

Formal to Casual- Usage of Laptop Among Students- An Eye Opener

S. PAUL SILVIAN¹, PRIYANKA G², SAYEDA BEGUM³, I GO P KX" LQ[⁴
AND UUGP VJ K" MWO CT⁷

¹Department of Medical Rehabilitation Sciences, College of Applied Medical Sciences, King Khalid University, Abha, KSA

²VIT-Business school VIT University Vellore, TN, India

³Saudi Electronic University Abi Bakr As Siddiq Branch road Jeddah, KSA

⁴Department of Technology Management, School of Mechanical Engineering, VIT University, Vellore, India

⁵College of Physiotherapy Dr. Vyaghreswarudu institute of physical medicine Thimmapuram, Vizag, India

Received: March 05, 2016| Revised: March 11, 2016| Accepted: March 13, 2016

Published online: April 04, 2016

The Author(s) 2016. This article is published with open access at www.chitkara.edu.in/publications

Abstract The number of college students using laptops is on the rise so is the musculoskeletal disorders reported. This research tries to understand whether university students in India have the same discomfort level as reported in prior studies. The study tries to evaluate the role of parameters like postural adaptation, time related parameters like duration of laptop usage, frequency of rest breaks and the predisposition of MSD among the students. And it is found that neck pain is the most common pain among Indian college students. And that MSD is caused by poor postural adaptation, time spent on the laptop as well as lack of proper ergonomic knowledge.

1. INTRODUCTION:

Laptops have become one of the major part of life where today it has replaced the predominant use of desktops. Though many organizations still work on desktops, most of the employees prefer to work on laptops outside office hours. There are organizations that provide employees with laptops in the place of desktops, now a days. In a management institute the students are mandatorily required to have laptops and are expected to carry it around for completion of academic works. There are a number of researchers who tried to elucidate on the

Journal of
Multidisciplinary
Research in Healthcare
Vol-2, No-2,
April 2016
pp. 149–156

Silvian, SP
Priyanka, G
Begum, S
Kumar, S

negative effects of using computers, and have established that musculoskeletal disorders arise as a side effect. Musculoskeletal disorder (MSD) can also be called an ergonomic injury or illness. MSD does not include injuries occurring as a result of falls, slips or any similar accidents. In other words it occurs as a result of bending, twisting, reaching which is characterized by over exertion and repetitive motion. It affects nerves, muscles, tendons and even support structures of the body (sometimes affect the joints of the body and even spinal disc).

Prior studies have found that college going students are prone to MSD due to prolonged, static inactivity present in them [5, 7, 13, 8]. “Students are at risk for MSD, because of student behavior, laboratory arrangements, a lack of emphasis on posture in the curriculum, and the attitudes/perceptions of faculty and administrators” [13]. [10] have also reported discomfort among college students after prolonged sitting hours. In a questionnaire administered by [15] they revealed that there is a deficiency of research pertaining to the relationship between laptop use and musculoskeletal injury, with the majority of previous work focusing on desktop computers. [2], reported that laptops come with a unique challenge, due to their size and adjustability. Laptops when placed on a standard desk, the resulting height of the keyboard is much higher than what is recommended to maintain a neutral posture, and often results in deviations of the wrists elbows, and/or shoulders, thereby increasing the chances of MSD. These challenges would result in postural discomforts like neck pain, shoulder back and even wrist pain for the user. They also result in neck flexion and forward head tilt, and substantial flexion in both the cervical and thoracic spine segments than desktop computer users [18, 19].

2. POSTURAL ADAPTATION

It is a very common sight in universities to find students sitting on pavements, canteens where ever they find place to sit with their laptops. Postural adaptations while using laptops can be a risk factor to developing MSD among children and teens. Australian researchers have shown that students using laptops maintained potentially stressful postures [7]. Other postures described included lying prone, sitting on the floor and sitting with the computer in the lap.

3. TIME DURATION:

[14] evaluated effects of active and passive pauses among twelve healthy male subjects who performed four sessions of computer work for 10 min in one day, with passive (relax) and active (30% maximum voluntary contraction of shoulder elevation) pauses given every 2 min at two different work paces (low/high), and proved that higher duration of laptop activity can lead to MSD.

4. ERGONOMICS KNOWLEDGE

Research has determined that ergonomic education relative to laptop use among students is effective in improving their understanding of postural and physiologic need. [6], conducted a study with a single-subject, multiple baseline design with five participants. They found that ergonomic education paired when with workstation and behavioral adjustment improved individuals body awareness. This also would lead to correct ergonomic posture when seated at their workstation. Results indicate that ergonomic education when paired with workstation and behavioral adaptation, contributes to improvements in correct body posture. Thus educational ergonomics can reduce MSD occurrence [16].

The main objective of this research is to find out the role of each of these predictors and their contribution to specific MSD pain.

5. METHODOLOGY

200 professional college students took part in this single cross sectional descriptive study. The inclusion criteria being use of laptop for more than 8 hours and exclusion criteria was that 1) any persons with fracture 2) dislocations or acute inflammatory problems 3) intake of analgesics. A 23 item questionnaire was developed for the purpose of this study. The questionnaire was divided into three sections, the first section being demographics, the practice of students while using laptop and the third section constituted the laptop related musculoskeletal problems. The practice of students, while using the laptop for ex: bending while using the laptop, lying down and using the laptop, keeping the laptop on the lap while using it etc were measured, along with the amount of time spent outside classroom hours on laptop. The amount of ergonomics knowledge they have is also measured.

6. RESULTS

Among the 200 respondents most of the respondents pointed out that they have neck pain while using laptop. Neck pain is the most common laptop related problem faced by today's college students.

In order to understand the underlying patterns of the items an exploratory factor analysis using a principal component analysis is performed. It is seen that the items loaded on the three constructs chosen, posture, time spent and ergonomic knowledge of the students. The three factors together accounts for 54.725% variability of the items.

In order to understand the significant contributor to pain, a MANOVA is used.

Silvian, SP
Priyanka, G
Begum, S
Kumar, S

Pain Areas	Percentage
Neck pain	51%
Back pain	23%
Eyes	12%
Wrist	7%
Fingertips	5%
Hip	2%

Items	Posture	Time	Ergonomic knowledge
Bending while using the laptop	0.360		
Usually sit and use laptop	0.513		
Usually lie on bed while working on laptop	0.628		
Usually put laptop in your lap	0.335		
Usually sit on the floor	0.731		
Knowledge about MSD Problems			0.480
Other students of your age have knowledge of MSD?			0.796
Heard about ergonomic postures?			0.709
Rest to body frequently while using laptop		0.585	
Think that hours spent is more		0.548	
Fail to take minimum of 2hrs break while using laptop?		0.646	

7. DISCUSSION

It is evident from the analysis that body pain is caused by poor postural

Independent Variables	Constructs	Dependent Variable	F	Sig. p<0.05	Formal To Casual-Usage of Laptop Among Students- An Eye Opener
Postural Adaptation	Bending while using	Neck	4.258	.043	
		Back	13.862	.000	
	Sitting while using	Neck	6.356	.025	
		Back	23.235	.001	
	Lying on bed while using	Back	12.323	.000	
		Eyes	7.869	.013	
		Hip	6.901	.015	
		Wrist	14.897	.000	
	Laptop in the lap	Neck	8.411	.045	
		Back	14.124	.001	
Eyes		1.989	.032		
Sit on the floor		Back	8.925	.005	
		Neck	7.988	.044	
	Eyes	13.440	.000		
Ergonomics Knowledge	Lack of knowledge of MSD	Hip	15.015	.000	
		Fingertips	14.313	.000	
		Neck	10.567	.002	
		Back	9.346	.003	
		Eyes	37.123	.000	
Time Spent	Ergonomic postures	Neck	24.248	.001	
	Rest break	Back	18.346	.000	
	Hours spent is more	Neck	15.654	.032	
		Take 2 hours rest	Neck	17.287	.014
		Back	19.389	.003	
		Eyes	7.858	.000	
		Wrist	4.819	.000	
a. R Squared = .517 (Adjusted R Squared = .488)					
b. R Squared = .598 (Adjusted R Squared = .523)					
c. R Squared = .685 (Adjusted R Squared = .611)					

Silvian, SP
Priyanka, G
Begum, S
Kumar, S

adaptations, time spent on the laptop as well due to lack of ergonomic knowledge. Back and neck are found to be affected while the student bends a lot as well as when they sit down while using the laptop. Lying on the back as well as sitting on the floor creates the most of pain, it affects all areas like neck, back, eyes, wrist, hips and even pain on the finger tips. Lack of ergonomic knowledge leads to more neck pain, back pain as well as strain on eyes. All these constructs together contribute to 61% of MSD pain. The time spent on the laptop is a major cause of neck, back, eyes and wrist pain. It is seen that over time, any postural adaptation might lead to MSD. Muscles would get tired faster in awkward postures, even when the work activity does not demand high muscle forces. This might take some time before they become cumulative trauma and lead to severe debilitations. [1] reported a relationship between neck pain and sedentary sitting posture as well as twisting or bending of the trunk. However, little is known about the rest breaks taken by students, or the variety of postures they adopt. It is also important to note that many students prefer to use laptops on bed, lying down or sitting on the bed. These can be considered as habitual postures. Changes in habitual posture could be of greater consequence that such postures may lead to more prolonged periods of altered spinal loading. While assessing ergonomics hazards, [12] has found that impact varies greatly depending on the combination of frequency, duration and cumulative time of exposure, as well as rest and personal characteristics of the individual. [3] has reported that duration of use without a break may be a more significant risk for musculoskeletal disorders. It might be due to the strain caused by sustained and static demands and these are implicated strongly in disorders of the neck or upper extremities. [10] found daily computer usage to be 2.9 hours for university students. [9] reported it as 3.2 hours. Daily computer usage was found to be 3.1 hours and weekly computer usage, 21.5 hours, which conforms to literature as reported by [4, 17], in their study found that only 44% of student awareness about ergonomics. They were ready to read and understand about ergonomics but were reluctant to practice ergonomics though.

CONCLUSION

Laptops are made for portability, greater flexibility and access to information, which is a boon to today's technology savvy generation. While enjoying the fruits of such technological advancements it is important to be aware of the disadvantages of improper management and use of laptops. Though many students are aware of ergonomics, they exhibit poor postural adjustments and improper time management constituting to a majority of MSD problems.

The need for conscientizing the coming generations about the ergonomic recommendations they need to keep in mind while using laptops is imperative.

Formal To Casual-
Usage of Laptop
Among Students-
An Eye Opener

REFERENCES

- [1] Ariëns GA et al. Physical risk factors for neck pain. *Scand J Work Environ Health*. 2000 Feb;26(1):7-19. <http://dx.doi.org/10.5271/sjweh.504>
- [2] Asundi, k., odell, d., luce, a. & dennerlein, j. T. 2010. Notebook computer use on a desk, lap and lap support: effects on posture, performance and comfort. *Ergonomics*, **53**, 74-82.
- [3] Bernard, B., Ed. (1997). *Musculoskeletal Disorders in the Workplace* (PB97-178628). Washington D.C.: National Institutes for Occupational Safety and Health.
- [4] Bilge Calik (2014). Upper extremities and spinal musculoskeletal disorders and risk factors in students using computers. *Pak J Med Sci*; Nov-Dec;30(6):1361-6.
- [5] Dockrell S, Bennett K, Culleton-Quinn E 2015. Computer use and musculoskeletal symptoms among undergraduate university students. *Computers and Education*, 85: 102-109. <http://dx.doi.org/10.1016/j.compedu.2015.02.001>
- [6] Gravina, N., Lindstrom-Hazel, D. and Austin, J. (2007). The effects of workstation changes and behavioural interventions on safe typing postures in an office. *Work*, **29**, 245-253
- [7] Harris, C. and Straker, L., 2000. Survey of physical ergonomics issues associated with school children's use of laptop computers. *International Journal of Industrial Ergonomics*, 26, 337-347. [http://dx.doi.org/10.1016/S0169-8141\(00\)00009-3](http://dx.doi.org/10.1016/S0169-8141(00)00009-3)
- [8] Laeser, K., Maxwell, L., & Hedge, A. (1998). The effect of computer workstation design on student posture. *Journal of Research on Computing in Education*, 31(2), 173-188 <http://dx.doi.org/10.1080/08886504.1998.10782249>
- [9] Menendez C, Amick III BC, Jenkins M, Janowitz I, Rempel DM, Robertson M, et al. Multi-method study evaluating computing-related risk factors among college students. *Work*. 2007; **28**(4):287-297.
- [10] Peper E, Gibney KH. Computer related symptoms: a major problem for college students, 1998. From <http://www.tifaq.org/articles/computer-related-symptoms-peper-gibney.html>.
- [11] Peper, E., & Gibney, K. H. (2000). Computer-related symptoms: A major problem for college students, [research report]. [www.tifaq.com](http://www.tifaq.com/articles/computer_related_symptoms-peper_gibney.html). Available: www.tifaq.com/articles/computer_related_symptoms-peper_gibney.html [2000, 2/28/00].
- [12] Punnett L, van der Beek AJ. A comparison of approaches to modeling the relationship between ergonomic exposures and upper extremity disorders. *American Journal of Industrial Medicine*. 2000;37:645-655. [http://dx.doi.org/10.1002/\(SICI\)1097-0274\(200006\)37:6<645::AID-AJIM9>3.0.CO;2-#](http://dx.doi.org/10.1002/(SICI)1097-0274(200006)37:6<645::AID-AJIM9>3.0.CO;2-#)

Silvian, SP
Priyanka, G
Begum, S
Kumar, S

- [13] oyster L, Yearout R. A computer in every classroom – are schoolchildren at risk for repetitive stress injuries (RSIs)?. In: Lee GCH editor. *Advances in occupational ergonomics and safety*. Amsterdam: IOS Press; 1999. p. 407–12.
- [14] Samani A, Holtermann A, Sogaard K, Madeleine P:2009. Active pauses induces more variable electromyographic pattern of the trapezius muscle activity during computer work. *Journal of Electromyography and Kinesiology*.
<http://dx.doi.org/10.1016/j.jelekin.2008.11.011>
- [15] Schlossberg EB, Morrow S, Llosa AE, Mamary E, Dietrich P, Rempel DM. Upper extremity pain and computer use among engineering graduate students. *Am J Ind Med*. 2004;46:297–303. <http://dx.doi.org/10.1002/ajim.20071>
- [16] Sears JM, Bowman SM, Hogg-Johnson S. Using injury severity to improve occupational injury trend estimates. *American Journal of Industrial Medicine*. 2014 May 8. DOI: 10.1002/ajim.22329. [Epub ahead of print] PMID: 24811970
<http://dx.doi.org/10.1002/ajim.22329>
- [17] Shantakumari N, Eldeeb RA, Sreedharan J, Gopal K. Awareness and Practice of Computer Ergonomics among University Students. *Int J Med Health Sci*. 2012; 1(4):15-20.
- [18] Straker, L., Jones, K.J., Miller, J., 1997. A comparison of the postures assumed when using laptop computers and desktop computers. *Appl. Ergon*. **28(4)**, 263e268
- [19] Szeto, G.P., Lee, R., 2002. An ergonomic evaluation comparing desktop, notebook, and subnotebook computers. *Arch. Phys. Med. Rehabil*. **83(4)**, 527e532.