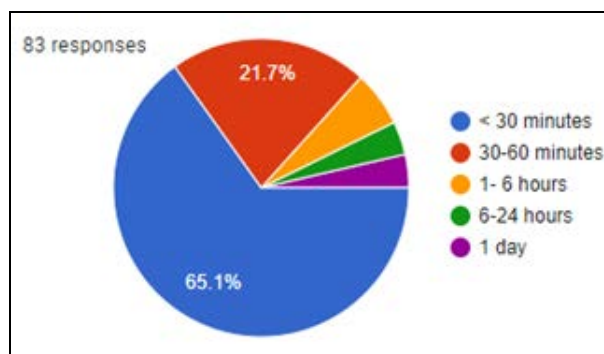
Graph 1: Illustrates List of commonly affected areas of musculoskeletal discomfort



Graph 2: Illustrates Region of pain or discomfort present after the use of a laptop



Graph 3: illustrates -After using your laptop, do you experience pain or discomfort in your neck or upper extremities



Graph 4: Illustrates experience of pain or discomfort after using a laptop and how long these symptoms do last

Table 1: Illustrates musculoskeletal disorder in different laptop use positions

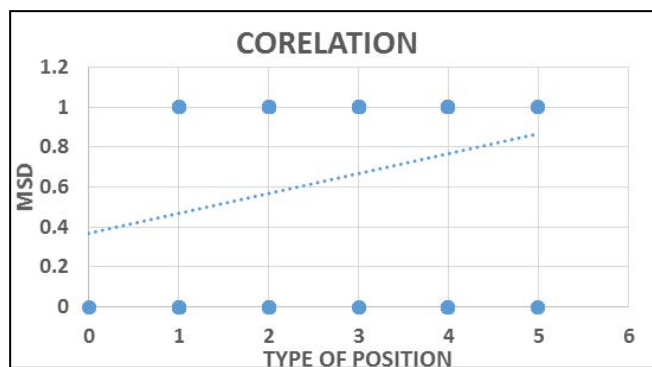
Musculoskeletal discomfort	option1	option 2	option 3	option 4	option5
Neck	2	10	6	4	4
shoulder		1	1		
neck,shoulder	2	8	6	7	
Wrist hand	1		1	2	1
Whole UL		1	5	8	
TOTAL	5	20	19	21	5
%	4.6	18.5	17.5	19.4	4.6

Table 2: illustrates percentage of subjects experiencing pain after using laptop

subjects	Percentage%
No pain	24%
pain	64.8%

Table 3: Illustrates correlation between musculoskeletal disorders and type of different laptop positions

MSD	N	Pearson corelation	Significance
Type of Position	107	.264	.006



Graph 10: Illustrates positive correlation between musculoskeletal discomfort and use of different type of laptop positions.

Discussion

The present study was done to find the prevalence of musculoskeletal discomfort and also to find the association of musculoskeletal discomfort with use of differential patterns of laptop. Jacobs *et al.* in 2009 studied that 75.8% of student population use laptops in their educational institutions ⁸. According to a study by Smith *et al.* it was noticed that there is increase in laptop ownership from 66% in 2006 to 88% in the year 2009 ^[11]. With increasing tendency of laptop use among students and academicians it is clear that research on the prevalence of developing MSDs due to laptop use is essential. It is very evident from the results of the present study that maximum pain or discomfort was experienced in neck (69.19%), than 44% in shoulder, about 6.2% in elbow, 7.4% in forearm and 23.5% in wrist hand and fingers . According to a study by Kumari and Pandey (2010) it was also observed that similar type of result with 80% of participants were facing symptoms in neck, back, wrists, forearms, elbows followed by eye strain (42%) during the usage of computer. Kumari and Pandey (2010) also found that prolonged sitting in awkward or poor postures were the common causes of these symptoms ^[8]. Due to less ergonomic awareness student population and academicians adopts poor posture while working on laptop which leads to discomfort and pain. In the present study, 25.7% of students adopted a posture of facing down, 22.9% adopted a posture of slouching

forward and 24.8% of the students adopted a posture of slouching backward, 8.5% of students adopted a posture of lying on stomach while performing recreational activities. For academic and work related purposes, majority of students adopted slouching forward posture. A study by Moffet *et al.* (2002) also supported the result showing impact of two work situations (Laptop and desktop) on muscle activity and neck postures of individuals. They observed that during the use of laptop individuals bend their head forward, had more back trunk inclination and wrist extension, resulting in more symptoms in back, wrist and neck. In the present study also, subjects suffered with upper back pain, trapezius, scapular pain and low back pain apart from upper limb and neck pain. Straker *et al.* (1997a) also reported that users of laptop tried to assume posture that would compromise their typing posture by increased neck, shoulder and elbow flexion. They adopt this posture in order to see a lower screen and reach a higher keyboard ^[9]. Harbison and Forrester (1995) also found that laptop users required increased forward head inclination because of lack of adjustability of laptop screen ^[14]. From the results, it was also found that majority of students do not prefer to use computer accessories which might result in more pain and discomfort. About 55% to 75% subjects did not use external monitor while using laptop for academic, recreational or work related purpose. Also 43% to 58% of the subjects did not use external mouse. Kumari and Pandey (2010) also support the use of various computer accessories like- adjustable keyboard tray, foot rest, Best-fit computer mouse design, task lighting and docking station which can help in preventing the health related symptoms ⁸. It was observed in the present study that majority of student population took breaks during extended periods of using laptop. Results showed that 42% of students take break for less than 15 minutes for recreational purposes, 50% for academic and 40% of students for work related purposes. The overall result shows that majority of students take break for less than 15 minutes during working on laptop. Menendez *et al.* in 2008 also supported results that taking breaks for less than 15 minutes was negatively associated with any symptoms. This brings attention to the idea that smaller breaks may be as beneficial or, possibly, more beneficial than larger breaks when computing ^[10]. In the present study it was found that about 63.6% subjects suffered pain after using laptop .The present study also showed that more musculoskeletal discomfort (19.4%) was found in position slouching backward and 18.5% musculoskeletal discomfort was found with facing down position. In the present study positive correlation was found between musculoskeletal discomfort and differential patterns of laptop use. A study done by Ariens *et al.* also found a positive relation between neck flexion and neck pain, suggesting an increased risk of neck pain for those who spent a high percentage of the working time with the neck at a minimum of 20 degree of flexion ^[13].

Conclusion

The present study concluded that there is high prevalence of neck pain (69.19%) due to laptop use among the students and Academicians. The discomfort or pain lasted for at least less than half an hour after laptop use. The students adopted poor postures such as slouching forward, and facing downward and slouching backward during working on laptop. There was a positive correlation between musculoskeletal discomfort and differential patterns of laptop use.

Limitations of Study

The limitation of the study is the sample size. • In addition it is a self-reported study and possible that the respondents might have given vague answers or exaggerated their musculoskeletal problems. • This study is limited only to prevalence of neck, shoulder and low back pain. Perhaps in future it should cover up its associated risk factors. • The number of respondents should have in large numbers to reflect more accurate and efficient findings.

Future Recommendations

Future research can be focused on the effects of ergonomical advices & modifications at the work site to reduce risk of neck pain in laptop users. • Future research should include identifying the causes of neck pain so that appropriate primary prevention strategies may be developed.

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