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Original Research Article

MULLIGAN VERSUS KINESIO TAPE IN PATIENTS WITH MECHANICAL NECK PAIN

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ABSTRACT

Introduction: Mechanical neck pain (MNP) is a problem that can be result from various causes but it is usually result from poor or faulty posture, overuse injuries or trauma.

Materials and Methods: Thirty patients with mechanical neck pain were assigned randomly into three groups: Group (A) 10 participants received conventional physical therapy program. Group (B) 10 participant received conventional physical therapy program plus natural apophyseal glides (NAGs). Group (C) 10 participant received conventional physical therapy program plus kinesio tape. Pain intensity level, neck functional disability level, and cervical range of motion were measured pre and post intervention period.

Results: There was significant decrease in numerical pain rating scale and neck disability index. There was significant increase in range of motion for all groups.

Conclusion: The conventional physical therapy program and NAGS are effective in improving pain intensity level, neck functional disability level, and cervical range of motion in mechanical neck pain more than the conventional physical therapy program and kinesio tape and conventional physical therapy program alone.

KEY WORDS: kinesio tape, Mechanical Neck Pain, Mulligan, Myrin Goniometer, Natural apophyseal glides, Neck Disability Index, Numerical Pain Rating Scale.

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INTRODUCTION

Mechanical neck pain (MNP) is considered one of the most widely recognized musculoskeletal conditions [1]. The vast majority of neck pain has no identifiable cause; it is diagnosed as MNP [2]. Mechanical neck pain is characterized by neck pain that provoked by sustained neck postures and neck movement [3].

The frequency of mechanical neck pain is obviously incremented by subjects with more severe postural variations from the norm and the pain resulted from cumulative effects of frequent or repeated mild stress over a long period of time [4].

Poor posture during working, quick awkward movement of the head, or sleeping in a wrong position are considered various reasons that may cause MNP [5].

It had been proved that natural apophyseal glides (NAGs) is powerful and has an impact on diminishing pain and is capable of enhancing neck inability record in mechanical neck pain [6].

Natural apophyseal glides is oscillatory mobilizations that is applied to facet joints. They must never cause pain, however they might cause discomfort to some extent. These oscillatory mobilizations are utilized to increase spinal movement and reduce pain [8].

Natural apophyseal glides may be utilized in the assessment and treatment of patient in the closed kinetic chain weight bearing position, where most patients experience their symptoms [9]**.** Mobilizations repeated for less than 6 times with 2 hertz [6]**.**

Kinesio tape has been estimated to enhance a variety of physiological issues, including the ROM [7]. Furthermore, it has an impact on diminishing pain intensity level and neck functional disability level [4].

While Kinesio tape is a passive method that used in the mechanical neck pain, nevertheless it decreases pain efficiently by stimulating blood circulation and induces muscular relaxation [10]**.**

It was obvious that kinesio tape affects cutaneous mechanoreceptors by stretching skin and it gives detailed signal information about joint movement and position [11].

Up till now there are no reviews to think about NAGS versus kinesio tape on mechanical neck pain. Accordingly, the current study was conducted to compare the effect of NAGS versus kinesio tape in patient with mechanical neck pain.

MATERIALS AND METHODS

This study was commissioned and approved by the ethics committee of faculty of Physical Therapy, Cairo University, Egypt. Participation was voluntary and participants provided written consent to be involved in the study.

Design of the study: A randomized controlled trial.

Subjects: Thirty patients of both genders (24 female and 6 male) who were between 20-40 years [12] were participated in this study. They were examined and diagnosed as having MNP. All patients were referred to physical therapy department. the inclusion criteria include that pain intensity level on NPRS ought to be higher than two out of ten, and persists for two weeks at least and worsen by movements [12].

Meanwhile cervical disc problems or cervical spondylosis, history of previous neck trauma or head injuries, malignancy, cervicogenic headache were considered of the exclusion criteria.

INSTRUMENTATION

Numerical pain rating scale (NPRS): Numerical pain rating scale (NPRS; 0–10) is utilized to assess pain intensity level, where 0 indicates no pain and 10 indicates maximum pain. Measurement results of NPRS for all participants showed average pain rating [13].

Neck disability index (NDI): Neck Disability Index (NDI) is considered a reliable and valid measurement for the disability accompanying neck pain. The Arabic version of NDI was used in the current study to investigate pain intensity in Arabic speaking patients suffering from neck pain [14]. The Arabic version of NDI has two factors ten items structure and has proven to be a reliable, valid, and responsive tool [14].

Myrin goniometer (OB): Myrin goniometer is utilized to measure cervical range of motion (ROM). This measurement tool includes a compass needle affected by the earth's magnetic field and an inclination needle affected by gravity. The compass needle measures motion on the horizontal plane, and the inclination needle measures motion on the vertical plane. Thus, it has proven to be reliable and valid for neck ROM measurement [15].

All measures were evaluated by an assessor blinded to group allocation before intervention and reassessed in the same manner after 4-week intervention had been completed.

Procedures: The current study consists of three Stages: Pretest measurements, Intervention period, Posttest measurements:

PRETEST MEASUREMENTS

Pain intensity level measurement: The patient was asked to place mark at his/her level of pain at sheet of NPRS.

Neck functional disability level measurement: The neck functional disability level was measured by the neck disability index (NDI) pre and posts the treatment. In this study we used the Arabic version of the NDI.

Cervical ROM measurement: Measure the

cervical ROM by myrin goniometer in all directions (flexion, extension, side bending and rotation). The patient was seated in erect and comfortable position while his/her feet were placed flat on the floor. Keep knee in right angle. Fix the strap around the head with the instrument at the side. Set the inclination needle at zero. Bend the head forward (neck flexion), and backward (neck extension). The instrument is place at the front or the back. Set the inclination needle at zero, Bend to right side (right lateral flexion) and bend to the left side (left lateral flexion), The patient sits on low stool with his/her head erect. Fix the straps round the head and over the vertex. Set the compass needle at zero. The patient asked to rotate his/her neck to the right side (right rotation), and to the left side (left rotation).

Intervention: All patients were informed about the aim and the procedure of the study and they were asked to sign a consent form. Participants were randomly assigned into three equal groups.

Group (A): This is the control group; it is comprised of ten subjects. Participants of this group were subjected to conventional physical therapy program three sessions per week over four weeks. This program included 4 components; hot packs application, neck stretching exercises, and isometric exercises, and chin in.

Group (B): This group included ten subjects who were subjected to conventional physical therapy program while NAGs technique is applied with 2 hertz in 3 sets, whereas glides are rhythmical and Mobilizations was repeated 6 times.

Group (C): ten subjects were assigned to this group and treated using conventional physical therapy program and kinesio tape. The area to be applied with the tape should be cleaned and shaved pre- application. A test for allergy should be carried out for all participants pre-application of kinesio tape; where a small piece of kinesio tape is stuck to the thoracic spine and left for 24 hrs. Patients who experienced any allergic reaction were asked to remove the tape immediately; consequently would not be included in this group [16].

Posttest measurements: Pain intensity level, Neck functional disability level, and cervical ROM measurements were repeated as discussed before in pretest measurements after the intervention period to determine its effect.

Statistical analysis: Statistical Package for Social Sciences (SPSS version 16) was utilized to analyze the collected data. While nonparametric data analysis was used to compare between pre and post estimations of three groups through one way ANOVA test. MANOVA test was utilized to investigate the values between groups and within each group. The level of significant was set at 0.05 for all statistical tests.

Sample size: The sample size and power calculations were performed using G*Power version 3.0.10(Franz Faul, Universitat Kiel, Germany). The calculations were based on detecting the mean of NAGS is (0.76) [6] , the mean of KT is (2.7) [4], and the mean difference between them is (1.94) on an 11 points NPRS, assuming standard deviation of (1.2), an alpha level of 0.05 and desired power of 99%. The total estimated desired sample size was 15 patients. To accommodate the expected dropouts before the study's completion, a total of 30 patients were included in the study.

RESULTS

Pain intensity level results: Pre values of the three groups for neck pain showed no evidential distinction. Meanwhile post values of the three groups showed noteworthy distinction. And this appeared in the following measurements where the post values of group (A) and group (B) ($p = 0.0001$). However, post values of group (C) ($p = 0.001$).

Neck functional disability level results: Results showed that there was not a noteworthy distinction between pre values of the three groups. While pre- and post-function within groups have been recorded showing noteworthy distinctions. Thus; the post values of group (A) and group (B) ($p = 0.0001$). However, post values of group (C) ($p = 0.001$).

Cervical ROM results: Pre values of the three groups for ROM records have not shown a noteworthy distinction. However; there was a substantial distinction between post estimations of the three groups. The total mean values of range of motion in group (A), (B), and (C) have been shown as 11.76%, 17.96%, and 14.01%, respectively.

There were no statistically significant difference between subjects in all groups concerning age, weight, height, body mass index, (P<0.05) as shown in table (1)

Table 1: Descriptive statistics of the mean age, weight, height, and BMI.

SD: standard deviation, p-value: probability, NS: not significant

Items	Age (Year)	Weight (kg)	Height (cm)	BMI (kg/m2)
Group A mean ±SD	27.00 ±2.40	64.50 ±9.28	164.90 ±5.15	23.60 ±2.63
Group B mean ±SD	26.50 ±3.68	67.10 ±7.06	163.30 ±5.88	25.10 ±2.42
Group C mean ±SD	26.70 ±3.12	67.30 ±6.27	165.70 ±7.27	24.30 ±2.31
F-value	0.065	0.417	0.393	0.931
P-value	0.937	0.663	0.679	0.407
P<0.05	NS	NS	NS	NS

Function: as shown in table (2) the mean values and SD of function for groups (A, B & C)

Table 2: Mean values of function within each group.

SD: standard deviation, p-value: probability, S: significant

Item	Function					
	Group A		Group B		Group C	
	Pre	Post	Pre	Post	Pre	Post
Mean ±SD	13.60 ±6.18	4.30 ±2.58	14.70 ±4.69	3.60 ±1.71	14.70 ±4.62	4.30 ±1.83
Min. – Max.	5.00 – 22.00	2.00 – 10.00	10.0 – 25.0	1.00 – 6.00	6.00 – 21.00	0.00 – 6.00
Mean difference	-9.3		-11.1		-10.4	
Improvement %	68.38%		75.51%		70.75%	
F-value	51.65		49.394		19.244	
P-value	0.0001		0.0001		0.001	
Significant	S		S		S	

Pain: as shown in table (3) the mean values and SD of Pain for groups (A, B &C)

Table 3: Mean values of pain within each group.

SD: standard deviation, p-value: probability, S: significant

Item	Pain					
	Group A		Group B		Group C	
	Pre	Post	Pre	Post	Pre	Post
Mean ±SD	6.70 ±2.45	2.80 ±1.22	5.80 ±1.75	1.80 ±1.39	6.70 ±1.41	2.40 ±1.17
Min. – Max.	4.00 – 10.00	0.00 – 4.00	4.00 – 9.00	0.00 – 4.00	4.00 – 8.00	0.00 – 4.00
Mean difference	-3.9		-4		-4.3	
Improvement %	58.21%		68.97%		64.18%	
F-value	57.858		31.919		54.561	
P-value	0.0001		0.0001		0.0001	
Significant	S		S		S	

Flexion: as shown in table (2) the mean values and SD of flexion for groups (A, B & C)

Table 4: Mean values of flexion within each group.

SD: standard deviation, p-value: probability, S: significant

Item	Flexion					
	Group A		Group B		Group C	
	Pre	Post	Pre	Post	Pre	Post
Mean ±SD	36.88 ±5.07	41.50 ±1.87	35.70 ±4.85	42.70 ±1.94	37.43 ±3.17	42.90 ±1.91
Min. – Max.	30.0 – 41.0	41.0 – 45.0	29.0 – 41.0	39.0 – 45.0	32.0 – 40.0	40.0 – 45.0
Mean difference	4.62		7		5.47	
Improvement %	12.53%		19.61%		14.61%	
F-value	20.521		17.912		14.087	
P-value	0.0001		0.001		0.004	
Significant	S		S		S	

Extension: as shown in table (5) the mean values and SD of extension for groups (A, B & C)

Table 5: Mean values of extension within each group.

SD: standard deviation, p-value: probability, S: significant

Item	Extension					
	Group A		Group B		Group C	
	Pre	Post	Pre	Post	Pre	Post
Mean ±SD	37.88 ±3.65	42.78 ±2.39	37.30 ±3.74	43.30 ±1.41	37.70 ±7.11	43.00 ±1.33
Min. – Max.	32.0 – 40.0	39.0 – 45.0	31.0 – 42.0	41.0 – 45.0	20.0 – 45.0	41.0 – 45.0
Mean difference	4.9		6		5.3	
Improvement %	12.94%		16.09%		14.06%	
F-value	15.291		22.469		5.355	
P-value	0.001		0.0001		0.033	
Significant	S		S		S	

Right side bending: as shown in table (6) the mean values and SD of Right side bending for groups (A, B & C)

Table 6: Mean values of right side bending within each group.

SD: standard deviation, p-value: probability, S: significant

Item	Right side bending					
	Group A		Group B		Group C	
	Pre	Post	Pre	Post	Pre	Post
Mean ±SD	34.60 ±3.89	39.33 ±2.58	34.60 ±6.00	41.60 ±5.81	37.44 ±3.97	43.20 ±3.82
Min. – Max.	29.0 – 43.0	30.0 – 45.0	29.0 – 43.0	30.0 – 45.0	30.0 – 43.0	41.0 – 45.0
Mean difference	4.73		7		5.76	
Improvement %	13.67%		20.23%		15.39%	
F-value	15.237		7.013		5.029	
P-value	0.0001		0.016		0.002	
Significant	S		S		S	

Left side bending as shown in table (7) the mean values and SD of left side bending for groups (A, B & C)

Table 7: Mean values of left side bending within each group.

SD: standard deviation, p-value: probability, S: significant

Item	Left side bending					
	Group A		Group B		Group C	
	Pre	Post	Pre	Post	Pre	Post
Mean ±SD	37.10 ±4.04	42.50 ±3.37	36.80 ±7.37	43.40 ±4.71	37.80 ±5.37	44.20 ±1.13
Min. – Max.	30.0 – 41.0	34.0 – 45.0	21.0 – 43.0	30.0 – 45.0	28.0 – 45.0	42.0 – 45.0
Mean difference	5.4		6.6		6.4	
Improvement %	14.56%		17.93%		16.93%	
F-value	10.523		5.682		13.593	
P-value	0.005		0.028		0.002	
Significant	S		S		S	

Right rotation as shown in table (8) the mean values and SD of Right rotation for groups (A, B & C)

Table 8: Mean values of right rotation within each group.

SD: standard deviation, p-value: probability, S: significant

Item	Right rotation					
	Group A		Group B		Group C	
	Pre	Post	Pre	Post	Pre	Post
Mean ±SD	53.33 ±8.52	57.56 ±3.29	50.90 ±7.40	57.90 ±4.17	53.70 ±7.02	59.20 ±2.53
Min. – Max.	40.0 – 60.0	49.0 – 60.0	40.0 – 60.0	50.0 – 60.0	40.0 – 60.0	52.0 – 60.0
Mean difference	4.23		7		5.5	
Improvement %	7.93%		13.75%		10.24%	
F-value	8.271		6.787		5.427	
P-value	0.059		0.018		0.032	
Significant	NS		S		S	

Left rotation as shown in table (9) the mean values and SD of left rotation for groups (A, B & C)

Table 9: Mean values of left rotation within each group.

Item	Left rotation					
	Group A		Group B		Group C	
	Pre	Post	Pre	Post	Pre	Post
Mean ±SD	55.00 ±9.35	59.90 ±0.31	49.20 ±9.28	59.10 ±1.28	51.40 ±7.51	58.00 ±3.09
Min. – Max.	30.0 – 60.0	59.0 – 60.0	30.0 – 60.0	57.0 – 60.0	41.0 – 60.0	50.0 – 60.0
Mean difference	4.9		9.9		6.6	
Improvement %	8.91%		20.12%		12.84%	
F-value	2.739		11.159		6.596	
P-value	0.115		0.004		0.019	
Significant	NS		S		S	

SD: standard deviation,
p-value: probability,
NS: not significant, S: significant

DISCUSSION

The aim of the present study was to elucidate a comparison between the impact of NAGs and Kinesio tape in mechanical neck pain. Results showed that both NAGs and kinesio tape are efficacious in MNP treatment. However, NAGs and conventional physical therapy has proven to be more efficacious than kinesio tape in addition to conventional physical therapy. While Conventional physical therapy program solely found less efficacious than NAGs and kinesio tape.

NAGs are invaluable when performed well and can be used on most spinal pathology [17]. They are used to increase the spinal movements and decrease the pain associated with it [8].

A supposition has been made about kinesiotaping stated that its impact may be increased by increasing local circulation, facilitating the muscles, providing a positional stimulus to the skin, muscle, or fascial structures providing proper afferent input to the central nervous system [18].

These results concurred with the results reached by Hussain et al. (2016) as he investigated the efficacy of natural apophyseal glides versus grade I and II Maitland mobilization in non-specific neck pain. This investigation was inferred that mobilization of Mulligan NAGs was more viable when compared with mobilization of Maitland in Grade 1 and II in progressing NPRS and NDI scores in sufferers with nonspecific neck pain. The advantage of the Mulligan mobilization demonstrated a noticeable decrease in NDI scores and NPRS score on the side of existing outcomes, Mulligan's mobilizations techniques have proven to be medically effective in enhancing joint function, with various theories for its circumstances and results. More recent researches have demonstrated more strategies incorporating the hypoalgesic and sympathetic nervous system excitation effects [19, 20]

A study was conducted by Kumar (2011) to investigate the impact of mulligan concept (NAGs) on pain at available end range in cervical spine pain and stiffness. It was carried out on 100 patients suffering from MNP. Patients were randomly divided into3 experimental and 1 control group. All groups received hot packs for 12 minutes along with set of active exercises from day 1 to day 12. Results demonstrated that the NAGs is a valuable manual treatment method for accomplishing quicker change in ROM and pain [21].

An investigation was made by Gautam et al. (2014) to make a comparison between the impact of Maitland and mulligan mobilization in enhancing neck pain, ROM and disability. A group compromising thirty subjects suffering from mechanical nonspecific neck pain were divided into three groups; the control group (Group A) received conventional physical therapy, group B received conventional physical therapy in addition to Maitland grade II group, meanwhile group C received conventional therapy in addition to Mulligan mobilization (NAGs, SNAGs). Mulligan mobilization has proven to be superior to Maitland mobilization in enhancing Pain, ROM and disability [22].

Another investigation was carried out by Dawood et al. (2013) to study the efficacy of Kinesio tape against cervical traction on mechanical neck dysfunction. The study included fifty four patients who were randomly divided into three groups; group (A) where Kinesio tape was applied on patients every 4 days for 8

sessions with exercises program, group (B) treated by cervical traction posture pump with exercises program 3 days/week for 12 sessions, and control group (C) received exercises program only inform of stretching, postural and isometric exercises for neck and shoulder joint 3 days/week for 12 sessions. Results demonstrated that there was a critical reduction in visual analogue scale and neck disability index for experimental groups (A) and (B). While the control group (C) had a noteworthy decrease in visual simple scale and neck inability index with minimum impact. The combination between kinesio tape and exercise program applied on patients had an obvious impact on enhancing pain intensity and function neck disability in mechanical neck dysfunction more than exercise alone [23].

Similar investigation was carried out by Ali et al. (2015) to explore the impact of kinesio tape in patients suffering from mechanical neck dysfunction. Results revealed that combination between kinesio tape and therapeutic exercise turned out to be more helpful in enhancing neck pain and diminishing function restriction more than therapeutic exercises only with patients experiencing mechanical neck dysfunction [24].

Mahgoub et al. (2014) examined the adequacy of kinesio tape versus phonphoresis on neck pain intensity, cervical ROM and neck inability in patients suffering from mechanical neck dysfunction. Results revealed that pain intensity, cervical ROM and neck function inability in mechanical neck dysfunction had been improved with kinesio tape more than phonophoresis [25].

CONCLUSION

NAGs plus conventional physical therapy program group (B) was more effective in decreasing pain intensity level, neck functional disability level, and increasing cervical ROM than kinesio tape plus conventional physical therapy program group (C) or than conventional physical therapy program alone group (A).

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Conflicts of interest: **None**

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