Original Article

SHORT TERM EFFICACY OF KINESIOTAPING AND EXERCISES ON CHRONIC MECHANICAL NECK PAIN

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ABSTRACT

Background and introduction: The purpose of study is to determine the short term effectiveness of Kinesiotaping combined with Exercises in reducing pain and improving Cervical range of motion and functional ability for subjects with Chronic Mechanical Neck pain.

Method: : Pre to post test experimental study design randomised thirty Chronic Mechanical Neck pain patients each 15 into KT and control group. KT group received kinesiotaping with exercises and Control group received only exercises for 3 times a week for 4 weeks. Pain, active cervical range of motion and functional ability were measured before and after 4 weeks of intervention.

Results: Comparative analysis using Independent't' test and Mann Whitney U test found that there is a statistically significant difference ($p<0.05$) in means of NPRS, active Flexion, Extension, Rotation to right, Rotation to Left ROM, Neck Disability Index (NDI) in percentage when compared post intervention means between the groups. Pre to post test within the group analysis in both the groups using Paired't' test and Wilcoxon signed rank test found that there is a statistically significant change in means of NPRS, Flexion, Extension, Rotation to right, Rotation to Left ROM, NDI.

Conclusion: Kinesiotaping combined with exercises for 4 weeks found short term effect in improving pain, active cervical ROM and functional ability than exercises alone in treatment of chronic Mechanical neck pain.

KEYWORDS: Cervical Spine; Mechanical Neck Pain; Kinesiotape; Exercises; Pain; Cervical Mobility; Functional Ability.

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INTRODUCTION

Mechanical neck pain is defined as generalized neck pain provoked by sustained neck postures, neck movement, pain on palpation of cervical musculature without pathologies.[1] Chronic neck pain is defined as pain in the region between superior nuchal line to first thoracic vertebra with duration of at-least 3 months or more than that.[2] Mechanical neck pain affected by 30 % to 50 % of the general population and experience chronic pain annually. 11 % to 14 % of working population experience activity limitation due to neck pain.[3,4,5] Prevalence is high in middle aged people.[3]

There are many preventive approaches and treatment options in management of chronic mechanical neck disorders.[6]

Kinesotape is an alternative taping technique has been theorized to be an effective treatment to improve physiological problems based on function of the tape[7] providing support and stability to the muscles and joints without limiting the range of motion, corrects muscle function by strengthening weakened muscles, improves lymphatic drainage beneath skin by microscopically lifting the skin removing the waste substance thereby reducing pain and inflammation of that area[8] repositioning of the

subluxed joints due to improved strength of the muscle, improved proprioception and stability by relieving abnormal tension on muscle and fascia, provides stimulation to mechanoreceptors by increased stimulation during active movements[9], and reduces pain through neurological suppression.[8]

Although physiotherapists use kinesiotaping in clinical practice, but scientific evidence were limited. Studies have shown the effectiveness of kinesiotaping in treatment of musculoskeletal injury, acute whiplash-associated disorders of the cervical spine [10], improved rotatory angle, pain intensity and function neck disability in mechanical neck dysfunction [11], reduction neck and low back pain and improving functional performance in Surgeons who have Musculo-Skeletal Pain after performing Surgery,[12] effect on relieving Symptoms of MeralgiaParesthetica (MP) [13], immediate improvement in pain-free shoulder abduction after tape application in college students with shoulder pain[14], increased bioelectrical activity of the muscle after 24 hours,[13] positive effects on pain and function in cases of patella femoral pain.[15] Kinesio Taping found similar effect as cervical thrust manipulation in mechanical neck pain [16], case reports have suggested that KinesioTaping beneficial in treatment of acute patellar dislocations, trunk pain, and myofascial pain.[17,14,18]

In order to gain muscle strength, flexibility and endurance, to restore injured tissues, and to contribute to ability to sustain normal life activities, exercise is one of the most frequently used modalities in the rehabilitation of subjects with neck pain[19,20,21,23,24] Kietys in their study found that exercises done with kinesiotaping shows positive outcomes on range of motion and muscle function and did not had any discomfort during exercises.[25] Therefore conventional exercises have been shown effective in mechanical neck pain.[24]

The short term effect of kinesiotaping with exercises in reducing pain, improving cervical range of motion, functional abilities were limited and not found. Hence the study is with research question whether the combined treatment of kinesiotaping with conventional exercises does have a short term effect in subjects with mechanical neck pain. Conventional physiotherapy management for mechanical neck pain consists of longer duration which is usually more than 6 to 8 weeks which is inconvenient for regular follow-ups. It will be a beneficial to know the combined effect of kinesiotaping with exercises in short term duration on mechanical neck pain. Therefore the purpose of the study is to find the short term effect of kinesiotaping with exercise on pain, active cervical range of motion, and functional ability for subjects with chronic mechanical neck pain. The objective of the study to measure and determine the short term effect of kinesiotaping with exercises by analyzing pre and post treatment levels of pain, range of motion, functional ability. It was hypothesized that there will be a significant short term effect of kinesiotaping with exercises on improvement pain, range of motion, functional ability for subjects with chronic mechanical neck pain.

MATERIALS AND METHODS

Pre to post test experimental study design with two groups- Kinseiotaping (KT) group and control group. As this study involves human subjects the Ethical Clearance was obtained from the Human Ethical Committee of KTG College of Physiotherapy and K.T.G. Hospital, Bangalore as per the ethical guidelines for Bio-medical research on human subjects. 30 subjects based on inclusion criteria were recruited and study conducted at K.T.G. Hospital and the study was carried for 4 weeks of intervention. Subjects included were with chronic mechanical neck pain more than > 3 months duration [2] , positive kemps and brachial plexus compression test which is a reliable and valid diagnosting test for Mechanical neck pain[26], subjects with moderate severity of pain based on Oswestry pain questionnaire scoring 20 to 40, both male and female subjects aged between 30 to 50 years[13], subjects with dull aching pain increased by sustained postures, neck movement, palpation of cervical musculature[1], subjects willing to participate and give consent to participate in the study. Subjects excluded with spinal deformities, short neck, specific neck pain such as disc lesion, inflammatory disease, neoplasm etc, history of osteoporosis, fracture, whiplash injury, cervical surgery, cervicogenic headache, subjects allergic

to kinesiotape. Materials used were Latex free stretch kinesiotape materials, Goniometer, Theraband, Pen and paper, Marker, Chair, Plinth.

Individually informed consent was taken from all the 30 subjects selected for the study on the basis of inclusion criteria. 30 subjects were randomized 15 subjects into two groups by using thirty pieces of paper.

Procedure of Interventions for Study group - was treated with kinesiotaping and exercises. Before applying the kinesiotape a sensitivity test was carried out. A small portion was applied on inner part of arm and kept for a day. Next day the tape was removed and the subject did not have any reaction and hence proceeded with the method. The tape was applied to the posterior neck muscles and trapezius.

Kinesiotape application: Application of taping was carried for 2 times a week for 4 weeks. Subjects were seated on the chair. Part to be taped was exposed and cleaned with water so that the tape properly applied. Neck kept in neutral position. A 15cm tape was cut into y shape keeping a base of 3 cm. Paper was teared at middle of "y" strip. Base of the "y" strip was applied on T1 to T2 spinous process. Subjects were asked to do cervical contralateral side bending and rotation and one strip of the tape was applied with moderate stretch and the ends of the tape were applied without stretch. Same method was applied for the other side.

The subjects were asked to flex their neck as much possible without causing any discomfort. Another tape was cut of 10cms and applied horizontally on C2 to C3. Paper backing was teared at middle of the "I" strip and with moderate tension at the middle, tape was applied with no stretch at the ends.

Exercises: First two weeks: a. Neck muscle strengthening exercises in lying position with manual resistance was performed. Subjects were told to flex the neck and manual resistance was applied to the forehead. In prone position subjects were told to extend their neck avoiding lifting their shoulder and resistance was applied to the posterior part of head. In sitting neck rotation was done without any lumbar rotation. Resistance was given on lateral side of forehead all these exercises were performed 12 repetitions. b. Stabilization exercises in supine position. Subjects were asked to do chin tucks with various arm movements. Chin tucks were done without contraction of sternocleidomastoid and without any breath holding and this exercise was performed for 10 repetitions. c. Endurance exercises in supine position. Subjects were asked to do chin tucks with lifting their head up and holding for 5 to 10 seconds/counts and this exercise was performed 12 to 15 repetitions. e. Proprioceptive exercises in standing. Subjects were asked to do neck movements in various positions fixing their gaze and this exercise was performed 10 repetitions

Third and fourth week: a. strengthening exercises in supine position with resistance band. Subjects were asked to flex the neck. In prone position subject were asked to extend his neck avoiding lifting their shoulder. In sitting subjects were asked to do neck rotation without any lumbar rotation, shoulder shrugs with resistance band in sitting. Trapezius and rhomboid strengthening was done in prone position all these exercises were performed 2 sets with12 repetitions. b. Stabilization exercises in sitting and standing position. Subjects were asked to do chin tuck with various arm movements and these exercises were performed 12 repetitions. c. Endurance exercises in supine position. Subjects were asked to do chin tucks with lifting their head up and holding for 5 to 10 seconds and this exercise was performed for 2 sets 15 repetitions. d. Proprioceptive exercises on stable and unstable surfaces with neck movements and this exercise was performed for 10 repetition

Stretching of trapezius and active movements of neck and shoulder was performed in each session. Sessions were carried 3 times a week for 4 weeks.

Procedure of Interventions for Control group - was treated with same exercises as given for study group subjects without any other intervention of applying kinesiotaping.

Outcome measurements:

Pain level was measured using Numerical pain rating scale, Cervical Range of motion such as active Flexion, Extension, Rotation to right, Rotation to Left ROM was measured using Goniometer, functional ability was measured

using Neck disability Index Scale before starting the treatment and after 4 weeks of intervention.

Numerical pain rating scale: It has ranges from 0 to 10. 0 is no pain and 10 as maximum pain. Numerical pain rating scale exhibited fair to moderate test-test reliability in patients with mechanical neck pain.[27]

Range of motion: To measure cervical flexion, the subjects were told to sit erect in the chair. Then the fulcrum of the goniometer was placed on the external auditory meatus and stable arm was held parallel to the sagittal axis and movable arm was held parallel to the nose. Then the subjects were told to bend their neck without trunk bending and the ranges were measured. Same procedure was followed for extension. To assess rotation, fulcrum of the goniometer was placed on the joining of the sagittal and frontal axis. Then both of the arms of the goniometer were placed parallel to the ground. As the subjects rotated their head the movable arm was moved along the nose and measures were taken. Cervical Range of Motion (CROM) Goniometer found to be valid and reliable measurement tool for cervical flexion and extension ROM.[28]

Neck disability Index Scale: The NDI consists of 10 questions addressing functional activities. There are 6 potential responses for each item, ranging from no disability (0) to total disability (5). The NDI is scored from 0 to 50, with higher scores indicating greater disability. NDI is reliable and valid tool to measure functional disability in cervical pain.[29]

Fig. 1: Application of y strip kinesiotape.

Fig. 2: Application of I strip kinesiotape.

Fig. 3: Supine Cervical Flexion ROM exercises.

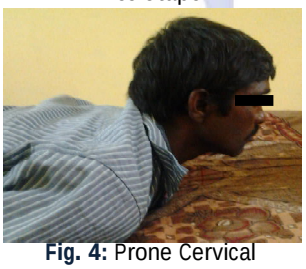

Fig. 4: Prone Cervical Extension exercises.

Fig. 5: Cervical Flexion exercises with resistance.

Fig. 6: Cervical Extension exercises with resistance.

Fig. 7: Cervical Rotation exercises with resistance.

Fig. 8: Chin tucks with arm movement exercises.

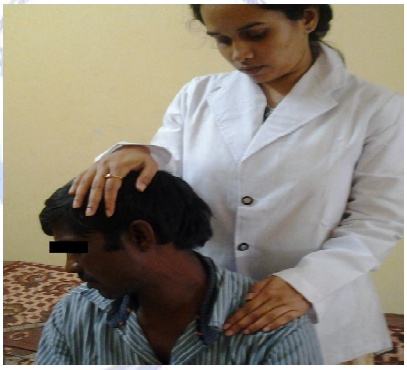

Fig. 9: Passive Trapezius stretching.

Statistical Methods:

Descriptive statistical analysis has been carried out in the present study and presented as mean ± SD. Significance is assessed at 5 % level of significance with p value was set at 0.05 (1 tailed Hypothesis) less than this is considered as statistically significant difference. Paired't' test as a parametric and Wilcoxon signed rank test as a non-parametric test have been used to analysis the variables pre-intervention to post-intervention with calculation of percentage of change. Independent 't' test as a parametric and Mann Whitney U test as a non-parametric test have been used to compare the means of variables between groups with calculation of percentage of difference between the means. The Statistical software namely SPSS 16.0, Stata 8.0, MedCalc 9.0.1 and Systat 11.0 were used for the analysis of the data and Microsoft word and Excel have been used to generate graphs, tables etc.

RESULTS AND TABLES

The study was carried on total of 30 subjects, KT Group there were 15 subjects with mean age 41.80 years and there were 8 males 7 females were included in the study. In control Group there were 15 subjects with mean age 40.87 years and were 8 males 7 females were included in the study. There was no significant difference in mean ages between the groups.

Basic Characteristics of the subjects d		Kinesio Taping Group	Control Group	Between the groups Significance[a]
Number of subjects studied (n)		15	15	--
Age in years (Mean± SD)		41.80± 5.21 (34-50)	40.87± 4.62 (34-50)	p= 0.469 (NS)
Gender	Males	8	8	P=0 .796 (NS)
	Females	7	7	

a- Pearson Chi-Square

Table 1: Basic Characteristics of the subjects studied.

	KT Group (Mean±SD) min-max	Control Group (Mean±SD) min-max	Perecntage of difference	Z value[b] (Non parametric significance)	t value [a] (Parametric)	Parametric Significance P value	95%Confidence interval of the difference Lower	Upper	Effect Size (r)
NPRS	7.20 ± 0.67 (6- 8)	7.33± 0.61 (6- 8)	1.78%	-0.534 P =0 .594 (NS)	-0.564	p=0.577 (NS)	0.57	-0.13	0.1 (Small)
Flexion ROM	14.60 ±2.06 (11- 18)	20.07±1.87 (17- 23)	31.55%	-4.499 P =0.000**	-7.604	p <0.000**	0	-5.46	0.81 (Large)
Extension ROM	26.80 ±3.61 (20- 30)	24.53±2.61 (20- 29)	-25.75%	-2.036 P =0.042**	1.97	p =0.059 (NS)	0.05	2.26	0.33 (Small)
Rotation to right ROM	38.60 ±4.79 (32- 48)	38.20±4.81 (32- 47)	-1.04%	-0.209 P =0.835 (NS)	0.228	p =0.821 (NS)	0.82	0.4	0.04 (Small)
Rotation to Left ROM	38.07±5.39 (30- 47)	36.87±4.82 (29- 45)	-3.20%	-0.626 P =0.531 (NS)	0.642	P=0.526 (NS)	0.52	1.2	0.11 (Small)
NDI in percentage	53.48 ±2.58 (48.89 - 57.78)	52.88±2.40 (48.89 - 57.78)	-1.12%	-0.665 P=0.506 (NS)	0.652	P =0.520 (NS)	0.52	0.59	0.12 (Small)

Table 2: Comparative analysis of pain, cervical range of motion and functional disability between Groups (Baseline comparative analysis)

	KT Group (Mean±SD) min-max	Control Group (Mean±SD) min-max	Perecntage of difference	Z value[b] (Non parametric significance)	t value [a] (Parametric)	Parametric Significance P value	95%Confidence interval of the difference Lower	Upper	Effect Size (r)
NPRS	1.20 ±0.77 (0-2)	6.00±0 .84 (5-7)	33.33%	-4.737 P =0 .000 **	-16.216	p <0.000**	-5.4	-4.19	0.94 (Large)
Flexion ROM	35.73 ± 3.34 (28-40)	26.47±1.95 (23-30)	-29.77%	-4.525 p =0.000**	9.252	p <0.000**	7.21	11.31	0.86 (Large)
Extension ROM	47.33 ± 2.28 (1.3-5.1)	34.47±1.68 (32-38)	-31.44%	-4.716 p =0.000**	17.535	p <0.000**	11.3	14.37	0.95 (Large)
Rotation to right ROM	62.00 ± 5.11 (50-68)	44.93±2.93 (40-50)	-31.92%	-4.64 p =0.000**	11.208	p <0.000**	13.94	20.18	0.89 (Large)
Rotation to Left ROM	61.67 ± 4.18 (52-67)	45.33±4.04 (38-52)	-30.54%	-4.642 p =0.000**	10.864	p <0.000**	13.25	19.41	0.89 (Large)
NDI in percentage	14.51 ± 2.35 (11.11-17.77)	37.92±4.85 (33.33- 51.11)	89.30%	-4.728 p =0.000**	-16.782	p <0.000**	-26.25	-20.54	0.95 (Large)

Table 3: Comparative analysis of pain, cervical range of motion and functional disability between the Groups (Post treatment comparative analysis)

** Statistically Significant difference p<0.05; NS- Not significant a. Independent t test b. Mann-Whitney Test

KT Group	Pre intervention (Mean±SD) min-max	Post intervention (Mean±SD) min-max	Perecntage change	Z valueb (Non parametric significance)	t value a (Parametric)	Parametric Significance P value	95%Confidence interval of the difference Lower	Upper	Effect Size (r)
NPRS	7.20 ± 0 .67 (6- 8)	1.20 ±0.77 (0-2)	-83.33%	-3.449 P =0.001**	25.1	P <0.000**	5.48	6.51	0.97 (Large)
Flexion ROM	14.60 ± 2.06 (11- 18)	35.73 ± 3.34 (28-40)	72.60%	-3.413 P =0.001**	-21.351	P <0.000**	-23.25	-19.01	0.96 (Large)
Extension ROM	26.80 ± 3.61 (20- 30)	47.33 ± 2.28 (1.3-5.1)	76.60%	-3.412 P =0.001**	-20.745	P <0.000**	-22.65	-18.41	0.95 (Large)
Rotation to right ROM	38.60 ± 4.79 (32- 48)	62.00 ± 5.11 (50-68)	60.62%	-3.423 P =0.001**	-17.932	P <0.000**	-26.19	-20.6	0.92 (Large)
Rotation to Left ROM	38.07 ± 5.39 (30- 47)	61.67 ± 4.18 (52-67)	62%	-3.423 P =0.001**	-17.282	P <0.000**	-26.52	-20.67	0.92 (Large)
NDI in percentage	53.48 ± 2.58 (48.89 - 57.78)	14.51 ± 2.35 (11.11-17.77)	-72.86%	-3.435** P=0.001**	57.156	P <0.000**	37.5	40.42	0.99 (Large)

Table 4: Analysis of pain, cervical range of motion and functional disability within the KT Group (Pre to post test analysis)

Control Group	Pre intervention (Mean±SD) min-max	Post intervention (Mean±SD) min-max	Perecntage change	Z valueb (Non parametric significance)	t value a (Parametric)	Parametric Significance P value	95%Confidence interval of the difference Lower	Upper	Effect Size (r)
NPRS	7.33± 0 .61 (6- 8)	6.00±0 .84 (5-7)	-18.14%	-3.407 P =0.001**	7.135	P <0.000**	0 .93	1.73	0.67 (Large)
Flexion ROM	20.07± 1.87 (17- 23)	26.47± 1.95 (23-30)	31.88%	-3.421 P =0.001**	-11.451	P <0.000**	-7.59	-5.2	0.85 (Large)
Extension ROM	24.53± 2.61 (20- 29)	34.47± 1.68 (32-38)	40.52%	-3.415 P =0.001**	-11.565	P <0.000**	-11.77	-8.09	0.91 (Large)
Rotation to right ROM	38.20± 4.81 (32- 47)	44.93± 2.93 (40-50)	17.61%	-3.25 P =0.001**	-6.041	P <0.000**	-9.12	-4.34	0.64 (Medium)
Rotation to Left ROM	36.87± 4.82 (29- 45)	45.33±4.04 (38-52)	22.94%	-3.416 P =0.001**	-13.408	P <0.000**	-9.82	-7.11	0.68 (Medium)
NDI in percentage	52.88± 2.40 (48.89 - 57.78)	37.92± 4.85 (33.33- 51.11)	-28.29%	-3.329 P=0.001**	12.302	P <0.000**	12.35	17.57	0.89 (Large)

** Statistically Significant difference p<0.05; NS- Not significant; a. Pared t test. b. Wilcoxon Signed Ranks Test

Table 5: Analysis of pain, cervical range of motion and functional disability within Control Group (Pre to post test analysis)

Comparative analysis using Independent't' test and Mann Whitney U test (Table 2 and 3) found that there is a statistically significant difference in means of NPRS, Flexion, Extension, Rotation to right, Rotation to Left ROM, NDI in percentage when compared post intervention means between the groups. When compared preintervention means there is a statistically significant difference in means of flexion ROM but there is no statistically significant difference in means of NPRS, Extension, Rotation to right, Rotation to Left ROM, NDI between the groups.

Pre to post test within the group analysis in both the groups using Paired't' test and Wilcoxon signed rank test (Table 4 and 5) found that there is a statistically significant change in means of NPRS, Flexion, Extension, Rotation to right, Rotation to Left ROM, NDI with negative percentage of change showing that there is decrease in the post means and positive percentage of change showing that there is increase in post means. There is clinical significant improvement with large effect size within the groups.

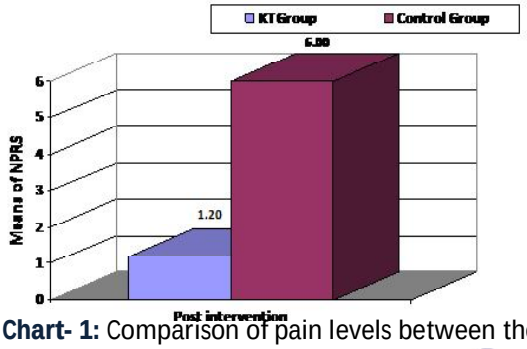

Chart- 1: Comparison of pain levels between the Groups (Post to post test comparative analysis)

The above graph shows that there is a statistically significant difference in means of NPRS Score when post intervention means were compared between the Groups.

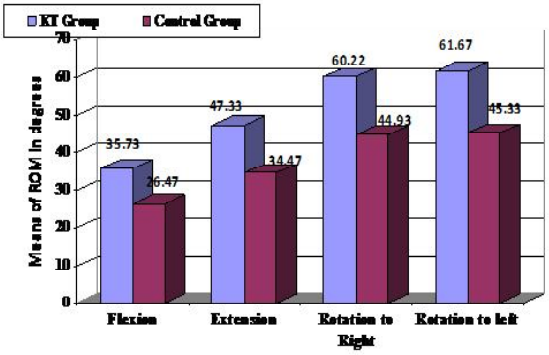

Chart- 2: Comparison of Cervical ROM between the Groups (Post test comparative analysis)

The above graph shows that there is a statistically significant difference in means of ROM when post intervention means were compared between the Groups.

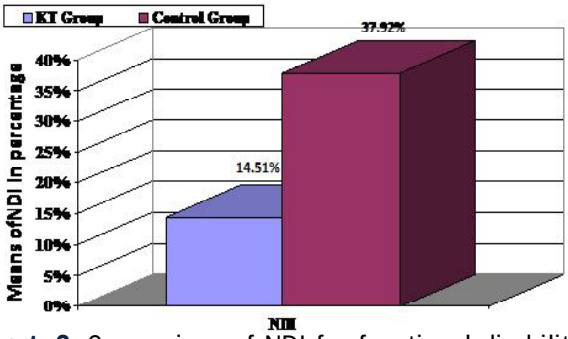

Chart- 3: Comparison of NDI for functional disability between the Groups (Post to post test comparative analysis)

The above graph shows that there is a statistically significant difference in means of NDI when post intervention means were compared between the groups.

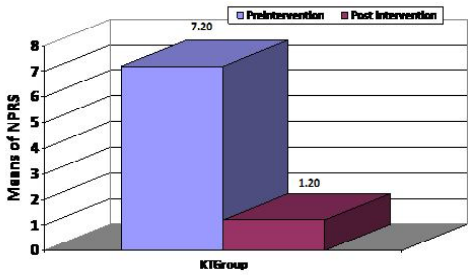

Chart- 4: Analysis of pain within KT Group (Pre to post test analysis)

The Char 4 shows that there is a statistically significant reduction in means of NPRS Score when analyzed from pre intervention to post intervention within KT Group.

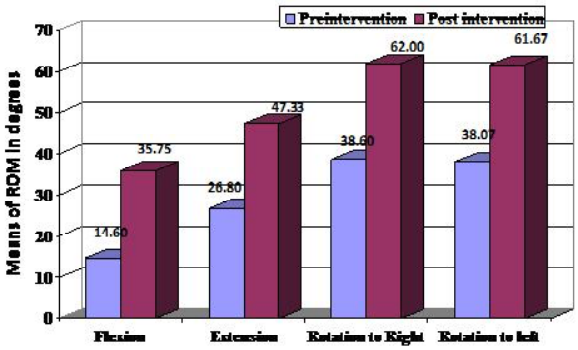

Chart- 5: Analysis of Cervical ROM within KT Group (Pre to post test analysis)

The above graph shows that there is a statistically significant increase in means of ROM when analyzed from pre intervention to post intervention within KT Group.

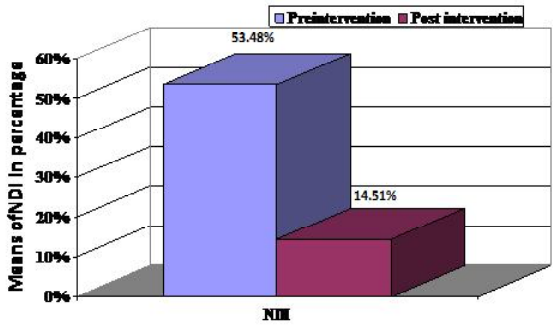

Chart- 6: Analysis of NDI for functional disability with in KT Group (Pre to post test analysis)

The above graph shows that there is a statistically significant increase in means of NDI when analyzed from pre intervention to post intervention within KT Group.

DISCUSSION

It is found from the analysis that the groups who received 4 weeks of Kinesiotaping combined with exercises and the groups who received exercises without Kinesiotaping significantly shown short term effect on reducing pain, improving functional ability and active cervical ROM for subjects with chronic mechanical neck pain. However, the greater percentage of improvement found in KT group who received Kinesiotaping with Exercises.

In Mechanical neck pain the exact pathology is still not clearly understood and has been reported to be related to various anatomical structures including intervertebral joints, ligaments, neural tissues, disc, muscles.[34]

There is also evidence suggesting that there is disturbed oxidative metabolism and elevated P substance (a substance responsible for producing pain) in neck muscles suggesting impaired local muscle circulation and metabolism.[35] There is altered coordination of cervical muscles and impaired proprioception in neck and shoulder. The evidences suggest that the muscles which are affected in chronic Mechanical neck pain are anterior and deep cervical flexors and deep extensors. Yinlen did a study which shows that that rotators are also affected to some extent.[3,11]

In Kinesiotaping Group improvements could be due to both Kinesiotaping and exercises. When KT was applied to posterior muscles, the tension in the tape might have provided neural feedback and muscle support during neck movement, improving neck ROM with a reduced mechanical irritation of the soft tissues without restricting the motion. This creates tension in soft tissue structures providing afferent stimuli, facilitating a pain-inhibitory mechanism thereby reducing the pain. Javier J stated presence of tension in the KT reduces pain and improves neck ROM.[16] KT's elasticity corrects muscle function by re-educating and strengthening weakened muscles due to which fatigue level of the muscles decrease thereby improving neck posture. Karien studied that KT's elasticity can re-educate weakened muscles to strengthen during exercise.[25]

KT might have improved cervical ROM (CROM) by reducing the tone of the muscles which may have increased due to sustained contraction of the muscles for long hours. KT application provides positional stimulus through the skin which improves kinesthetic awareness of neck position, holding the neck in normal posture without putting tension on muscles and tissues thus relieving pain. Proper alignment of fascia relieves abnormal tension on the muscles improving their function. Yoshida, Thelen stated that regulation of tone and increase of proprioception improved Cervical ROM due to continuous sensory feedback of the KT for 24 hours per day for 3-5 days per week, allows the tape to correct postural imbalance.[14] Manual savedra states that proper sensory feedback decreases fear of movement associated with

pain intensity thus improving ROM.[16] Pain reduction and improvement in neck ROM helps in overcoming the restriction of the activities improving the functional ability.

Strengthening and endurance exercises may have been able to reduce neck pain and improve Cervical ROM because improvement in cervical extensors and cervical flexor strength improves the neck posture and bring the Centre of gravity at its place correcting the biomechanics of spine. Cochrane review states that strengthening and endurance exercises improves the activation of deep cervical flexors and extensor muscles that are effective in improving cervical ROM. Exercises improve blood circulation and oxygenation which reduces spam and stiffness increasing the ROM.[24]

Exercise training involves performing and holding inner range positions of Craniocervical flexors (CCF), the anatomical action of the deep cervical flexor muscles. It increases the activation of these muscles improving endurance of the deep cervical flexors. Stabilization improves the contractibility of the muscles and improves neural control which improves proprioception. This improves muscle stability which might help to reduce pain and improve ROM. Chiu T gave strong evidence to support the use of neck stabilization and dynamic strengthening exercises to decrease mechanical neck pain.[24] Improved cervical kinesthetic sense following CCF training explain the improved ability to maintain an upright position of the cervical spine as it activates the deep cervical flexor musculature. Duscenceli suggested proprioceptive and neck strengthening exercises reduces neck pain.[33] Jullet studied that proprioceptive and Craniocervical flexors exercises for 6 weeks improved the quality of cervical afferent input through direct training and relocation which reduces pain.[34] Pia Damgrad stated that CCF coordination exercises induce mechanical hypoalgesia which relieves neck pain on movement Exercises reduces the fear of pain thereby increasing ROM.[4]

In control group, improvement in pain, functional disability and cervical range of motion means attributed due to the effects of exercises on mechanical neck pain as found effective in KT group.

The baseline comparison between the KT and control group found that there is no statistically significant difference shown that the baseline parameter are similar. As there is no change in the baseline parameters, Post-intervention parameters when compared between groups there is a statistically significant difference between the groups. However both the groups were found significant improvements, the KT group has shown greater significant improvement in percentage of change with large effect size than the exercises this could be due the combined effect of KT with exercises that enhance the recovery than exercise alone.

Based on the analysis, this study found that combination of Kinesiotaping and exercises significantly has short term effective in reducing pain and functional disability, improving cervical ROM. Therefore the present study rejects null hypothesis.

Limitations of the study: Chronicity of pain was not same. Hence this might have cause variation in measuring pain intensity. Placebo effect was not found to find influence of sham taping with exercises. The duration of the interventions was 4 weeks to find the short term effects no follow-up was done to know the long lasting effect and recurrence of symptoms. Improvement in strength was not measured. Home exercise programme was also not included in either of the groups which might have helped to achieve better results. Multimodal approach is useful for treating neck pain. But in this study only exercises were given.

CONCLUSION

The present study concludes that Kinesiotaping combined with exercises for 4 weeks found short term effect in improving pain, active cervical ROM and functional ability than exercises alone in treating of chronic Mechanical neck pain. It is recommended that use of kinesiotaping along with the conventional exercises enhances the performance and recovery for subjects with chronic mechanical cervical pain.

RECOMMENDATION FOR FUTURE RESEARCH

1. Further study recommended carrying out on large population.
2. Randomized controlled trail is necessary to find the long term effect.

3. Further study is necessary to find the effect of combination of Kinesotaping with other intervention on pain, cervical muscle strength, proprioception, quality of life in other cervical disorders.

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