

Original Research

Text Neck Syndrome among Undergraduate Students in Lahore, Pakistan

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ABSTRACT

Objective: To evaluate the frequency, severity, and prevalence of Text Neck Syndrome among undergraduate students using mobiles, tablets, or laptops.

Material and Methods: The descriptive study was conducted in two private colleges in Lahore after approval from the institutional review board of Sharif Medical and Dental College, Lahore, Pakistan. Students with ages greater than 16 years who used mobile phones daily for more than 1 hour were enrolled. Baseline demographic information was collected and questions regarding the duration of phone usage and neck pain were asked. Calculated a sample size of 266 with the help of the WINPEPI statistical program with a confidence of 95% and acceptance difference of 0.06 with an assumed proportion of 0.46.

Results: The age range was 18 – 23 years. Out of 266 undergraduate students, 122 (46%) were male and 144 (54%) were female. 157 (59%) students reported having neck pain: Mild in 88 (56.1%), Moderate in 55 (35%), and Severe in 14 (8.9%) students according to self-perception. 97 (61.8%) students were intermittent, 35 (22.3%) had continuous, and 25 (15.9%) had debilitating neck pain.

Conclusion: According to this study, Text Neck Syndrome was common in undergraduate students using smartphones, tablets, or laptops.

Keywords: Mobile Phone, Text Neck Syndrome, Neck Pain, Radiculopathy, Myelopathy, Prolonged Neck Flexion.

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INTRODUCTION

In our modern era, neck pain has become a pervasive public health problem,^{1,2,3} with a one-year incidence of as high as 40% in many epidemiological studies and a high incidence in electronic device users.⁴ Neck pain is one of the leading causes of morbidity with an estimated prevalence that ranges from 0.4% to 86.8%.^{5,6} We live in an age where the mobile phone has become a necessity and it is almost impossible to

live without it. The World Health Organization (WHO) has ranked neck pain as the 4th pathological condition among all health conditions for years lived with disability in adults.⁷ Mobile technology has advanced significantly in recent years, and as a result, smartphones now play a significant role in our daily lives. The average screen time for smart electronic devices usages such as Mobile phones and laptops has increased exponentially in recent times. Now, these devices are mostly used for communication, social media, entertainment, photography, texting and emailing, e-reading, obtaining the latest news and information, research purposes, making presentations, and online banking. The excessive use of these devices is now a major cause of different clinical conditions like vision problems, anxiety, depression, personality disorders, difficulty concentrating, mobile phone addiction, and Text Neck Syndrome.

The neck has a multiplex structure comprising the cervical spine with intervertebral discs, muscles, ligaments, facet joints, spinal cord with dura, and nerve roots. Any of these structures might portray the root cause of neck & shoulder pain which might radiate to the arms and hands.⁸ Neck pain is mostly idiopathic, termed "musculoskeletal neck pain". However, it can also be caused by several pathologies such as infection or other inflammatory conditions, tumors, and congenital disorders.⁹

Using mobile phones for prolonged duration increases the force on cervical spine vertebrae with more and more tilting of the head causing spinal curvature which results in text neck syndrome. Moreover, increased frequency of bending of the head forward along with neck flexion incites additional effects on the neck physiology thereby causing postural change and pain in the neck and associated areas¹⁰ as shown in **Figures 1, 2, and 3.**

"Text neck syndrome" is a major concern nowadays supported by a recent growing reporting of data which suggests that it might be

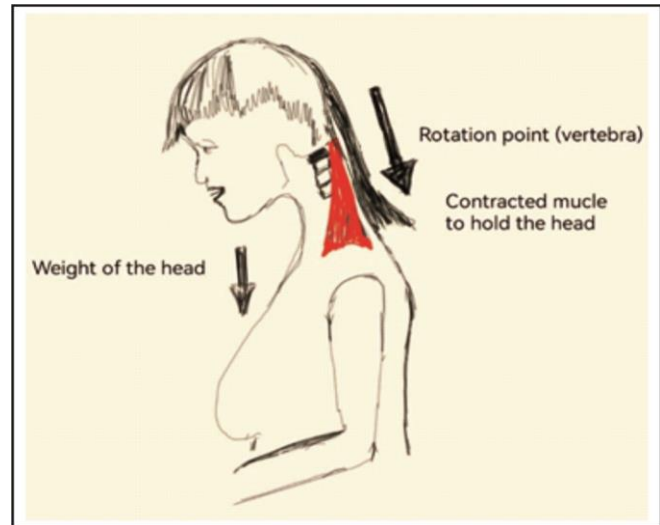


Figure 1: Increasing Force on cervical vertebrae and Extensors of the neck with increasing degrees of head flexion.

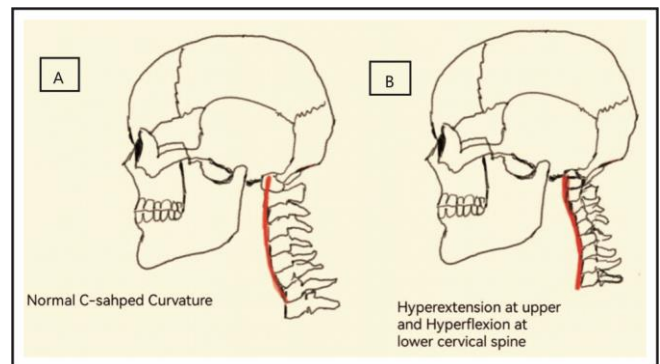


Figure 2A: Normal C-Shaped Cervical Spine Curvature. **B:** Abnormal Cervical Spine Curvature caused by Text-Neck Syndrome.

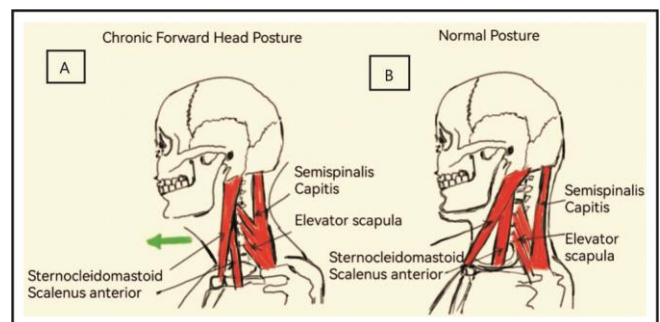


Figure 3(A): Ideal posture of head and neck along with normal physiology of cervical muscles.

(B) Shows Text Neck Syndrome causing tight cervical Extensor muscles and weak Flexor muscles resulting in chronic forward head posture with abnormal cervical spine curvature

considered an emerging 21st-century syndrome. Text neck syndrome is a type of stress injury that comprises the onset of degeneration of the cervical spine due to the frequently repeated forward and downward head flexion while we "text" for long periods looking at a smartphone device or looking over a mobile, tablet, or laptop.^{10,11} This can cause neck pain, chronic headache, vertigo/dizziness, upper back pain, and muscular spasms causing decreased neck and shoulder range of movements and increased bending of the spine. If nerves of the Brachial Plexus are also irritated then pain radiates to the shoulders, arms, and hands. If left untreated, can give rise to many complications like spinal asymmetry, disc herniation, compressive radiculopathy or myelopathy, and difficulty breathing.

Text neck syndrome has become the most common cause of musculoskeletal neck pain in the young age group due to overuse of smartphones and devices, as it is estimated that children and adolescents spend on average 5 to 7 hours on handheld devices.¹² It is estimated that over 75% of the world's population use mobile phones for hours daily with their heads flexed and downwards.¹³ In a recent study, it is estimated that 79% of the population with the age group ranging from 18 to 44 years have smartphones with them almost all the time.¹⁴ Smartphone penetration in Pakistan was 14% in 2014 and is projected to be 51% by the end of 2020.¹⁵ Undergraduate students in Pakistan use smartphones for more than 6 hours and check them 41 times daily.¹⁶ Therefore, this study was conducted to establish the correlation between mobile phone usage and text-neck syndrome among undergraduate students, thereby aiming to expand the awareness among young adults to prevent the overuse of mobiles for a prolonged duration, hence preventing text-neck syndrome. Also, the results from this research will help medical professionals and educational authorities in devising strategies that will help in the

management and prevention of morbidity resulting from excessive mobile phone usage, which in turn will decrease the social and economic burden.

MATERIALS AND METHODS

Study Design & Setting

A descriptive study was conducted using non-probability convenience sampling in two private colleges (Sharif Medical and Dental College and Sharif College of Engineering and Technology) in Lahore, Pakistan from January 2020 to March 2020 in 3 months. Prior ethical approval was taken for the study from the institutional review board of Sharif Medical and Dental College, Lahore. Informed consent was obtained before the administration of a structured self-validated questionnaire, containing both open and close-ended questions, made after the guidelines of the neck disability index proforma.¹⁷ Data anonymization was assured to all students.

Inclusion Criteria

Students, who were willing, greater than 16 years of age who used a mobile phone daily for more than 1 hour, for a minimum of the last 6 months or more, were included in the study.

Exclusion Criteria

Those with a history of chronic neck pain, cervical trauma, and congenital malformation related to the cervical spine, and those who were unwilling and/or submitted incomplete questionnaires were excluded.

Data Collection

Baseline demographic information was collected and questions regarding the duration of phone usage and neck pain were asked. A sample size of 266 was calculated with the help of the WINPEPI statistical program with a confidence of 95% and

an acceptance difference of 0.06 with the assumed proportion of 0.46.

Data Analysis

SPSS 23 was used for statistical analysis. Quantitative variables like age were expressed as Mean and Standard Deviation (\pm SD). Qualitative variables like gender, pain, and use of the smart device were expressed as frequencies and percentages. The association of the variable for statistical significance using the Chi-square test was applied and a 5% difference was taken as significant. A p-value of <0.05 is taken as a threshold of statistical significance.

RESULTS

Age & Gender Distribution

The age range was 18 – 23 years with an average age of 20.5 ± 2.5 years. Out of 266 undergraduate students, 122(46%) were male and 144(54%) were female. The majority 248 (93%) were right-handed and 172 (65%) were medical students (**Table 1**).

Mobile Phone Usage

It has been observed that approximately 67% of students have been using smartphones for a duration of 3 to 6 hours per day over the past 3 to 7 years. Out of these students, 161 (61%) started using mobile phones when they were between 16 to 20 years of age as shown in **Table 2**.

Posture While Using Phones

A majority of students utilized their smartphones while sitting (27%) or lying down in a prone position with either their heads straight (35%) or their heads up/flexed(22%). Strong associations with significant p-values (<0.05) were found between the severity of neck pain with the frequent posture of the body (p-value = 0.04) and the position of the neck (p-value = 0.02) while

using smartphones. In a sitting position, 33% of the students experienced mild neck pain and 30% had moderate pain. Comparably, 32%, 13%, and 6% of students with their heads straight and 34%, 17%, and 12% of students with their heads up or flexed in the prone position reported mild, moderate, and severe neck discomfort, respectively, while lying down. 156 (59%) students were using a smartphone with their necks flexed. Of them, 6.4% reported severe neck pain, 40% had moderate neck pain, and 22.4% had mild neck pain. Only 31% out of these 156 students were noted to have no neck pain or discomfort. Only 8% of students used neck support while using their phones. The severity of neck pain was found to be less in students who use their phones in a standing position or keep their necks in a neutral position (**Table 2**).

Associated Symptoms

Out of all the students surveyed, 157 out of 266 (59%) reported experiencing neck pain, while 167 out of 266 (62.7%) reported experiencing headaches when using a mobile phone. Notably, 96 (36%) had neck pain with associated headaches (**Figure 4**).

Medical Conditions

The majority of the students did not report any significant medical conditions (**Figure 5**).

The Severity of Neck Pain and Its Effect on Performance

Among those who reported neck pain, 88 out of 157 (56.1%) classified their pain as mild, 55 (35%) classified it as moderate, and 14 (8.9%) classified it as severe (**Figure 6**). Additionally, 97 out of 157 (61.8%) reported experiencing intermittent neck pain, while 35 (22.3%) reported experiencing continuous pain and 25 (15.9%) reported experiencing debilitating pain as shown in **Table 3**. Of the participants, 67 (42.6%) experienced a

disruption in their daily routine due to neck pain and had to switch workstations, while 47 (30%) sought medical assistance for their neck pain as shown in **Figure 4**.

Methods Adopted to Alleviate Pain

Additionally, 23 (14.6%) used over-the-counter

pain relievers, 29 (18.4%) underwent physiotherapy, and 19 (12%) used cervical collars to alleviate their neck pain(**Figure 4**). Just over half of the students (50.3%) engaged in regular exercise or sports, with jogging being the most popular activity(**Table 4**).

Table 1: Demographics (N=266).

Variables	Total		Severity of Pain				Chi-Square	P-Value	
	N	%	Mild	Moderate	Severe	No Pain			
Age	≤18 years	29	11%	6	9	2	12	6.17	0.41
	19-22 years	200	75%	70	42	10	78		
	≥23 years	37	14%	12	4	2	19		
Gender	Male	122	46%	40	26	3	53	3.75	0.29
	Female	144	54%	48	29	11	56		
Handedness	Right	248	93%	84	53	12	99	3.80	0.28
	Left	18	7%	4	2	2	10		
Course	Medical	172	65%	50	42	11	69	6.94	0.07
	Engineering	94	35%	38	13	3	40		

Table 2: Phone usage pattern (N=266).

Variables	Total		Severity of Pain				Chi-Square	P-Value	
	N	%	Mild	Moderate	Severe	No Pain			
Duration of use	1-2 year	32	12%	10	9	1	12	13.90	0.53
	3-4 years	66	25%	20	12	5	29		
	5-6 years	80	30%	27	13	4	36		
	7-8 years	51	19%	16	12	1	22		
	9-10 years	18	7%	6	5	3	4		
	More than 10 years	19	7%	9	4	0	6		
Daily Use	1-2 hours	26	10%	4	5	1	16	19.94	0.17
	3-4 hours	83	31%	29	18	2	34		
	5-6 hours	96	36%	30	17	6	43		
	7-8 hours	26	10%	12	7	1	6		
	9-10 hours	12	5%	4	5	1	2		
	More than 10 hours	23	9%	9	3	3	8		
Mobile phone ownership	1-2 years	54	20%	17	13	4	20	17.23	0.31
	3-4 years	76	29%	22	15	5	34		
	5-6 years	75	28%	25	12	2	36		
	7-8 years	36	14%	9	12	2	13		
	9-10 years	15	6%	9	2	1	3		
The age at which phone usage was	More than 10 years	10	4%	6	1	0	3	8.02	0.53
	5-10 years	16	6%	6	5	0	5		
	11-15 years	83	31%	27	22	5	29		
	16-20 years	161	61%	52	28	9	72		

started	21-25 years	6	2%	3	0	0	3		
Use of smartphone	Choice	96	36%	26	17	4	49	9.96	0.13
	Mandatory	109	41%	38	21	6	44		
	Only for fun	61	23%	24	17	4	16		
Frequent Position	Sitting	73	27%	24	22	0	27	21.89	0.04 (significant result)
	Standing	21	8%	5	5	1	10		
	Lying with a straight Head	93	35%	30	12	6	45		
The usual position of the neck	Lying in a prone position with head up	59	22%	20	10	7	22	15.36	0.02 (significant result)
	Use of neck support	20	8%	9	6	0	5		
	Neutral	83	31%	20	14	3	46		
	Flexed	156	59%	62	35	10	49		
	Extended	27	10%	6	6	1	14		

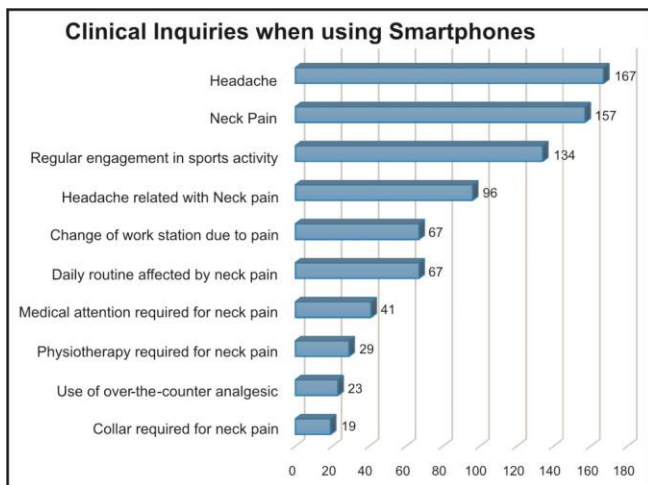


Figure 4: Clinical inquiries when using smartphones.

Table 3: The pattern of neck pain when using a smartphone (N=157).

The Pattern of Neck Pain	Frequency (Percentage)
Continuous	35 (22.3%)
Intermittent	97 (61.8%)
Debilitating	25 (15.9%)

Table 4: Type of sports activity/exercise (N=134).

Type of Sports Activity/Exercise	Frequency (Percentage)
Any game	38 (28.4%)
Gym	21 (15.7%)
Jogging	75 (56.0%)

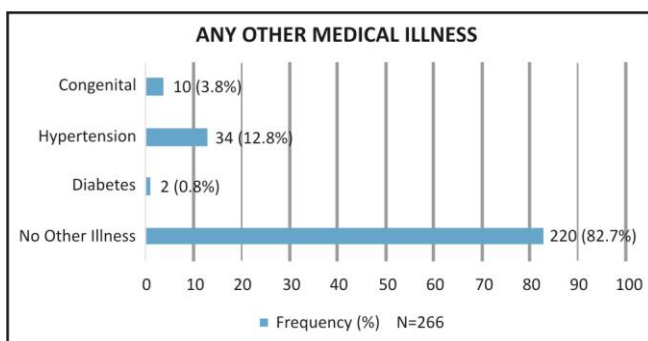


Figure 5: Any Other Medical Illness.

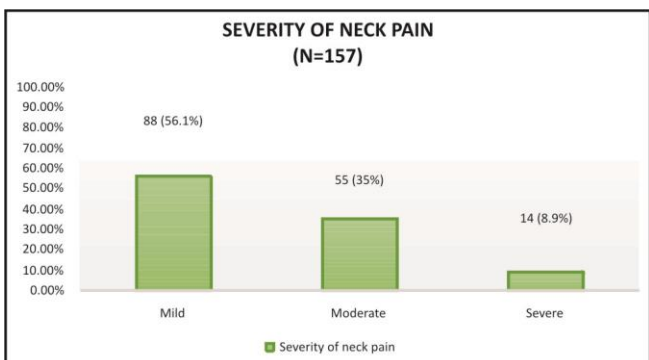


Figure 6: Severity of Neck Pain (Self-Perception).

DISCUSSION

The term "Text Neck Syndrome" was coined by Dr Dean L. Fisherman and incorporates neck pain, soreness, headaches, and shoulder pain that

result from frequent use of electronic devices in flexed neck posture.¹⁸ This posture causes abnormal physiological load on the neck which compromises daily function and if untreated can

ultimately lead to flattening of the spinal curve, early onset arthritis, and nerve damage.^{14,19} Any clinical condition is treated by either "Conservative management" or "Surgical management". For text neck syndrome, conservative management is recommended as it is not so severe to opt for surgery. Acute cases can be managed by rest, lifestyle modifications, and simple techniques like warming up neck muscles with stretching exercises every 20 to 30 minutes of smart device usage, chin and scapula retraction, talking more and texting less, applying ice or heat packs, massaging, better posturing and using over-the-counter medications (analgesics), etc. However chronic cases may require more aggressive treatment options, starting with medical treatment using a single method or in combinations, which may require a minor invasive procedure. Methods may include physical therapy in regular multiple sessions per week, prescription pain medications may include opioids, cervical epidural steroid injections, cervical facet injections, trigger point injections, and manual manipulation.¹⁴ Surgical interventions can be recommended in complicated cases like very severe pain and postural deformity. So, the key is to prevent text neck syndrome. It can be prevented by avoiding excessive usage of electronic devices, decreasing screen time, taking frequent breaks, avoiding prolonged static postures, and positioning the devices in such a manner that there is minimal stress on the head, neck, shoulder, upper limbs and the upper back, keeping the head and neck, as possible, in the neutral position.

Nowadays, mobile phones have become a popular replacement for larger electronic devices such as tablets and laptops. These devices are heavily integrated into our daily lives and can have long-term effects on our body structure due to excessive use and addiction. Undergraduate students primarily use mobile devices for personal and educational purposes. Previous studies have also identified other risk factors for

text neck syndrome among undergraduate students, such as physical inactivity, study-related stress, tall stature, anxiety, and poor posture while studying with books.^{20,21,22,23,24,25} Our study's objective was to determine the prevalence and severity of neck pain, commonly referred to as "text neck syndrome," resulting from the extended use of mobile phones among undergraduate students. We carefully analyzed the length of time students spend on their smartphones and the posture they adopt while using them. Our study revealed that a majority of students tend to use their mobile phones while sitting or lying down. Specifically, 59% of them use their phones in a flexed neck position, which can lead to text neck syndrome. Shockingly, 68.5% of those individuals developed this syndrome, indicating a clear link between prolonged neck flexion and the development of this condition. Comparable results were depicted in a study conducted in 2015, among undergraduate students in Korea by Kim et al. It showed that 55.8% of students developed neck pain with prolonged usage of mobile phones in the flexed neck position.²⁶ A national study among undergraduate physical therapy students of the University of Balochistan, Pakistan concluded that the prevalence of neck pain among mobile users was 69%.²⁷ Also a local study conducted among undergraduate students of two universities in Lahore showed that 56.7% of students were having neck pain for the same reason.²⁸

Additionally, our research included 244 students (91.7%) who began using smartphones between the ages of 11 and 20, primarily by personal choice. Of these students, 67% reported using their smartphones for 3 to 6 hours daily for the past 3 to 7 years. Out of the total, 157 (59%) students experienced neck pain, with 77.7% reporting intermittent and debilitating pain, and 43.9% experiencing moderate to severe intensity. This indicates that the prevalence of Text Neck Syndrome is higher among young adults and

teenagers who start using smartphones at an early age. This can result in severe and incapacitating effects on their physical health over time. To avoid this, it is strongly recommended that mobile usage should be discouraged before the age of 20. If it is necessary to use mobile devices for an extended period, it is crucial to keep the neck in a straight position and avoid bending it. Furthermore, it is suggested to inform students about performing warm-up exercises for their neck muscles before using smartphones and gadgets. It is also advisable to take a break after every 20 minutes of using these devices to avoid any negative effects.

RECOMMENDATIONS

There should be a multi-center study with a large study group for more comprehensive results. Proper guidelines and recommendations by clinical and educational institutes at all levels should be made and implemented to prevent Text Neck Syndrome. Also, awareness should be raised among adolescents and young adults, as this clinical syndrome can have lifelong detrimental effects on the body. Long-term follow-up is needed in the cases of severe Text neck syndrome that developed in the early decade of life. This may give an insight into increased chances of Neck-related morbidities in the later portion of adulthood.

CONCLUSION

There has been a boom in cases of Text Neck Syndrome in recent years owing to prolonged mobile phone usage. Our study showed that Text Neck Syndrome was common in undergraduate students and there is a positive correlation between prolonged neck flexion and developing neck pain. It mostly affects young adults and teenagers owing to their early exposure to smart devices including mobile phones, tablets, and laptops. The key is to prevent Text Neck

Syndrome. Awareness must be raised at different levels to prevent it and regarding warm-up exercises. Acute cases can be managed by simple lifestyle modifications. Chronic cases may require more aggressive medical or surgical interventions.

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Additional Information

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Ethical Review Board Approval: The study conformed to the ethical review board requirements.

Human Subjects: Consent was obtained by all patients/participants in this study.

Conflicts of Interest:

In compliance with the ICMJE uniform disclosure form, all authors declare the following:

Financial Relationships: All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work.

Other Relationships: All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

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AUTHORS CONTRIBUTION

S. No.	Author's Full Name	Intellectual Contribution to Paper in Terms of:
1.	Syed Ali Zunair	Conceptualization, study design, methodology, literature review, data curation, visualization, resources, formal analysis, original manuscript writing, editing, and referencing.
2.	Babar Butt	Conceptualization, study design, data collection, data interpretation, visualization, supervision, final review, editing, and approval.
3.	Farhan Fateh Jang	Interpretation of results and manuscript review.
4.	Amna Malik	Interpretation of results, and manuscript review.
5.	Aman Ur Rehman	Data collection and calculations.
6.	Nasir Raza Awan	Review of Manuscript and supervision.