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Effect of Multimodal Physical Therapy on Pain and Function in Text Neck Syndrome Among College-Going Students

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ABSTRACT

Background and Purpose: Text neck pain is becoming a growing epidemiological concern, particularly among young adults. The purpose of the study was to find out prevalence of text neck syndrome and the effect of Multimodal Physical Therapy on pain and function in Text Neck Syndrome among college-going students.

Methods: Quasi Experimental Study Design. Survey with self -administered questionnaire and smart phone addiction scale was conducted among the Subjects through Google form to evaluate musculoskeletal pain/ discomfort. The participants of the study were 120 subjects with a mean age of over 21.11 years having Text neck syndrome and they received ergonomics, postural correction, self-stretches and strengthening exercises. Participants were treated thrice a week for 8 weeks. The outcome measures of this intervention were measured in terms of Visual analogue scale for pain, Neck disability index for function.

Results: Paired 't' test was used to assess the statistical significance difference within the pre and post test score. Statistical analysis of the data revealed that there is a significant difference within the pre- test and post- test for the two parameters which results physiotherapy intervention showed improvement in pain and function among students with text neck syndrome.

Conclusion: The present study concluded that multi modal physiotherapy is effective in decreasing pain and improvement of function in subjects with Text neck syndrome. Ergonomic preventive strategies were incorporated into the daily routines of at-risk students, enabling them to significantly reduce their chances of developing Text Neck Syndrome.

Keywords: Text Neck syndrome, college going students, prevalence, mobile phone, smart Phone addiction.

INTRODUCTION

Now a days, the mobile phone has become the most popular and widely used device for various daily activities such as exchanging information, accessing the internet, watching movies, using social media sites, gaming, and a variety of other activities. Those who were constantly engaged to their phones may suffer from worry, stress, panic disorders, and various other psychological illnesses. Additionally, excessive phone usage can lead to physical health issues, with text neck syndrome emerging as a significant concern among them.[1]

In today's modern era characterized by remarkable advancements in mobile technology, an ever-growing number of individuals spend an increased amount of time on handheld devices, such as Smartphone, computer, tablets and e-readers. The outcome is prolonged flexion of the neck when leaning over electronic devices, which leads to "text neck" or "turtle neck posture.".[2]

The term "Text neck" was coined by Dr. Dean L. Fishman, a US chiropractor. Text neck refers to a repetitive stress injury or overuse syndrome where an individual habitually holds their head in a forward, flexed position while looking down at a mobile phone or other electronic device for extended durations.[2]

Text neck pain is becoming a growing epidemiological concern, particularly among young adults. Bending the shoulders, neck, and head while using cell phones gradually intensifies stress on the cervical spine. Additionally, a forward head posture can elevate the mechanical strain on the joints and ligaments of the cervical spine, while also increasing the demand on the muscles at the back of the neck due to increased gravitational moment. Increased usage of cell phones in the college students for notes and communication adds to this problem.[3]

A recent study reveals that 79% of individuals aged 18-44 keep their cell phones with them almost constantly, spending only about 2 hours per day without their phones in hand. Innovations in smartphone technology, such as internet browsing, social media apps, gaming, media playback, digital cameras, and high-resolution touchscreens, contribute significantly to the widespread use and perceived "addiction" to smartphones. [4] According to reports, more than 90% of students exhibit a flexed neck posture and protracted shoulders while using their smartphones.[5] In India, the prevalence of text neck syndrome falls within the range of 25% to 47%.[6]

Most smart phone users stare sharply downwards to read the screen of the mobile which makes their head forward and cause an excessive anterior curve in the lower cervical vertebrae and an excessive posterior curve in the upper thoracic vertebrae to maintain balance placing stress on cervical spine and neck muscles. Forward Head Posture (FHP) and Protracted Shoulder are most commonly recognized poor postures. FHP involves hyperextension of the upper cervical spine (C1-C3) and flexion of the lower cervical spine (C4-C7).[7]

The weight put on the spine dramatically increases when flexing the head forward at varying degrees. The weight of head increases intensely when it is forward flexed and the weight and effect progressively increase by changing the degrees. In fact, a full-grown head weighs almost 5 kg in the neutral position. The more the head is flexed, more the forces on the neck surge to more than the double at 15◦ (roughly 12 kg). The burden of the weight of the head increases to 18.14 kg at 30◦ and to 22.23 kg at 45◦, reaching a more than fivefold effect at 60◦, arriving to a 27.22 kg.[8]

The postural deviations cause alterations in muscle activities and an increase in cervical load. Neck is surrounded by various muscles to maintain its functional ability and mobility. Among these muscles, mainly, deep cervical flexors (longus capitis, longus colli, rectus capitis anterior), Scalene, Rhomboids, and Trapezius are the muscles which are affected. From which, Upper Trapezius is the most affected

muscles. Continuous use of a smartphone, when arms are unsupported, puts excess strain on the upper trapezius, reducing its pressure pain threshold. Besides, there occurs reduced activity in thoracic extensors and lower trapezius muscles. [9] The sternocleidomastoid frequently contains multiple Trigger points and is responsible for flexion of head and neck. Levator scapulae is also one of the primary muscles for developing Trigger points and neck pain. [10]

The most typical symptoms of Text Neck Syndrome include soreness, neck stiffness, and upper back pain. Over time, these symptoms can progress to chronic, sharp, persistent pain and severe muscle spasms in the upper back. Due to this abnormal posture, the cervical muscles weaken due to increased strain on muscle, this is the main reason of pain in Text Neck Syndrome. As a result, people with text neck syndrome exhibit postural abnormalities and a decrease in the strength and endurance of their cervical muscles. If Text Neck Syndrome is ignored and left untreated, it can lead to serious permanent damage. This includes flattening of the natural spinal curvature, early onset of arthritis, spinal misalignment, degeneration of the spine, compression and herniation of spinal discs, nerve or muscle damage, inflammation of cervical ligaments, nerve irritation, and an increase in the curvature of the spine., etc.[11]

Conservative treatments, such as physiotherapy, spinal manipulation, behavioural therapy, and ergonomic interventions or occupational therapy, are commonly prescribed or utilized in the management of arm, neck, and shoulder complaints.[12]

Physical therapy, incorporating activities such as aerobics, mobilization, electrotherapy, and ultrasound, plays a significant role in treatment programs aimed at enhancing neck strength and flexibility. [13] ''Exercise' stands out as a critical element in rehabilitating neck pain. These exercises encompass low load endurance training, scapular muscle re-training, strengthening and stretching exercises, joint mobilization, massage, ergonomical advice according to the physiotherapist and patient's condition.[4] post-isometric relaxation techniques have shown effectiveness in reducing discomfort and disability while improving cervical range of motion in individuals experiencing neck pain. Moreover, manual manipulation performed by healthcare professionals can enhance range of motion and alleviate pain. [13,14]

Addressing Text Neck Syndrome involves a multifaceted approach, including postural retraining exercises, which have shown efficacy in reducing pain, disability, and correcting postural abnormalities in college students. To counteract the strain caused by this syndrome, exercises such as cervical retraction, extension, and stabilization can be performed to reduce pain and enhance neck flexibility.[15]

Exercises aimed at alleviating text neck syndrome typically involve isometric exercises for the neck muscles, active range-of-motion exercises, and manual therapy. It is also crucial to implement proper ergonomic design to prevent repetitive strain injuries, which can develop gradually and potentially result in long-term disability. [16]

This study aim is to estimate the prevalence of text neck syndrome in college going students and to know the effect of physiotherapeutic exercises in alleviating pain and improving function in text neck syndrome.

NEED OF THE STUDY

Text Neck Syndrome has become increasingly prevalent among young adults, significantly impacting their social and physical well-being. Many smartphone users tend to lower their heads and gaze downwards to read their screens, resulting in an excessive anterior curve in the lower cervical vertebrae and an excessive posterior curve in the upper thoracic vertebrae. This posture places considerable stress on the cervical spine and neck muscles, affecting their function. There is an emerging emphasis for more comprehensive, multifaceted approaches to treat Text Neck Syndrome, focusing on not only alleviating symptoms but also

correcting postural imbalances and promoting long-term recovery. So, the need of the study is an attempt to estimate the prevalence of text neck syndrome among the college-going students and to spread awareness of physiotherapy care regarding the importance of good posture, proper ergonomics & physical therapy exercises to reduce pain and improve function in Text Neck Syndrome.

AIM OF THE STUDY

The aim of the study was to find out the effect of Multimodal Physical Therapy on pain and function in Text Neck Syndrome among college-going students.

OBJECTIVES OF THE STUDY

1. To estimate the Prevalence of Text neck syndrome among college going students.
2. To determine the Effect of Multimodal Physical Therapy on reducing pain in Text Neck Syndrome among college-going students.
3. To determine the Effect of Multimodal Physical Therapy on improving function in Text Neck Syndrome among college-going students.

MATERIALS AND METHODS

STUDY DESIGN **:** Quasi experimental study design

ETHICAL CLEARANCE AND INFORMED CONSENT: The study protocol was approved by Ethical committee of GSL Medical College & General Hospital (Annexure I), the investigator explained the purpose of the study and given the patient information sheet. The participants were requested to provide their consent to participate in the study. All the participants signed the informed consent and the rights of the included participants been secured.

STUDY POPULATION **:** Students with Text neck syndrome

STUDY SETTING **:** The study was conducted at Tertiary care teaching Centre, Rajamahendravaram

STUDY DURATION **:** Study was conducted for a period of one year from 1st August 2023 to 31st July 2024

INTERVENTION DURATION **:** 24 sessions, 3 days a week, 8 weeks

SAMPLING METHOD **:** Consecutive sampling method

SAMPLE SIZE **:** A total of 510 students were screened for Text neck syndrome and 133 students met eligibility criteria. Out of 133 students, 13 students do not gave consent to participate in the study. **120 subjects**, both male & female students with Text Neck Syndrome were included in the study by consecutive sampling method

MATERIALS USED

1. Google survey form
2. Treatment couch
3. Pillow
4. bed sheet
5. HCP
6. Data collection form

7. Visual analogue scale
8. Neck disability index

CRITERIA FOR SAMPLE COLLECTION

INCLUSION CRITERIA:

- The study population were college going students and willing to participate in the study
- Age group of 18 - 30 years
- Individuals using smart phone greater than 2 hours/day
- Duration of pain > 6 months
- NDI ≥ 5
- SAS - SV ≥ 31 for males and 33 for females

EXCLUSION CRITERIA:

- Trauma
- Patients undergone cervical surgery.
- Torticollis/scoliosis
- Malignancies
- Disc problems with radiculopathy
- Neurological deficits

STUDY TOOLS AND OUTCOME MEASURES:

1. SELF ADMINISTERED QUESTIONNAIRE
2. SMART PHONE ADDICTION SCALE-SHORT VERSION (SAS-SV) to measure self-reported addiction to smart phone use.
3. NECK DISABILITY INDEX (NDI) for abnormal symptoms of neck function.
4. VISUAL ANALOGUE SCALE (VAS) used to measure pain at baseline and at the end of 8 weeks

SELF ADMINISTERED QUESTIONNAIRE:

A self- administered questionnaire was built to collect information related to the Demographics (age, gender) use of phone, knowledge about text neck syndrome, health hazards of excess phone usage This smart phone TNS questionnaire which consists of 12 Domains. Each question or the domain is given 3-5 options, where the participants are chosen to fill the answers accordingly. Each question format was simple with multiple choice item.

The questionnaire consists of two parts:

- Demographics which include (Age & Gender)
- 12 domain closed ended questions [17]

SMART PHONE ADDICTION SCALE-SHORT VERSION (SAS-SV):

The SAS is a self-reporting scale to assess smartphone addiction. It consists of six factors and 33 items, with a six-point Likert scale (1: “strongly disagree” to 6: “strongly agree”). The respondent circles the statement which most closely describes their smartphone use characteristics. The higher the score, the greater the degree of pathological use of the smartphone. The SAS-SV scale is a short version that contains only 10 questions for easy smartphone addiction screening of adolescents who are considered vulnerable

to addiction. The cutoff value was 31 for males and 33 for females. The SAS SV showed good reliability and validity for the assessment of smartphone addiction. The smartphone addiction scale short version, which was developed and validated in this study, could be used efficiently for the evaluation of smartphone addiction in community and research areas.[18]

VISUAL ANALOGUE SCALE [VAS]:

The Visual Analogue Scale (VAS) is a reliable, valid, responsive and frequently used pain outcome measure. The instrument used consists of horizontal lines, 10cm long with anchor points of 0 [no pain] and 10 [severe pain]. It located at either end of the line. Patients are instructed to draw a vertical mark on the line indicating their pain level. [19]

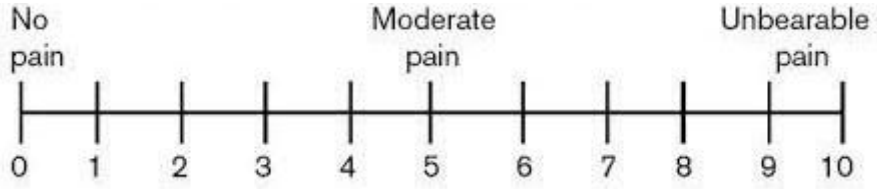


Fig:1 VAS

NECK DISABILITY INDEX (NDI):

The NDI assessment involves a 10-item, 50-point index questionnaire that assesses the effects of neck pain and symptoms during a range of functional activities. Of 10 items, four relate to subjective symptoms (pain intensity, headache, concentration, sleeping), four activities of daily living (lifting, work, driving, recreation) and two discretionary activities of daily living (personal care, reading) Each item is scored on a 0 to 5 rating scale, in which zero means „No pain" and 5 means „Worst imaginable pain. The test was interpreted as a raw score, with a maximum score of 50. A higher NDI score indicates greater neck disability. This index is the most widely used and most strongly validated instrument for assessing self-rated disability in patients with neck pain. Interpretation of NDI scores: 0 to 4 - no disability; 5 to 14 - mild disability; 15 to 24 - moderate disability; 25 to 34 - severe disability; and greater than 35 - complete disability. [20]

INTERVENTION

This is 1 year study, conducted a Survey among college going students through Google form containing Self-administered questionnaire and Smart phone addiction scale was given to the subjects to identify Text Neck Syndrome. The result showed prevalence of Text neck syndrome among college going students.

The Study consists of 8 weeks of intervention. The subjects were recruited based on the Inclusion Criteria. Subjects who fulfilled the inclusion criteria were asked to sign the consent form. Before the Commencement of the treatment a brief demonstration about the intervention was given. Pre-test was done to measure Pain and Function by using Visual Analogue Scale [VAS] and Neck Disability Index (NDI). Intervention duration was for a period of 8 weeks, 3 sessions per week. After 8 weeks post treatment outcome data was analysed for Results. Ergonomic advice was also provided to students at risk of developing Text Neck Syndrome.

MULTIMODAL PHYSICAL THERAPY:

Posture/ergonomical advice includes:

1. Smartphone users should adopt postures that limit neck flexion between 0 and 15 degrees. This will help in controlling excessive cervical load and muscle activity
2. "Focus Breaks" involves taking eyes off the screen for few seconds and do the slight movement of the head, looking at the wall, etc. This helps to relieve tension off your neck.
3. Take short "Mobility Breaks" every 20-30 minutes. During "Mobility, Breaks" involves few neck movements repetitions to all directions, stretching of arms, and upper back.
4. While using a cell phone, personal computer and other electronic devices please hold them at eye level.
5. While using big and heavy electronic devices such as Tablets and large cell phones, please hold them with both hands.
6. During reading books or newspapers please hold them at eye level. [21]

Fig 2: Ergonomical advice while using mobile phone

POSTURE CORRECTION EXERCISES:

Cervical retraction/ chin tuck exercises:

Chin tuck were taught by asking the participant to sit on a chair, tucking their chin posteriorly and inferiorly while touching it.

Scapular retraction exercises:

Scapular retraction was done by the participant Standing or sitting with feet hip-width apart and retracting shoulder blades without shrugging the shoulders.

Dosage: patients asked to do exercises holding it for 5 to 10 seconds count and these exercises performed one set of 10 repetitions each. [22]

Fig 3: Chin tuck exercises

Fig 4: Scapular retraction exercises

SELF-STRETCHING EXERCISES:

Upper trapezius:

Sit up straight in a chair with your head and neck in a neutral position, ears in line with shoulders. Hold

the edge of your chair seat with your right hand. Tilt your head to the left, while looking straight ahead. Put your left hand on the right side of your head and gently pull your head to the left. Repeat the same for right side.

Fig 5: Upper trapezius stretch

Sterno cleido mastoid:

The participants were asked to sit on a chair and keep their necks elongated. Rotate the head to the opposite side as far as possible within a pain-free range to lengthen the target SCM to a pain-free end range. Then, using their opposite hand placed just above the ear, they apply a final stretch without causing pain.

Fig 6: Sternocleidomastoid stretch

levator scapulae:

Sitting with head side bent and rotated away from the target side. The other hand is placed on the head to gently pull it forward and to the side in an oblique direction opposite the line of pull of the target muscle.

Fig 7: levator scapulae stretch

Pectoralis major:

Take a standing or sitting position. Interlock fingers, and lift your arms above the head. Gently squeeze your scapulae together and move your elbows and hands backwards.

Dosage: Each muscle stretched for a hold of 10 sec per repetition for 10 repetitions. [23]

Fig 8: Pectoralis major stretch

NECK ACTIVE RANGE OF MOTION (AROM) EXERCISES:

- **Neck flexion and extension**

Bend your head forward until your chin is close to your chest, then fall your head in the opposite direction until you're looking up.

- **Neck rolls:**

Sit with your shoulder blades relaxed, drop your ear to your shoulder, and hold for five seconds
Then, slowly roll your neck forward to the opposite side and hold for five seconds. Return to the starting position and repeat

Fig 9: Neck flexion and extension ROM exercises

Fig 10: lateral flexion exercise

- **Neck rotations**

Turn your head as far as possible to one side, looking over your shoulder. hold this position for at least 10 seconds before repeating on the other side. [24]

Fig 11: Neck rotations

STRENGTHENING EXERCISES:

Shoulder shrugging exercises:

Sit in a chair with your feet flat on the floor and shift your weight slightly forward. Keep your ears, shoulders, and hips aligned, then raise your shoulders as high as you can, as if you're trying to touch them to your ears.one set of 10 repetitions with 10 seconds hold, 10 seconds rest between the repetitions for the first 4 weeks.

Fig 12: shoulder shrugging exercises

Neck isometrics:

Neck flexion: Place one hand on the forehead and press the forehead into the palms in a nodding fashion while not moving. Hold for 10 sec. Repeat it for five times.

Neck extension: Put your hands on the back of your head. Try pushing your head backward with your hands going forward. Hold for 10 sec. and repeat it for five times.

Rotation (left side): Place the left hand on the left side of the chin. Attempt to turn the head to look over the left shoulder but not allowing the motion. Hold for 10 sec. Repeat it for five times.

Rotation (right side): Place the right hand on the right side of the chin. Attempt to turn the head to look over the right shoulder but not allowing the motion. Hold for 10 sec. Repeat for five times. [25]

Fig 13: Neck isometric exercises

Fig 14: Application of HCP

STATISTICAL ANALYSIS

All statistical analysis was done by using SPSS software version 20.0 and MS excel – 2019. Descriptive data was presented in the form of mean +/- standard deviation and mean difference percentages were calculated and presented.

Within the group: paired "t" test was performed to assess the statistically significant difference in mean value within the group for Visual Analogue Scale for pain, neck disability index for function from pre-test and post- test values.

Data also tabulated and graphically represented

For all statistical analysis $P < 0.05$ was considered as statistically significant.

RESULTS

A total of 510 participants of age group 18 to 30 years were screened in the survey. The majority of the responders 414(81.1%) were females while 96(18.8%) were males. The mean age of our study subjects were 20.74± 2.91 years.

Most of the responders were addicted to their smartphones (61.9%). The mean SAS-SV score was 35.33 ± 11.2. The majority of students used their smartphones 2-3 and more than 3 h (28% and 54%, respectively).

The prevalence of Text Neck Syndrome is 26% documented in 133 students. The female students affected with TNS are 109(81.9%) and male students affected with TNS are 24(18%). The age group which was most affected was 21.09%. The participants with risk of being affected with Text Neck Syndrome is about 30.7% documented in 116 students

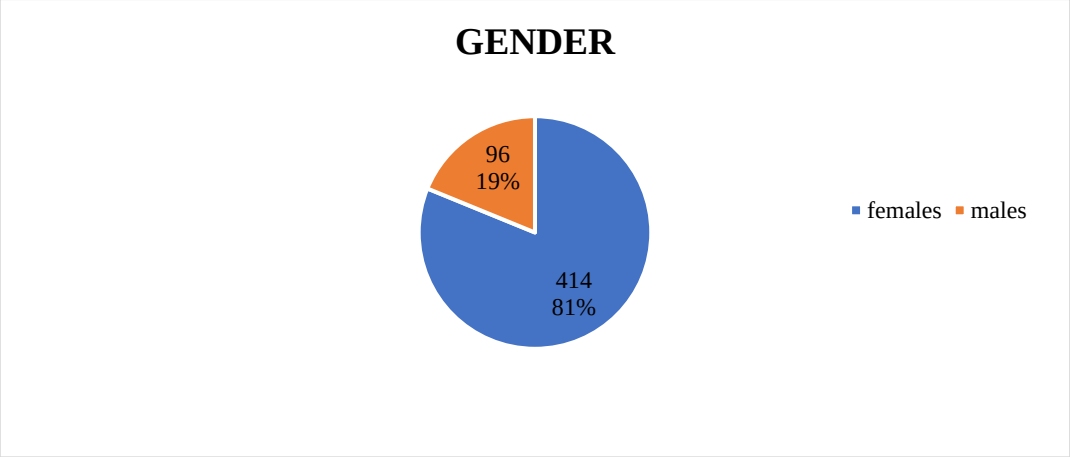
Subjects with Text Neck syndrome were screened for eligibility, amongst 120 subjects were included in the study trail. All the 120 subjects who met inclusion criteria have undergone baseline assessment.

Comparison was done within the pre - test and post- test. So as to evaluate the effectiveness of Physiotherapy management.

DEMOGRAPHIC DATA

Variables	N	Percentage
Females	414	81.1%
Males	96	18.8%
Mean Age	20.74± 2.91	

TABLE 1



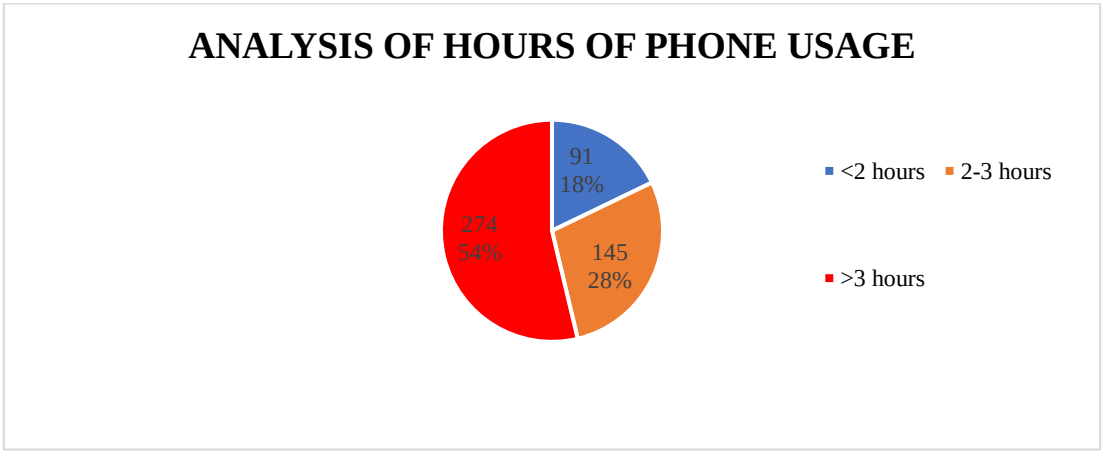
GRAPH-1

Results: According to table-1 and Graph-1, we can infer the demographic data of the participants. The percentage of Females is 81% (414) and the percentage of Males is 19% (94). The mean age of the participants is 20.74± 2.91.

ANALYSIS OF HOURS OF PHONE USAGE AMONG THE PARTICIPANTS:

Hours of phone usage	No of participants	percentage
< 2 hours	91	18%
2-3 hours	145	28%
>3 hours	274	54%

TABLE 2



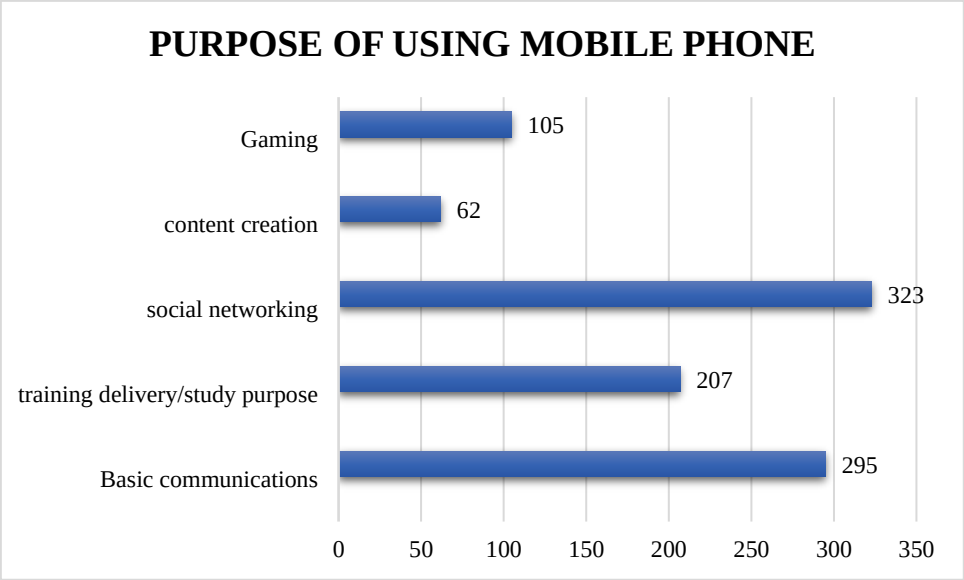
GRAPH-2

Results: Above graph shows that the subjects using mobile phone more than 3 hours -54%, 28% using mobile phone for 2-3 hours, 18% using leads than 2 hours.

ANALYSIS OF PURPOSE OF USING MOBILE PHONE AMONG THE PARTICIPANTS:

TABLE 3

Purpose of using mobile phone	No of participants
Basic communications	295
training delivery/study purpose	207
social networking	323
content creation	62
Gaming	105



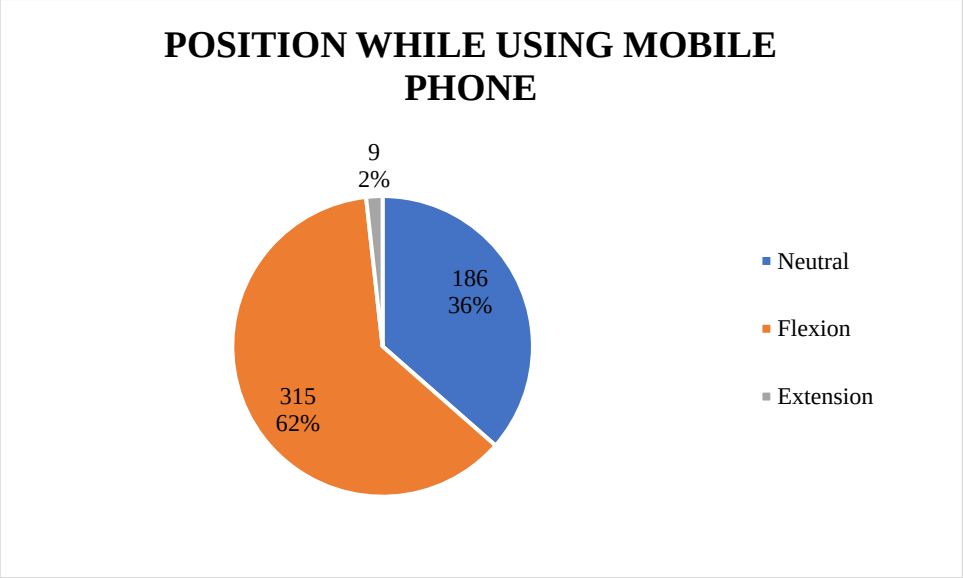
GRAPH-3

Results :The above graph shows that the purpose of using mobile phones among the students in which mobile phone usage is more for social networking followed by basic communications, study purpose, gaming and content creation**.**

ANALYSIS OF POSITION WHILE USING MOBILE PHONE AMONG THE PARTICIPANTS:

Position while using phone	No of participants
Neutral	186
Flexion	315
extension	9

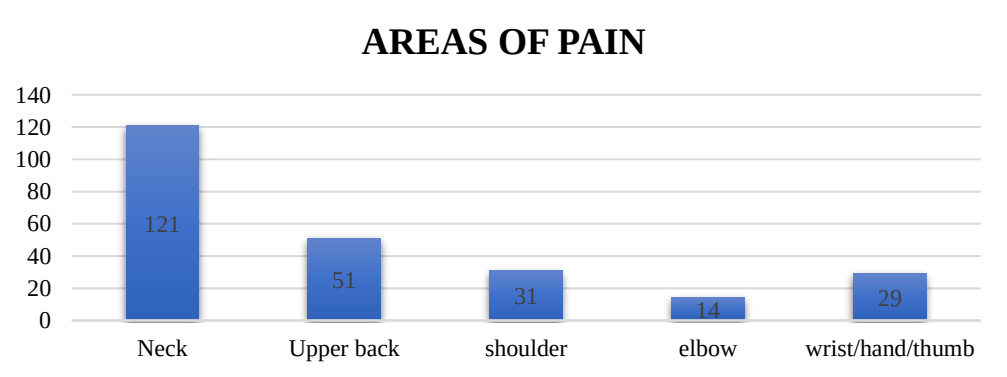
TABLE 4



GRAPH 4

Results: In the above graph 62 % of subjects using mobile phone in flexed position, 36% using phone in neutral position and 2 % using in extended position.

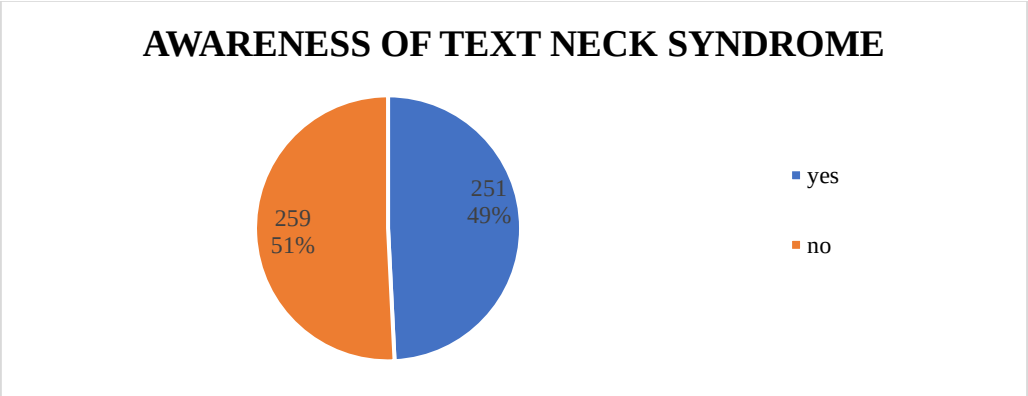
ANALYSIS OF AREAS OF PAIN AMONG THE PARTICIPANTS:



GRAPH 5

Results: The above graph shows that the prevalence of pain among the students, shows the frequency more in the neck region followed by lower back & upper back, shoulders, wrist& hands.

ANALYSIS OF AWARENESS OF TEXT NECK SYNDROME AMONG PARTICIPANTS:



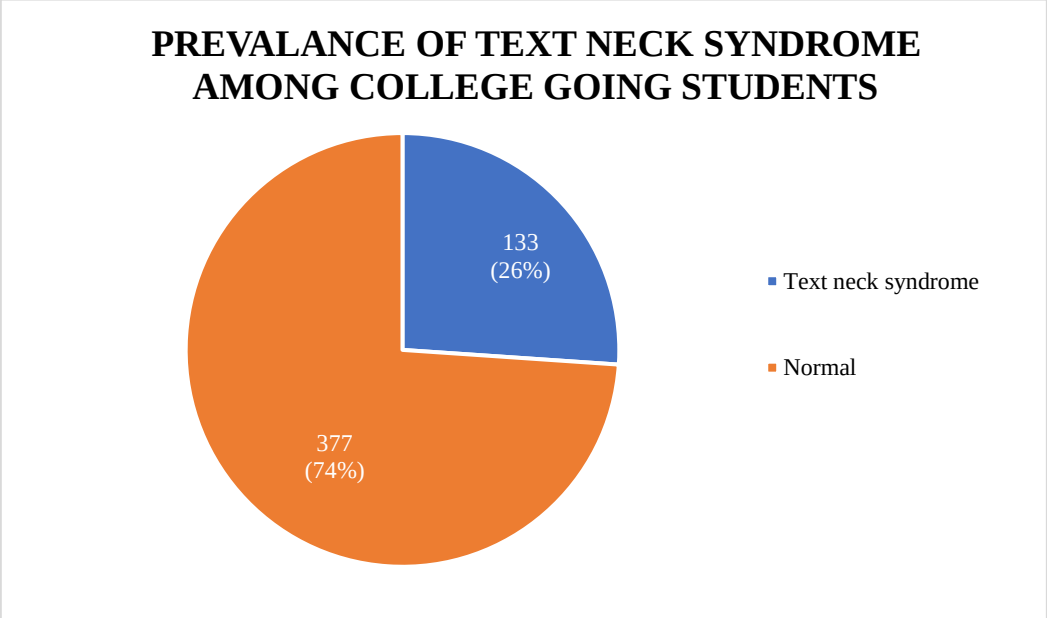
GRAPH 6

Results: above graph shows that there is 49% awareness about TNS

PREVALENCE OF TEXT NECK SYNDROME:

	No of participants	percentage
Text neck syndrome	133	26%
normal	377	74%
total	510	

TABLE 5



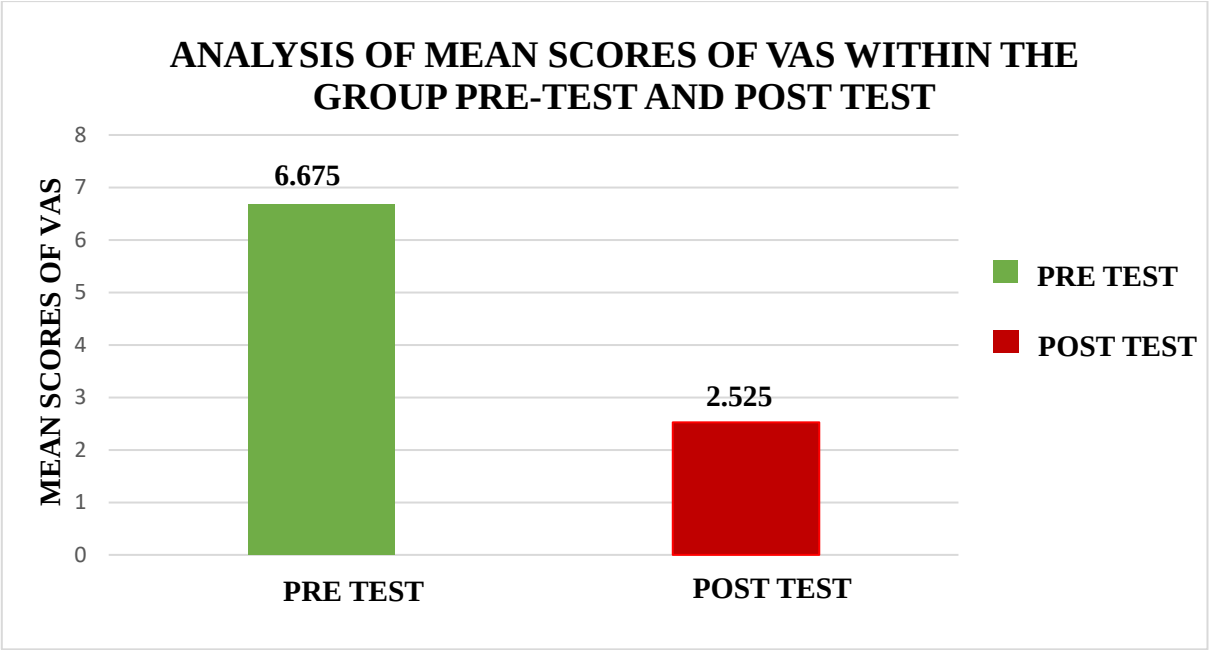
GRAPH 7

Results: the above graph shows the prevalence of Text neck syndrome among college which is 26% among college going students

ANALYSIS OF MEAN SCORES OF VAS WITHIN THE PRE- TEST AND POST- TEST

VAS	MEAN	SD	P VALUE	INFERENCE
PRE-TEST	6.675	0.997		
POST TEST	2.525	0.697	0.0001	SIGNIFICANT

TABLE 6



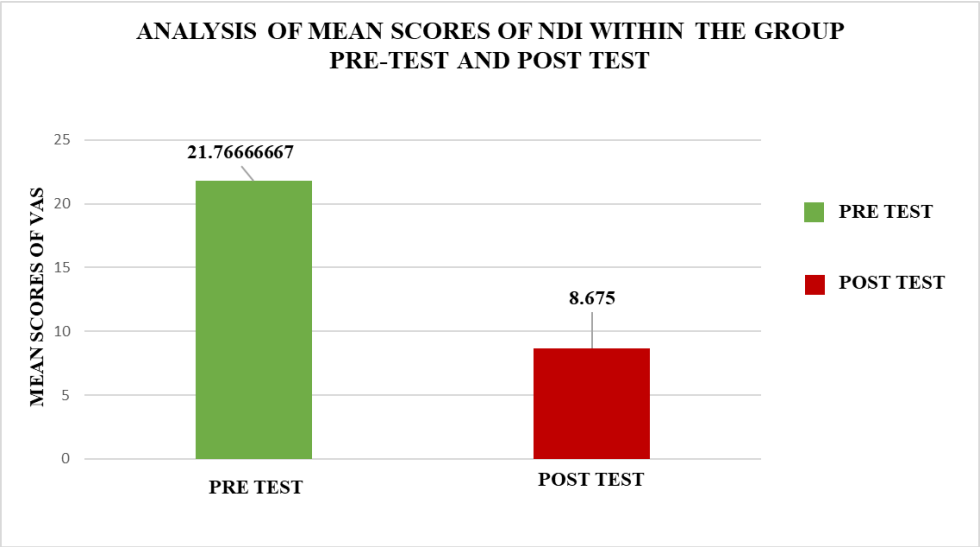
GRAPH 8

Results: The above table and graph show that the mean scores of VAS changes from pre- test to post-test values within were found to be statistically Significant [$p<0.05$].

ANALYSIS OF MEAN SCORES OF NDI WITHIN THE PRE- TEST AND POST- TEST

NDI	MEAN	SD	P VALUE	INFERENCE
PRE-TEST	21.766	4.374		
POST TEST	8.675	2.456	0.0001	SIGNIFICANT

TABLE 7



GRAPH 9

Results: The above table and graph shows that the mean scores of NDI changes from pre- test to Post-test values within were found to be statistically Significant [$p<0.05$] .

DISCUSSION

The aim of present study was to know the effect of multi modal physiotherapy as a management on pain and function in subjects with Text next syndrome among college going students. The survey was done through Google form among students by self-administered questionnaire and smart phone addiction scale. The following outcome measures Visual Analogue Scale (VAS), neck disability index was used to measure the intensity of pain and function and the result showed effective in decreasing pain and improving function by giving Physiotherapy intervention.

This study included 510 Physiotherapy students studying in GSL Educational Institutions, Rajanagaram, from the age group 18-30 years as our sample population. Demographic information of 510 respondents who participated in the survey can be described by gender in Table 1 and Graph 1, from which 414(81.1%) were females while 96(18.8%) were males. The mean age of the participants was 20.74± 2.91.

In this study out of 510 samples, 26% (133) were affected with Text Neck Syndrome in which 109 are females and 24 are males. The age group which was affected maximum is 22.36 years.

The majority of students used their smartphones 2-3 and more than 3 h (28% and 54%, respectively). Approximately 51% of participants were unaware of text neck syndrome. This study results shows 62 % of subjects using mobile phone in flexed position, 36% using phone in neutral position and 2 % using in extended position.

Sathya P et al conducted a study on prevalence of text neck syndrome in young-adult population that is 32%. According to their study Females were most affected with 80% and the age group which was most affected was 22 years (34%). [26]

Salameh MA et al, conducted a study on Prevalence of text neck syndrome, its impact on neck dysfunction, and its associated factors among medical students. The study found that 31.7% of students with text neck syndrome have mild neck disabilities, with a higher proportion of females. Their study results also show that more than a quarter of medical students had text neck syndrome. Text Neck Syndrome was linked to an increased number of gadgets used, low exercise, and more time spent in a sitting position.[27]

In this study, the majority of the responders were addicted to their smartphones (61.9%) in which females 80.7% and males 19.3%. The mean SAS-SV score was 35.33 ± 11.2.

A previous study by Kholoud T. et al on prevalence of text neck syndrome and its association with smart phone use also showed that the most of the participants are addicted to smart phone that is 63.1% and there was a significant correlation between smart phone use and text neck syndrome. [28]

Physiotherapy interventions which include ergonomic correction, posture correction and stretching and strengthening exercises showed statistically significant, and clinically effective within the pre-test & post-test according to previous studies. [22,25] Ergonomic advice was provided to students at risk of developing Text Neck Syndrome, with 116 (30.7%) students identified as being at risk. In this study, Multi modal physiotherapy interventions showed statistically significant differences within the group from pre-test to post-test values on reducing Pain and improving Function in subjects with Text Neck Syndrome.

Results of the previous study by Arun Jenikkin A et al showed Posture correction exercises can improve the movement patterns and the alignment of the head, shoulder & thoracic spine in people with TNS. It seems that improvement in scapular kinesis & alignment would be followed by improvement in neuromuscular force created by cognition and conscious control of the musculature. [29]

Neck corrective exercises can reduce the VAS and NDI by strengthening the deep flexor muscles of the neck and stretching the muscles in this region improves the alignment of the upper spine in maintaining proper head and neck postures. These exercises can reduce weight of the head and pressure on the cervical spine and naturally prevent pain, fatigue, arthritis, and nerve and muscle injuries in the head and neck.
Sarraf et al. proved that strengthening and extending the neck's deep flexors through self-management exercises can help reduce the severity of neck pain and improve function while also strengthening shoulder girdle muscles, such as the rhomboid, middle, and lower trapezius, and stretching the pectoralis minor, dorsal, and rotator cuff shoulder can help maintain appropriate head and neck postures. [30]
Isometric training aims at improving isometric function of neck muscle, which counteracts the forces of gravity in order to maintain head and neck in upright position. A study conducted by the chin tuck exercise strengthens deep craniovertebral flexors and the head bending exercise improves the muscular endurance of cervical flexors and reduce the pain in patients with chronic cervical pain and improve their muscular functions.
A previous study by Yang, Jiaqi MD et al also proved that Isometric training can help improve neck pain symptoms in patients with neck pain, reduce the degree of neck pain, and improve neck dysfunction. [31]
Another possible mechanism involved in the improvement is that strength training might have improved coordination, increased motor unit recruitment, and increased firing rate in each unit. Exercises reduce the fear of pain thereby increasing ROM. Pain reduction and improvement in neck ROM helps in overcoming the restriction of the activities improving the functional ability. The components of NDI are directly related to the patient's pain. The reduction in NDI scores seen in the experimental group may be due to the reduction of pain. Therefore, it may be concluded that the use of strengthening and endurance exercises for cervical muscles as well scapular stabilization exercises in the present study might have led to improvement in pain and thereby decreasing functional disability. [32]
According to the findings of the current study, physiotherapy interventions significantly reduced pain and improved function among the subjects with Text neck syndrome. The current study findings point to the physiotherapy as a potential therapy for the management of Text Neck Syndrome.

LIMITATIONS

- No follow up.
- All the data was self-reported and may subject to bias
- The study only focused on college going students which may not be representative of general population

RECOMMENDATIONS FOR FUTURE RESEARCH

- Further research is necessary to involve multi-institutions and large sample size to get better representative of study population
- A follow-up of patients for more prolonged periods could be advisable to see if the improvement was maintained or not.
- Can include objective measures such as ROM, neck posture, strength and endurance of the muscles which can further strengthen the findings of the study.

CONCLUSION

The present study concluded that there is a greater prevalence of Text Neck Syndrome among college going students that is 26%. The prevalence of Text Neck Syndrome is primarily influenced by factors such as extended screen time, lack of awareness, and improper posture while using technology for academic or recreational purposes. Ergonomic preventive strategies were incorporated into the daily routines of at-risk students, enabling them to significantly reduce their chances of developing Text Neck Syndrome.

Multi-modal physiotherapy is a feasible and effective approach to address Text Neck syndrome that led to an improvement among the subjects. The analysis between pre-test and post-test within the group suggests that the intervention is effective in decreasing pain and improving function in Text neck syndrome among college going students.

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