

EFFECTIVENESS OF JANDAS APPROACH VERSUS PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION ON NECK POSTURE AND FUNCTIONAL DISABILITY ON THE INDIVIDUALS WITH TEXT NECK SYNDROME – AN COMPARATIVE STUDY

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Abstract.

Background: Text neck syndrome also known as forward head posture in students and its effect on their daily activities found that 73% of students have forward head posture, and that this posture has a impact that is moderate their daily activities, with the majority of students reporting some degree of neck pain throughout the day It is characterized by an imbalance in the neck muscles, which makes the neck difficult to hold straight affect individuals' work productivity, functional performance, and quality of life.

Methods: 42 two college going students (both male and female) between the age group of 17 to 25 participated in a randomized control trial. To ensure their eligibility for the study, participants were first evaluated using an google forms to evaluate their medical history, past injuries, and current levels of physical activity. Following the screening, participants were split into two groups at random: the Janda's approach program group A (n=21) and the Proprioceptive neuromuscular facilitation group B(n=21). Training was place three times a week for four weeks for both groups. Before and after the intervention, CV angle was evaluated using a Kinovea software and functional disability was measured from the neck disability index.

Result: There is significant improvements within both groups over time. Group A had a highly significant increase in CV Angle ($t = 10.47$, $p = 0.0001$) and a substantial reduction in NDI ($t = 45.7$, $p = 0.0001$) from Week 0 to Week 4. Similarly, Group B showed significant improvement in CV Angle ($t = 4.44$, $p = 0.0002$) and a major reduction in NDI ($t = 21.98$, $p = 0.0001$). Between-group comparisons revealed Group A had greater CV Angle improvement ($t = 2.43$, $p = 0.02$), while Group B achieved a larger NDI reduction ($t = -3.53$, $p < 0.05$). Both interventions were effective but had differing strengths depending on the outcome.

Conclusion: In people with text neck syndrome both Janda's approach and Proprioceptive Neuromuscular Facilitation (PNF) successfully enhanced neck posture and decreased functional impairment but Janda's approach has more significant improvement in individuals with Text neck syndrome.

Keywords: Text neck syndrome, Neck posture, Functional disability, Kinovea software and Neck disability index.

INTRODUCTION

FUNCTIONAL ANATOMY OF NECK REGION

To keep the spine that is cervical head in alignment and allow for smooth movement in both flexion (SCM) and extension (Semispinalis capitis, cervicis, and splenius capitis), the neck flexors and extensors cooperate. The strength that is typical for flexion to extension is 60%. The rectus capitis anterior, longus coli, and longus

capitis are the deep neck flexors that work more to retract than to bend the spine that is cervical. Deep neck flexors do not produce movement that is dynamic instead, they preserve posture (cervical lordosis) and equilibrium. Specifically, the postural muscle known as the longus colli serves to counterbalance the cervical lordosis caused by the head's weight and extension that is cervical.[1]

PATHOLOGY

Individuals with dysfunctions of the spine that is cervical display UCS. The neck that is deep, serratus anterior, rhomboids, and middle and lower trapezius are among the weak and inhibited muscles in this illness. Tight and facilitated are the pectoralis major and minor, levator scapula, supraoccipital, SCM, and trapezius that is upper. Additionally, specific postural abnormalities such as forward head posture, lifted and prolonged shoulders, increased lordosis that is cervical thoracic kyphosis, and rotation, abduction, and winging of the scapulae are observed in UCS. The glenoid fossa becomes more vertical as a result of serratus anterior weakening, which results in scapular abduction, rotation, and winging. This postural alteration also reduces stability that is glenohumeral. The levator scapulae and upper trapezius contract more in order to preserve glenohumeral centration. [1]

NECK PAIN CORRELATION WITH POSTURAL CHANGES

Those who suffer from persistent neck discomfort frequently display the characteristic cluster of postural dysfunction, which includes a forward head, rounded shoulders, and heightened kyphosis that is thoracic. According to Janda's UCS, this stance is appropriate. It is probable because the deep neck flexors are weak that patients with persistent neck discomfort struggle to maintain lordosis that is cervical. Increased lordosis that is cervical healthy persons is linked to insufficient deep neck flexor endurance, but not to forward head posture. [1]

Nowadays, teenagers use smartphones more than any other device for information sharing, social media use, online gaming, video watching, and a host of other everyday activities. Research that is numerous have examined how smartphone addiction affects the musculoskeletal system. There is a link that is direct between neck issues and smartphone addiction. A positive correlation between the amount of time spent using a mobile phone overall neck pain. The number of teenage smartphone users has increased significantly in recent years, and this has been linked to musculoskeletal discomfort. This is a major health concern that is global. Nonetheless, the quantity that is overall of and text neck syndrome instances [2]

One of the most prevalent incorrect neck that is habitual is the forward head posture, which is also known as text neck syndrome or turtle-neck syndrome. A head that is forward is defined as the head's prolonged, exaggerated protraction movement, which accounts for 6% of the body's total weight. The cervical portion of the spine forms a lordotic curve in terms of anatomy. The neck can also retract and protract in addition to head flexion and extension. When using electronic gadgets for extended periods of time, tensing the neck in one posture for an amount that is extended will cause our head's centre of gravity to move forward, increasing the strain on the neck. [3]

PREVALENCE OF NECK PAIN WITH FORWARD HEAD POSTURE

The study on the prevalence of forward head posture in students and its effect on their daily activities found that 73% of students have forward head posture, and that this posture has an impact that is moderate on their daily activities, with the majority of students reporting some degree of neck pain throughout the day. [4]

Females were most affected with 80% and the age group which was most affected was 22 years (34%). [5]

NECK PAIN

Having musculoskeletal pain, including pain in the neck and upper extremities, may affect individuals' work productivity, functional performance, and quality of life. Further, it may

increase the demand for medical services and cause a substantial burden due to the cost of medical treatment. For students, experiencing musculoskeletal pain may impact their educational achievement and truancy from classes [20]. While using smart phones, there is a lack of neck and upper-limb support, combined with repeated finger movements for texting, which can result in a high static muscle load, especially when using only one hand [21–24]. Furthermore, forward head position while using smart phones has been identified as a risk factor for musculoskeletal pain, increasing tension on cervical structures and potentially initiating degeneration and tearing of the neck structures. A history of previous neck and shoulder pain may also increase the likelihood of developing recurrent neck pain and the severity of the condition. While there is an association between using an electronic devices (i.e., a smartphone) and musculoskeletal symptoms including neck pain among collegiate students having an episode of previous neck pain, and various aspects of smartphone exposures including the smartphone time duration spent on using the phone, the number of typed messages, number of hands used to hold the device, the head positions of the smartphone, and associated musculoskeletal neck and shoulder pain duration and severity among university students [6]

JANDAS APPROACH

According to Janda (1987), specific muscle groups, referred to be "postural" and "phasic" (Table 1), are more likely to experience tightness or weakening depending on how the central nervous system (CNS) controls and functions them. According to his classification, normal movement was dependent on the balanced roles that these two groups played in human growth and movement patterns. Muscle imbalance syndromes that he identified as "upper crossed," "lower crossed," and "layer" syndromes were often caused by the "postural" muscles responding to dysfunction with increased tightness and the "phasic" muscles responding with weakening.

Janda thought that these imbalances that are muscular deficits in movement, which in turn altered the CNS's motor programming. He pointed out that the central nervous system (CNS) mediates musculoskeletal discomfort that is persistent. The only approach to address these deficits was to support an appropriate motor program at the end, correct muscle balance, and then return the peripheral proprioceptive structures to normal (by joint or soft tissue mobilization). Rather than focusing on treating individual anatomical components, he prioritized motor relearning as a means of restoring system function that is nervous.[7]

PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION

The post-isometric relaxation stretching technique, also known as proprioceptive neuromuscular facilitation, or PNF, is a straightforward, efficient, non-invasive, and more sophisticated type of flexibility training that uses hold-relax/contract relax to stretch and contract the muscle group. It can be done with or without supervision. PNF stretching and hold-relax techniques are frequently used in clinics to relieve pain, improve joint range of motion, and lessen muscle rigidity. The goal of the stabilizing reversal technique is to increase the strength of the postural muscles of the shoulder girdle and trunk [6]. PNF has been demonstrated to regulate abnormal muscle movements and enhance physical function and balance

People who experience pain in the neck may have a change or deficit in their proprioception of the neck joint and muscles, which are important for postural stability, joint position, and head and neck motor control. (2) The effectiveness of treatment for both chronic and subacute neck pain is currently unclear. Numerous non-pharmacological therapies, including manual therapy, exercise therapy, and electrophysical agents, can be used to treat neck discomfort. In individuals with sub-acute and chronic neck pain, a study found that manual treatment significantly differs from exercise therapy or standard general practitioner care in terms of both effectiveness and cost-effectiveness. [8]

MATERIALS AND METHODS

The ethical clearance received from institutional ethical committee of Parul university. The study included total 42 participants who were selected based on inclusion and exclusion criteria. The inclusion criteria for the study were Subjects with CV angle less than 48 degrees, Pain more than 2 months, Females and male both and individuals with Any recent injuries to upper limb or Any past surgery of upper limb and congenital abnormalities were excluded.

All the participants were informed about the study and consent was taken from each participants in the signature on the consent form. Privacy and confidentiality of the subjects should be maintained. Personal information such as name, age, address, was taken After those subjects were asses with sit CV angle and Neck disability index.

OUTCOME PARAMETERS – Kinovea Software and Neck diability index

INTERVENTION

JANDAS APPROACH PROTOCOL

STRETCHING:

1) Modified levator scapulae stretch –

Position of the patient - Standing position with knees extended and one hand horizontal adduction

Procedure –

- Ask the patient to take one hand in horizontal adduction and internal rotation towards the other hand
- Apply stretch towards the direction
 - Number of seconds hold – 30 seconds
 - Number of sets – 3
 - Duration of exercise – 3 days/week for 4 weeks

2) Upper trapezius stretch –

Position of the patient – Patient position will be sitting on the chair or stool.

Procedure –

- The patient can be instructed to rotate his neck toward the tight side
- Bend sideways away from the tight side, and then add neck flexion
- The patient can also be instructed to sit or stand with the ipsilateral hand behind the back to stabilize the scapula
- Finally, the patient can use the contralateral arm to grasp his or her own head to apply the stretch.
 - Number of seconds hold – 30 sec
 - Number of sets – 3
 - Duration of exercise – 3 days/week for 4 weeks

3) Pectoralis doorway stretch –

Patient position – Patient position will be standing

Procedure -

- Standing with the arms in a reverse T against the wall and facing a corner or open door
- The patient should Lean their entire body forward, with their knees and ankles slightly bent
- The amount of forward movement can be used to alter the degree of stretch.

- Number of seconds hold – 30 seconds
- Number of sets – 3 sec
- Duration of exercise – 3 days/week for 4 weeks

4) Pectoralis towel chest stretch –

Patient position – Patient position will be standing

Procedure –

- Ask patient to grasp the towel with the forearms pronated and elbows flexed 90 degree
- Have the patient then elevate the shoulders and bring the towel behind the head and shoulders
- Number of seconds hold – 30 sec
- Number of sets – 3
- Duration of exercise – 3 days/week for 4 weeks

STRENGTHNING:

1) Table Push –

Patient position – Patient position will be standing

Procedure -

- Ask patient to stand with a stable base of support of support
- Begin by pushing the table on a flat surface
- Use both arms to push the table and vary the activity by adjusting the width of the grip and the position of the arms by pushing
- Number of repetitions – 10 reps
- Number of sets – 3
- Duration of exercise – 3 days/week for 4 weeks

2) Dumbell Shrug –

Patient position – Patient position will be standing

Procedure –

- Ask patient to stand with a stable base of support
- Hold dumbell in both the hands
- Number of repetitions – 10 reps
- Number of sets – 3
- Duration of exercise – 3 days/week for 4 weeks

3) Deep neck flexors strengthening –

Patient position – Patient position will be crook lying on the plinth

Procedure -

- Ask patient to keep both the hands behind the head
- Tuck in the chin and press the chin towards the head
- Number of repetitions – 10 reps
- Number of sets – 3
- Duration of exercise – 3 days/week for 4 weeks

PROPRIOCEPTIVE NEUROMUSCULAR FACILITATION

STRETCHING

PNF D1 Upper Limb Pattern

The D1 pattern involves flexion and extension at the shoulder and wrist in a diagonal direction. Here's how to perform it with an elastic band:

D1 Flexion (shoulder flexion, adduction, and external rotation)

- **Starting position:**
 - Hold the band in one hand.
 - Anchor the band at a low point (e.g., under your foot or to a stationary object near your feet).
 - Begin with the arm extended by the side, palm facing inward.
- **Movement:**
 - Pull the band diagonally across the body (as if reaching across the body to the opposite shoulder) while lifting the arm and rotating the wrist so the palm faces away from the body (flexion of the shoulder).
 - You should feel resistance as you move your arm and wrist in a diagonal upward direction.
- **End position:**
 - Your hand should be near the opposite shoulder with the elbow bent and the wrist in a flexed position.

D1 Extension (shoulder extension, abduction, and internal rotation)

- **Starting position:**
 - With the band anchored, the arm is in a flexed position, as described above.
- **Movement:**
 - Push the arm diagonally downward and outward, extending the shoulder and rotating the wrist so that the palm faces inward (internal rotation).
 - The band will provide resistance as the arm moves downward in a diagonal motion.
- **End position:**
 - Your arm should be extended outward, with the wrist in a neutral or extended position and the elbow straight.
- **STRENGTHENING**

Strengthening exercises:

The hold relax technique of PNF was used to perform isometric contractions for 10 seconds with 5 repetitions for shoulder and scapular muscle stabilizing exercises [6], progressively increasing the number of repetitions each week.

- a) Scapular squeeze or retraction
 - b) Wall push-ups
Elbow abduction in 90-90 and sliding up and down while leaning against a wall
 - c) Arm exercises I, V, T, and W in a prone position
 - d) Chin tucks in a supine position with a towel roll behind the neck
Exercises that develop the core muscles, such as planks and spinal extensions
- Number of repetitions – 12 reps
 - Number of sets – 3
 - Duration of exercise – 3 days/week for 4 weeks

STATISTICAL ANALYSIS

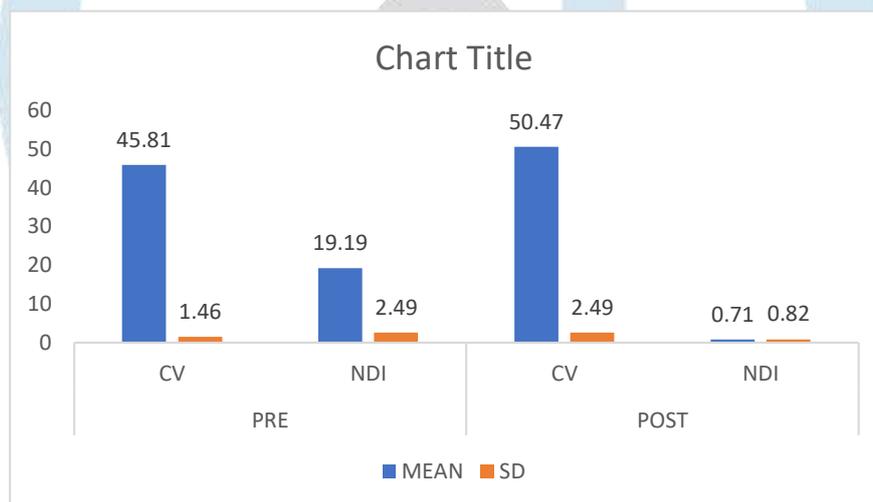
Descriptive analysis of CV angle and Neck disability index interpreted by using statistical software IBM SPSS-26. The descriptive statistics including means and standard deviations were obtained.

RESULT

Intra group analysis of Group A and Group B

Table 1 – Comparison of pre and post data of group A for CV angle and NDI

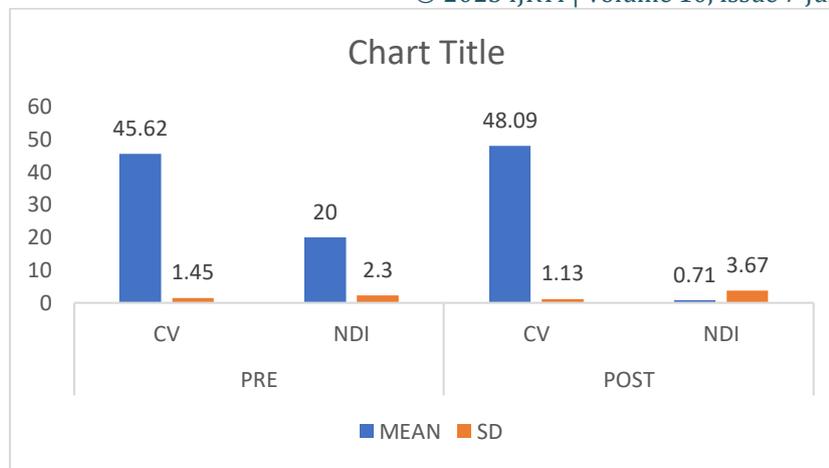
CV angle	Mean	SD	NDI	Mean	SD
Pre	45.81	1.46	Pre	19.19	2.49
Post	50.47	2.49	Post	0.71	0.82



The significant positive t-value after the intervention shows that the CV Angle increased significantly. Significantly below the traditional significance level ($p < 0.05$), the p-value suggests strong evidence to reject the null hypothesis. This suggests a statistically significant change in CV Angle indicating that the intervention most likely had a measurable effect. Following the intervention, the NDI (Neck Disability Index) dramatically dropped, as indicated by the huge negative t-value. The incredibly low p-value suggests that the outcome is highly statistically significant, offering compelling proof that the intervention significantly decreased impairment.

Table 2 – Comparison of pre and post data of group B for CV angle and NDI

CV angle	Mean	SD	NDI	Mean	SD
Pre	45.62	1.46	Pre	20	2.3
Post	48.09	2.49	Post	0.71	3.67



Between before and post, the mean CV Angle value increased from 45.62 to 48.09. This suggests that the alignment of the cervical spine or posture has improved. A statistically significant p-value ($p < 0.05$) in the paired t-test indicates that the intervention significantly altered posture. The NDI's mean value dropped sharply from 20.00 (before) to 0.71 (after). Following the intervention, individuals reported much less neck disability, which suggests an improvement in functional results. The post-intervention NDI's high standard deviation ($SD = 3.67$) indicates that participant outcomes varied. It's possible that some people had better reactions than others.

GROUP	VARIABLES	MEAN ± S.D		P VALUE	T VALUE
		PRE	POST		
A	CV ANGLE	45.81 ± 1.46	50.47 ± 2.49	0.0001	10.47
A	NDI	19.19 ± 2.49	0.71 ± 0.82	0.0001	45.7
B	CV ANGLE	45.62 ± 1.45	48.09 ± 1.13	0.0002	4.44
B	NDI	20 ± 2.30	5.42 ± 3.67	0.0001	21.98

Group B improvement is less noticeable than Group A's (lower t-value of 4.44), the CV Angle also increased significantly in Group B. This suggests that, in comparison to Group A, the intervention had a favourable but slightly lesser impact on Group B's posture or cervical alignment. With a huge t-value (21.98) and a very significant p-value (0.0001), Group B's NDI also declined dramatically. Although the improvement is not as noticeable as it was in Group A, this still shows a significant decrease in neck impairment. As seen by higher t-values for both variables, Group A had larger improvements than Group B.

Inter group analysis of Group A and Group B

Table - 3

VARIABLE	GROUP A		VARIABLE	GROUP B		P VALUE	t VALUE
	MEAN ± S.D			MEAN ± S.D			
	PRE	POST		PRE	POST		
CV ANGLE	45.81 ± 1.46	50.47 ± 2.49	CV ANGLE	45.62 ± 1.45	48.09 ± 1.13	0.02	2.43
NDI	19.19 ± 2.49	0.71 ± 0.82	NDI	20 ± 2.30	5.42 ± 3.67	-3.53	0

There is a statistically significant difference in the CV Angle between Group A and Group B after the intervention, as indicated by the p-value (0.02) being below the conventional significance level ($p < 0.05$). Group A has a substantially larger CV Angle than Group B, as indicated by the positive t-value (2.43). This implies that Group A benefited more from the intervention in terms of better cervical position than Group B. There is a statistically significant change in NDI between Group A and Group B after the intervention, as indicated by the incredibly small p-value. The negative t-value (-3.53) shows that Group A

has a significantly lower NDI compared to Group B, reflecting greater improvement in reducing neck disability. This suggests that Group A benefitted more from the intervention than Group B in terms of functional recovery. The intervention was more effective for Group A across both variables CV angle and NDI.

DISCUSSION

The result of this study demonstrated that the Janda's approach and Proprioceptive neuromuscular facilitation both techniques has shown effect on different components but Janda's approach has been effective more in individuals with text neck syndrome. More than any other device, teenagers these days use mobile phones for social media, online gaming, exchanging information, viewing videos, and a variety of other daily tasks. The effects of smartphone addiction on the musculoskeletal system have been the subject of numerous studies. The amount of time spent on a mobile phone was found to positively correlate with total neck pain, indicating a direct link between smartphone addiction and neck problems. Teenage smartphone use has grown dramatically in recent years, and this has been connected to musculoskeletal pain. Globally, this is a serious health issue. The number of cases of text neck syndrome overall [9] PNF has been the subject of numerous studies to date, with encouraging findings regarding the management of inappropriate muscle activity and the improvement of bodily functioning and balance . PNF is frequently used to alleviate physical dysfunction brought on by illness or injury are believed to have enhanced blood and tissue fluid circulation, normalized muscle tone, enhanced nerve control efficiency, and stimulate the proprioceptive Myoreceptors of the muscles and tendons [10]

Vladimir Janda's studies on the patterns of muscle compensation and postural imbalance in the body. Based on his observations, he concluded that a weak postural base leads to flawed movement patterns that minimize natural movement in certain joints while contributing to chronic overuse in others, resulting in a self-reinforcing cycle of dysfunction and eventual injury. Janda classified two muscle groups as phasic or extensor and tonic or flexors [11]

The Jandas Approach targets the muscular imbalances that are frequently linked to Text Neck Syndrome, including weakness in the deep cervical flexors and stiffness in the levator scapulae, upper trapezius, and pectoralis muscles. According to studies of (Kim & Kim, 2016) reestablishing proper cervical spine alignment and addressing forward head posture require focused stretching and strengthening [12]. Exercises like deep neck flexor strengthening, which are part of the Jandas Approach, efficiently work the deep cervical muscles that keep the cervical alignment. It has been demonstrated that engaging these muscles improves cervical posture and lessens functional impairment (Falla et al., 2004). [13]

Clinical implication - The results demonstrate the Janda's Approach's potential as a better intervention for enhancing neck posture and lowering functional impairment in people with Text Neck Syndrome. Postural irregularities and related deficits can be effectively addressed by combining specific stretching and strengthening exercises. PNF has advantages as well, but for best effects in this demographic, its use can call for further adjustments or longer periods of time.

CONCLUSION

In individuals with Text Neck Syndrome, both the Janda's Approach and PNF successfully enhanced cervical posture and functional impairment; however, the Janda's Approach produced better results. These findings highlight how crucial focused, research-based rehabilitation techniques are for treating postural issues in the contemporary digital age.

LIMITATION AND FUTUTRE SCOPE

The limitations faced in this study was sample size taken was comparatively small and the duration was also limited. The duration of the intervention was four weeks. Although notable benefits were noted, a lengthier follow-up could ascertain whether the gains were sustainable. The study's main focus was on NDI and CV angle. Other metrics, such electromyographic activity, range of motion, or muscle strength, might offer a greater understanding of the intervention's effects. The lack of a long-term follow-up makes it more difficult to determine if the observed obtains hold up over time or call for further intervention. More participants from a wider range of backgrounds, including age groups, professions, and Text Neck Syndrome severity, should be included in future studies with bigger sample sizes. Analyzing how well the Jandas Approach works in contrast to other therapeutic modalities like McKenzie exercises, yoga, or chiropractic adjustments might offer a more comprehensive perspective. Research on integrating the Jandas Approach with other fields, such ergonomics instruction, workplace adjustments, or dietary guidance, may result in a more all-encompassing management approach.

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