



Prevalence of Discomfort and Visual Strain Due to the Use of Laptops among College Going Students in Hyderabad

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Authors' contributions

This work was carried out in collaboration between all authors. Author MRD collected the data, performed the statistical analysis and prepared the first draft. Author VVL designed the study, guided the student and corrected the manuscript. Author MGD managed the literature search, carried out all the corrections and made the final draft. All authors read and approved the final manuscript.

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ABSTRACT

Laptop computers are mostly used by all society members and it has become an integral part of the student community. This study investigates the prevalence of discomfort and visual strain symptoms among college students. A sample of 15 students between the age of 20-25 years from the Home Science College, PJTSAU were selected as respondents. One third of respondents were using laptops for more than 2-4 hrs. Ninety three per cent of respondents experienced lower back pain followed by neck and wrists/hands. Majority of the respondents experienced visual strain like burning sensation, blurred vision and swelling of the eyes. Uses of real keyboards, separate mouse can reduce the incidence of postural discomforts or pain.

Keywords: Laptop; college students; postural discomfort; visual strain.

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1. INTRODUCTION

The use of laptop computers in an educational environment is gradually increasing. Laptop is generally used by college going students for academic activities (projects, presentation and assignments) and for leisure time activities (playing games, watching movie and communicating with friends). Laptop computer users frequently assume inconvenient postures when using laptops. These postures include lying on the floor, placing the laptops on ones lap, slouching back ward and slouching forward [1].

It may be noted that the laptops are not designed for elongated or constant use [2]. Absolutely, this has resulted in a sequence of illnesses affecting different parts of the body which includes pain in the neck, upper back, hands and wrists, numbness, swelling and tingling sensation [3]. It was also witnessed that a migraine, damages to the spine and nerve related alignments are increasing among the students' community [4]. With the growing use of laptops by students in colleges, it is clear that the college student population potentially at higher risk of neck and upper limb pain. So the present study is directed to determine the use of laptop computers by college students and assess the postures adopted for laptop use for various purposes, the length of time laptop was used, and use of laptop accessories.

2. REVIEW OF LITERATURE

In general, computer operators spend long hours at their computers without adequate breaks. And while most people consider their hands, wrists, arms, and fingers as being used most, the neck and shoulder generally maintain static posture [5]. The prevalence of MSD/MSS for the neck/shoulder is higher than for the hand/arm among desktop computer operators. These differences may result from the different movements of muscles and patho-physiological reactions between hand/arm and neck/shoulder regions because the neck/shoulder muscles are more static than hand/arm muscles during computer work.

Laptop computers associated with awkward postures is the design and construction of laptop computers that violate basic ergonomic requirements; namely that users can change the positions of the keyboard and monitor independently for an appropriate viewing and typing angle. Most current laptop computers

have their monitors fixed to the main body of the keyboard with a hinge, so users cannot adjust the position (e.g., angle, height, and distance) between keyboard and monitor [2,6,7]. This lack of flexibility in the arrangement of components may restrict the users from assuming a comfortable position while operating their laptop computers.

It was found that physical discomfort experienced by laptop computer operators might be from the variety of non-traditional laptop workstation setups that may put their body into awkward postures. For example, lying prone may induce a laptop computer operator to increase their neck extension and muscle load of neck and shoulder to sustain the position [2].

Laptop computer operators flexed their neck more than desktop computer operators. Since laptop computer devices cannot be adjusted, subjects' awkward body postures may increase biomechanical overload on the muscle tissues [8,6].

The amount of time spent engaged in continuous computer work has been mentioned as a risk factor for MSD/MSS of the neck, shoulder, and upper limbs. It was revealed that the duration of computer use, particularly for more than 4hours per day, was significantly associated with MSS [9,10].

Although laptop computers have been getting lighter and smaller, many people carry them with other supplementary accessories, such as power supply cords, spare batteries, or external peripherals; adding weight to their laptop bag. The handling of a laptop bag with heavy loads, particularly if it continues for long periods of time, is a potential risk factor for MSD/MSS [11].

Majority of undergraduate students in Cornell University complained about neck pain due to the use of lap tops. Fore arm and wrist pain were the other problems faced by them [12].

3. METHODOLOGY

Fifteen students (girls) of the Home Science College, PJTSAU in Hyderabad were identified as respondents in the study who were in the age group of 20 to 25 years. The respondents were purposively selected as a sample because all the respondents were hostellers and accessibility of respondents was easy. The interview schedule was used to study the discomforts in body parts

and visual strain symptoms experienced by the respondents.

4. RESULTS

4.1 Socio-demographic and Socio-Economic Information, (Table 1)

The demographic information of respondent shows that out of 15, the majority of the respondent who used laptop was under the age of 22 years. Among 15 respondents, 73.3 per cent were using laptop more than 2-4 hours, 13.3 per cent were using for less than 2hrs while the remaining 13.3 were using above 4 hours.

4.2 Prevalence of Discomfort

Most of the students preferred to use the laptop on the bed rather than the table and chair but prolonged use of laptop leads to postural discomforts (Table 1). Respondents suffered frequently from musculoskeletal health problems like pain or postural discomfort in lower back (93.3%) and neck (86.6%) followed by wrist or hand (66%) and buttock (60%) after usage of laptop as shown in the Table 2.

Table 1. Socio-demographic and socio-economic information

n =15		
S. no	Parameters	Frequency (%)
1.	Age	
	20-22 years	10(66.6)
	23-25 years	5(33.3)
2.	Educational qualification	
	Graduation	8(53.3)
	Post-graduation	7(46.6)
3.	Duration of using laptop	
	> 2 hrs	2(13.3)
	2-4 hrs	11(73.3)
	<4 hrs and above	2(13.3)
4.	Workstation	
	Table and chair	3(20)
	Bed	12(80)

4.3 Prevalence of Visual Strain Symptoms (Table 3)

Respondents reported the problems regarding vision such as burning sensation (73%), eyes becoming red/pink (73%) with a higher percentage rather than swelling (46.6%) and blurred vision (53%).

Table 2. Prevalence of discomfort

n =15		
S. no	Body parts	Frequency (%)
1.	Neck	13(86.6)
2.	Shoulder	5(13.3)
3.	Elbows	1(6.6)
4.	Wrist/hands	10(33.3)
5.	Lower back	14(93.3)
6.	Hips/thighs/buttocks	9(60)
7.	Knee	4(26)
8.	Ankles/Feet	7(46.6)

Table 3. Prevalence of visual strain symptoms

n =15		
S. no	Parameters	Frequency (%)
1.	Burning sensation	11(73.3)
2.	Swelling	7(46.6)
3.	Blurred vision	8(53.3)
4.	Becoming pink/red	11(73.3)

5. DISCUSSION

Since respondents were using non-traditional laptop furniture like bed, chair without armrest, laps, stools, sitting on floor etc. and this leads respondents to adopt postures like forward bending, greater forward neck flexion, head tilt and crossed leg and puts static load on buttock, shoulder and back. Hands were not getting proper arm rest and this puts more pressure on shoulder and wrist. Respondents were adopting a prolonged static posture of neck and shoulder, and this can increase the severity of MSDs on this particular body parts.

This finding is supported by Kumari and Pandey [3] who observed the similar type of result with 80 per cent of respondents were facing symptoms in the neck, back, wrists and forearms pain. Kumari and Pandey [3] stated that prolonged sitting in awkward or poor postures were the common causes of these symptoms. Harris and Straker [2] also opined that physical discomfort experienced by laptop computer operators may be from the variety of non-traditional laptop workstation setups that may put their body into awkward postures. For example, lying prone may induce a laptop computer operator to increase their neck extension and muscle load of neck and shoulder to sustain the position.

Students were using laptops either in dark room or bright room. So this leads to headache when the computer screen was very bright and complaints of dry eyes were more among students using darker screen. It has been suggested that screen brightness and contrast should be adjusted to provide balance with room lighting and maximum visibility.

Visual complaints were more among students because they did not take frequent breaks from the computer. This can be explained by the fact that accommodation is an active process and stationary position of the eyes can lead to fatigue of accommodation. Relief can be obtained from continual visual accommodative spasm and glare from the monitor by varying the focal point of the user.

6. CONCLUSION AND RECOMMENDATIONS

The present study concluded that there is a high prevalence of lower back (93%) and neck pain (86.6%) due to laptop usage among college going students. They had also faced visual strain symptoms like burning sensation, swelling and blurred vision due to the long usage of laptop. Hence, it is recommended that the user should take visual rest by looking at a distant object away from the screen at least once every $\frac{1}{2}$ to 1 hr to overcome the visual strain symptoms. It is also suggested that when a person is working with the computer, needs to take a break after every 20 minutes and look at 20ft distance for 20 sec and also recommended that user needs to get up for a minute and sit while working with the computer. Use of real keyboard and separate mouse is recommended to avoid awkward posture of wrist and hands.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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