Turkish Journal of Physiotherapy and Rehabilitation**; 32(3)**
ISSN 2651-4451 | **e-ISSN** 2651-446X

INTERMITTENT VERSUS CONTINUOUS TRACTION IN MANAGEMENT OF MECHANICAL NECK DYSFUNCTION

Mohamed Hussein Elgendy [1], Tamer Thabet Mohammed Ali [2], Ghada Ismail Mohamed[3] , Mohamed Serag Eldein Mahgoub Mostafa[4]

[1] Professor and Head of Physical Therapy, Basic Science Department, Faculty of Physical Therapy Cairo University, Egypt, Prof.mgendy@hotmail.com

[2] M.Sc. in Physical Therapy. Administrator Manager of physical therapy department at Ministry of health, Egypt. Email address: drtamerthabet@gmail.com

[3] Assistant professor of physical Therapy, Basic Science Department, Faculty of Physical Therapy, Cairo University, , Egypt. Email address: Drdody2007@outlook.com

[4] Associate professor of physical Therapy, Basic Science Department, Faculty of Physical Therapy, Cairo University, and Heliopolis University, Egypt. Email address: drsergany_79@hotmail.com

[1]drsergany_79@hotmail.com

ABSTRACT

Background: Mechanical neck dysfunction (MND) affects approximately people in middle age when abnormal stress and strain placing on the spinal structures. Cervical traction is one of the treatment options in physical therapy treatment for patients with MND. The traction type is an important variable that affects traction outcome**. Objectives:**To compare the efficacy of intermittent and continuous traction on neck disability, pain intensity level, and cervical range of motion (ROM) in patients with acute MND. **Design:** Pretest -posttest randomized control group design was used. **Participants:** Forty-five patients diagnosed with acute MND, Aged 20 to 40 years, participants were randomly assigned to groups A, B, and C, equally. **Interventions:** group (A) received a traditional physical therapy program, group (B) received intermittent traction plus a traditional physical therapy program, group (C) received continuous traction plus the traditional physical therapy program. **Outcome measure:** There were statistical improvements in all groups after intervention relieving pain and improve functional impairment, and increase ROM in favor of group B. **Conclusion:** The intermittent traction group had the greatest improvement in the management of patients with MND than other groups.

Keywords: Intermittent traction, Continuous traction, Mechanical neck dysfunction.

1. INTRODUCTION

Mechanical neck dysfunction (MND) is a type of dysfunctional syndrome caused by the mechanical deformation of structurally impaired tissues. This dysfunction syndrome is being affected, but when contractile structures are affected, functional impairment is demonstrated when the tendon or muscle is loaded, mostly with resisted loads. Movements cause pain to be produced, but symptoms cease when the loading is ended **(Mckenzie and May 2008).**

Traditional treatment of MND includes patient education and physical modalities and exercises, spinal manipulation or analgesic or corticosteroids injections may be used In more acute or severe problems. However, more treatment options especially patients with severe pain and conventional treatment alone has low expectations **(Akinbo et al., 2013).**

Cervical traction is often used as a treatment choice by physical therapists for treating MND; however, there is a varying opinion about the methods of application and clinical results associated with traction **(bid et al., 2014).**

Rath (1994) divided cervical traction application into three categories: manual, mechanical, and self-traction (home traction). Mechanical traction is applied as continuous and intermittent (rhythmic and progressive) forms (**Saunders, 1995).**

Physical therapy modalities are increasing day after day, and looking for a safe, low cost and effective modality is one of the physical therapy research goals. Cervical traction therapy is commonly used in outpatient clinics widely. Many

research has shown its beneficial effects on cervical pain throughout the last years. **Savva C., and Giakas G., (2013),** However, **Harte, A. et al., (2003), Daniel D.M., (2007), and Wong L.K.F et al., (2017)** referred that supplementary research is necessary as there isn't clear sufficient evidence to enforce the contribution of the treatment method's benefit.

As mechanical traction can be applied intermittently or continuously, this study was conducted to assist the physical therapists to choose the best traction modality that has a better effect on patients with MND

2. LITERATURE REVIEW

Most neck pain cases originate due to mechanical causes as lack of work breaks, keeping head, neck, and arms in the same position for an extended time, jobs require fastened in position, and repetitive movements, **(Buckle and Devereux, 2002;Strimpakos N., 2011).**

Graham N et al., (2006) concluded that there are two clinical findings that can be gathered, moderate evidence that intermittent traction is beneficial and moderate evidence of no benefit from continuous traction, as both continuous and intermittent traction have no conclusive evidence proof.

a Cochrane review concluded that if compared conservative therapies, heat, or placebo traction to mechanical traction research does not enforce or deny the efficacy of intermittent or continuous traction for neck pain relief or functional improvement **(Graham et al., 2008)**

Furthermore, in a meta-analysis study that assessed the effect of intermittent traction relieving neck pain, the results were a significant decrease in pain scores than those receiving placebos. NDI scores not differ significantly. The pain scores also did not differ later on during the follow-up time**. (Yang JD et al., 2017)**

On the contrary, Meta-analyses found a poor quality of evidence: Traction is superior when added to other traditional therapies in reducing pain in patients with cervical radiculopathy, but the findings were not clinically pertinent. **(Claudio C. et al., 2020)**

As there is a wide gap in the literature review in investigating and comparing the effect of Intermittent and Continuous Traction in the management of MND pain. This study was met its intentions of providing its readers with logical approaches based on the outcomes of the Visual analog scale (VAS) score, Bubble inclinometer (BI), and Neck disability index (NDI).

3. MATERIALS AND METHODS

Study design:

A randomized control group design with pre and post-tests was adopted. Written Informed consents were being received from all patients. This study was accepted and approved by the Ethics Committee for Scientific Research, Faculty of Physical Therapy, Cairo University. Pan African Registry number is **(PACTR202102867579609)**

Participants :

The sample was composed of Forty-five patients referred from the orthopedic department to the physical therapy department of Derb-Nigm general hospital, Al Sharqia, Egypt in the period from February 2021 to July 2021. Patients were chosen based on inclusion criteria as age ranged from 20-40 years, suffering from acute (MND), The (NDI) is above 5 **(Haneline, 2006)**, pain intensity level between 4 to 9 to ensure group homogeneity**.** patients with neck pain that was not of mechanical origin were excluded from the study. **(bid et al, 2014). caused by a mechanical problem**

sample size:

G*power program 3.1.9 (version 3.1, Heinrich-Heine-University, Düsseldorf, Germany) is used to determining sample size. with comparison 3independent groups, for 8 major variable outcomes. sample size was calculated using F tests (MANOVA: Special effects and interactions), Type I error () = 0.05, effect size f2 (V) = 0.2658228, power (1-error probability) = 0.80, and Pillai V = 0.4200000. For this trial, the sample size was 44 participants (15 participants in each group at a minimum). A sample of convenience nonprobability type was enlisted through a written announcement hanging on the wall at the department of the physical therapy department

Randomization

sixty participants were assessed for eligibility. 45 cases underwent and divided into 3 experimental groups. Simple randomization by giving the patient numbers and putting them in a bowel, then pull the numbers and assign them to groups A, B, and C consequents. figure (1)

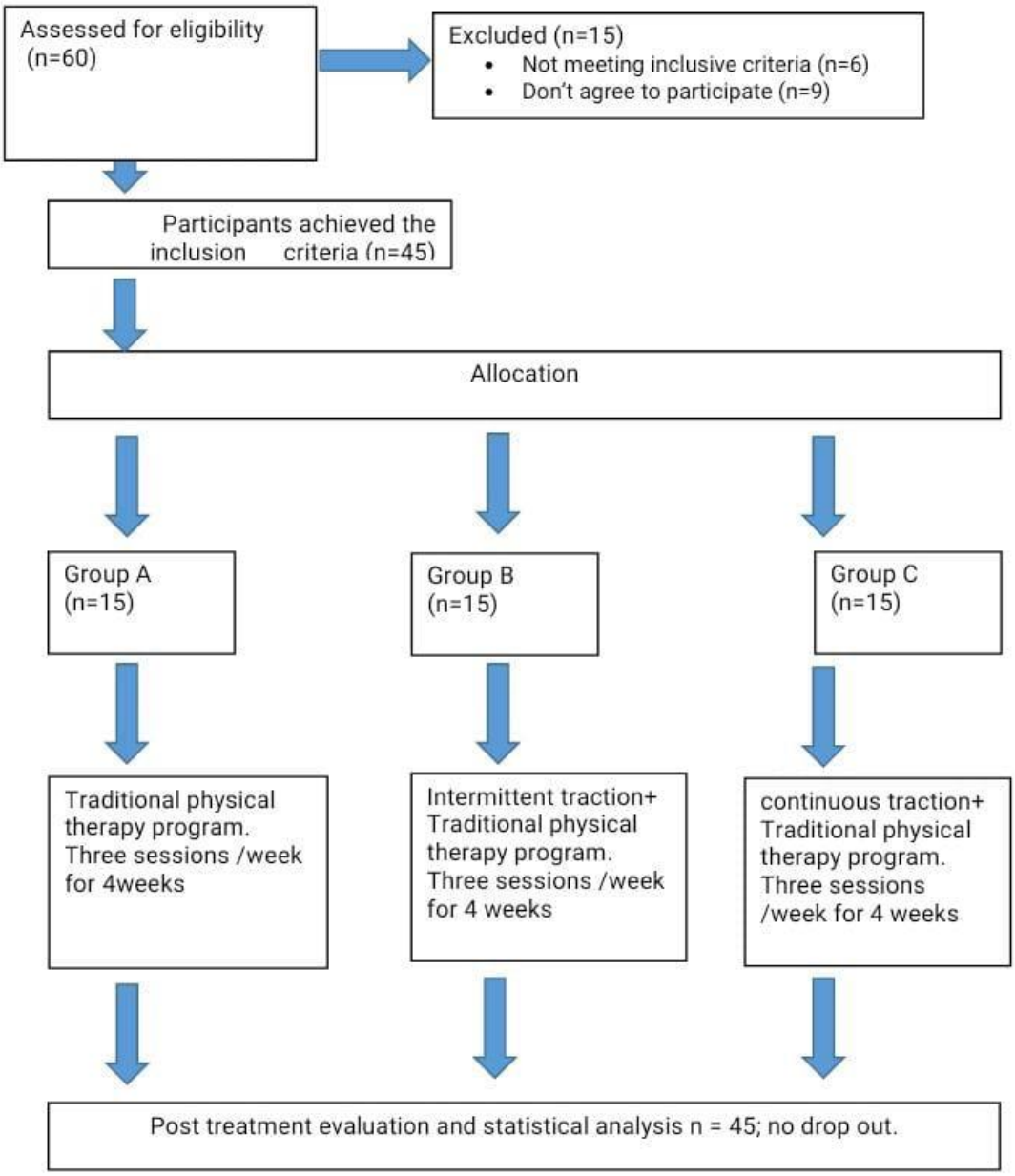

Fig.1: Flow chart of the participants.

Interventions:

Following randomization, procedures (measurement procedures& treatment procedures) were carried out. All Patients have 3 sessions every week for 4 weeks, Each participant was assessed just before and after the intervention. The pain intensity level was measured by (VAS), neck disability was assessed by neck NDI, and Bubble inclinometers Adapted from **Norkin and White, (2003)** were used to measuring cervical ROM.

Treatment procedures:

- **Group (A) Control Group:** 15 patients received a traditional physical therapy program; A- Infrared radiation for 15 minutes, B- Exercise consists of 1) Stretching exercises of the upper trapezius, sternocleidomastoid, levator scapulae, and scaleni, 2) isometric exercises for Neck Flexors, extensors, side-binding muscles **(Lewitt KM., 2001).** and C-Posture exercise program as a home program. **(Tan J. and Nordin M. 1992).**

- **Group (B) intermittent traction group:** 15 patients received intermittent traction added to the traditional physical therapy program.**Traction parameters:** (patient supine, 15^0 of cervical flexion, traction force 10% of weight of body of the patient, with a 60s hold time and 20s, and the relaxation force of 50% of the pull force for a total time of treatment 15 min**) (Young et al., 2009a. Fritz et al., 2014).**

- **Group (C) continuous traction group:** 15 patients given continuous traction in addition to the traditional physical therapy program. **Traction parameters:** (patient supine, 15^0 of cervical flexion, traction force 10% of the total body weight for a total time of treatment 15 min) **(Saunders and Ryan2004).**

4. DATA COLLECTION

Data obtained from the three groups regarding NDI, VAS, and cervical ROM were calculated before and after 4 weeks of intervention. SPSS for windows version 25 (SPSS, Inc., Chicago, IL) was used to statistically analyzed variables. The following statistical procedures were performed: Quantitative descriptive statistics data (mean and standard deviation), for demographic data, VAS, NDI, and ROM variables, Chi-square test: (χ2-test) to compare among groups A, B, and C for gender variable, Multivariate analysis of variance (MANOVA) used for the comparison of the major variables at different groups and measuring periods, Qualitative descriptive statistics data including the number and percentage for gender variable, Analysis of variance (ANOVA-test) to compare among groups A, B, and C for demographic data variables. eight dependent variables were the VAS, NDI, neck (flexion, extension, side bending to right and left, rotation to right, and left). statistical analyses were significant at $P \leq 0.05$.

5. FINDINGS

The baseline demographic characteristics of participants: as in table (1) there were no statistically significant differences regarding age, weight, and height, and gender within groups. (P>0.05).

Results of Mixed design multivariate analysis of Variance (MANOVA):- MANOVA: found Statistically Significant multivariate effects for the main effects of groups.

Results of Mixed design analysis of Variance (ANOVA):- there is a significant change in the outcome of all variables (VAS, NDI, cervical ROM)

At baseline clinical characteristics of participants: - as in table (2) there are no statistically significant differences among groups regarding NDI, pain, and cervical ROM outcome measures (P>0.05).

Clinical Characteristics of Participants after 4 weeks of intervention: as in table (2) showed statistically significant differences among groups regarding neck regarding NDI, pain, and cervical ROM outcomes (P<0.001).

Between groups comparison: Comparing groups A and B, there were statistically significant differences in NDI, pain, cervical ROM (p< 0.001) after 4 weeks of interventions in favor of group B. Comparing groups A and C, there were statistically significant differences in pain, flexion, extension, right rotation, and left rotation in favor of group C, but not in neck disability index, right side binding, and left side binding outcome measures after 4 weeks of interventions. between group B and C there were statistically significant differences, in favor of group B, regarding MANOVA outcome measures after 4 weeks of interventions, as in tables (2) and (3).

Table (1): Demographic Characteristics of Participants at Baseline:

Characteristics	Group A(n=15)	Group B(n=15)	Group C(n=15)	F-Value	P Value
Age(years)	28.53±4.02	28.40±3.39	28.67±4.1	0.01	0.99
Weight(kg)	87.73±8.74	88.47±9.41	87.73±8.58	0.03	0.97
Height(cm)	165.5±4.91	166.7±5.05	165.4±5.71	0.28	0.76
Sex(M/F)	7/8	6/9	6/9	X^2=0.18	0.91

centimeter (cm), kilogram (Kg), male (M), Female(F) , probability value (p), fisher test (F). * Data are mean± SD, statistical analyses were significant at P = 0.05

Table (2) Clinical Characteristics of Participants at baseline and after 4 weeks of intervention:

Table 3. Between Groups Effects after 4 weeks of intervention of the 3 groups.

	Group Aversus GB		Group A versus Group C		Group B versus Group C	
Outcome	**MD (99% CI)**	**P-Value**	**MD (99% CI)**	**P-Value**	**MD (99% CI)**	**P-Value**
NDI	11.33 (6.35, 16.32)	0.0001	4.27 (-0.72, 9.25)	0.12	-7.07 (-12.05, -2.08)	0.003
VAS (mm)	3.63 (2.51, 4.76)	0.0001	1.44 (0.31, 2.57)	0.008	-2.19 (-3.32, -1.07)	0.0001
Flex (deg)	-9.07 (-12.13, -6.01)	0.0001	2.33 (0.88, 5.55)	0.024	6.73(-3.51,9.95)	0.0001
Ext (deg)	-15.8 (-21.23, -10.38)	0.0001	-5.07 (-10.49, 0.36)	0.039	-10.73 (5.31, 16.16)	0.0001
RR (deg)	-17.2 (-23.08, -11.32)	0.0001	-5.93 (-11.82, -0.05)	0.047	11.27 (5.38, 17.15)	0.0001
LR (deg)	-17.47 (-23.33, -11.6)	0.0001	-6.33 (-12.2, -0.47)	0.03	11.13 (5.27, 16.99)	0.0001
RSB (deg)	-9.53 (-13.98, -5.09)	0.0001	-1.73 (-6.18,2.71)	0.99	7.8 (3.36, 12.25)	0.0002
RSB (deg)	-9.13 (-13.55, -4.72)	0.0001	-1.13 (-5.55,3.28)	0.99	8.0(3.59, 12.41)	0.0001

Visual Analogue Scale (VAS), Neck Disability Index (NDI);, Flexion (Flex), degrees (deg).,; Extension (Ext), Right Rotation (RR), Left Rotation (LR), Right side binding (RSB), Left Lateral Flexion (LSB), fisher test (F), probability value (p). * Data are mean±SD, statistical analyses were significant at P = 0.05

6. DISCUSSION

This study was designed to compare the efficacy of intermittent and continuous traction on pain intensity level, neck disability, and cervical ROM in patients with acute MND. Traction with traditional physical therapy program for the patients in Group B there was a statistically significantly greater improvement in functional disability, pain intensity level, and cervical ROM than Group C received Mechanical continuous Cervical Traction and Group A received traditional physical therapy program.

Regarding the effect of exercise program on MND:

The therapeutic exercise aimed to improve the performance of the cervical muscles, decrease pain intensity level, and enhance the functional disability as a result of MND **(Gross A. et al., 2007),** in addition, to increase head excursion and cervical ROM **(Morningstar M.W. 2003).**

The use of exercise programs can relax the tense soft tissues through stretching exercises which decreasing muscles spasm and improve circulation which decreases the concentration of metabolites. Its Always recommended that stretching and strengthening weakened or strained muscles are usually the first line of treatment **(Gross A. et al., 2007).**

these results are concurring with **Lars et al., (2014)** who identified that strengthing exercise guide to release from neck muscle pain and had a high clinical significance.

Ylinen et al., (2007) identified that stretching exercises is recommended to relieve pain, at least for the short-term treatment. as they compare stretching exercises with manual therapy in treatment ofchronic neck pain

exercise is an evidence-based practice to not only relieve pain in individuals with MND but also to improve motor function and muscle strength **(O'Riordan, C. et al 2014)**

Regarding the effect of cervical traction on MND:

traction decreases pain and paraspinal muscle spasm by enabling muscle relaxation, mechanoreceptors stimulation, and soft tissues stretching by widening the intervertebral foramen, facet joints gliding, and spinal curves straightening, **(Graham N. et al., 2011)**

As the group that received intermittent traction had the greatest improvement the mechanism by which intermittent traction reduces neck pain is by decompressing the spine structured of the by stretching paraspinal muscles and ligaments **(Himanshi S. and Nirali P. 2014)**

The advantages of the intermittent traction technique are the effect on circulation and stimulation of mechanoreceptors in the capsules, ligaments, tendons, and joints. It is ideal for the less acute and less critical cervical diseases and injuries **(Bland, 1994).**

This also agrees with the results of **Bid, D et al., (2014)** who concluded that the addition of intermittent cervical traction to the traditional therapy is more efficient and gives superior effect in the management of MND.

Romeo et al., (2018), also reported that adding traction to other conservative treatments had a statistically significant effect versus other conservative treatments alone.

These results disagree with **Borman et al., (2008)** who concluded that no specific effect of traction was observed over conventional physical therapy interventions in adults with chronic neck pain.

Himanshi s. et al., (2014) concluded that conservative treatments which include neck strengthening exercises and TENS are more effective than the effectiveness of ICT for reduction of pain and improvement of function in the management of cervical radiculopathy CRS. Also **Thoomes et al., (2013)** stated that cervical traction was not effective in the treatment of CRS.

7. LIMITATIONS:

This study was limited by the following factors: Firstly, The outcome measures improvements were limited to the 4-week follow-up, the long-term effects not examined, Secondly, The psychological status of the patients affect the treatment application.

8. CONCLUSIONS

Both traction methods intermittent and continuous are effective when added to a traditional physical therapy program in patients with acute MND in favor of intermittent cervical traction (ICT).

Conflicts of interest

Certainly, there are no potential conflicts by the authors.

Funding Information

No grant from funding organizations in the public, profit-making, or non-profit sectors was obtained in this study.

Competing interests:

We did not receive any financial support from any institution or company it is our project and we insured all expenses. No competing interests

Source of funding: self-funding.

Author contribution:

We are four authors for this work, and we did all requirement to accomplish this work, there is no other researchers participate in this work.

REFERENCES:

1. **McKensie R, May S:** The cervical and thoracic spine. Mechanical Diagnosis and Therapy. Spinal Publ N Z Ltd, 1: 1–5., 2008
2. **Akinbo S., Danesi M., Oke D., Aiyejusnle C., Adeyomoye A.:** Comparison of supine and sitting positions cervical traction in patients with cervical spondylosis. Internet J Rheum.;8. 2013
3. **Bid, D., Ramalingam, A.T., Bhatt, J.A., Rathod, P.N., Tandel, K.V., Tandel, S.S.:** The effectiveness of mechanical cervical traction on patients with unilateral mechanical neck pain. Indian J. Physiother Occup. Ther. 8 (3), 97–103,2014.
4. **Rath, W.:** Cervical traction: A clinical prespective. Orthop Res.1994; 13: 29-32, .
5. **Saunders HD and Ryan RS:** Evaluation, Treatment and Prevention of Musculoskeletal Disorders, Volume 1, and the Spine. 4th Edition. The Saunders Group, Chaska, MN 2004.
6. **Savva C. and Giakas G**. The effect of cervical traction combined with neural mobilization on pain and disability in cervical radiculopathy. A case report. Man Ther. Oct;18(5):443-6,2013.
7. **Harte, A., Baxter, G. and Gracey, J. :** The Efficacy of Traction for Back Pain: A Systematic Review of Randomized Controlled Trials. Archives of Physical Medicine and Rehabilitation, 84, 1542-1553**,** 20**03**.
8. **Daniel, D.M. ()** Non-Surgical Spinal Decompression Therapy: Does the Scien-tific Literature Support Efficacy Claims Made in the Advertising Media? Chiroprac-tic & Osteopathy,15, 7,. , 2007.
9. **Wong, L.K.F.,Luo, Z.W., Kurusu, N. And Fujino, K. .** Experiment and Dynamic Simulation of Cervical Tractions in Inclined and Sitting Positions. Open Journal of Therapy and Rehabilitation., 5, 83-9**,** 2017.
10. **Buckle PW, Devereux JJ.** The nature of work-related neck and upper limb musculoskeletal disorders. ApplErgon.;33(3):207–17, 2002.
11. **Strimpakos N.** The assessment of the cervical spine. Part 1: Range of motion and proprioception. J Bodyw Mov Ther.;15(1):114-24, 2011.
12. **Graham, N.; Gross, A.R.; Goldsmith, C.; BHScPT, A.R.G**. Mechanical traction for mechanical neck disorders: A systematic review. J. Rehabil. Med., 38, 145–152, 2006.
13. **Graham, N.; Gross, A.; Goldsmith, C.H.; Klaber Mo_ett, J.; Haines, T.; Burnie, S.J.; Peloso, P.M.J**. Mechanical traction for neck pain with or without radiculopathy. Cochrane Database Syst. Rev, 16, CD006408. 2008.
14. **Yang JD, Tam KW, Huang TW, Huang SW, Liou TH, Chen HC.** Intermittent Cervical Traction for Treating Neck Pain: A Meta-analysis of Randomized Controlled Trials. Spine (Phila Pa 1976). Jul 1;42(13):959-965,2017.
15. **Claudio Colombo , Stefano Salvioli , Silvia Gianola , Greta Castellini and Marco Testa** . Traction Therapy for Cervical Radicular Syndrome is Statistically Significant but not Clinically Relevant for Pain Relief. A Systematic Literature Review with Meta-Analysis and Trial Sequential Analysis J. Clin. Med., 9, 3389; doi:10.3390/jcm9113389,2020**.**
16. **Haneline MT:** Evidence-based chiropractic practice, 1st ed. Jones and Bartlett learning,; Aug. 2006.
17. **Nader I., Ibrahim m., Enas F.,** Intermittent Versus Continuous Traction In Treatment Of Lumbar Disc Herniations., Cairo University Giza, Egypt Master (Msc) Thesis , 2006
18. **Norkin C, White D.:** Measurement of Joint motion. A guide to Goniometry. 3rd edition. Philadelphia. F.A. Davis Company, 2003.
19. . **Lewitt KM:** Manipulative therapy in rehabilitation of the locomotor system.2nd ed. Butter worth Heinemann, , PP 190-192, 2001**.**
20. **Tan, J.C. and Nordin, M.H.:** Role of physical therapy in the treatment of cervical disc disease. Orth Clin N Am, 1992.,283: 435-443**.**
21. **Young IA, Michener LA, Cleland JA, Aguilera AJ, Snyder AR.:** Manual therapy, exercise, and traction for patients with cervical radiculopathy: a randomized clinical trial.PhysTher.; 89(7):632-642,2009.
22. **Fritz JM, Thackeray A, Brennan GP, Childs JD.(2014).** Exercise only, exercise with mechanical 209 traction, or exercise with over-door traction for patients with cervical radiculopathy, with 210 or without consideration of status on a previously described subgrouping rule: a211 randomized clinical trial. J Orthop Sports PhysTher.;44(2):45-57. ,2014.
23. **Saunders HD and Ryan RS:** Evaluation, Treatment and Prevention of Musculoskeletal Disorders, Volume 1, and the Spine. 4th Edition. The Saunders Group, Chaska, MN 2004.
24. **Gross A.R., Goldsmith C. And Hoving J.L.:** Con-servative management of mechanical neck disorders: A systemic review; J. Rheumatol., 34: 1083-102, 2007.
25. **Morningstar M.W.:** Cervical hyperlordosis, forward head posture, and lumbar kyphosis correction: A novel treatment for mid-thoracic pain; J. Chiro. Med., 2003, 2 (3): 111-5,.
26. **Ylinen J., Kautiainen H. And Wirén K.:** Stretching exercises versuss manual therapy in treatment ofchronic neck pain: A randomized, controlled cross-over trial; J. Rehabil. Med., 39: 126-32, 2007.
27. **Oliviero, W.C. and Dulebohn, S.C.:** Results of halter cervical traction for the treatment of cervical radiculopathy: Retrospective review of 81 patients. Neurosurg. Focus.;, 12(2): 1-4, 2002.
28. **Graham N, Gross A, Goldsmith CH, Klaber Moffett J, Haines T, Burnie SJ, Peloso PMJ**. A systemic review. The Cochrane Library, John Wiley & Sons Ltd,.82-91, 2011.
29. **Himanshi Sh. And Nirali P..** Effectiveness Of Tens Versus Intermittent Cervical Traction In Patients With Cervical Radiculopathy. Int J Physiother Res;2(6):787-792., 2014.
30. **Bland J.** Disorders of the Cervical Spine. Philadelphia, Saunders.1994.
31. **Romeo, A.; Vanti, C.; Boldrini, V.; Ruggeri, M.; Guccione, A.A.; Pillastrini, P.; Bertozzi, L. Cervical Radiculopathy:** Effectiveness of Adding Traction to Physical Therapy. A Systematic Review and Meta-Analysis of Randomized Controlled Trials. Phys. Ther., 98, 231–242. ,2018
32. **Thoomes, E.J.; Scholten-Peeters, W.; Koes, B.; Falla, D.; Verhagen, A.P.** The e_ectiveness of conservative treatment for patients with cervical radiculopathy: A systematic review. Clin. J. Pain., 29, 1073–1086,2013.