

A Review on Advanced Physiotherapy Treatment for Cervical Spondylosis

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ABSTRACT

INTRODUCTION: Cervical Spondylosis (CS) is a clinical condition frequently encountered in the physical therapy clinic. Cervical spondylosis is a result of space occupying lesions in the cervical spine: either cervical disc herniations, spondylosis, or osteophytosis. Little is known about the appropriate role of nonoperative treatment in the management of cervical spondylosis. There is low to intermediate quality proof that different forms of interventions can alleviate pain and improving function for cervical spondylosis. The present study aims to review the effectiveness of different advanced physiotherapy treatment on cervical spondylosis.

MATERIAL AND METHODS: The literature review was searched for the advanced physiotherapy treatment, 50 articles were searched and out of which 13 articles were taken as per the inclusion criteria. Various advances in physiotherapy and their effect on cervical spondylosis were sorted out and evaluated.

CONCLUSION: The study hereby concluded that cervical traction, asanas, virtual reality training, manual therapy, cranio-sacral therapy, acupuncture with sevenacupoints, percutaneous neuromuscular electrical stimulation, thunder-fire moxibustion, deep cervical flexors training, ergonomic latex pillow, dynamic exercise, Saunders traction device and high intensity laser therapy were found to be effective in reducing pain and improving cervical range of motion in case of cervical spondylosis.

Keywords: Cervical spondylosis, pain, cervical range of motion, Physiotherapy

INTRODUCTION

Cervical spondylosis is a general and nonspecific term that refers to the degenerative changes that develop either spontaneously with age, or secondarily as the result of trauma or other pathological condition. These changes develop slowly.^[1] More than 85% of people over the age of 60 years are affected.^[2] About 10 million persons per year affected in India alone. Prevalence of Cervical Spondylosis is similar in both sexes although degree of severities greater in males. It has been estimated that 75% of persons over the age of 50 years have narrowing of

spinal canal or intervertebral foramina and 50% of these cases have symptomatic spondylotic changes in cervical spine occur at solitary disc space level in 15-40% of patients and multiple level in 60-85% of patients. C4-C7 most commonly affected.^[3]

Etiology

The primary risk factor and contributor to the incidence of cervical spondylosis is age-related degeneration of the intervertebral disc and cervical spinal elements. Degenerative changes in surrounding structures, including the uncovertebral

joints, facets joints, posterior longitudinal ligament (PLL), and ligamentum flavum all combine to cause narrowing of the spinal canal and intervertebral foramina.

Consequently, the spinal cord, spinal vasculature, and nerve roots can be compressed, resulting in the three clinical syndromes in which cervical spondylosis presents:

- axial neck pain
- cervical myelopathy
- cervical radiculopathy.^[4]

Disc Degeneration and Bone Spurs

As the discs in the spine age, they lose height and begin to bulge. They also lose water content, begin to dry out and weaken. This problem causes settling, or collapse, of the disk spaces and loss of disk space height. Eventually, the cushioning qualities of the disks begins to decrease.

As the facet joints experience increased pressure, they also begin to degenerate and develop arthritis, similar to what may occur in the hip or knee joint. The smooth, slippery articular cartilage that covers and protects the joints wears away.

If the cartilage wears away completely, it can result in bone rubbing on bone. To make up for the lost cartilage, your body may respond by growing new bone in your facet joints to help support the vertebrae. Overtime, this bone overgrowth called bone spurs may narrow the space for the nerves and spinal cord to pass through (stenosis).^[5]

Risk Factors

Age is the most common risk factor for cervical spondylosis. The condition is extremely common in patients who are middle-aged and older.^[5]

Few environmental factors can also be responsible for these conditions along with actual conditions related with faulty life style for example:

- Crowd
- carrying heavy load on shoulders
- unsuitable furniture

- lack of exercise
- improper clothing
- over load imitation
- unhygienic conditions
- lack of awareness
- inappropriate time table
- poverty
- occupation etc.^[6]

Other factors that may increase your risk for developing cervical spondylosis include:

- Genetics — a family history of neck pain and spondylosis
- Smoking — clearly linked to increased neck pain
- Occupation — jobs with lots of repetitive neck motion and overhead work
- Depression or anxiety
- Previous injury or trauma to the neck^[5]

Pathophysiology

The pathogenesis of cervical spondylosis involves a degenerative cascade that produces biomechanical changes in the cervical spine, manifesting as secondary compression of neural and vascular structures. An increase in the keratin-chondroitin ratio prompts changes to the proteoglycan matrix resulting in loss of water, protein, and mucopolysaccharides within the intervertebral disc. Desiccation of the disc causes the nucleus pulposus to lose its elasticity as it shrinks and becomes more fibrous. As the nucleus pulposus loses its ability to maintain weight-bearing loads effectively, it begins to herniate through the fibres of the annulus fibrosus and contributes to the loss of disc height, ligamentous laxity, and buckling, and compression of the cervical spine.

With further disc desiccation, the annular fibres become more mechanically compromised under compressive loads, producing significant alterations in the load distribution along the cervical spine. The

result is a reversal of the normal cervical lordosis.

Furthermore, disruption in the load balance along the spinal column generates greater axial loads onto the uncovertebral and facet joints which triggers hypertrophy or enlargement of the joints and accelerates bony spur formation into the surrounding neural foramen. These degenerative changes lead to loss of cervical lordosis and movement, as well as a reduction in the spinal canal diameter.^[4]

Signs and symptoms

Cervical spondylosis generally presents with one or more of the following signs:

- Neck pain
- Arm pain – usually in dermatomal distribution.
- Myelopathy

Symptoms may occur alone or in combination:

- Sensory symptoms of tingling or numbness
- Muscle weakness and atrophy^[7]
- Restricted neck movement is always present with significant cervical spondylosis.^[8]

Special test for cervical spondylosis

1. Foraminal compression (Spurling's) test:

Aim of the test

- Identifies dysfunction (typically compression) of cervical nerve root.

Patient position

- Patient sitting with head side bent towards uninvolved side. Apply pressure through head straight down. Repeat with head side bent towards involved side.
- This test is performed in 3 stages; if symptoms are produced, don't proceed to next stage:
 - First stage involves compression with the head in neutral
 - Second in extension
 - Third in extension & rotation to unaffected side then to affected side.

Positive sign:

- Positive finding is pain and/or paresthesia in dermatomal pattern for involved nerve root.

2. Distraction test:

Aim of the test

- Indicates compression of neural structures at the intervertebral foramen or facet joint dysfunction.

Patient position:

- Patient sitting or supine, examiner places one hand under patient's chin & other hand around the occiput and the head is passively distracted.

Positive sign

- Positive finding is a decrease in symptoms in neck (facet condition) or a decrease in upper limb pain (neurologic condition).^[9]

Imaging Studies

Although magnetic resonance imaging (MRI) has become the imaging modality of choice, standard radiographs are still helpful because they provide a straight forward assessment of cervical spondylosis.^[2]

X-rays

X-rays provide images of dense structures, such as bone. An X-ray will show the alignment of the bones along your neck. It can also reveal degenerative changes in your cervical spine such as:

- the loss of disk height
- the presence of bone spurs.

Magnetic resonance imaging (MRI) scans

MRI scans create better images of the body's soft tissues, such as muscles, disks, nerves, and the spinal cord than X-rays. An MRI can help determine whether your symptoms are caused by damage to soft tissues, such as:

- bulging
- herniated disk.

Computerized tomography (CT) scans

More detailed than a plain X-ray, a CT scan can help your doctor better view your spinal canal and any bone spurs.^[5]

TREATMENT

Medical management

Medications:

Non-Steroidal Anti-Inflammatory Drugs (NSAID's)

Opioid Analgesics

Muscle Relaxants

Corticosteroids^[1]

Surgical management

Patients with cervical spondylosis who may need operation fall roughly into four groups which are not, however, mutually exclusive.

- (1) Those whose major symptom is a painful stiff neck.
- (2) Those with evidence of compression of a cervical spinal root.
- (3) Those with cervical myelopathy due to encroachment upon the spinal canal by osteophytes, or occasionally due to instability or spondylolisthesis of one cervical vertebra upon the next lower.
- (4) Those with symptoms suggesting basilar artery insufficiency and in whom a vertebral artery is compressed by osteophytes.

The following operations are practised :

- (1) Fusion of one vertebra to another by a bone graft, thereby immobilising the affected joints. This may be accomplished by an anterior or a posterior approach.
- (2) Facetectomy and foraminotomy, in order to relieve pressure upon a compressed nerve root. This may be combined with incision of the dural root sheath and division of adhesions.
- (3) Laminectomy combined if necessary, with foraminotomy; this relieves compression of the spinal cord.
- (4) Decompression of the vertebral artery in the neck.^[11]

PHYSIOTHERAPY TREATMENT EXERCISES

1. Isometric exercises of head and hands:

In this patient is asked to move his head in particular directions with using his hands. Such as, he is pushing his hands forward while simultaneously pushing his head

backward counteracting the force made by hands.

2. Neck rotation:

In this exercise patient is asked to move his or her neck in different directions e.g. back and forth, side to side, turning and circling without using his hand, freely and independently.

3. Shoulder rotation:

Shoulders can be rotated one by one or both together. The patient is asked to rotate his shoulder clock wise and anti clock wise in both directions by positioning his hand above the shoulder.^[12]

ELECTROTHERAPY

1. Heat pack and cold pack

These therapies can assist in the healing process by providing physiological changes to a range of tissues including changes in:

- blood flow
- nerve conduction
- metabolic function.

Since the biophysical properties differ across cold and heat agents, the capability of reaching particular target tissues varies across modalities.

2. Ultrasound

It is believed that ultrasound application increases blood flow and metabolism at the site of injury, and can thereby decrease pain and increase the rate of healing .

3. LASER

The term LASER is an acronym for light amplification by stimulated emission of radiation-a form of photonic therapy that uses monochromatic light with:

- High power
- low power

Three main types of LASER are used clinically:

- helium-neon
- the gallium-arsenide
- the gallium-aluminium-arsenide

Many mechanisms of action have been proposed for LASER including:

- the slowing of transmission of nociceptive signals

- regulation of serotonin and norepinephrine
- may limit the release of pro-inflammatory mediators

4. Traction

The main effect of traction is to overcome spasm of the neck muscles.

Other Electrotherapy treatment may include:

- Direct current (DC)
- Iontophoresis
- Electrical nerve stimulation
- Electrical muscle stimulation
- Transcutaneous electrical nerve stimulation (TENS)
- Pulsed electromagnetic fields
- Repetitive magnetic stimulation
- Permanent magnets (albeit extremely small current).

Collars

The object of the collar is to limit or reduce neck movements in order to give any "inflammation" or oedema present a chance to subside. Collars vary from the massive Minerva plaster, which immobilises the head and neck, to light collars made of felt, sorbo, rubber or even paper. As the osteophyte will either remain unchanged or increases lightly in size it would be logical to suggest that it be worn for life.

Manipulation

Manipulation has been described as "a forcing movement with special purposes other than direct increase in the range of movement of a joint" (Cyriax, 1948). In the cervical spine its main use is to reduce an intra-articular displacement or mobilise the zygapophyseal joint and the neuro-central joint. When there are signs of cord compression manipulation is contra-indicated as the liability of further cord damage is considerable^[11]

Need of Study

Reviewing the various articles, we observed that there are various advanced physiotherapy treatment for cervical spondylosis, so the following study is for

gathering various details for them. Thus there is a need to evaluate more advanced physiotherapy treatments in cervical spondylosis.

LITERATURE REVIEW

1. Mantujain, et al published article on 9 march 2021" **Effect of selected group of asana when used as an adjunct in management of cervical spondylosis of mild to moderate severity**". The objective of the study was to assess the possible benefit of a selected group of asana in a group of patients over a short time frame and assess their functional outcome. This study concluded that Yogic practices "Specific Group of Asana" done for eight weeks on a home-based program could be useful in reducing pain and disability in people suffering from CS of mild to a moderate degree.
2. Afzal, et al. published an article in 2020 on "**The short-term effects of cervical traction on neck mobility (flexion and extension) in patients with cervical spondylosis**". 30 patients were selected. They were divided randomly into two groups. Group 1 obtained manual intermittent cervical traction. Group 2 obtained sustained cervical traction. The improvement in ROM (Rt. And Lt. rotation) was more marked in sustained traction as compared to intermittent traction. There was a significant improvement in pain in both groups in pre to post score.
3. Madhumanti et al. published an article in 2020 on "**Immediate and Short Term Effect of Virtual Reality Training on Pain, Range of Motion, and Kinesiophobia in Patients with Cervical Spondylosis**". They selected 44 patients. Group A of 22 patients received conventional therapy and Group B of other 22 patients received conventional plus Virtual Reality Training programme. The study concluded that VRT was better in reducing pain than conventional

treatment on the immediate and short-term basis. However, VRT group was not effective in improving ROM on an immediate basis. Both the treatment methods were equally effective in reducing kinesiophobia.

4. Mohammed Abdullah Alnazi et al published article on October 2020 on “**manual therapy in cervical spondylosis**”: A systemic review was conducted to investigate the effectiveness of manual therapy methods designed to improve pain and ROM in cervical spondylosis patients by summarizing the evidences from randomized controlled trials. Manual therapy program designed for cervical spondylosis treatment is more effective at increasing neck ROM and reducing pain.
5. Ruchi Srivastava et al. Prasad published article in September 2019 on “**Management of Cervical Spondylosis through Exercises and Asanas**”. They studied that besides common treatment modalities available for cervical spondylosis certain specific exercises and yogasanas has mark able role and effect in curing as well as controlling the symptoms of cervical spondylosis.
6. Tushar J. Palekar, Nikhil B. Shah, Soumik Basu, Gaurang Baxi and Shilpa Khandare published an article in 2019 on “**Effect of Craniosacral Therapy in Treatment of Cervical Spondylosis**” They selected 30 participants on the bases of inclusion and exclusion criteria. The study concluded that CST (Craniosacral Therapy) has a significant effect in reducing pain and improving functional disability of the participants suffering from chronic neck pain.
7. Chun-Lei Gu, Yu Yan, Ding Zhang and Ping Li published an article in 2019 on “**An evaluation of the effectiveness of acupuncture with seven acupoint-penetrating needles on cervical spondylosis.**” Sixty patients with cervical spondylosis were grouped using computer-generated random numbers. Group A (n=30) received acupuncture with seven acupoint-penetrating needles combined with traction. Group B (n=30) received acupuncture of non-relevant acupoint-penetrating needles combined with traction. Acupuncture using seven acupoint-penetrating needles combined with traction was more effective, reduced neck pain, and improved sleep quality in patients with cervical spondylosis compared to acupuncture of non-relevant acupoint-penetrating needles.
8. Qiangmiao, MB, Jian-hongqiang, et al published article in 2018 “**Effectiveness of percutaneous neuromuscular electrical stimulation (PNMES) for neck pain relief in patients with cervical spondylosis(CS)**” this study was conducted to evaluate the effectiveness and safety of PNMES for treating neck pain in patients with CS. In this study 124 patients with neck pain of CS were included and randomly divided into a PNMES group and control group in ratio of 1:1. All patients received PNMES or sham PNMES 30 minutes daily. At the end of 12week treatment and 4 week up, the result of this study demonstrated that PNMES is more effective than sham PNMES for neck pain relief in patients with CS.
9. Ruina Huang, Yunxuan Huang, Ruijia Huang, Shaofen Huang, Xiaojun Wang, Xiaojiang Yu, Dangan Xu and Xinghua Chen published an article in 2018 on “**Thunder Fire Moxibustion for Cervical Spondylosis: A Systematic Review and Meta-Analysis**”. They selected 12 participants for the study. The result showed that thunder-fire moxibustion was more effective than the control group. Thunder-fire moxibustion can improve the total effective rate of treatment and relieve pain, numbness, and other symptoms of cervical spondylosis.
10. Marwa Shafiek Mustafa Salehm, Nagwa Ibrahim Rehab and Moussa Abdel Fattah Sharaf in 2018 on “**Effect of deep cervical flexors training on neck**

proprioception, pain, muscle strength and dizziness inpatients with cervical spondylosis.” Forty patients with cervical spondylosis suffering from neck pain and dizziness were chosen from Out-Patient Clinic, Faculty of Physical Therapy, Cairo University to participate in this study. They were randomly divided into two equal groups. The study group (A): received DCFs training plus traditional physical therapy (hot backs, TENS and cervical proprioceptive training). The control group (B) received traditional physical therapy only. The study findings indicate that DCFs training was more effective than traditional physical therapy for improving neck proprioception, pain, muscle strength and dizziness in patients with cervical spondylosis.

11. Arjeta Azemi et al published article on Dec 2018 on “**effect of dynamic exercises in treatment of cervical spondylosis**”. After long-term researches with higher sample size this study confirms that dynamic exercises play a significant role in treating cervical spondylosis.
12. Fatemeh Fazli et al published article on Sep 2018” **effect of ergonomic latex pillow on pain and disability in patients with cervical spondylosis**”. Ergonomic latex pillow can significantly decrease disability symptoms related to neck pain in patients with cervical spondylosis after four weeks of intervention. According to results of this study some symptoms of cervical spondylosis decrease by using ergonomic latex pillow, thus it is recommended that patients with cervical spondylosis use an ergonomic latex pillow while receiving physical therapy to improve their neck disability symptoms.
13. Robert Haładaj, Mariusz Pingotand Mirosław Topol published article in 2017 on “**The Effectiveness of Cervical Spondylosis Therapy with Saunders**

Traction Device and High-Intensity Laser Therapy.” The study included 174 patients (114 women and 60 men) aged 24–67 years. The patients were divided into two randomized groups. In group I (88 subjects) traction therapy with the Saunders device was applied, and in group II (86 subjects) HILT was applied. Both therapeutic methods improved the efficiency and demonstrated analgesic efficacy in patients with cervical spondylosis immediately and in the medium term after the therapy. HILT was more effective than the Saunders method in long-term follow-up.

MATERIALS & METHODS

The following topics may be utilized as found necessary

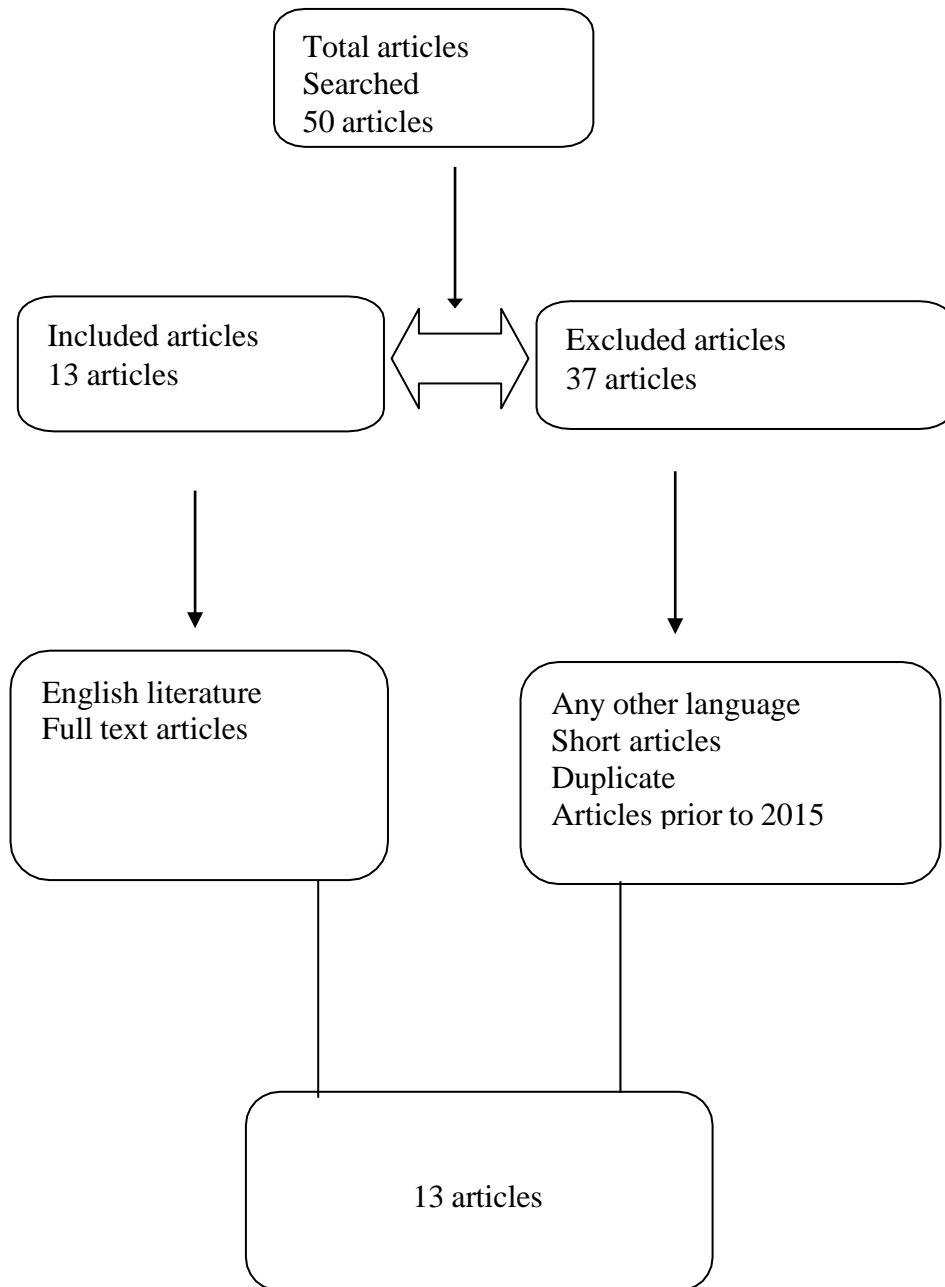
1. Research Design- REVIEW OF LITERATURE
2. Population- any population who were diagnosed with Cervical spondylosis will be included without limits on gender, race, nationality and medical units.

Inclusion criteria:

- Study – cross-sectional study, correlational study, cohort study, survey method, regression
- Design- single group design, two group design, randomized control trial, experimental study design, retrospective design, systemic study.

Exclusion criteria:

- Any other languages than English
 - Any study conducted prior to 2015
 - Articles other than that of cervical spondylosis have been excluded
3. Data collection technique- any articles which were in inclusion criteria were taken as data.
 4. Search database –
Pubmed
ResearchGate
Google scholar
 5. **Procedure**



DISCUSSION

In our study the recent advances in physiotherapy treatment of cervical spondylosis were included. We searched and reviewed various articles for various advances in physiotherapy treatment and their effect on cervical spondylosis. So we have formulated various advanced physiotherapy treatments as under:

Mantu Jain et al. conducted study on effect of selected group of asanas when used as an adjunct in management of cervical spondylosis of mild to moderate severity.

The module of specific group of asana (SGOA) was practiced for a period of 30 minutes. The patients were also given a handout of the same for a home based programme and followed up fortnightly for 8 weeks. Patients were examined at presentation (0) and sequentially every fortnight at 2,4,6 and 8 weeks. Every time printed questionnaires for neck pain and disability (NDI) were filled by one of the supervisors. The researcher found that yoga practice was much more effective than other treatments in curing neck pain and stiffness

of the neck at the end of three months and also found that reduction in NDI scores in patients at 8 weeks of practice. They proved that the yogic practices “specific group of asana” done for 8 weeks on home based programs when added to conventional medications helps in reduction of pain and disability in people suffering from cervical spondylosis SGOA is a set of combination of stretching and isometric muscle training postures, implemented for the treatment of CS. Stretching causes the fullest elongation of muscle fibre and refines the muscle’s elasticity as well as reassert a rich tone, whereas isometric posturing can relieve muscle spasm and pain. There is overall increased muscle flexibility, control, improved ROM, and more significantly shifting to healthy habitual patterns of posture in daily.^[14]

Farjad Afzal, et al. studied on the short-term effects of cervical traction on neck mobility (flexion and extension) in patients with cervical spondylosis. 30 patients were selected by inclusion and exclusion criteria and were divided randomly into two groups. Group 1 obtained manual intermittent cervical traction. Group 2 obtained sustained cervical traction. This Study shows that results are not significant when compared the groups between the groups. It is shown in this study that both interventions are significant to reduce the pain when compare with in the groups i.e., pre to post comparison with in groups. There was significant improvement in pain in both groups in pre to post score. Study concluded that both interventions are significant to reduce the pain when compare with in the groups i.e., pre to post comparison with in groups. Study also concluded that the effects of intervention are not maintained for 05 minutes of single session of intervention.^[15]

Madhumanti Mukherjee, et al. studied on immediate and Short-Term Effect of Virtual Reality Training (VRT) on pain, range of motion and kinesiophobia in Patients with Cervical Spondylosis. One group received conventional treatment, and other received

conventional plus VRT for 3 consecutive days a week. VRT was given for 10 min. The VR game required active cervical ROM to play the game which is sensed by the gyroscope inside. The outcomes assessed were pain using the Numeric Rating Scale and cervical ROM (all movements) using universal goniometer and kinesiophobia. Distraction has been proven as the main principle behind pain relief when VRT is used. Virtual reality (VR) uses the computer software to display the virtual environments. Pain and ROM were assessed on the immediate (day 1) and short-term (day 3) basis while kinesiophobia was assessed only on day 3. All the ranges of cervical motions in conventional and VRT intragroup analysis are statistically significant (flexion, extension, both rotations, and both lateral flexion) both during immediate and short-term assessment. VRT is more effective than conventional treatment alone in the reduction of pain immediately (day 1) and in short term (day 3). VRT also demonstrated improvements in ranges of bilateral cervical rotations and lateral flexion on the short-term basis (day 3) while there was no improvement observed immediate posttreatment (day 1). Both the treatment methods were equally effective in reducing kinesiophobia.^[16]

Mohammed Abdullah Alanazi has studied the effectiveness of manual therapy in cervical spondylosis. This review was conducted to determine the efficacy of manual therapy approaches in improving quality of life in patients with neck pain. Evidences from RCTs are used to assess the efficacy of manual therapy approaches in neck pain. There is low to intermediate quality proof that different forms of manipulation and/or mobilization can alleviate pain and improving function for chronic neck pain relative to other treatments. Several prior studies of chronic neck pain show findings in favor of manipulation and mobilization for individuals with chronic neck pain. The authors concluded various theories as following: Neck pain is associated with

mechanical instability, and can be caused by an increase in nociceptive discharge of the afferent fibres in the vertebral zygapophyseal joints, intervertebral discs, paraspinal muscles, and soft tissues. Spinal manipulation can affect the mobility of a hypomobile segment, and produces increased range of movement. The effectiveness of spinal manipulation is due to the fact that manipulation can increase the range of movement of the joints, increasing the activity of the proprioceptive fibres and thereby reducing the transmission of pain stimuli, also relieving chronic tension and spinal nerve irritation caused by joint dysfunction; it relaxes the muscles due to stretching of the joint capsules, which stimulates mechanoreceptors, decreasing muscle soreness. In addition, joint adhesions can be reduced in chronic cases, increasing the pain threshold in the skin and the pain threshold to pressure in the paraspinal muscles. The biomechanical changes caused by spinal manipulation have physiological consequences, through their effects on the influence of sensory information to the central nervous system. The afferences to the muscle spindles, and the afferences to the Golgi tendon organs are stimulated by spinal manipulation. Sensory nerve fibres of smaller diameter are likely to become active, although this has not been directly demonstrated. The reasons underlying the biomechanical changes in the spine affect the afferent neurons, with a subsequent change in central processing, and affecting the somatomotor efferences and the somatovisceral reflexes. Spinal manipulation triggers changes in the musculoskeletal system. Experimental tests indicate that the charge of the impulse of a spinal manipulation influences the proprioceptive primary afferent neurons in the paraspinal tissues. In addition, the manipulation can affect the processing of pain, possibly by altering the central facilitated state of the spinal cord, and can affect motor control system. It is likely that more than one mechanism explains the

neurophysiological mechanisms of vertebral manipulation^[17]

Ruchi Srivastava et al. studied on management of Cervical Spondylosis through Exercises and Asanas. Exercises which used are isometric exercises of head, neck rotation, shoulder rotation, backward bending of body, backward stretching of spine along with hands. Beside exercises patients to practice following asanas for their proper benefit - Halasana, Bhujangasana, Dhanurasana, Ustrasana, Ardhamatsyendra asana, Chakrasana. It's following effects on our different body part helps to provide relief in cervical spondylosis patients:- Muscle fibres and cervical vertebrae, Thoracic vertebrae and Lumbar vertebrae on the back are strengthened. It helps to keep the back bone flexible and strong. Stretches the shoulders and spine. Relieves stress and fatigue. It helps to make spinal cord strong and flexible. It makes your back bone elastic and flexible.^[18]

Tushar J.Palekar, et al. have studied on Effect of Craniosacral Therapy in Treatment of Cervical Spondylosis. The subjects were assessed for the outcome measures using NPRS, NDI and Cervical ROM pre-intervention. After this procedure, craniosacral therapy was administered to them for a period of 2 weeks. 3 sessions per week post which patients were assessed again for the said outcomes. Intervention included 4 techniques: 1) Still Point Induction 2) Occipital Decompression 3) Cranial Vault with Traction 4) Still Point Induction. In this study they considered cervical as a single entity and all the subjects having neck pain. They were evaluated before and after at 2 weeks. There is a positive significant difference in mean difference of all cervical range of motions, the pre and post assessment of these ranges show an increase in range of motion. Pain relief causes deep relaxation of the participant muscles. They concluded that Craniosacral Therapy has a therapeutic effect on reducing pain, improving cervical range of motion and improving overall

cervical function amongst people with cervical spondylosis.^[19]

Chun-Lei Gu, et al. have studied on an evaluation of the effectiveness of acupuncture with seven acupoints-penetrating needles on cervical spondylosis. All treatments were performed with patients in a sitting position. In Group A, seven sets of acupoints were selected. In Group B, acupoints were selected according to clinical symptoms. The efficacy observed with seven acupoint-penetrating needles combined with traction to treat cervical spondylosis is due to several factors. First, the selected acupoints are the stress concentration points of muscle fibre bundles or tendons. Point-through-point acupuncture of these acupoints can improve the high tension state of spasm or contracture of soft tissues, reduce the bad traction of these tissues on the cervical vertebral body, nerves, and blood vessels, and correct the state of cervical instability, alleviating pain and improving cervical dysfunction. Second, acupoint penetration at the head can activate the reticular activation system in the brain, increase the excitability of the cerebral cortex, improve local blood circulation of the brain, and accelerate metabolism, thereby improving patients' sleep quality, anxiety, general discomfort, and other symptoms. Third, intermittent traction in a sitting position can effectively reduce the spasticity of muscles and ligaments around the cervical vertebrae. Results showed that acupuncture using seven acupoint penetrating needles combined with traction was more effective, reduced neck pain, and improved sleep quality in patients with cervical spondylosis.^[20]

Qiangmiao, et al conducted study on effectiveness of percutaneous neuromuscular electrical stimulation (PNMES) for neck pain relief in patients with cervical spondylosis (CS)". In this study 124 patients with neck pain of CS were included and randomly divided into a PNMES group and control group in ratio of 1:1. All patients received PNMES or sham PNMES 30 minutes daily, 3 times weekly for 12 weeks.

The primary outcome was assessed by visual analogue scale. All outcome measurements were measured at the end of 12-week treatment, and 4-week follow-up after treatment. The patients receiving PNMES exhibited more decrease in the mean VAS and NDI respectively, compared with the patients received sham PNMES. Additionally, the increase in the mean ROM was also significantly higher in the PNMES group than that in the sham PNMES group at the end of the 12-week treatment, and 4-week follow-up. The result of this study demonstrated that PNMES is more effective than sham PNMES for neck pain relief in patients with CS. The results found that PENS combined with DN therapy was more effective than DN alone for reducing soreness in the short term and decreasing neck pain intensity immediately in patients with chronic neck pain.^[21]

Ruina Huang, et al. conducted a study on Thunder- Fire Moxibustion for Cervical Spondylosis. The intervention group adopts single thunder-fire moxibustion or thunder-fire moxibustion combined with other therapies, while the control group receives other therapies except thunder-fire moxibustion, such as usual care, acupuncture, moxibustion, medication or physical therapy, and so on. The pain scores were assessed by the Numeric Rating Scale (NRS) or Visual Analog Scale (VAS). Seven trials had a treatment duration less than or equal to 2 weeks, and 5 had a treatment duration more than 2 weeks. The baseline data between the two groups in every research were comparable. Ten researches measured total effective rate, 4 researches measured traditional Chinese medicine syndrome score, 4 researches measured pain score, 2 researches measured satisfaction score, and 2 researches measured the score of the symptoms and functional rehabilitation of cervical vertigo. Thunder-fire moxibustion can produce strong fire power, thermal infrared radiation force and medicine chemical factor. The heat of thunder-fire moxibustion can improve blood circulation and stimulate related acupoints to activate

meridians. The drug of thunder-fire moxibustion, therefore, penetrates and reaches the acupoints with a high drug concentration area in the human body surface. According to the theory of traditional Chinese medicine, the comprehensive effect of these factors can act on meridians and acupoints to raise local temperature, stimulate local blood circulation and lymph circulation, and accelerate metabolism. The result showed that thunder-fire moxibustion was more effective than the control group. Thunder-fire moxibustion can improve the total effective rate of treatment and relieve pain, numbness, and other symptoms of cervical spondylosis.^[22]

Marwa Shafiek et al. have studied on Effect of deep cervical flexors training on neck proprioception, pain, muscle strength and dizziness in patients with cervical spondylosis. The patients in both groups received the same traditional physical therapy treatment including hot packs, TENS and cervical proprioceptive training 3 times a week for six weeks. The study group received the same program of the control group in addition to DCFs training 3 times a week for six weeks. There was improvement in pain after the treatment. This significant decrease in the pain is due to significant improvement of proprioception in DCFs group than traditional physical therapy group. This explanation based on that, pain induces changes in muscle spindle discharge and the proprioceptive properties of brainstem neurons. Study concluded that Post treatment there was a significant decrease in right and left HRA, pain intensity, severity of dizziness and DHI of the study group compared with that of control group. Also, there was a significant increase in the DCFs strength posttreatment compared with pre treatment.^[23]

Arjeta Azemi has studied the effect of dynamic exercises in treatment of cervical spondylosis. In this research were included 60 patients, of both genders, aged 40-60 years old, all participants were divided in

randomized order into two groups and were treated for 10 days. The treatment protocol for the first group (A) has been the application of physical modalities, deep transverse massages and dynamic exercises while the other group (B) was treated with isometric exercises. According to the overall research findings, physical therapy plays an important role in treating cervical spondylosis, reducing pain, increasing muscular strength and flexibility in the cervical region. The two exercise protocols have shown to be very successful treatment strategies for people with cervical spondylosis. However, in group A, the exercises protocol showed to be more effective in increasing mobility and reducing pain. According to our results, the level of pain was significantly decreased, while cervical mobility was increased in both groups, however in group A of exercise it was significantly, these data can be compared with other research papers. The role of dynamic exercises and deep transverse massages has shown to be more effective in treatment of cervical spondylosis, the same results reported by other authors who have concluded that the dynamic exercises are more effective in cervical spondylosis treatment can be comparative to our results. Based on the results of our research we can confirm that if we combine the exercises of both groups the success of rehabilitation will be much more effective in cervical spondylosis.^[24]

Fatemeh Fazli, et al. have studied the effect of ergonomic latex pillow on pain and disability in patients with cervical spondylosis. The results of the present study demonstrated that pain intensity and disability in both groups were significantly lower after four weeks. Nevertheless, the levels of pain intensity, disability and the medication usage were lower in patients using the latex pillow compared to those using their regular pillow, though the treatment course in the experimental group was only significantly more effective in terms of the functional disability improvement. Improvements in the

symptoms were observed in long-term follow-up in the group receiving the pillow. A possible explanation for these findings is that the pillow needs time to produce noticeable changes in pain relief through restoration of intervertebral discs and muscles. Ergonomic latex pillow decreases the pain through affecting the paraspinal musculature and supporting the spine regarding reduction of the abnormal loading and biomechanics. This finding can indicate the importance of time in the pillow's effectiveness. In addition, this pillow with different heights (ergonomic) supports the head and neck in supine or side lying position. So it may be effective in improving the symptoms of the patients [25]

Robert Haładaj, et al. have studied on the Effectiveness of Cervical Spondylosis Therapy with Saunders Traction Device and High-Intensity Laser Therapy: A Randomized Controlled Trial. Group I patients were subjected to cervical axial traction using the Saunders device. The procedure was performed in the supine position once per day, 5 days per week for 3 weeks in accordance with the applicable rules. Altogether, 15 traction procedures were performed in each patient. Traction with the Saunders device and HILT demonstrated analgesic efficacy, and improved global mobility and efficiency in patients with cervical spondylosis. Centralization of neurological symptoms obtained after only 2 weeks was the achievement of this therapy. The Visual Analog Scale (VAS) was used. Pain subsided on the average by 50%. NDI questionnaire revealed that in patients undergoing HILT a statistically significant 60% improvement was observed in daily functioning. The results revealed that the most significant improvement of the weakened muscle strength and reduction of pain intensity were obtained after the treatment with Saunders traction. The Saunders method was similarly effective as HILT only in the first period, i.e., immediately after the procedures and in medium-term follow-up. HILT showed a

better therapeutic effect in long-term follow-up. [26]

CONCLUSION

The study hereby concluded that cervical traction, asanas, virtual reality training, manual therapy, craniosacral therapy, acupuncture with seven acupoints, percutaneous neuromuscular electrical stimulation, thunder-fire moxibustion, deep cervical flexors training, ergonomic latex pillow, dynamic exercise, Saunders traction device and high intensity laser therapy were found to be effective in reducing pain and improving cervical range of motion in case of cervical spondylosis.

Declaration by Authors

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