

Association between Smartphone Users and Musculoskeletal Discomfort in neck and upper extremity among the university students. A cross sectional survey based study

A K M Rezwan *, Md. Ekramul Hasan **, Nurul Huda ***, Md. Sajibur Rahman ****, Shahana Islam *****, Fariha Anjum Ameer *****

*Senior Lecturer- Gono Bishwabiwalay, Nalam, Saver, Dhaka.

**Physiotherapy consultant - Aichi Hospital limited. Uttara. Dhaka.

***Sports Physiotherapist - Prime Bank Cricket Club. Dhaka.

****Sports Physiotherapist - Lt. Sheikh Jamal Dhanmondi Cricket Club. Dhaka.

*****Intern physiotherapist - Gonoshasthaya Samaj Vittik Medical College. Dhaka.

*****Intern Physiotherapist - Gonoshasthaya Samaj Vittik Medical College. Dhaka.

DOI: 10.29322/IJSRP.11.02.2021.p11035

<http://dx.doi.org/10.29322/IJSRP.11.02.2021.p11035>

Abstract- Background: The number of smartphone users is multiply markedly, most of the daily piece of work are done through these devices. The usage of smartphone played important role in everyday life particularly among the university students.

Objective: Objective of the study was to find out Association between Smartphone Users and Musculoskeletal Discomfort in neck and upper extremity among the university students.

Methodology & Materials: A cross sectional survey based study among the university students based on a single examination of a private university (Gono Bishwabidyalay, Saver, Dhaka) at one point in time. Randomly 185 respondents were selected based on the inclusion & exclusion criteria. Pretested, modified, semi-structured questionnaire were used to collect the data.

Result- In this study 18 to 25 years age group were more near about 73%. Male and female ration were near about equal. Unmarried 79.5% & Graduate 70.3% respondents were more. 55.8% of the respondent's height was 61 to 65 Centimeter & average family members were 6 to 10 persons. More of the respondents 37.3% monthly income around 30 to 40 thousand. 56.2% of the respondents were used touch phone and 33.5% of the respondents use smartphone for study purpose & 56.6% of the respondents use smart phone average 7 to 9 hours. Times of smart phone use day and night near about equal. Lying position 33.5% were used phone more time. Most of the respondents 70.3% didn't use smartphone stand & 83.2% felt no addiction. Irregular smart phone user 68.6% were more, most of the respondents 74.1% used light weight smartphone and 75.1% didn't used any neck support. Both hand user 45.9% were more in number. Within the respondents 60% were felt neck pain & 53.5% felt upper limbs pain during phone use. Dull & sharp shooting pain 27.6% group were more and similar. Periodic nature 43.8% & mild sharpness 51.4% of pain group were more. Pain aggravated 48.6% respondents during movement of neck and upper extremity. Most of the respondents don't felt 77.3% any weakness of upper extremity. More of the respondents 62.2% didn't know the hazard

of smart phone use & 69.2% didn't follow any preventive measure. In this study there were statistically significant association found between feels addiction to smart phone with neck pain during use smart phone (where $P=0.026$) & Felt addiction to smart phone with feels weakness on upper extremity (where $P=0.00$) & sexes with feels weakness on upper extremity (where $P=0.03$) & ideas of hazard smart phone use with feels weakness on upper extremity (where $P=0.02$) & neck support uses with upper extremity pain during use phone (where $P=0.044$) & follow preventive measure with types of smart phone use (where $P=0.006$) & upper limb pain during phone use with neck support use (where $P=0.044$) all were less than 0.05.

Conclusion: It is posit that there is a positive relationship between smartphone users and generality of upper extremity and neck discomforts. It is high time to spread the basic education on proper usage related to ergonomics is justify to the university students to increase their awareness.

Index Terms- Smartphone, University students. Musculoskeletal discomfort, Neck Pain, Upper extremity.

I. INTRODUCTION

The usage of smartphone played a significant role in everyday life especially among the university students. This perturb has arisen universally of possible musculoskeletal symptoms among smartphone users due to excessive use. The smartphone is a handheld device that is capable of performing the function of a laptop and a hand phone^[1]. Current estimates founded that at least 77% of the world's population has their own mobile phone. In the year of 2012 was conducted a study carried out on university students in the United States of America showed that short message service (SMS) is the most frequently used communication method. Lots of studies have been conducted to study the correlation between using mobile phones for texting and both, neck and shoulder pain. Prolonged neck flexion is linked to

neck, shoulder, and upper extremity pain [2]. In our modern society use of smartphones has increased rapidly. There are 3.4 billion smartphone users worldwide. Smartphone users depend on age, ranging from students to workers to senior citizens. The change of growing smartphone use, concerns of musculoskeletal problems associated with intensive smartphone use have also increased. An epidemiological survey was carried out within the smartphone users in the Republic of Korea found that 18.8% of smartphone users experienced musculoskeletal symptoms in at least one body part especially in the neck, upper trunk and upper extremity [3]. The musculoskeletal discomfort combine to smartphone use include muscle fatigue and load of the for neck and shoulder muscles, due to the repeated motions of hands, wrists, and arms [4]. The number of mobile subscribers in Bangladesh reached 162.920 million at the end of April, according to data provided by BTRC [5]. Long time uses of smartphones has been associated with inactive lifestyle and inactive lifestyle can cause musculoskeletal complaints. Smartphones can also cause physical, psychological and social problems, anxiety, stress, headache, and sleep problems. The musculoskeletal complaints are acute, chronic and repetitive, it is considered as a public health problem [6]. Smartphone users are increasing rapidly in developing countries. Bangladesh is the fifth largest mobile market in terms of the number of subscribers in the Asia Pacific and the ninth-largest mobile market in the 3 world country. Global Mobile Market Report showed that smartphone penetration has increased from 5.2% in 2017 to 16.1% in 2018 that means 10.9% growth a year in 4 developing country Bangladesh. There are no statistics on smartphone users of university students in developing countries, whereas several studies reported that university students are among the highest contributors to the increasing number of

smartphone sales in the world [7]. The purpose of this study was to examine the Association between Smartphone Use and Musculoskeletal Discomfort in neck and upper extremity among the university students.

II. METHODOLOGY

A cross sectional survey based study as the observation of the association between smartphone use and musculoskeletal discomfort in neck and upper extremity among the university students based on a single examination of a large private university (Gono Bishwabidyalay, Nolam, Saver, Dhaka) at one point in time. Random sampling technique was applied to collect the data & Slovin sample size formula were used and 185 respondents were selected based on the inclusion & exclusion criteria. In inclusion criteria the University students who had been using smartphone for a period minimum 1 year. Pretested, modified, semi-structured questionnaire were used to collect the data. Data was analyzed by statistical software Microsoft Excel & SPSS version 16.

III. DATA ANALYSIS & INTERPRETATION

The questionnaires collected were concealed to exclude any incomplete participant that fell under the exclusion criteria as well as participants who did not fulfill the inclusion criteria. Data entry was carried out by Microsoft Excel before analyzed using SPSS software.

Table-1: Distribution of respondent by Educational Status (N=185)

Marital Status	Frequency	Percentage
Graduate	130	70.3
Post Graduate	55	29.7
Total	185	100
Mean ± SD = 1.297 ± 0.45		

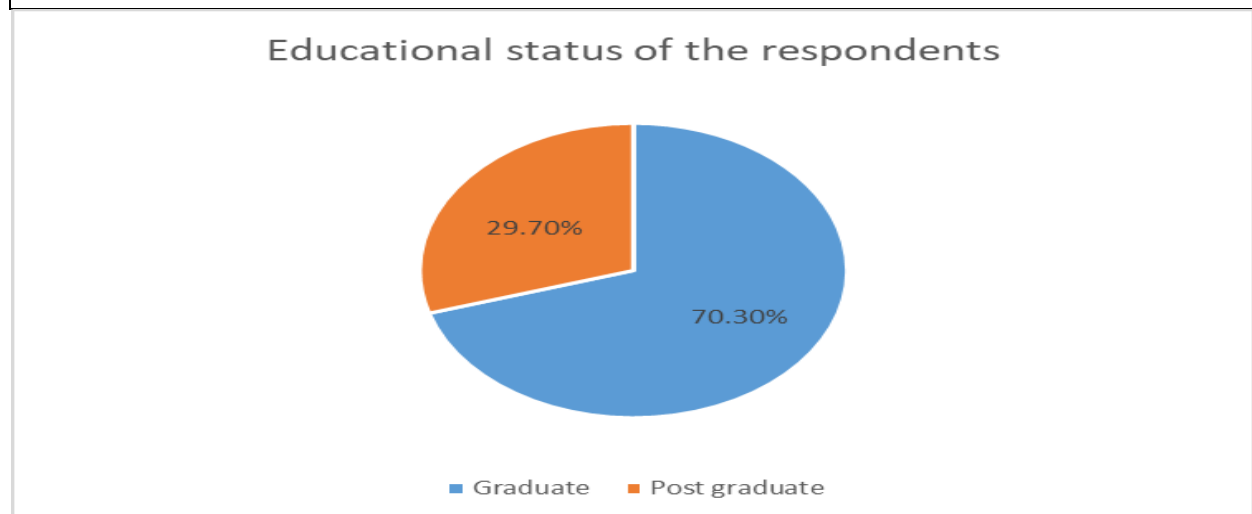


Table-2: Distribution of respondents by pattern of phone used (n=185)

Pattern of phone use	Frequency	Percentage
Button Phone	22	11.9
Touch phone	104	56.2
Tablet	46	24.9
Others types	13	7.0
Total	185	100
Mean ± SD= 2.27 ± 0.760		

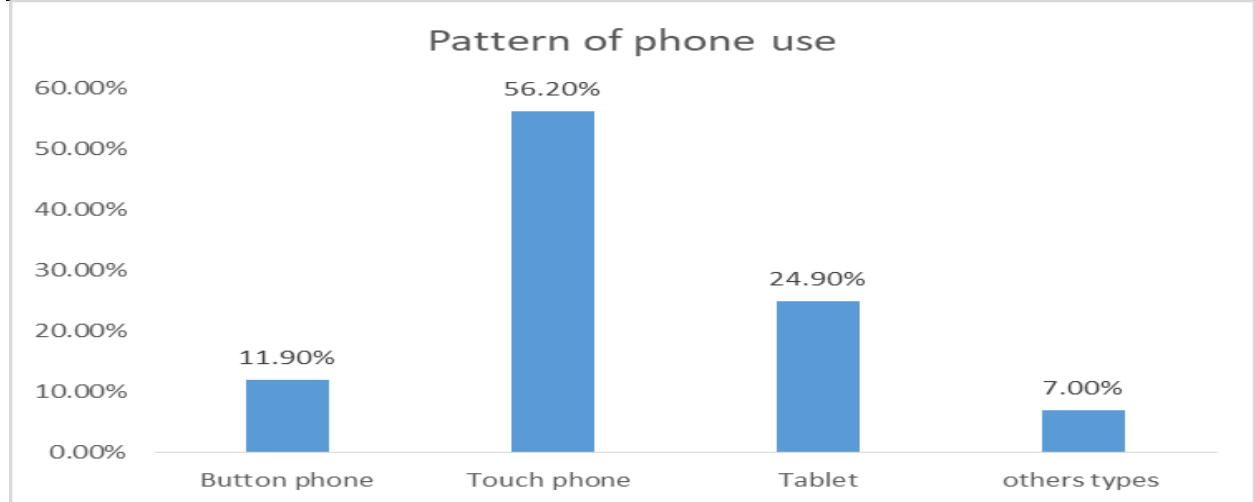


Table-3: Distribution of the respondents by Purpose of phone used (n=185)

Purpose of phone used	Frequency	Percentage
Call	46	24.9
Social media	53	28.6
Business	14	7.6
Study	62	33.5
Others	10	5.4
Total	185	100
Mean ± SD=2.659 ± 1.31		

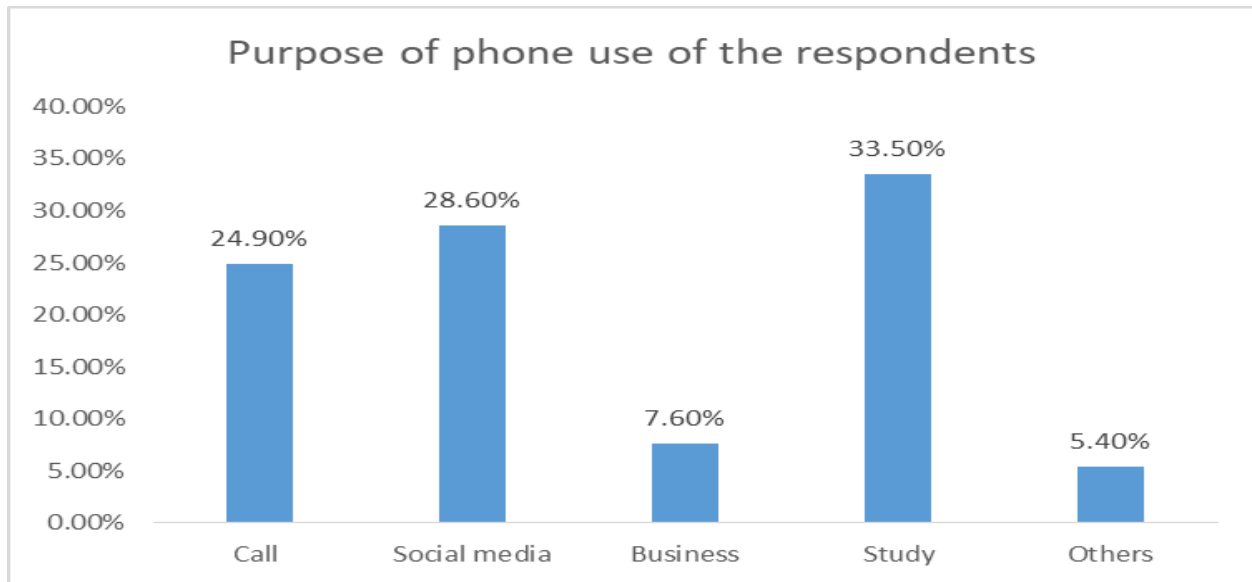


Table-04: Distribution of respondents by types of smart phone use (n=185)

Types of smart phone use	Frequency	Percentage
Heavy	48	25.9
Light	137	74.1
Total	185	100
Mean ± SD = 1.74 ± 0.44		

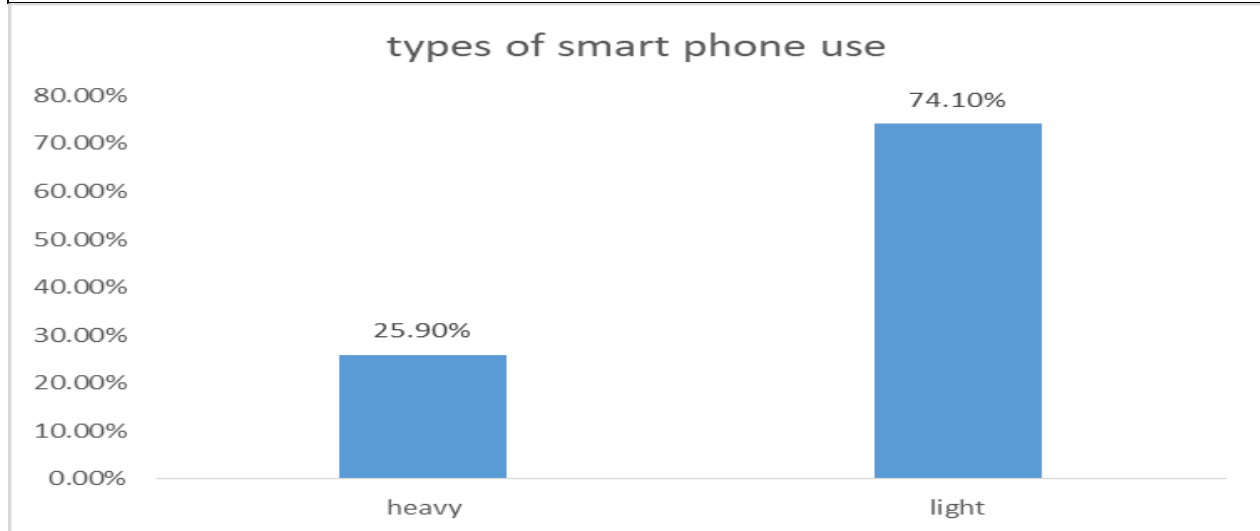


Table-05: Distribution of the respondents by Types of pain (n=185)

Types of pain	Frequency	Percentage
Cramping pain	46	24.9
Dull pain	51	27.6
Sharp shooting pain	51	27.6
Stabbing pain	32	17.3
Others types	5	2.7
Total	185	100
Mean ± SD = 2.454 ± 1.12		

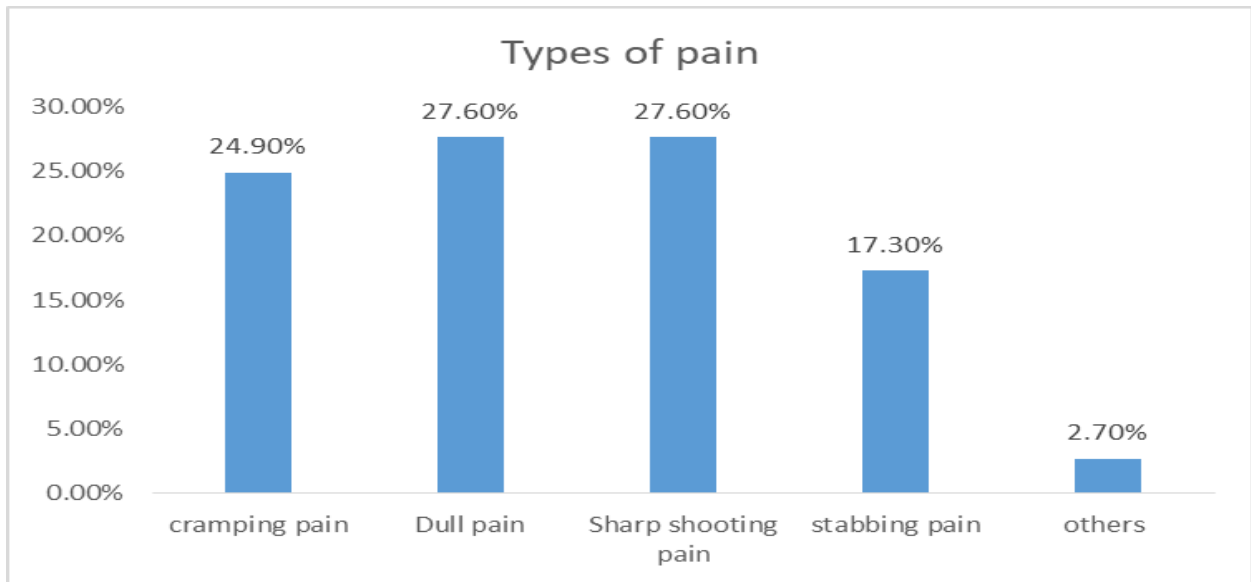


Table-06: Distribution of the respondents by Nature of pain (n=185)

Nature of pain	Frequency	Percentage
Constant	54	29.2
Periodic	81	43.8
Episodic	50	27
Total	185	100

Mean ± SD= 1.97 ± 0.751

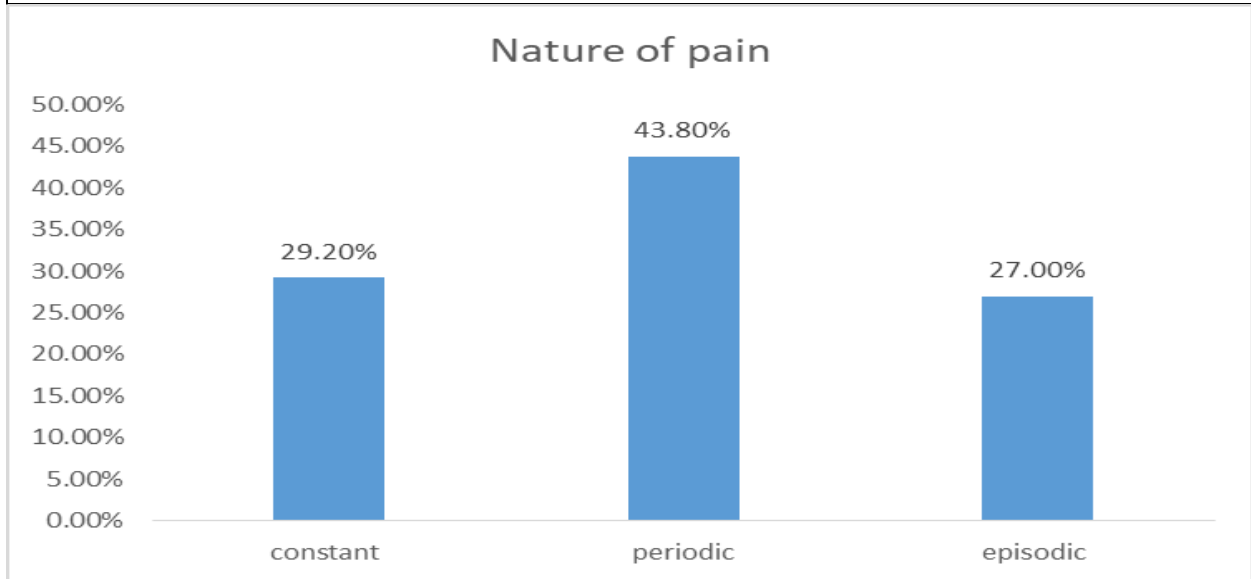


Table-07: Distribution & Association of the respondents between feels addiction with neck pain during use of smart phone.

Feels addiction	Neck pain		Total	p-value
	Yes	No		
Yes	19	12	31	
No	92	62	154	0.026

Total	111	74	185	
--------------	------------	-----------	------------	--

Table-08: Distribution & Association of the respondents between ideas of hazard smart phone use with felt weakness on upper extremity.

Felt weakness on upper extremity	Ideas of hazard smart phone use		Total	p-value
	Yes	No		
Yes	16	26	42	
No	54	89	143	0.002
Total	70	115	185	

Table-09: Distribution & Association of the respondents between Neck support used with upper extremity pain during use phone.

Neck support uses	Upper extremity pain		Total	p-value
	Yes	No		
Yes	24	22	46	
No	75	65	136	0.044
total	99	86	185	

Table-11: Distribution & Association of the respondents between follow preventive measure with types of smart phone use

Follow preventive measure	Types of smart phone		Total	p-value
	Heavy	Light		
Yes	15	42	57	
No	33	95	128	0.006
Total	48	137	185	

Table-33: Distribution & Association of the respondents between upper limb pain during phone use with used neck support.

Upper limb pain during phone use	Use neck support		Total	p-value
	Yes	No		
Yes	24	75	99	
No	22	64	86	0.044
Total	46	139	185	

IV. DISCUSSION-

In this study 18 to 25 years age group were more near about 73% of the respondents [8]. Male and female ration were near about equal [9] Unmarried 79.5% & Graduate 70.3% of the respondents were more that's are near similar to another's study [10]. 55.8% of the respondent's height was 61 to 65 Centimeter [11] & within the respondents 68.1 % were more in number average 6 to 10 persons. More of the respondents 37.3% monthly income around 30 to 40 thousand. 56.2% of the respondents use touch phone and 33.5% of the respondents use smartphone for study purpose [12] 56.6% of the respondents use smart phone average 7 to 9 hours same was found another study in Ahmadabad, India [13]. Times of smart phone use day and night near about equal duration. Different types of posture use during phone use within that's lying position 33.5% were used

phone more time [14]. Most of the respondents 70.3% didn't use smartphone stand & 83.2 % felt no addiction same similarity found in Konkuk University [15]. Irregular smart phone user 68.6% were more, most of the respondents 74.1% used light smartphone and 75.1% didn't used any neck support. Both hand user 45.9 % were more in number near about same statistics found within different universities students [16]. Within the respondents 60% were felt neck pain & 53.5% felt upper limbs pain during phone use. Similar types of pain dull & sharp shooting 27.6 % pain felt were more found in different cross sectional survey [17]. Periodic nature 43.8 % & mild sharpness 51.4 % of pain group were more. Pain aggravated 48.6 % during movement of neck and upper extremity. Most of the respondents don't felt 77.3 % any weakness of upper extremity. More of the respondents 62.2% didn't know the hazard smart phone use & 69.2% didn't follow any preventive measure. Statistically significant association found between feels

addiction to smart phone with neck pain during use smart phone [18] where P-value was 0.026 & Felt addiction to smart phone with feels weakness on upper extremity where P-value was 0.00. & sexes with feels weakness on upper extremity where P-value was 0.03 & ideas of hazard smart phone use with feels weakness on upper extremity where P-value was 0.02 & neck support uses with upper extremity pain during use phone where P-value was 0.044 & follow preventive measure with types of smart phone use where P-value was 0.006 & upper limb pain during phone use with neck support use where P-value was 0.044 all were less than 0.05

V. RECOMMENDATION:

A case referent study should be carried out for future research to obtain a more well validated cause and effect relationship. Based on the study findings the following recommendations are made with view to prevent and minimize the neck and upper extremity musculoskeletal discomfort likes 1. Practice some physical exercise regularly, such as- Stretching exercise 2.Maintain correct posture, such as back and neck should be straight 3. Use back and neck support during use smart phone 4. To use comfortable and adjustable chair 5. Take rest during work time 6. Avoid gripping and always recommend to hold lightly and click gently.

VI. CONCLUSION:

Therefore, preventive measures should be taken to reduce the prevalence of upper extremity and neck symptoms among students. Respondents should be taught to adopt a good posture on smartphone usage such as sitting on a chair with back support with the addition of pillow to be placed on the lap to support the arms. Several exercises should also be done such as chin tuck which helps counteract the poor posture, stiffness and to increase blood circulation within the muscles.

REFERENCES

- [1] Deivendran Kalirathinam, Manoj Abraham Manoharlal, ChongLi Mei, Chong Kar Ling, Thomas Wong Yong Sheng, Albin Jerome, Mahadeva Rao US. Association between the usage of Smartphone as the risk factor for the prevalence of upper extremity and neck symptoms among University students: A cross - sectional survey based study. *Research J. Pharm. and Tech.* 2017; 10(4): 1184-1190.
Available from URL: <https://rjptonline.org/HTMLPaper.aspx?Journal=Research%20>
- [2] Al-Hadidi F, Bsisu I, AlRyalat SA, Al-Zu`bi B, Bsisu R, Hamdan M, et al. (2019) Association between mobile phone use and neck pain in university students: A cross-sectional study using numeric rating scale for evaluation of neck pain. *PLoS ONE.* 2019 14(5):0217231.
Available from URL: <https://doi.org/10.1371/journal.pone.0217231>
- [3] Namwongsa S, Puntumetakul R, Neubert MS, Chaikleng S, BoucautR Ergonomic risk assessment of smartphoneusers using the Rapid Upper Limb Assessment (RULA) tool. *PLoS ONE.*2018; 13(8):0203394.
- [4] Available from URL: <https://pubmed.ncbi.nlm.nih.gov/30161266/>
- [5] Hyo-Jeong Kim, DH, and Jin-Seop Kim. The relationship between smartphone use and subjective musculoskeletal symptoms and university students. *J Phys Ther Sci.* 2015 Mar; 27(3):575-579.
Available from URL: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4395668/>
- [6] BTRC. Mobile phone users in Bangladesh. UNB. June 19,2020

- Available from URL: <https://unb.com.bd/category/Bangladesh/mobile-phone-users>
- [7] Sema Can, Ayda Karaca. Determination of musculoskeletal system pain, physical activity intensity and prolonged sitting of university students using smartphone. *Biomedical Human Kinetics.*2019; 11: 28-35.
Available from URL: <https://webcache.googleusercontent.com/search?q=cache>
 - [8] Rahman, Md Mostafizur; Bashir, Ahmed. Academic Application of Smartphone by University Students in Developing Country. *International Journal of Information Dissemination and Technology;* 2020; 10(1): 1-7
Available from URL: <https://search.proquest.com/openview/07b5711102fdf67ec066c21946f71ea0/1?pq-ori>
 - [9] Maria Elizabeth Cochrane, Muziwakhe Daniel Tshabalala, Nkateko Climax Hlatsway,Rosina Mahlatse Modipana, Pertunia Phuti Makibelo, Exaggerate Potego Mashale and Lerato Caroline Pete. The short-term effect of smartphone usage on the upper-back postures of university students. *Cogent Engineering* (2019); 6: 1627752 Available from URL: <https://doi.org/10.1080/23311916.2019.1627752>
 - [10] Ewa Gustafsson, Sara Thomée, Anna Grimby-Ekman, Mats Hagberg. Texting on mobile phones and musculoskeletal disorders in young adults: A five-year cohort study applied *Ergonomics.* 2017; 58:208-214
Available from URL: <https://doi.org/10.1016/j.apergo.2016.06.012>.
 - [11] LÍgia Bruni Queiroza, Benito Lourenço, Luiz Eduardo Vargas Silvaa, Daniela Mencaroni, Rodrigues Lourençob & Clovis Artur Silvab. Musculoskeletal pain and musculoskeletal syndromes in adolescents are related to electronic devices. *J. Pediatr. (Rio J.)*,2018;1.94(6) Available from URL: <https://doi.org/10.1016/j.jpeds.2017.09.006>
 - [12] Short, N., Mays, M., Cool, A., Delay, A., Lannom, A., O'Donnell, L., & Stuber, R. (2020). Defining Mobile Tech Posture: Prevalence and Position among Millennials. *The Open Journal of Occupational Therapy,* 2020; 8(1):1-10. Available from URL: <https://doi.org/10.15453/2168-6408.1640>
 - [13] Amine Hatun Ataş & Berkan Çelik. Smartphone Use of University Students: Patterns, Purposes and Situations. *Malaysian Online Journal of Educational Technology.* 2019; 7 (2):59-70. Available from URL: <https://files.eric.ed.gov/fulltext/EJ1214011.pdf>
 - [14] Parth Shastri. 7 hours on cellphones every day. *Ahmedabad news.* 2019. Available from URL: <https://timesofindia.indiatimes.com/city/ahmedabad/7-hours-on-cellphones-every-day>
 - [15] Jittaporn Mongkonkansai. Uraivan Madardam & Siriluk Veerasakul. Smartphone Usage Posture (Sitting and Lying Down) and Musculoskeletal Symptoms among school-aged children (6-12 years old) in Nakhon Si Thammarat, Thailand. *Journal of research square.*2020:1-18. Available from URL :<https://assets.researchsquare.com/files/rs-51245/v1/78b1c134-d3e0-4f01-97c5-6d396dbb22ea.pdf>
 - [16] Jeongmin Lee, Boram Cho, Youngju Kim & Jiyea Noh. Smartphone Addiction in University Students and Its Implication for Learning. *Research gate.*2015:297-305 Available from URL: <https://www.researchgate.net/publication/300020494>
 - [17] Fadi Al-Hadidi, Isam Bsisu, Saif Aldeen AlRyalat, Belal Al-Zu`bi, Rasha Bsisu, Mohammad Hamdan, Tareq Kanaan, Mohamad Yasin & Omar Samarah. Association between mobile phone use and neck pain in university students: A cross-sectional study using numeric rating scale for evaluation of neck pain. *PLoS One.* 2019; 14(5):0217231. Available from URL: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6527223/>
 - [18] Abdullah Farooq Khan, Syed Faraz Ul Hassan Shah Gillani, & A. Wahid Are you suffering pain neck due to smart phone text neck syndrome. *Pakistan Journal of Medical and Health Sciences.*2018;12(3):1095-1097. Available from URL: <https://www.researchgate.net/publication/329865092>
 - [19] Sema Can & Ayda Karaca. Determination of musculoskeletal system pain, physical activity intensity and prolonged sitting of university students using smartphone. *Biomedical Human Kinetics,*2019;11: 28-35
Available from URL: <https://doi.org/10.2478/bhk-2019-0004>

AUTHORS

First Author – A K M Rezwan (Corresponding author)
Senior Lecturer- Gono Bishwabiwalay, Nolam, Saver, Dhaka.

Second Author – Md. Ekramul Hasan., Physiotherapy consultant - Aichi Hospital limited. Uttara. Dhaka.

Third Author – Nurul Huda., Sports Physiotherapist - Prime Bank Cricket Club. Dhaka.

Fourth Author – Md. Sajibur Rahman., Sports Physiotherapist - Lt. Sheikh Jamal Dhanmondi Cricket Club. Dhaka.

Fifth Author – Shahana Islam, Intern physiotherapist - Gonoshasthaya Samaj Vittik Medical College. Dhaka.

Sixth Author – Fariha Anjum Ameer. Intern Physiotherapist - Gonoshasthaya Samaj Vittik Medical College. Dhaka.