



## Treatment of Cervical Spondylosis in Southeast Nigeria: Benefits of Intermittent Alternating Upright Distraction and Flexion High Weight Cervical Traction

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### Authors' contributions

This work was carried out in collaboration between all authors. Authors AAI and GOE designed the study, wrote the protocol and managed the patients. Author AVE managed the literature searches and data collection. Author CIE helped in statistical data analysis, meanwhile and author GCO wrote the first draft of the manuscript. Authors AVE and OO helped in drafting of the manuscript. All authors read and approved the final manuscript.

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### ABSTRACT

Cervical spondylosis is a very common and painful condition affecting many people. The mainstay of treatment of this painful condition has been analgesics which have not proved effective in addition to their untoward complications. Biomechanical studies have shown the potential of neck

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distraction by traction to be very promising in pain relief and an assessment of high weight cervical traction was done to evaluate its efficacy. Fifty patients including thirty (30) males and twenty (20) females (mean age: 50.46±8.31 years, mean weight: 87.17±14.30 kg, mean height: 1.66±0.12 meters) were available for study on the usefulness of infrared radiation only and a combination of infrared radiation and cervical traction in a cross-over research design at the National Orthopaedic Hospital Enugu. Infrared radiation was applied three times a week for six weeks before a washout period of seven days and then application of cervical traction combined with infrared radiation were done three times a week for six weeks. Pain rating scores were used to evaluate pain relief before, during and after treatment sessions and finally after six weeks. The results of the study showed that cervical traction in combination with infrared radiation was superior ( $p < 0.05$ ) to infrared radiation alone in the management of cervical spondylosis as there was prolonged relief of pain in those that had cervical traction. It is recommended that high weight cervical traction should always be used in the management of cervical spondylosis.

*Keywords: Cervical spondylosis; high weight traction; infrared radiation; pain.*

## 1. INTRODUCTION

After back pain, neck pain is the most frequent musculoskeletal cause of consultation of an Orthopaedic Surgeon worldwide; and like back pain, it is multi-factorial in origin; reflecting poor posture, muscle strain, sporting and occupational activities as well as psychological factors. Cervical spondylosis can cause radiculopathy or myelopathy [1]. The medical treatment for cervical spondylosis include neck immobilization, pharmacologic therapy, life style modifications, and physical modalities like traction, manipulation, exercises, and heat therapy [2]. No carefully controlled trials have compared these modalities; therefore these therapies are often initiated based on the clinician's preference or specialty. Comparing the efficacy of these treatment modalities with no treatment at all is difficult and faced with lot of ethical issues.

Lack of convergence of expert opinions on the clinical benefits of cervical traction in pain management among patients suffering from cervical spondylosis suggests the need to re-assess the relevance of cervical traction as a therapeutic tool in the treatment of cervical spondylosis. The Royal College of General Practitioners in London reported "that traction does not appear to be effective for neck and low back pain" [3]. This view was also canvassed by Al-shatoury [4] and Galhom [5] who essentially concluded that traction in treatment of cervical pain is not better than placebo. However, other workers like Saunders, [3] and Shakoor et al. [6] disagreed with the assertion of the Royal College and clearly demonstrated that traction is a useful tool for the treatment of cervical spondylosis. Saunders asserted the possibility that the patients involved in the study by the Royal College of General Practitioners were those who

could not benefit from cervical traction (poor patient selection) or that the patients were under-loaded. This then brings to fore the principles of high weight cervical traction in the physical therapy of cervical spondylosis.

Physical therapy programs vary, but they generally last from 6 to 8 weeks and sessions are scheduled 2 to 3 times a week [7,8] cervical spine distraction forces  $\geq 12.5$  kg need to be achieved over this period for any remarkable effect on the spine; but forces  $> 25$  kg probably do not provide any additional advantage [9,10]. It has been found that the optimum position imparting mild cervical flexion is achieved with the patient facing door. As a general rule, 4 to 6 kg weight is applied for 14 to 20 minutes per session [11].

Traction can be provided with a mechanical traction unit in the clinic or an over-the-door traction device. The later can be used at home 2 – 3 times daily for 15 minutes at a time.

The physical therapist can also use his hands to provide manual cervical traction.

The main goal of physical therapy in the treatment of the neck pain includes, decreasing or eliminating the pain, improving functional activity and preventing future problems with the neck. Cervical traction separates the joint surfaces and disc spaces in the neck.

Hinderer and Beghin [9] had concluded in their study that elongation of cervical spine 2-20 mm can be achieved with  $\geq 12.5$  kg traction force; approximately 5 kg of which is needed to counter-balance the weight of the head. Cervical mechanical traction commonly used for cervical spondylosis radiculopathy, in addition to cervical joint distraction, may loosen adhesions within the

dural sleeves, reduce compression irritation of discs, reduce inflammatory pain response and muscle spasm, and improve circulation within the epidural space. It had been noted that intermittent traction is probably more effective than static traction [12]. Traction is contra indicated in Patients with myelopathy, rheumatoid arthritis with atlanto-axial subluxation and positive Lhermitte sign [11].

Strengthening and stretching weakened or strained muscles is usually the first treatment modality that is administered. Physical therapist may also use cervical traction and posture therapy. Various methods for traction of the cervical spine exist and ranges from skeletal traction for fractures and deformities to Halter traction, cervical air traction, air plus and air plus deluxe, Dr Riter's neck and shoulder relaxer and manual traction with Turkish towel under the occiput [13].

## **2. MATERIALS AND METHODS**

### **2.1 Study Area and the Study Site**

The study was carried out in Physiotherapy department, National Orthopaedic Hospital, Enugu, Enugu State. The hospital is one of the tertiary hospital and the only National Orthopaedic hospital in the Southeast Nigeria.

### **2.2 Study Design**

The study utilized a one group crossover research design.

### **2.3 Sampling and Sampling Technique**

The study was a total study involving all patients with chronic cervical spondylosis who presented to the Physiotherapy department NOHE from June 2006 to February 2014. A total of fifty (50) (30 males and 20 females) adult patients who met the selection criteria and who had cervical spondylosis without clinical evidence of myelopathy participated in the study. Convenience sampling technique was used in selecting the patients using selection criteria.

### **2.4 Ethical Consideration**

Ethical approval from the Research and Ethics committee of National Orthopaedic Hospital, Enugu was obtained before conducting this study. The patients' written informed consent was also duly obtained before involving them in the study.

### **2.5 Procedure for Data Collection**

Diagnosis of cervical spondylosis was made on all the subjects by the attendant Orthopaedic Surgeons and re-confirmed by the researchers using Spurl's Assessment Procedures.

### **2.6 Exclusion Criteria**

Patients with myelopathy, rheumatoid arthritis, atlanto-axial subluxation from any cause, traumatic cervical spine deformity, other causes of neck pain, and positive Lhermitte sign were excluded from the study.

### **2.7 Inclusion Criteria**

The subjects that have cervical spondylosis with grade 1-5 based on classification by Kellgren and Ball. [14] were included in the study.

### **2.8 Subjects**

A total of 80 patients volunteered to participate in this study, but only 50 met the selection criteria. The study was carried out between June 2006 and February 2014. Cross over research design was used to evaluate the effectiveness of infrared radiation only as a control paradigm and cervical traction combined with infrared as experimental paradigm in the treatment of cervical spondylosis. Infrared radiation was applied three times a week for six weeks using the Infraphil lamp made in USA by Philips electronics model HP 3616, before a wash out period of 7 days; and then cervical traction and infrared radiation were applied on the same patients per treatment session three times per week for the same six weeks.

For traction each of the patient were loaded with tolerable weight ranging from 12.5 kg to 20 kg for upright distraction traction and 4 to 7.5 kg for flexion traction. Upright distraction was alternated with flexion, each being used 9 times of 18 visits. When maximum tolerable level was reached, a weight of 1 kg was removed to make the patient bear the weight with ease for the empirical 15 minutes session at each visit. The treatment was carried out thrice each week for 6 weeks. The traction was done with each patient sitting down on chair in the traction unit with his/her hands on his/her laps, with knees and hips flexed at an angle 90°.

A standardized instrument numeric pain rating scale was used to collect data on patients' pain

intensity. The scale ranges from 0 – 10 with 0 representing no pain, while 10 represents worst pain [15]. The procedure was explained to the patients who were asked to point at the number that corresponded with the pain intensity they were experiencing.

### 2.9 Procedure for Data Analysis

These data were analyzed using descriptive (mean, standard deviation and percentages) and inferentially using paired t-test to find the differences in pain intensity before and after 6 weeks of traction treatment. Graph was also used to illustrate the results.

## 3. RESULTS

The results in Table 1 show that the age ranges of the patient were 30 to 63 years. The patients with the shortest duration of symptoms before presentation came one month after the beginning of the problem, while the patient with the longest duration presented 6 months after the onset of pain. The mean age was 50.46±8.308. The weight of the Patients ranged from 61 kg to 128 kg with the average as 87.17 kg. The height ranged from 1.45 m to 1.90 m with the average as 1.66 m.

**Table 1. Baseline characteristics of patients evaluated at initial assessment**

Variables	N	Range	Mean±SD
Age (years)	50	30 - 63	50.46±8.31
Duration of pain before treatment	50	1- 60	14.70±15.86
Height (m)	50	1.5 - 1.9	1.66±0.12
Weight (kg)	50	61 - 128	87.17±14.30

The results in Table 2 show that 12 (24%) patients used 12.5 kg weight from the inception to completion of treatment for upright distraction traction, thirty one (31, 62%) patients started their treatment with 12.5 kg and ended with 15 kg for the upright distraction traction, one patient only use 15 kg for upright distraction traction throughout the treatment, while four (4, 8%) patients used from 12.5 – 17.5 kg. Only two (2, 4%) patient used from 12.5 – 20 kg for upright distraction traction treatment through the treatment.

Table 3 shows that 4.0 – 7.5 kg weights were used for all the patients for the flexion traction

throughout the treatment and that the response was 100 percent for all the patients.

**Table 2. Weights used for the upright traction**

Weight (kg)	Frequency	Percentage
12.5	12	24
12.5 - 15	31	62.0
15	1	2.0
12.5 – 17.5	4	8.0
12.5 - 20	2	4.0
Total	50	100

**Table 3. Weight for neck flexion traction (kg)**

Weigh	Frequency	Percentage
4.0 – 7.5	50	100

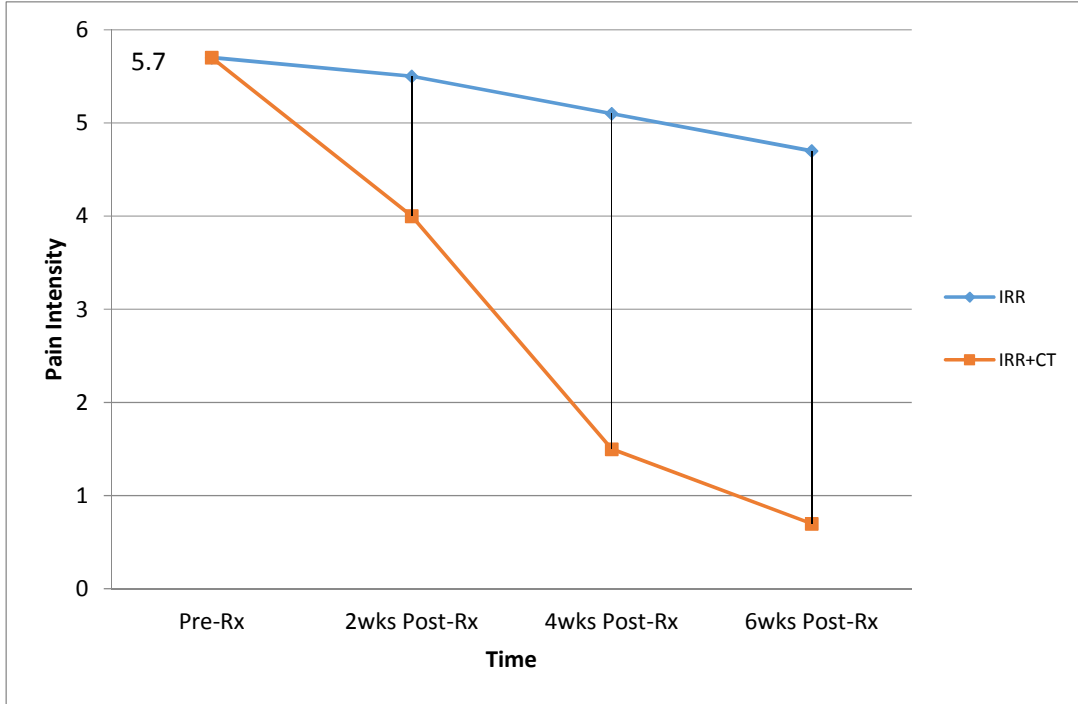
## 4. DISCUSSION

The clinical benefits of cervical traction in neck pain management among patients suffering from cervical spondylosis had been noted by several researchers, but there is paucity of data on the effects of different traction weights on pain intensity among patients suffering from cervical spondylosis [3,6,9,12].

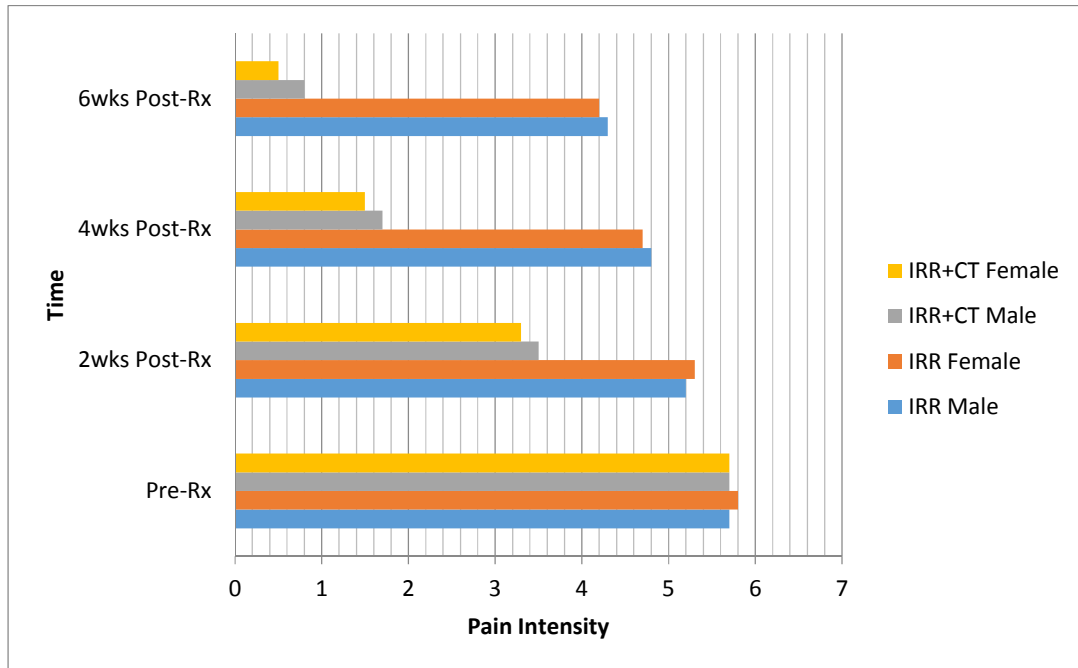
The findings of this study show that a greater percentage of the patients were males. This collaborates the finding of higher incidence of cervical spondylosis in males as reported by Wu et al. [1]. Vos et al. [16] reported higher prevalence in females, while Okada et al. [17] reported that both sexes are affected equally but problems begin earlier in males. Thus, there is yet no consensus in literature on the gender incidence predilection of cervical spondylosis. Vos et al. [16] also noted that the prevalence of cervical spondylosis rises with age in both sexes and is highest in the age group between 50—59 years. The mean age of 50.46±8.31 years of the patients in this study conforms to this finding. Cervical spondylosis can also be seen in people as early as 25 years [10]. The youngest patient in this study was 30 years.

In this study, cervical traction relieved pain very significantly in the experimental group compared to the control group treated with infra red alone. This agrees with a similar study by Shakoor et al. [6], who compared two groups of patients with cervical spondylosis in their work and found that those treated with cervical traction and exercise had better pain relieve than those treated with non-steroidal anti-inflammatory drugs (NSAID).

Fig. 1 clearly demonstrated that traction consistently and progressively produced pain relief in the group treated with traction. The relief of pain produced by traction was not influenced by gender (Fig. 2) of the patients. Thus, cervical traction is clearly a very good adjunct in the treatment of cervical spondylosis.



**Fig. 1. Comparison of pain intensity of subjects that received IRR and those treated with IRR and cervical traction**



**Fig. 2. Comparison between sex and pain intensity with treatment groups (IRR and IRR & CT)**

Also the use of high weight was beneficial since a consistent decline in the magnitude of the pain was observed throughout the treatment period as illustrated in Figs. 2 and 3. This is in line with the observations of Hinderer and Biglin [6] and Rana and Crystal [12]; who stated that at least 12.5 kg weight is necessary to distract the cervical spine before the beneficial effects of traction can be “sustainably” observed. Thus, we wish to observe that weights equal or greater than 12.5 kg to a maximum tolerable limit of the patient needs be achieved for a sustainable progressive pain relieve to occur. This buttresses Saunders [3] criticism of the report on traction by the Royal College of General Practitioners of London that the patients in their series were under-loaded.



**Fig. 3. A radiograph of a subject showing degenerative cervical spondylosis**



**Fig. 4. A radiograph of a subject showing osteophyte formation**



**Fig. 5. A radiograph of a subject 6 weeks post traction**

The significant reduction in pain intensity recorded among the traction group could be attributed to the alternation of upright distraction traction with flexion traction at subsequent visits during the treatment period. This is in agreement with the work of Rana and Crystal [12] and Murphy and Lieponi [11] who observed that flexion traction with 4 to 6 kg takes care of pressure of osteophytes on the vertical floor of the neural canal.

## 5. CONCLUSION

High weight cervical traction has proved to be a veritable modality of treatment for cervical spondylosis and should always be incorporated in the management of cervical spondylosis. Also cervical traction combined with infrared showed a better outcome than infrared radiation therapy only, therefore infrared radiation alone is not an effective treatment procedure for cervical spondylosis. The study did not compare other physical therapy modality of pain reduction such as TENS with cervical traction to isolate the efficacy of infrared radiation with cervical traction and the study did not include follow up time for persistence of pain relief post treatment of subjects which might have limited the findings of the present study.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

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