

Association between Hours of Online Class Work and Musculoskeletal Problems among the Physiotherapy College Students in Delhi

Megha Rana¹, Shaheen Khanum², Mohd Asif²

¹Research Scholar, Banarsidas Chandiwala Institute of Physiotherapy, Delhi.

²Assistant Professor at Banarsidas Chandiwala Institute of Physiotherapy, Delhi.

Corresponding Author: Shaheen Khanum

DOI: <https://doi.org/10.52403/ijhsr.20220421>

ABSTRACT

Background: The objective of this study was to know if there is an association between the Online class work hours and the musculoskeletal health among physiotherapy students. This study helped us to find out the correlation between these two and shows us the pain prevalence of different region.

Objective: Association between hours of online work and musculoskeletal problems among the physiotherapy college students in Delhi.

Methodology: The data was collected by convenient sampling, around 220 subjects were approached, out of which 157 responded and 155 subjects fulfilled inclusion criteria. The aim of the study was explained via email. The subjects were provided with a consent form and questionnaire. The data collected was arranged into 3 groups, students who study online for 0-3 hours, the students who study online for 4-7 hours, the students who study for more than 7 hours. To evaluate overall muscular health, MSK-HQ scale was used, to record the painful areas Nordic Musculoskeletal Health Questionnaire was administered and to record the intensity of pain Numeric Pain Rating Scale was used. The correlation of these questionnaires with number of working hours was checked

Result: Neck was found to be the most pain prevalent area Negative correlation was found between MSKHQ and working hours.

Conclusion: This study indicates that with the increasing number of working hours the MSKHQ score decreases and neck pain is most prevalent among the responders.

Keywords: Upper Crossed syndrome, Muscular Imbalance, LBP, online classes, musculoskeletal pain

INTRODUCTION

With the growing use of technology, risks regarding musculoskeletal health have also been increased which is somewhat associated with the prolonged use of these technical devices (laptop, mobiles, tablets and desktops). The usage of online classes and internet has been increased amid this pandemic, which requires a long duration of sitting position. ^[1]

Usually most of the students require to sit for a long duration to do their internet related work and this prolonged duration can cause various musculoskeletal

problems. long duration of sitting can cause the lack of spinal mobility which puts a stress on the back, neck and legs leading to joint stress and fatigue. The improper way of sitting like leaning forward can overstretch the ligaments hence causing the bad posture. ^[2]

A recent study showed that prolonged usage causes faulty posture such as forward neck posture, slouched posture, or rounded shoulders^[3]. Sustained forward neck posture can cause injury to the structure 3 of the cervical and lumbar spine, as well as ligaments^[4, 5] Sitting in front of

mobile, laptops or for long hours causes slouched posture, rounded shoulders, forward neck posture and other related Musculoskeletal (MSK) problems.

Using smartphones is related to increased cervical angles [6,7]. And on the top of that, the students who are under constant academic stress are more prone to develop postural imbalance which is very clearly explained by the theory of Tension Myositis Syndrome where the emotional stress causes the vasoconstriction, hence making the muscles go hypo-perfused which causes them to get tensed and to develop spasm. [3]

In a different study it was reported that slouching down for a long period of time causes upper crossed syndrome (UCS), where the neck is forward bend and the back is slouched. Those presented with UCS have a shortened or contracted neck flexor, trapezius lower fiber, and rhomboid (rhomboid and contracted trapezius upper fiber levator scapula, pectoralis major, and pectoralis minor). [8]

The smartphone users tend to make large angles of head flexion while holding the smartphone and during the usage the muscle activity of neck extensors is increased. [9] Sitting for a longer period can put a strain on the muscle. [10]

The slouched posture which the shoulders assume can increase the muscle activity and is associated with fatigue. [11] Postural fatigue in the neck, shoulders, arms, or persistent pain or discomfort in soft tissues surrounding the neck and shoulders can be there. [12] The long term, lower intensity stress and improper posture are believed to cause neck pain. [13]

A similar cross-sectional study done by Carole James et al investigated musculoskeletal discomfort and computer use in university staff, through the use of online questionnaires. Looking at the large number of data available in the studies regarding screen-time affecting the musculoskeletal health of adult, in this study we want to find out if the screen time affects the musculoskeletal health of young adults,

the same way it was affecting the health of older adults. [14]

MATERIAL AND METHOD

The study design was observational having 155 subjects taken from Delhi NCR. The inclusion criteria was college students exposed to online classes and other internet related work. [8] with age between 18 to 25. [15], the subject must be having theory and practical classes only in online mode, must understand English. and can be male and female. The exclusion criteria included any orthopaedic trauma [7], any neurological disorders. [7, 16], subjects including structural deformities (e.g., scoliosis, kyphosis or any other deformity). [13, 16], degenerative conditions (e.g. osteoarthritis, inflammatory arthritis). [7,16], usage of braces [17], recent or scheduled surgeries [7], participants with radiating leg pain, or referred pain extending past the knee in reports and LBP specific pathology (e.g. Cancer, ankylosing spondylitis, or disc herniation). [16]

The duration of smartphone /desktop/laptop usage was noted and the outcome measures used were Nordic musculoskeletal questionnaire to identify the areas of the body causing musculoskeletal problems [18], Numeric Pain Rating scale to rate the score of each joint, [19] Musculoskeletal Health questionnaire to assess level of disability [20]

Procedure

The data was collected by convenient sampling, around 220 subjects were approached, out of which 157 responded and 155 subjects fulfilled inclusion criteria.

The aim of the study was explained to the subjects via email.

The subjects were provided with a google link which contained consent form and questionnaire.

The participants were divided accordingly on the basis of their number of online working hours. samples were divided into 3 groups

1. Students who study online for 0-3 hours

2. The students who study online for 4-7 hours
3. The students who study for more than 7 hours

To evaluate overall muscular health, MSK-HQ scale was used, to record the painful areas, Nordic Musculoskeletal Health Questionnaire was administered and to record the intensity of pain Numeric Pain Rating Scale was used.

Data Analysis

The data entry was done on Microsoft excel 2013 and statistical analysis was done by using SPSS software version 24. The demographic profile of age was analyzed by using descriptive statistic. The relationship between online hours and pain was done by using Karl Pearson correlation (r). The level of significance was set at $p = 0.05$.

RESULT

Of the total population of 220 students, 155 responses were collected, as they fulfilled inclusion criteria and gave their consent. Hence 70% responses were included in the analysis, out of which 41 students were there in slot A (0-3 hours), 74 students in slot B(4-7 hours) and 41 in slot C(more than 7 hours).

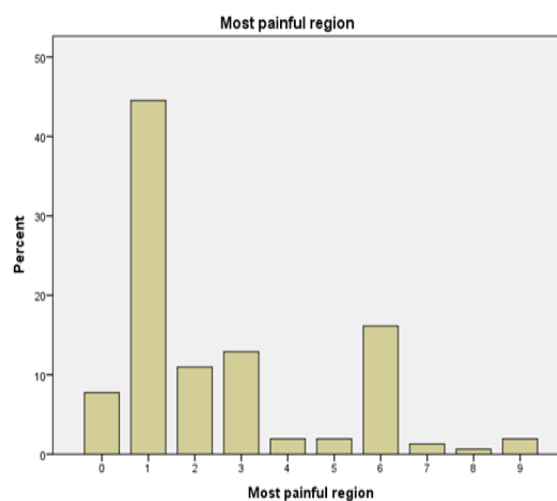
The maximum MSK-HQ score observed is 56 and the minimum MSK-HQ score observed is 14. The Karl Pearson coefficient for the correlation between the MSKHQ and the online work time is (-0.36) which shows a negative correlation between the two. The value for the Karl Pearson coefficient for NPRS and the online work hours is 0.03, which shows a positive correlation between the two.

Pearson's coefficient for MSKHQ and NPRS is (-0.644) which shows a negative correlation between the two. Out of 155, 69 respondents responded with neck being the most pain prevalent region, and ankle being the least with 0 responses and 12 students responded with no pain at all.

	Mean	Std. Deviation	Minimum	Maximum
Time in hours	5.735	3.0692	0.5	12.5
Time in minutes	343.26	185.390	15	750
MSK-HQ score	41.35	9.555	14	56
NPRS score	4.14	2.136	0	10

		MSK-HQ score	NPRS score
Time in hours	r value	-.367**	.300**
	p value	0.000	0.000
Time in minutes	r value	-.366**	.301**
	p value	0.000	0.000

	Frequency	Percent
No Pain	12	7.7
Neck	69	44.5
Shoulders	17	11.0
Upper back	20	12.9
Elbow	3	1.9
Wrist	3	1.9
Lower Back	25	16.1
Hip	2	1.3
Thigh	1	0.6
Knee	3	1.9



NIL	0
Neck	1
Shoulders	2
Upper back	3
Elbow	4
Wrist	5
Lower Back	6
hip	7
Thigh	8
Knee	9

Time (hours)	Pearson Correlation	1	.998**	-.367**	.300**	0.027	0.146
	Sig. (2-tailed)		0.000	0.000	0.000	0.738	0.070
	N	155	155	155	155	155	155
Time (min)	Pearson Correlation	.998**	1	-.366**	.301**	0.020	0.142
	Sig. (2-tailed)	0.000		0.000	0.000	0.803	0.078
	N	155	155	155	155	155	155
MSK-HQ score	Pearson Correlation	-.367**	-.366**	1	-.644**	-.292**	-.373**
	Sig. (2-tailed)	0.000	0.000		0.000	0.000	0.000
	N	155	155	155	155	155	155
NPRS score	Pearson Correlation	.300**	.301**	-.644**	1	.299**	.316**
	Sig. (2-tailed)	0.000	0.000	0.000		0.000	0.000
	N	155	155	155	155	155	155
No.of body areas painful 12M	Pearson Correlation	0.027	0.020	-.292**	.299**	1	.527**
	Sig. (2-tailed)	0.738	0.803	0.000	0.000		0.000
	N	155	155	155	155	155	155
No.of body areas painful SURVEY	Pearson Correlation	0.146	0.142	-.373**	.316**	.527**	1
	Sig. (2-tailed)	0.070	0.078	0.000	0.000	0.000	
	N	155	155	155	155	155	155

** . Correlation is significant at the 0.01 level (2-tailed).

DISCUSSION

As per the previous researches conducted, the expected result was that these devices had some effect on the musculoskeletal health of students and in this study the effect of online class working hours on the musculoskeletal health of physiotherapy students had a mild significance.

The highest pain prevalence was recorded in the neck region, followed by lower back and then upper back followed by shoulders, elbow, wrist, knee and hip.

In a similar study done by Daneshmandi et al., done on office workers results of the NMQ showed that neck (53.5%), lower back (53.2%) and shoulder (51.6%) symptoms were the most prevalent problems. [21]

Another similar study by Carole James et al., on the university staff through the use of online questionnaires revealed that neck (60%), shoulder (53%) and lower back discomfort (47%) were being the most common. [14]

In this study, the results were quite close to the above studies but there had been the involvement of upper back. This could be due to the pattern of the study as in the places like office and university one has to sit in a professional way in order to maintain the decorum. Whereas in home one can sit in whichever way they are comfortable in. One might have been studying or attending classes in a lying down position or a recumbent position. The reason for the

upper back involvement in my study could be due to the involvement of lack of professional decorum, lack of inspection.

Janwantanakul P et al., in their study found out that prolonged phone usage can cause faulty postures such as forward neck and slouched posture. [3] The students are more likely to assume a bad posture having forward neck posture, slouched / kyphotic back, rounded shoulders, while attending online classes or working on online settings. [3]

The reason for this might be explained by the mal posture which the students are more likely to assume while sitting in front of a screen.

Repeated stress and pain sustained from excessive watching on handheld devices for long periods of time can cause text neck syndrome. Text neck leads to harmful symptoms such as neck pain, upper back pain, shoulder pain, chronic headaches and increased curvature of the spine. [22]

Prolonged hours of sitting caused the students to get less active and sitting in a mal aligned posture for a long period of time, the students are more likely to develop tightness in the muscles of neck and shoulder.

Muscles such as Trapezius and pectoralis major are more likely to get affected and tightened which in turn would cause bad posture and pain in that neck region.

In the study done by Iqra Mubeen, the relation between upper cross syndrome

(UCS) and bad posture were seen.^[23] In another journal by Neumann it was reported that prolonged slouching can cause UCS which has a characteristic feature of contracted Trapezius, pectoralis major, Rhomboid.^[8]

My result data of Upper back involvement can be confirmed by the studies done on UCS. Pain in the upper back is also a result of poor posture and overuse of muscles. continuous sitting in a static posture puts strain on muscle and cases pain which cases the formation of a slouched posture.

A study reported that prolong sitting without breaks leads towards decreased flexibility of hamstring muscles which ultimately becomes risk factor for developing low back pain. Long duration sitting can be a contributory factor in hamstring tightness.^[24]

Another study by Michael Scott Braman reported that Hamstring contraction creates knee flexion, hip extension and posterior pelvic tilt. Posterior tilt causes hypolordosis which causes compressive forces to act on the spine, causing pain.^[25]

In this study the Lower back problems can be explained by the continuous sitting for long hours can cause tightness in the hamstring muscles, tightness in the hamstring muscles can put stress over the lower back and can even exaggerate the pain. The poor movement habits, muscular imbalances can contribute to the development of LBP.

The continuous prolonged sitting is also a main case of buttock pain which might be due to the undue pressure over the piriformis muscle.

And with little active lifestyle, students are less likely to get exposed to sunlight which eventually causes weakening of bones fatigue and pain.

The laptop and the computer excessive keyboarding and mouse usage, repetitive movements are required which can put some pressure over the wrist, causing stiffness and pain. Those who work on the smartphone or take their online

classes by holding their cellphone in their hand the entire time can also experience wrist pain as by doing this they are putting their tendons into some strain.

The elbow remains bent over the entire time while working on these devices whether holding the smartphone or while keyboarding. This causes the repetitive contraction over the elbow flexors hence the elbow gets prone to overuse injury.

Working from home causes a vicious cycle of mal aligned posture and musculoskeletal problem to occur. As the mal-aligned posture occurs it contributes to the poor posture and poor movement habits which in turn cause muscular imbalance imbalances which may increase strain over the soft tissues, joints and nerves which can add to the problem if the areas prone to get affected gets involved due to this kinetic chain.

In the results the Group A, has 13% of population who had no pain whereas in the Group C only 3 % of the population had no pain anywhere around the body.

This could be explained by the fact that Group A spent just 0-3 hours in the online work whereas the Slot C spent more than 7 hours in their online class work amid lockdown. The Group A students were least likely to have gotten engaged in a static sitting posture for a longer period of time and the Group C students spent most of their time in a static sitting posture which contributed to their musculoskeletal problems, sitting for long duration increases fatigue in the muscle hence the people are more likely to develop mal posture.

At the time of lockdown students have been prevented the students from going for a walk or carrying out other physical activities which otherwise could have helped with the musculoskeletal problems.

CONCLUSION

This study showed a negative correlation with a mild significance between the online study work hours and the MSKHQ score. which indicated that, with

the increasing number of hours the MSKHQ score decreases.

This study showed the prevalence of neck pain among the respondents.

Clinical Relevance

The continuous Online classes, Online project works, club activities, online tests and assignments, extra-curricular activities in the online settings, and studying from E Books have caused the deterioration of musculoskeletal health of these students. The study here will let us know, how many hours can initiate the symptoms so that appropriate intervention and precautions can be formulated.

Limitations

- Limited time and resources are two crucial factors which affected this study
- The online mode of form distribution might have affected the response rate as many of them did not bother to respond or look at them.
- The class time is not clearly defined as some months might be having less class time and others might be having more.
- The study was limited by the fact that here daily activities or workout a student does was not considered, which might have interfered with the result.
- Association between the musculoskeletal problems and a students' demographic is not taken into consideration.

Scope for future study

- The aim of this study was to find out the association between the musculoskeletal system with the online class working hours, for the future with the help of this study.
- Study can be done on a different population of students or college.
- Can be done after the end of the lockdown.
- Can be done on a different population group.

Acknowledgement: None

Conflict of Interest: None

Source of Funding: None

Ethical Approval: Approved

REFERENCES

1. Oha K et al., Individual and work-related risk factors for musculoskeletal pain: a cross sectional study among estonian computer users. *BMC Musculoskeletal Disorder* 2014
2. Lim Chia Voon, et al., The prevalence of low back pain and disability among University students A cross sectional study. December, 2013
3. Janwantanakul , et al., Risk factors for the onset of nonspecific low back pain in office workers: a systematic review of prospective cohort studies. *J Manipulative Physiol Ther*, 2012, 35: 568–577.
4. Bonney RA and Corlett EN: Head posture and loading of the cervical spine. *Appl Ergon*, 2002, 33: 415–417.
5. Fernández-de-las-Peñas C et al. : Forward head posture and neck mobility in chronic tension-type headache: a blinded, controlled study. *Cephalalgia*, 2006, 26: 314–319.
6. Kim MS, Influence of neck pain on cervical movement in the sagittal plane during smartphone use. *J Phys Ther Sci*, 2015
7. Xie Y. et al. comparison of muscle activity in using touchscreen smartphone among young people with and without chronic neck-shoulder pain. *Ergonomics* 2016;59(1):61–72.
8. Neumann DA: Kinesiology of the musculoskeletal system: foundations for physical rehabilitation. St Louis: Mosby, 2009.
9. Lee M, et al. The effects of smartphone use on upper extremity muscle activity and pain threshold. *J Phys Ther Sci* 2015;27
10. . Kapreli E, et al.: Respiratory dysfunction in chronic neck pain patients. A pilot study. *Cephalalgia*, 2009, 29: 701–710.
11. Berolo S, et al.: Musculoskeletal symptoms among mobile hand-held device users and their relationship to device use: a preliminary study in a Canadian university population. *Appl Ergon*, 2011, 42: 371–378.
12. Stupar M, et al., Prevalence and factor associated with neck pain in office workers. In: Proceeding of the World congress on the Neck pain; Los angeles. Toronto: Canadian

- Institute for the relief of pain and Disability 2008:154
13. Jensen C, et al., Musculoskeletal symptoms and duration of computer and mouse use. *IJIE*. 2002;30 :265-275.
 14. James C, James D, Nie V, Schumacher T, Guest M, Tessier J, Marley J, Bohatko-Naismith J, Snodgrass S. Musculoskeletal discomfort and use of computers in the university environment. *Appl Ergon*. 2018 May;69:128-135. doi: 10.1016/j.apergo.2018.01.013. Epub 2018 Feb 2. PMID: 29477320.
 15. Gupta VK, et al., Computer-related illnesses and Facebook syndrome: what are they and how do we tackle them? 2012.
 16. Billy GG, et al., Changes in lumbar disk morphology associated with prolonged sitting assessed by magnetic resonance imaging. *PMR*. 2014; 6(9):790–795.
 17. Agaezi Sonya, Low Back Pain: Multidisciplinary Approach in Low Back Pain Assessment. *EC Anaesthesia* 5.5 (2019): 120-12
 18. Joanne O. Crawford. Occupational Medicine 2007
 19. Rodriguez CS. Pain measurement in the elderly: a review. *Pain Manag Nurs* 2001
 20. Sam Norton et al., Validation of the Musculoskeletal Health Questionnaire in inflammatory arthritis: a psychometric evaluation *Rheumatology (Oxford)*. 2019 Jan; 58(1): 45–51. Published online 2018 Aug 10
 21. Daneshmandi H et al., Adverse Effects of Prolonged Sitting Behavior on the General Health of Office Workers. *J Lifestyle Med*. 2017; 7(2):69–75.
 22. Neupane S et al., Text Neck Syndrome- Systematic Review. *Imperial J Interdisciplinary Res*. 2017;3(7):141-8.
 23. Mubeen, I., Malik, S., Akhtar, W., Iqbal, M., Asif, M., Arshad, A., Zia, S., & Khalid, S. (2016). Prevalence Of Upper Cross Syndrome Among The Medical Students Of University Of Lahore. *International Journal of Physiotherapy*, 3(3), 381-384. <https://doi.org/10.15621/ijphy/2016/v3i3/100851>
 24. Parul Rakholiya et al., Effect of prolong sitting on hamstring flexibility on schoolchildren: An observational study. *IJAR*. 2021; 7(1); 348-353.
 25. Braman, Michael Scott. The Effect of Hamstring Lengthening on Pelvic Tilt and Lumbar Lordosis" (2016). Theses and Dissertations (ETD). Paper 407. <http://dx.doi.org/10.21007/etd.cghs.2016.0578>.

How to cite this article: Rana M, Shaheen Khanum, Mohd Asif. Association between hours of online class work and musculoskeletal problems among the physiotherapy college students in Delhi. *Int J Health Sci Res*. 2022; 12(4): 163-169. DOI: <https://doi.org/10.52403/ijhsr.20220421>
