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Comparison Of Kinesio Taping Versus Passive Stretching In Collegiate Students With Nonspecific Neck Pain- A Pilot Study

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Abstract:
Background: *Non-specific neck pain is a common musculoskeletal disorder affecting a significant portion of the population, particularly collegiate students. Various interventions, including stretching exercises and Kinesio taping (KT), have been employed to manage non-specific neck pain. However, limited studies directly compare the effectiveness of these interventions. This study aimed to compare the effects of passive stretching and kinesio taping on pain intensity and neck disability among collegiate students with non-specific neck pain.*
Methods: *A pilot study was conducted with 20 collegiate students (ages 18-25) experiencing Non-specific neck pain for over four weeks. Participants were randomly assigned to two groups: Kinesio Taping (KT) and Passive Stretching (PS). The Kinesio taping group received a standardized application of KT for four weeks, while the passive Stretching group underwent supervised passive stretching of the upper trapezius and levator scapulae for the same duration. Pain intensity was measured using the Numeric Pain Rating Scale (NPRS), and disability was assessed with the Neck Disability Index (NDI). Statistical analysis included within-group and between-group comparisons using SPSS software, with significance set at $p < 0.05$.*
Results: *Both kinesio taping and passive Stretching groups exhibited significant reductions in NPRS scores ($p < 0.001$) and NDI scores ($p < 0.001$) post-intervention. The Kinesio taping group showed a greater reduction in pain (6.70 ± 0.95 to 2.40 ± 1.08) and disability scores (38.20 ± 11.91% to 14.00 ± 6.33%) compared to the passive Stretching group (pain: 6.80 ± 1.03 to 3.10 ± 0.74; disability: 35.20 ± 14.43% to 18.20 ± 7.63%), though the between-group differences were not statistically significant.*
Conclusion: *Both Kinesio taping and Passive Stretching effectively reduced pain and disability in collegiate students with Non-specific neck pain, with Kinesio taping demonstrating a non-significant trend toward greater improvement. These findings suggest that both interventions can be considered viable options for Non-specific neck pain management, warranting further research with larger sample sizes to confirm their comparative effectiveness.*
Keywords: *Neck Pain, Neck Disability Index, NPRS, Passive Stretching, Kinesiotaping*

INTRODUCTION

Non-specific neck pain is defined as cervical pain with no established pathological etiology as the root cause of the symptoms. Symptoms include limited cervical spine motion and neck muscle weakness, which are frequently associated with other issues such as poor vertebral, neck, or shoulder function, as well as mental and physical stress at work. Furthermore, patients with chronic non-specific neck pain have higher functional limits and catastrophizing views, which may result in disability, decreased vitality, and a poorer overall health status.[1] Non-specific neck pain is complex in etiology, including gender, age, poor self-rated health, and poor posture.[2]

Neck pain is among the most prevalent musculoskeletal conditions with an age-standardized prevalence rate of 27.0 per 1000 people in 2019.[3] The Global Burden of Disease (GBD) Study identified low back and neck pain as the second biggest cause of years lived with disability (YLD) among young individuals aged 20-24 years.[4]

Neck pain risk factors are classified into three categories: physical, psychosocial, and individual-related[5]. Working in uncomfortable or prolonged postures was the most often mentioned risk factor. [6] There are several work-related factors that increase the chance of developing neck pain, including heavy workloads,

computer use, and study time. Additionally, neck pain is a problem for adolescents and children as well. Strong neck flexion when studying, sitting, watching television, and using cellphones (or other handheld devices) was linked to neck pain, according to a cross-sectional research of 207 children and adolescents with non-specific neck pain.[7]

According to studies, chronic neck pain patients have increased stiffness in a number of the neck muscles[8]. Taş et al. discovered that chronic neck pain patients had stiffer upper trapezius, levator scapulae, and sternocleidomastoid muscles than non-symptomatic individuals.[9] While the precise function of trapezius stiffness in the start of chronic neck pain is unknown, reducing this stiffness may be a primary goal of rehabilitation programs. In line with this, neck muscle stretching, notably of the trapezius, has been linked to instant alleviation from neck pain.[10] Stretching is a frequent technique used during rehabilitation. Stretching is used to increase muscular length and range of motion, as well as to align collagen fibers during healing a muscle. Passive stretching helps to restore muscle length while also recovering range of motion (ROM).[11]

In the treatment of chronic non-specific neck pain taping shows promise as an adjuvant therapy. Incorporating taping not only broadens the range of available treatments but also emphasizes the modality's potential effectiveness.[12] Kinesio taping is being utilitized for clinical management of patients with neck pain.[13] Various advantages have been suggested by Kase et al.[14], contingent upon the degree of strain imparted to the tape during its application.: (1) via the skin to deliver a positional stimulation, (2) To make fascial tissues aligned, (3) to expand the region by elevating the soft tissue and fascia above the painful or inflamed location., (4) to stimulate the sensory receptors in order to facilitate or restrict movement, and (5) to guide exudates toward a lymph duct in order to aid in the elimination of edema.[14] Pain reduction with kinesio taping has been documented in a number of previous trials involving various conditions: Shoulder impingement syndrome.[15]; acute whiplash [16], and chronic low back pain [17]

Need For The Study

Neck pain is one of the most commonly reported musculoskeletal illnesses, producing a significant economic burden for healthcare systems,[3] and the 2018 Global Burden of Disease report listed neck pain as one of the leading causes of long-term dysfunction[4]. The average prevalence of neck pain in the general population is 23.1%, while the incidence of neck pain is particularly high in college students (48%-78%). [18] Several interventions have been used to treat neck pain, such as manipulation, joint mobilization, strengthening exercises, massage therapy, stretching exercises, and kinesio taping.[19]Stretching exercises have been reported to be effective in managing chronic neck pain.[2021] Studies have also demonstrated the effect of kinesio taping in decreasing pain intensity in neck pain.[19]

Aims And Objectives

This study aims to compare the effectiveness of kinesio taping and passive stretching in non-specific neck pain among collegiate students.

Hypothesis

Null Hypothesis (H_0):

There is no significant difference in the effects of Kinesio taping and passive stretching on pain intensity and neck disability among collegiate students with nonspecific neck pain.

Alternate Hypothesis (H_1):

There is a significant difference in the effects of Kinesio taping and passive stretching on pain intensity and neck disability among collegiate students with nonspecific neck pain.

Design and ethics

This study was designed as a pilot study to compare the effects of kinesio taping and passive stretching exercises on nonspecific neck pain in collegiate students. The study protocol was approved by the Galgotias University Departmental Ethics Committee (Ref No: DRC/PT/59/24) Informed consent was obtained from all participants prior to enrollment in the study.

Inclusion Criteria

The inclusion criteria for this study included

- College students
- Age 18-25 years
- Gender: male and female
- Neck pain for more than 3 months

Exclusion Criteria

Participants with neck pain by the following conditions were excluded:

- history of injury or trauma to cervical spine
- pathological findings of cervical spine
- neck pain associated with vertigo, psychological disorders
- allergy to KT.

Intervention

An informed written consent was taken from the subject. Selection of the subjects was done as per the inclusion and exclusion criteria. The subjects were divided into 2 groups, A and B, of 10 each. Group A consisted of the Kinesio taping group and Group B was the Passive stretching group. Pre assessment was done of pain using NPRS and disability using Neck Disability Index (NDI)

Kinesio Taping

Group A: Before applying Kinesio tape, the subject's neck was properly cleansed with alcohol and gauze pads "Y" and "I" strips were applied in 2 layers, according to the GonzáLez-Iglesias et al.'s study guidelines.[16] The initial layer was a Y-strip. The unsplit base was positioned over the mid-thoracic area of the spine and secured without tension. The participants were instructed to sit up straight, chins resting on their chests and necks flexed. After that, the split ends (Y-strip) of the tape were stretched up to 15 to 25% to cover the cervical musculature by and pasted up and over both spine ridges. The first strip of Kinesio tape was placed from T1–T2 region to C1–C2 region. The second layer was an overlying I-strip put perpendicular to the Y-strip, covering the maximal posterior cervical muscles and applying maximum stress to the mid-cervical area (C3-C6). The Kinesio tape was stretched from both ends, and the central piece of the tape was stuck first, followed by releasing tension to apply the ends without stretching. Kinesio tape was applied for 4 weeks, and removed at the end of the intervention.

Figure 1: Kinesiotape application "Y" and "I" strip

Passive stretching

Group B: Passive stretching was applied to upper trapezius and levator scapulae muscles for three repetitions with 30 seconds daily for 4 weeks. Participant position was sitting. For the upper trapezius muscle, therapist stood behind the participant and applied the stretch in form of cervical flexion, same side cervical rotation and opposite side cervical lateral flexion. A manual stretch was performed by using the other hand to depress the distal clavicle and the scapula. For levator scapulae muscle the therapist stood behind the participant and applied the stretch in form of cervical flexion, contralateral lateral flexion and contralateral cervical rotation.


Figure 2: Levator scapulae stretch

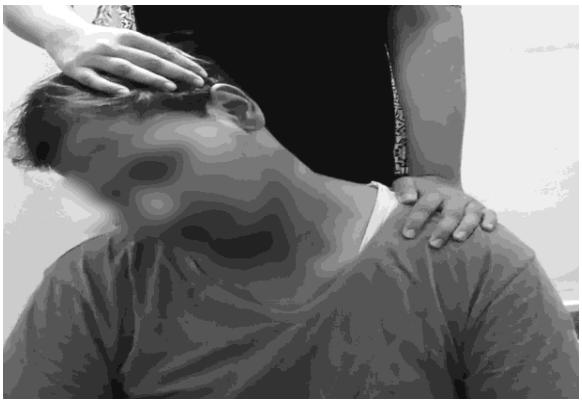


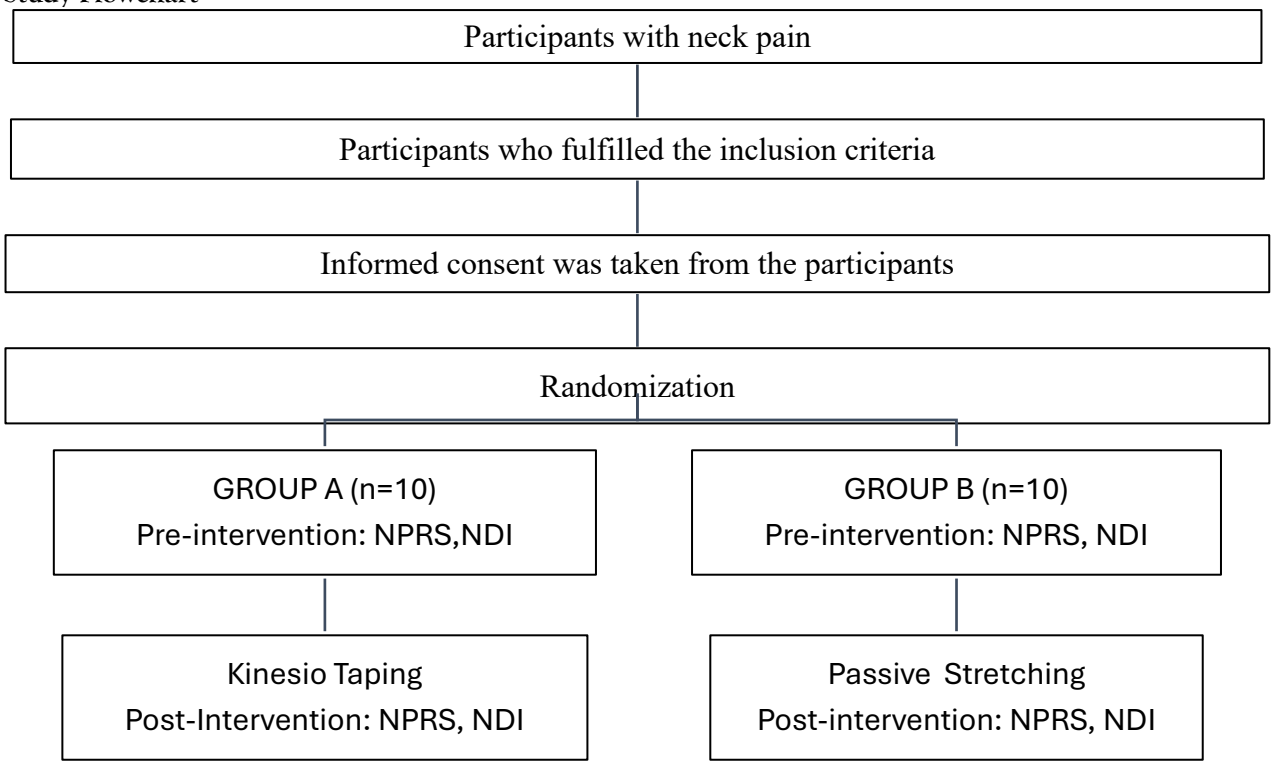
Figure 3: Trapezius stretch

Outcome measures

Pain intensity - Neck pain intensity pre and post intervention was quantified using NPRS scoring on a scale of 0–10, with 0 indicating no pain, 5 indicating moderate pain, and 10 indicating intense pain.

Disability- The neck disability index (NDI) was used to quantify disabilities caused by neck pain.[22] This index was designed to assess cervical pain and dysfunction using 10 questions. Each of the 10 items i.e., pain intensity, headache, concentration, sleeping, lifting, work, driving, recreation, personal care, and reading, was scored on a six-point scale (0–5 points). The sum of each item is the NDI score, which is directly proportional to cervical abnormality-related functional disability. Vernon reported that a score of < 4 indicates no disability; 5–14, mild disability; 15–24, moderate disability; 25–34, severe disability; and > 35, complete disability.[22]

Study Flowchart



Statistical Analysis

The research used SPSS software (version 22) to analyze the data. The collected data were systematically organized and entered into statistical software for analysis. Statistical analysis in this study involved assessing the normality of the data using the Kolmogorov-Smirnov (K-S) and Shapiro-Wilk (S-W) tests. These tests

determined whether the data were normally distributed, a key assumption for choosing the appropriate statistical methods. Based on the results, non-parametric tests were applied for variables that did not follow a normal distribution (e.g., NPRS scores), while parametric tests were used for variables with normally distributed data (e.g., NDI scores and percentages). Between-group comparisons were conducted to evaluate differences in pain and disability scores between the Passive Stretching and Kinesio Taping groups. Within-group analyses assessed pre- and post-intervention changes in these scores. Mean values, standard deviations, standard errors, and p-values were reported to determine statistical significance, with a threshold of $p < 0.05$ considered significant. The application of these methods ensured rigorous evaluation of the interventions' effectiveness.

RESULTS

TABLE NO 1 – SHOWS THE TEST OF NORMALITY

Tests of Normality						
	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
NPRS PRE	.202	20	.032	.882	20	.019
NPRS POST	.252	20	.002	.843	20	.004
NDI (%) PRE	.182	20	.080	.941	20	.253
NDI (%) POST	.167	20	.147	.954	20	.428
NDI PRE SCORES	.180	20	.088	.947	20	.320
NDI POST SCORES	.167	20	.147	.954	20	.428
a. Lilliefors Significance Correction						

The table reports results of normality tests applied to different variables by Kolmogorov-Smirnov (K-S) and Shapiro-Wilk (S-W) tests. These tests check if data for each variable is normally distributed, which is one of the assumptions that is necessary for most statistical analysis. Included were scores on the Numeric Pain Rating Scale before and after treatment (NPRS PRE and NPRS POST), Neck Disability Index percentage scores before and after treatment (NDI (%) PRE and NDI (%) POST), and raw scores for the Neck Disability Index before and after treatment (NDI PRE SCORES and NDI POST SCORES).Both tests showed significant values of Sig. < 0.05 for both pre-intervention and post-intervention scores in terms of NPRS scores. The result shows that data do not follow a normal distribution in terms of NPRS PRE and NPRS POST; thus, the null hypothesis that the data have normal distributions is rejected. In contrast, results of NDI (%) PRE and NDI (%) POST showed to be normally distributed because p-values from both tests are above 0.05. Additionally, the raw NDI values NDI PRE SCORES and NDI POST SCORES had also shown to be more than 0.05 for both of its p-values, proving that data of these variables was normally distributed.
The Lilliefors Significance Correction was applied to the K-S test, which improved its usability for small sample sizes. With these results, non-parametric tests should be used in the analysis of NPRS scores because of their non-normal distribution. On the other hand, parametric tests may be used in the analysis of NDI scores and percentages because their data fit the assumption of normality. This difference is important in choosing the right statistical tools for use in further analyses.

TABLE NO 2 – SHOWS THE DEMOGRAPHIC DETAILS OF THE SUBJECTS

	GROUP	N	Mean	Std. Deviation	Std. Error Mean	P value
AGE	**Passive stretching**	10	22.60	1.578	.499	0.671
	Kinesio taping	10	22.90	1.524	.482	
BMI	**Passive stretching**	10	23.740	2.9478	.9322	0.302
	Kinesio taping	10	22.220	3.4328	1.0855	

The table summarizes the demographic characteristics, including age and BMI, of participants in two intervention groups: Passive Stretching and Kinesio Taping. Each group has 10 subjects, and the results are presented as mean values, standard deviations, and standard errors of the mean. A p-value is reported for each demographic parameter to assess the statistical significance of differences between the groups.

For age, the means in the Passive Stretching are 22.60 years with an SD of 1.578 and SEM of 0.499. For Kinesio Taping, the group had a mean age of 22.90 years and a standard deviation of 1.524 with a standard error of the mean of 0.482. The p - value for age is significantly different between groups. P = 0.671.

For BMI, the mean BMI for the Passive Stretching group is 23.740 (SD = 2.9478, SEM = 0.9322), and for the Kinesio Taping group, it is 22.220 (SD = 3.4328, SEM = 1.0855). The p-value for BMI is 0.302, and this indicates that there is no significant difference between the two groups. In the end, there are no differences in age or BMI between the two groups; this signifies that the two groups are demographically similar. This similarity is of utmost importance so as to reduce confounding variables and compare the intervention effects fairly.

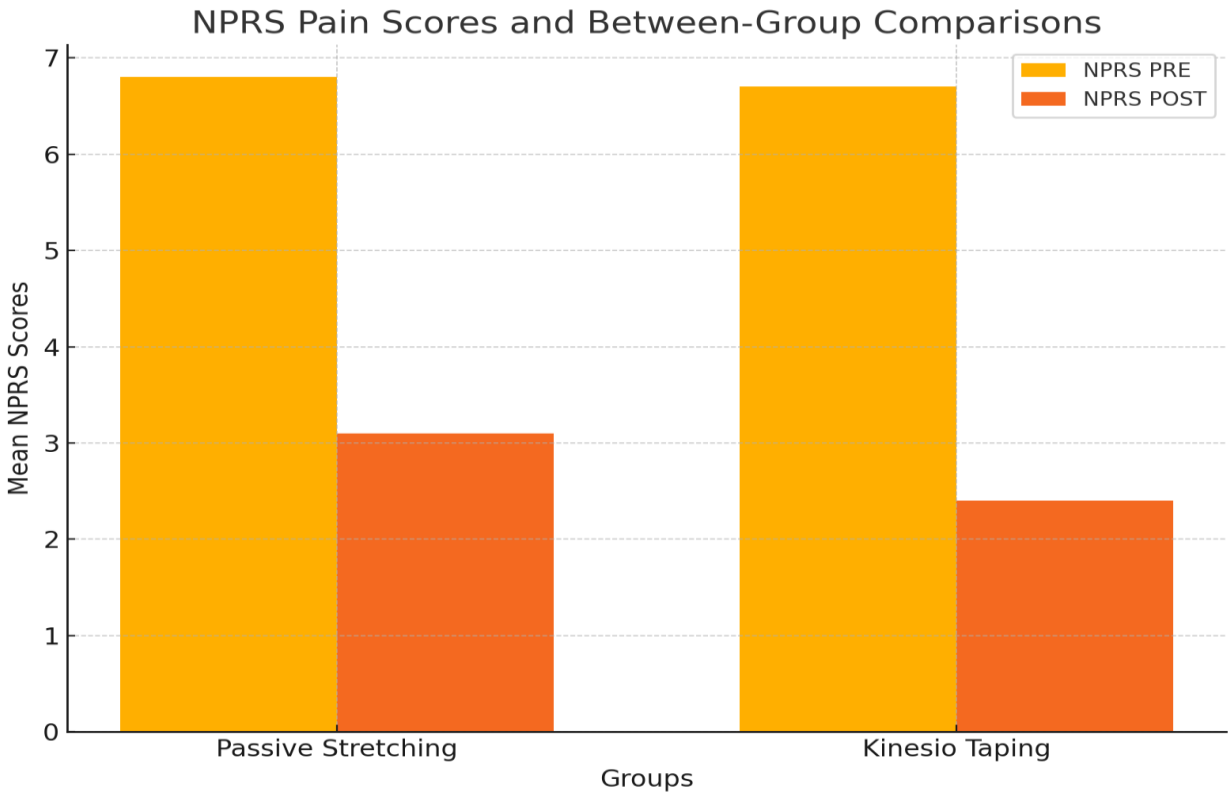
TABLE NO 3 – Shows The Nprs Pain Scores Of The Subjects And There Between The Group Comparisons

	GROUP	N	Mean	Std. Deviation	Std. Error Mean	P value
NPRS PRE	**Passive stretching**	10	6.80	1.033	.327	0.824
	Kinesio taping	10	6.70	.949	.300	
NPRS POST	**Passive stretching**	10	3.10	.738	.233	0.107
	Kinesio taping	10	2.40	1.075	.340	

This table shows the results of pre- and post-intervention pain scores assessed by the Numeric Pain Rating Scale (NPRS) for two groups: Passive Stretching and Kinesio Taping. In each group, there are 10 participants, along with mean scores, standard deviations, and standard errors of the mean for pre- and post-intervention measurements. P-values show the level of statistical significance for differences between the groups.

At group mean scores for NPRS PRE of the Passive Stretching is 6.80, SD =1.033, SEM= 0.327) whereas that of Kinesio Taping was the mean recorded at 6.70, SD=0.949, and SEM = 0.300. The p- value obtained for the groups prior to the intervention about their mean scores is at p-value= 0.824 indicating no statistically different variation of the groups preceding intervention. For NPRS POST, the Passive Stretching group had a mean score of 3.10 (SD = 0.738, SEM = 0.233), whereas the Kinesio Taping group had a lower mean score of 2.40 (SD = 1.075, SEM = 0.340). The p-value for the post-intervention scores is 0.107, indicating a trend toward lower pain scores in the Kinesio Taping group, though not statistically significant.

In summary, although both treatment groups showed a decrease in scores for pain after the corresponding interventions, no differences occurred between the groups before the interventions and after the intervention. This implies that these two interventions were comparably effective in reducing NPRS pain scores.



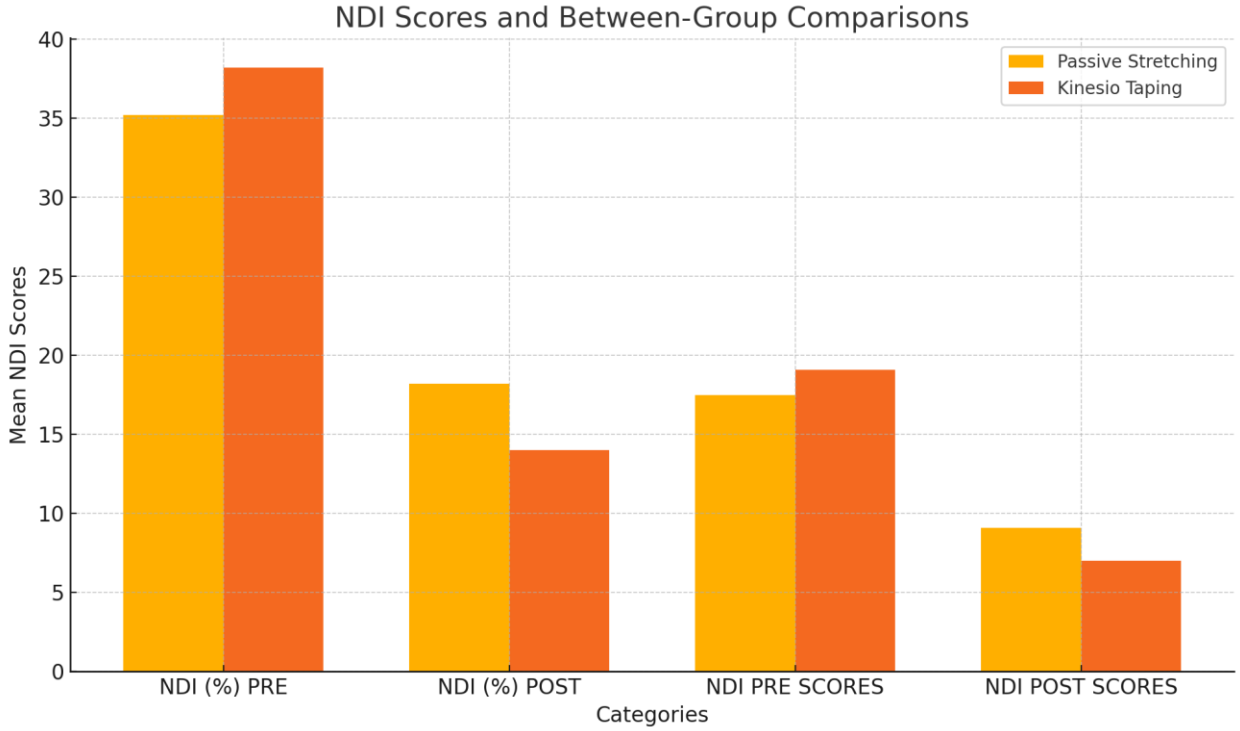
Graph 1: NPRS Pain Scores and Between-Group Comparisons

TABLE NO 4 – Shows The Neck Disability Index Scores Of The Subjects And There Between The Group Comparisons

	GROUP	N	Mean	Std. Deviation	Std. Error Mean	P value
NDI (%) PRE	Passive stretching	10	35.20	14.428	4.563	0.618
	Kinesio taping	10	38.20	11.905	3.765	
NDI (%) POST	Passive stretching	10	18.20	7.627	2.412	0.197
	Kinesio taping	10	14.00	6.325	2.000	
NDI PRE SCORES	Passive stretching	10	17.50	7.091	2.242	0.591
	Kinesio taping	10	19.10	5.953	1.882	
NDI POST SCORES	Passive stretching	10	9.10	3.814	1.206	0.197
	Kinesio taping	10	7.00	3.162	1.000	

This table shows the Neck Disability Index scores for two groups of interventions, namely, Passive Stretching and Kinesio Taping, each having 10 subjects. The data were expressed in terms of percentages and raw scores. In addition to this, the mean, standard deviation, and standard error of the mean are included with p values to determine statistical significance between groups.For NDI (%) PRE, the mean score for the Passive Stretching group was 35.20% (SD = 14.428, SEM = 4.563), and the Kinesio Taping group reported a mean score of 38.20% (SD = 11.905, SEM = 3.765). The p-value for the comparison before the intervention is 0.618, and there is no statistical difference between the groups. After the intervention, the NDI (%) POST scores revealed mean values of 18.20% (SD = 7.627, SEM = 2.412) for Passive Stretching and 14.00% (SD = 6.325, SEM = 2.000) for Kinesio Taping. The p-value of 0.197 is not significant; however, scores indicate that there is more reduction in the Kinesio Taping group.

For raw scores, the mean NDI PRE SCORES of the Passive Stretching group was 17.50 with a SD of 7.091 and SEM of 2.242, as against that of the Kinesio Taping group, which showed 19.10 with SD of 5.953 and SEM of 1.882, and the calculated p-value was 0.591, showing no statistical significance in the pre-intervention difference. Similarly, the NDI POST SCORES were 9.10 (SD = 3.814, SEM = 1.206) in the Passive Stretching group and 7.00 (SD = 3.162, SEM = 1.000) in the Kinesio Taping group, with a p-value of 0.197, indicating no significant post-intervention difference. In conclusion, both interventions resulted in reductions in NDI scores, but there were no statistically significant differences between the groups in either percentage or raw scores, pre- or post-intervention. These findings suggest that both Passive Stretching and Kinesio Taping were similarly effective in improving neck disability.



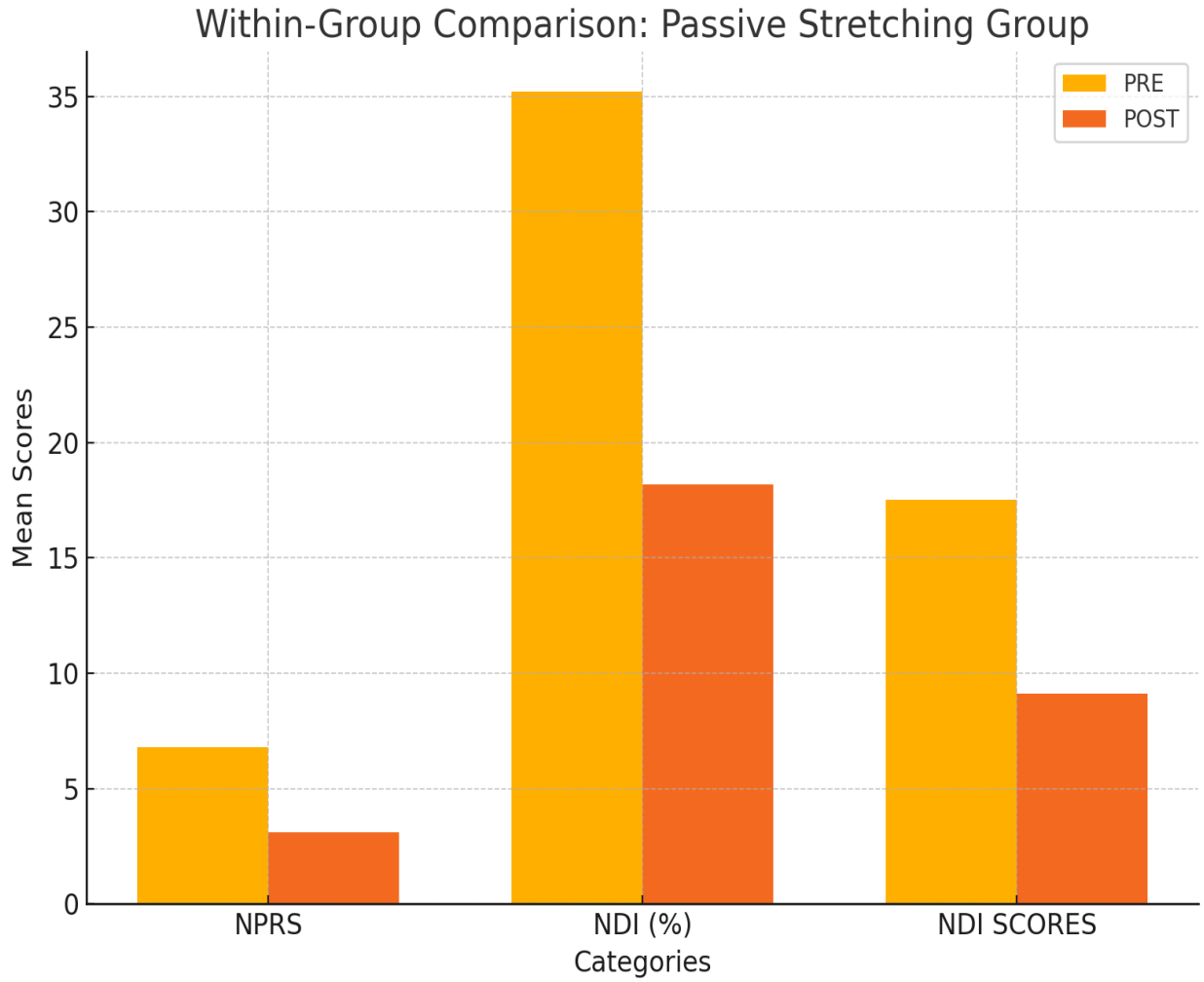
Graph 2: NDI Scores and Between-Group Comparisons

TABLE NO 5 – SHOWS WITHIN THE GROUPS COMPARISON OF THE PASSIVE STRETCHING GROUP

		Mean	N	Std. Deviation	Std. Error Mean	P value
Pair 1	NPRS PRE	6.80	10	1.033	.327	P<0.001
	NPRS POST	3.10	10	.738	.233	
Pair 2	NDI (%) PRE	35.20	10	14.428	4.563	P<0.001
	NDI (%) POST	18.20	10	7.627	2.412	
Pair 3	NDI PRE SCORES	17.50	10	7.091	2.242	P<0.001
	NDI POST SCORES	9.10	10	3.814	1.206	

This table presents within-group comparisons for the Passive Stretching group, in terms of changes in preintervention-postintervention NPRS values, NDI percent and NDI raw values. Results are presented as a mean value and standard deviations, standard errors of the mean, and p-value of the differences observed, indicating the significance of within-group changes.

Mean NPRS score before intervention Pair 1 (NPRS PRE vs. NPRS POST) is 6.80 (SD = 1.033, SEM = 0.327) and was markedly reduced to 3.10 (SD = 0.738, SEM = 0.233) after intervention. Here, p-value is P < 0.001, and hence within a group, pain levels were highly significantly reduced.
Mean score for NDI% reduced from 35.20% (SD = 14.428, SEM = 4.563) pre-interventional stage to 18.20 % (SD = 7.627, SEM = 2.412) post-intervention. As the P value of <0.001 shows statically significant improvement in disability percentage scores.
For Pair 3 (NDI PRE SCORES vs. NDI POST SCORES), the mean NDI raw score before the intervention was 17.50 (SD = 7.091, SEM = 2.242, while it significantly decreased at 9.10 for post-intervention (SD = 3.814, SEM = 1.206). The p value is P < 0.001, thus evidence of significant improvement in the raw NDI scores over the Passive Stretching treatment.
In conclusion, the results showed significant improvements both in percentage and raw scores within the Passive Stretching group on pain and neck disability, thereby indicating that this intervention is effective in reducing pain and enhancing functional outcomes.



Graph 3: Within-Group Comparisons in Passive Stretching Group

TABLE NO 6 – SHOWS WITH IN THE GROUPS COMPARISON OF THE KINESIO TAPING GROUP

	Mean	N	Std. Deviation	Std. Error Mean	P value

Pair 1	**NPRS PRE**	6.70	10	.949	.300	P<0.001
	NPRS POST	2.40	10	1.075	.340	
Pair 2	**NDI (%) PRE**	38.20	10	11.905	3.765	P<0.001
	NDI (%) POST	14.00	10	6.325	2.000	
Pair 3	**NDI PRE SCORES**	19.10	10	5.953	1.882	P<0.001
	NDI POST SCORES	7.00	10	3.162	1.000	

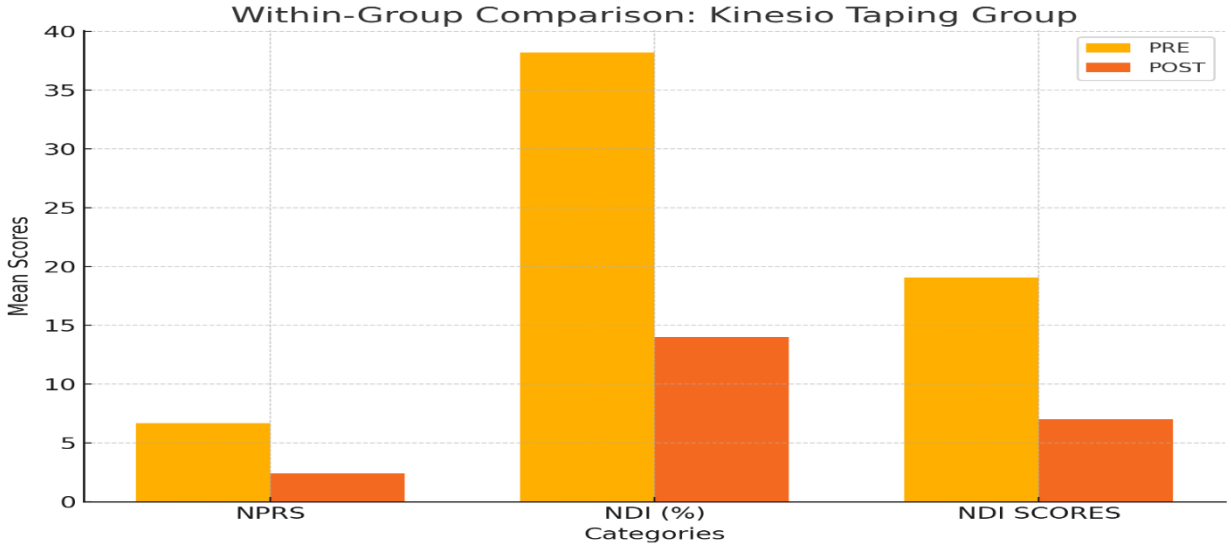
This table shows the within-group analysis for the Kinesio Taping group, comparing pre- and post-intervention values for NPRS scores, NDI percentages, and NDI raw scores. The data include mean values, standard deviations, standard errors of the mean, and p-values indicating the statistical significance of changes within the group.

For Pair 1 (NPRS PRE vs. NPRS POST), the average NPRS score before treatment was 6.70 (SD = 0.949, SEM = 0.300), whereas it significantly reduced to 2.40 (SD = 1.075, SEM = 0.340) after the treatment. The p-value is $P < 0.001$, which exhibits a highly significant reduction within the group in terms of pain levels.

For Pair 2, NDI (%) PRE vs. NDI (%) POST: Mean percentage score for NDI declined from 38.20% (SD = 11.905, SEM = 3.765) at pre-intervention to 14.00% (SD = 6.325, SEM = 2.000) at post-intervention. Again, this is highly significant with $P < 0.001$, thereby pointing towards a highly improved condition of functional disability.

For Pair 3 (NDI PRE SCORES vs. NDI POST SCORES), the raw mean NDI score decreased from 19.10 (SD = 5.953, SEM = 1.882) pre-intervention to 7.00 (SD = 3.162, SEM = 1.000) post-intervention. The p-value of $P < 0.001$ guarantees a statistically significant decrease in the disability score in the group of Kinesio Taping.

In summary, the group showed a significant improvement post-intervention in both pain and neck disability percentage scores as well as raw scores. The results therefore reveal that Kinesio Taping is effective in decreasing pain and enhancing functional outcome within the group.



Graph 4: Within-Group Comparisons in Kinesio Taping Group

DISCUSSION

This pilot study was aimed at comparing the effects of kinesio taping and passive stretching on pain and neck disability among collegiate students with non-specific neck pain. Numerical Pain Rating Scores (NPRS) and Neck Disability Index Scores (NDI) were utilized as outcome measures to gauge the efficacy of the interventions on the population and post-intervention scores were compared across groups to ascertain which

intervention led to better outcomes. For this purpose, the participants were divided into two intervention groups: Passive stretching group and kinesio tape group with each group having 10 subjects. Demographic characteristics of the participants including age and BMI were assessed and p-value was reported for each demographic parameter to assess for the statistical significance of differences between the groups. For the passive stretching group, the mean age of the participants was 22.60 years with a standard deviation (SD) of 1.578 and standard errors of the mean (SEM) of 0.499. The Kinesio Taping group had a mean age of 22.90 years, a standard deviation of 1.524, and a standard error of the mean of 0.482. The p - value for age is significantly different between groups P = 0.671. For BMI, the mean BMI for the Passive Stretching group was 23.740, with a standard deviation of 2.9478, and a standard error of the mean of 0.9322. For the Kinesio Taping group, the mean BMI was 22.220 with SD of 3.4328 and SEM of 1.0855. The p-value for BMI is 0.302, and this indicates that there is no significant difference between the two groups. In the end, there are no differences in age or BMI between the two groups; this signifies that the two groups are demographically similar. This similarity is of utmost importance to reduce confounding variables and compare the intervention effects fairly. This study's statistical analysis included determining the normality of the data using the Kolmogorov-Smirnov (K-S) and Shapiro-Wilk (S-W) tests. These tests determined whether the data followed a normal distribution. Based on the findings, non-parametric tests were used for variables that did not have a normal distribution (e.g., NPRS scores), while parametric tests were used for variables with normally distributed data (e.g., NDI scores and percentages). The Lilliefors Significance Correction was applied to the K-S test, which improved its usability for small sample sizes. Because of these findings, non-parametric tests were used to analyze NPRS scores due to their non-normal distribution. Parametric tests, on the other hand, were used to analyze NDI scores and percentages because their data conformed to the normality assumption. The use of these methods ensured a rigorous assessment of the interventions' effectiveness.

The results of the current study suggest that the application of Kinesio Tape and passive stretching had similar effects for reducing pain and disability. Both interventions demonstrated significant within-group improvements in pain and disability scores, with no statistically significant differences observed between Passive Stretching and Kinesio Taping. NPRS scores improved significantly in both groups ($p < 0.001$). Passive Stretching reduced pain from 6.80 ± 1.03 to 3.10 ± 0.74, while Kinesio Taping reduced pain from 6.70 ± 0.95 to 2.40 ± 1.08. Significant reductions were recorded in both groups for NDI percentage scores ($p < 0.001$). For Passive Stretching, scores decreased from 35.20 ± 14.43% to 18.20 ± 7.63%; for Kinesio Taping, scores reduced from 38.20 ± 11.91% to 14.00 ± 6.33%. Raw NDI scores also significantly improved within both groups ($p < 0.001$). This suggests that both methods are comparably effective in reducing pain and enhancing functional outcomes. Previous research has demonstrated the effectiveness of kinesio tape and stretching on pain level. The impact of kinesiotape application on whiplash injuries was examined in a study by Gonzalez-Iglesias et al., and the authors reported reductions in pain levels.[16] Hernandez et al. observed comparable results to Gonzalez-Iglesias et al. when they examined the effectiveness of cervical manipulation and kinesiotape application in individuals with mechanical neck pain.[13] In their study on the effectiveness of kinesio tape application for mechanical neck pain, Karatas et al. demonstrated that patients who received kinesio tape experienced pain relief.[23] Following kinesio tape application, improvements in pain level were noted in the current study. Although various studies have demonstrated that using kinesiotape can reduce pain, the mechanism underlying this improvement has not been clarified. The lowered subcutaneous nociceptor pressure in the skin could be one potential analgesic mechanism. An additional theory suggests that afferent impulses applied to soft tissue structures facilitate a pain-inhibiting mechanism and activate the gait control mechanism.[2425] Passive stretching can improve both muscle length and range of motion. It has been shown to improve muscular torque and has an analgesic effect by increasing the pain threshold.[11] Passive stretching adapts the proprioceptive system to reduce muscle-tendon stiffness and static stretching at stiff muscle ends increases ROM and reduces pain by causing pain tolerance.[2627] [28] Jeon, J.-J. et al. found that self-stretching exercises in conjunction with kinesio taping improved neck pain, the upper trapezius muscle's pressure pain threshold, neck pain-related disability, and the active CROM of taxi drivers with persistent, nonspecific neck pain better than kinesio taping alone.[21] A study by Tunwattanapong, Punjama et al found

that a four-week stretching exercise program can alleviate chronic, moderate-to-severe neck or shoulder pain, improve neck function, and improve quality of life in office workers.[20] The findings within this study indicated significant improvements in both kinesio tape group and passive stretching group. Within group analyses revealed substantial reduction in pain and disability for noth interventions. Kinesio taping demonstrated a trend towards greater reductions in post treatment NPRS and NDI score compared to passive stretching, though between-group differences were not statistically significant. This suggests that both interventions are similarly effective in addressing non-specific neck pain and its associated disability.

CONCLUSION

This study compared the efficacy of Kinesio Taping and passive stretching in relieving pain and increasing functional results in collegiate students with non-specific neck pain. Both approaches resulted in significant within-group improvements in pain intensity and disability, as measured by lower NPRS and NDI scores. However, no significant differences were found between the two groups, implying that both methods are equally helpful in treating non-specific neck pain.

The findings support earlier research showing the benefits of passive stretching in decreasing pain, increasing flexibility and lowering tension, as well as the effectiveness of Kinesio Taping in reducing pain and improving muscular function. These results lend credence to the use of both methods as effective, non-invasive treatments for neck pain in young adults. To further improve treatment protocols, future research could investigate combining these therapies, analyzing their long-term impacts, and involving a variety of demographics.

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