

Comparison of Cyriax manipulation with traditional physical therapy for the management of cervical discogenic problems. A randomized control trial

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Abstract

Objective: To determine and compare the clinical outcome of Cyriax manipulation and traditional physical therapy for the treatment of cervical discogenic problems in terms of pain, range of motion and disability.

Methods: The randomised controlled trial was conducted at Benazir Bhutto Hospital, Rawalpindi, Pakistan, from January to June, 2018, and comprised patients having prolapsed intervertebral disc with neck or arm pain who were then randomly allocated into control and experimental groups using the sealed envelope method. The control group received cervical isometrics 10 repetitions $\times$ 1 set, 4 days/week and targeted muscle stretchings 10 repetition $\times$ 1 set/day for 4 days/week. The experimental group received 10 min pre-manipulative massage and Cyriax manipulation protocol. Data was analysed using SPSS 20.

Results: Of the 40 subjects, there were 20(50%) in each of the two groups. The experimental group showed significance difference in terms of numeric pain rating scale, range of motion and the neck disability index ($p < 0.05$ each).

Conclusion: Cyriax manipulation was found to be significantly better than the traditional treatment of physiotherapy for cervical discogenic pain.

Keywords: Cervical pain, Cyriax manipulation, Disco-genic problems, NPRS, Numeric pain rating scale, NDI, Neck disability index. (JPMA 70: 1329; 2020). <https://doi.org/10.5455/JPMA.13250>

Introduction

Cervical discogenic pain is characterised by the pain that is caused by disc herniation and perceived in the neck, radiating to head, scapula and the arm.¹ Cervical disc herniation is characterised by prolapsed nucleus pulposus material through the annulus into the spinal canal.² The degeneration of the disc is generally a painless process. Pain is felt only when it compresses some pain-sensitive structures like dura or nerve root.³ The local mechanical or chemical irritation of neural structures causes symptoms. The disc bulge can be postero-central or postero-lateral. Posterior migration of disc material beyond the disc space puts pressure on the posterior longitudinal ligament and then on the anterior part of dura mater, causing multi-segmental pain, as well as pain in the trapezius and scapular area radiating to head. It can also

be postero-lateral caused by the lateral migration of the disc, putting pressure on the nerve root causing the root signs that have dermatomal behaviour and affect the upper limb in specific pattern. It is commonly associated with numbness in the arm and fingers with no neurological deficits. Postero-central bulge can also shift to postero-lateral with symptoms shifting from centralisation to radiculopathy. Degenerative disc disease causing neck pain is the first step of the spinal changes followed by osteophytes, disc narrowing and spinal stenosis.⁴ Symptomatic disc displacements can occur at any age, but have different clinical features depending on the age group. Cartilaginous displacements are most common at the C6-C7 and C5-C6 joints. They are infrequent at the C4-C5 or C7-T1 joints, and seldom occur at the C2-C3 or C3-C4 joints. In young adults, nucleus pulposus can get involved which is rare in old age. Diagnoses can be established on clinical findings along with patient's history and the functional examination.³ Neck pain has become a more common condition that affects nearly 50% of individuals complaining at least single clinically significant

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pain in their whole life.⁵ A report in the United States describes cervical pain among 5 most contributing factors in causing years lived in disability.⁶ In Pakistan, prevalence of neck pain among goldsmiths in Lahore has been reported to be 62%⁷ and among Doctor of Physical Therapy (DPT) students, 51.8% in Lahore,⁸ among sewing machine operators in Sahiwal it is 78.57%⁹ and among the computer users it is 72%.¹⁰ In India, prevalence of neck pain among desk job workers in tertiary care hospitals in New Delhi is 43.3%,¹¹ in Uttar Pradesh 99.2%.¹² Prevalence of neck pain among Saudi school teachers was 11.3%.¹³

Treatment options for cervical discogenic pain are analgesics, collars, epidural injections. The epidural injections can be the treatment of choice when conservative management does not work. If the disc is not herniated, epidural injections with local anaesthesia with or without steroids have proved to be effective in a randomised controlled trial (RCT),⁶ physiotherapy (cervical traction, upper limb tension technique, muscle energy techniques, isometrics), manipulations and anterior cervical discectomy and fusion (ACDF) surgery. Surgery is usually recommended in irreducible cases. Dr. James Cyriax has a unique pattern treating discogenic problems by manipulation.³ Manipulation is a low amplitude, high velocity motion performed at the end of available range of motion session after the 'slack' has been taken up, beyond the physiological limit within the anatomical range with therapeutic intent to eliminate the internal derangements caused by disc displacement. Manipulation influences pain perception by increasing the release of endorphin and affecting the mechanoreceptors of facet joints that controls the pain gate. The purpose of this treatment is to reduce the conflict between the displaced discal fragment and the involved sensitive structure.³ Unilateral neck, scapular or upper limb pain without neurological deficits can be effectively treated by Cyriax manipulation.

The major risk related to manipulation is vertebra-basilar insufficiency. Retrospective studies show that 80% of cases are caused by previous trauma, like motor vehicle accidents and even vomiting and coughing.¹⁴ Another study shows that almost half of the cases of vertebral artery dysfunction were spontaneous.¹⁵ Recent studies show that there is no considerable difference in ipsilateral or contralateral blood flow to brain by end range rotations or manipulations.^{16,17} Dangers of not manipulating in

individuals who need it, is as harmful as we consider the danger of manipulations. Many disc Dural involvements causing cervico-scapular pain are not reverted back spontaneously. The pain that can be resolved by few sessions of manipulation become irreducible and dangerous to spinal cord.³ Cyriax manipulation can reduce the impingement caused by the disc material on the nerve structure. The current aim of the study was planned to evaluate the significance of Cyriax manipulation in cervical prolapsed intervertebral disc in terms of pain, range of motion (ROM) and disability.

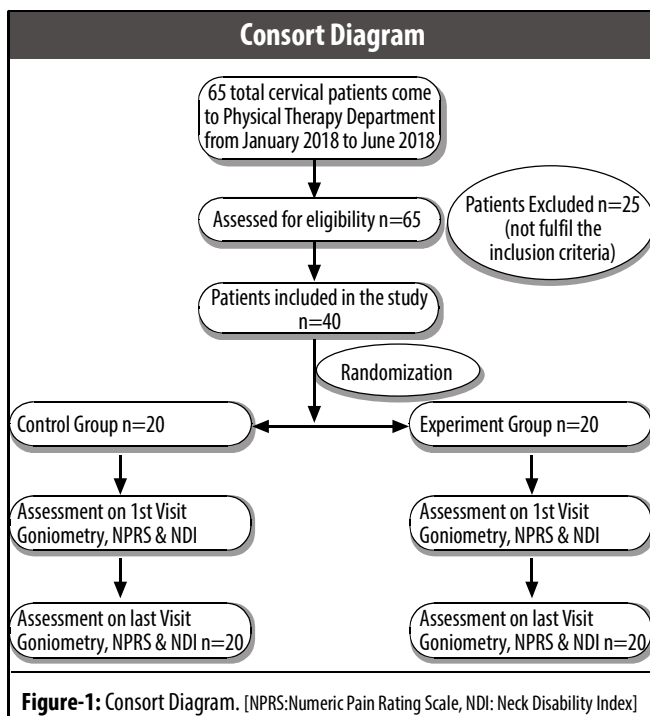
Patients and Methods

The RCT was conducted at Benazir Bhutto Hospital, Rawalpindi, Pakistan, from January to June, 2018. After approval from ethics committee of Riphah International University, Islamabad, Pakistan, the sample size was calculated using Open-Epi calculator.¹⁸ Those included were patients aged 25-45 years having prolapsed intervertebral disc with neck or arm pain, diagnosed by Weinmar's clinical prediction rule¹⁹ and Cyriax protocol.³ Weinmar's clinical prediction rule has four components. These are positive Spurling test (symptoms reproduction), upper limb tension test, involved side cervical rotation ROM limited more than 60 and distraction test positive (symptom reduction).

Patients with positive vertebra-basilar insufficiency, positive sharper purser test, rheumatoid arthritis, osteoporosis, neuropathies, recent surgery and who were on anti-coagulant therapy were excluded.

After taking written informed consent from all the participants, they were then randomly allocated into control and experimental groups using the sealed envelope method. The control group received cervical isometrics (trapezius, scalene and sternocleidomastoid) 10 repetitions $\times$ 1 set, 4 days/week and targeted muscle stretching 10 repetition $\times$ 1 set/day for 4 days/week. The experimental group received 10 min pre-manipulative massage and Cyriax manipulation protocol along with the cervical isometrics and muscle stretching.

This technique is performed in comfortable lying position with head slightly off the bed. An assistant helps in the fixation at the foot or at the shoulder. Initial pre-manipulative massage is given on mid-cervical region with the fingers over the contralateral side and thumb on the ipsilateral side. Massage is performed by simultaneously flexing and extending the wrist in the skin



lifting manner. The procedure includes traction with circumduction, traction with rotation to comfortable side first, traction with side flexion and lateral glide. Traction with rotation was not given in cases of bilateral arm pain. Instead, simple long lever traction was given. Total of 4 sessions were given to both groups each consisting of 40 minutes.³

Main outcome measures were cervical ROM, neck and arm pain intensity and disability that were measured by Goniometry, Numeric Pain Rating Scale (NPRS), neck disability index (NDI)²⁰ at baseline and after the 4th session of the intervention. NPRS is single-direction measure of pain intensity in which the person marks a number on an 11-point scale from 0-10 that best depicts his/her pain intensity; 0 means no pain, and 10 means very severe pain. It is reliable and valid tool to measure pain. NDI is a neck pain-specific functional status questionnaire. It has 10 segments; each get 5 scores. Total 0 means no disability or functional limitation, and 50 means complete disability. The RCT was registered with the clinical trial registry number 03827135.

Data was analysed using SPSS 20. Normality of the data was checked using Shapiro-wilk test which showed $p < 0.05$ and indicated that the data was not normally distributed. That's why Mann-Whitney test was used for inter-group analysis, and Wilcoxon test was used for intra-group analysis.

Results

Of the 65 patients assessed, 40(61.5%) were included; 20(50%) in each of the two groups. The overall mean age of the sample was 38.6 ± 6.23 years; 40.3 ± 5.08 years in the control group, and 36.8 ± 6.9 years in the experimental group. The overall mean body mass index (BMI) of the sample was 23.6 ± 3.29 ; 24.2 ± 3.56 in the control group,

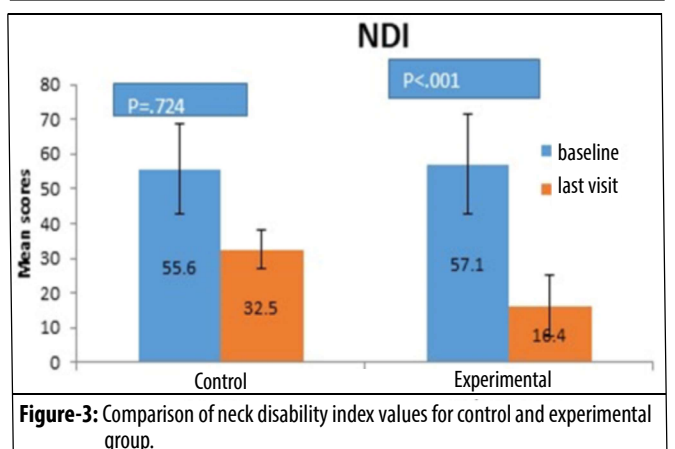
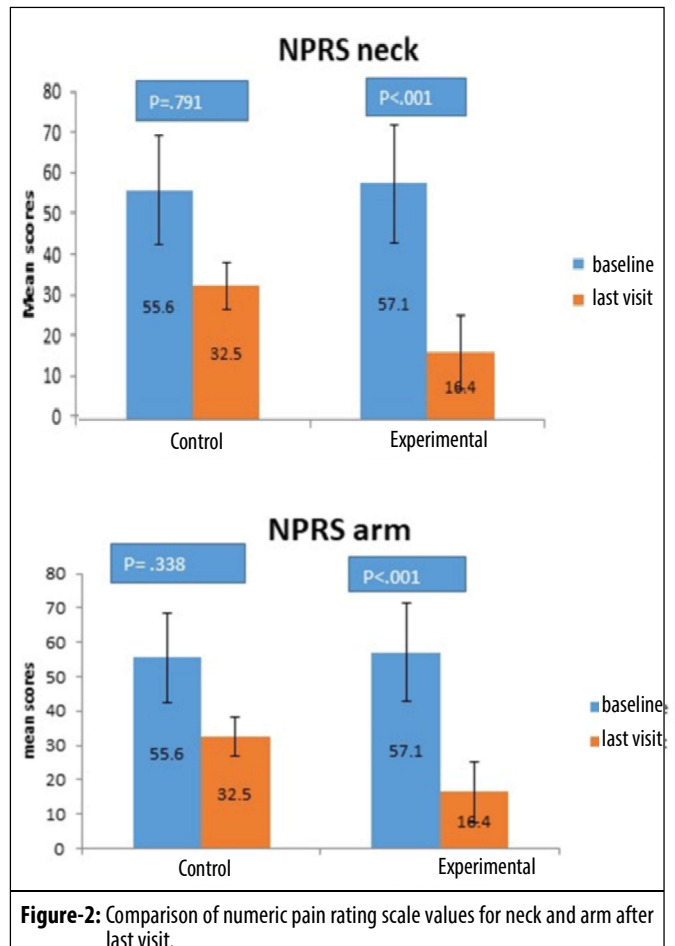


Table: Comparison of pre and post values within control and experimental groups and End line comparison between the groups.

S.N	Ranges	Control group			Treatment group			End line comparison		
		Pre	post	p-value	Pre	Post	p-value	Control	Treatment	p-value
1.	Flexion	35(10)	40(15)	<0.001	35(15)	60(14)	<0.001	40(15)	60(14)	0.003
2.	Extension	35(10)	55(10)	<0.001	42(20)	55(18)	<0.001	55(10)	55(18)	0.323
3.	Left side bending	35(10)	45(7)	<0.001	35(9)	45(3)	<0.001	45(7)	45(3)	0.469
4.	Right side bending	37(10)	45(5)	<0.001	35(15)	45(5)	<0.001	45(5)	45(5)	0.027
5.	Left rotation	50(13)	65(10)	<0.001	49(23)	77(10)	<0.001	65(10)	77(10)	0.002
6.	Right rotation	60(19)	65(17)	<0.001	50(22)	80(10)	<0.001	65(17)	80(10)	<0.001
7.	NPRS neck	7(2)	4(2)	<0.001	7.5(3)	2(2.75)	<0.001	4(2)	2(2.75)	<0.001
8.	NPRS arm	7(3)	4(1.75)	<0.001	8(3)	1.5(2)	<0.001	4(1.75)	1.5(2)	<0.001
9.	NDI	54(21)	33(2)	<0.001	60(27)	15.5(12.75)	<0.001	33(2)	15.5(12.75)	<0.001

NDI: Neck disability index; NPRS: Numeric pain rating scale.

and 23.0 ± 2.98 in the experimental group. There was no significant difference in baseline characteristics between the groups ($p > 0.05$).

Within the control and experimental groups, there was a significant difference from baseline pain and disability scores to after-intervention scores ($p < 0.001$). (figure 2, 3) Between the groups, showed significant difference in flexion, rotation, NPRS and NDI scores ($p < .005$), but there was no significant difference in case of extension and side-bending ($p > 0.05$) (Table).

Discussion

The findings showed there was a significant improvement in the pain, ROM and neck disability through Cyriax manipulation in patients having cervical discogenic pain. The findings are fairly consistent with the results of a Cochrane systematic review held in 2015 which showed that single session of mobilisation and manipulation on neck pain had immediate positive effects, while multiple sessions of manipulation further enhanced long-term effects on neck pain, function and quality of life.²¹ The findings of the present study confirm the result of an earlier RCT which studied the non-surgical treatments of cervical radiculopathy which had suggested manipulation to be very effective and safe in reducing pain, hypo mobility and disability.²²

The current study showed that there was a significant improvement in pain and neck disability by Cyriax manipulation. A systematic review worked to find best evidence on efficacy of spinal manipulation and mobilisation for low back pain and neck pain, showing that there was moderate evidence that spinal manipulative therapy for chronic neck pain was superior when compared to physical therapy and family physician care.²³

A review of 33 high-quality RCTs on mobilisation and manipulation of mechanical neck pain showed strong evidence that mobilisation or manipulation, when combined with exercises, are beneficial for acute or chronic neck pain with and without headache.²⁴

An RCT was conducted to compare the effects of manual therapy, physical therapy, general practitioner care and placebo in the treatment of chronic neck pain. Physiotherapy included exercise, massage and modalities. Manual therapy included mobilisation and manipulation. General practitioner care included analgesics, posture correction, home exercises and bed rest. Placebo included detuned ultrasonography (US) and diathermy for 10 mins. Changes in severity of chief complaint and functional limitation was the main outcome measure. Results showed that manual therapy was significantly better than the other subgroups in chronic neck pain condition in patients aged <40 years. It also showed that manual therapy was better than the traditional physical therapy.²⁵

Another RCT showed that cervical manipulation induced significant improvement in pressure pain threshold (PPT), neck pain intensity and cervical ROM in individuals with bilateral chronic neck pain. The current study also showed that Cyriax manipulation considerably improved the neck pain, disability and cervical ROM in patients with unilateral or central neck pain.²⁶

The main limitation of the current study is the lack of compliance by the patients due to financial and travelling issues. Due to financial issues, it was not possible for patients to have magnetic resonance imaging (MRI) done at the baseline and after the last session.

On the basis of the findings we recommend that Cyriax manipulation should be included as a safe and effective technique in the treatment of cervical discogenic

problems. Future studies must include better diagnostic tools for pre and post evaluations to be more precise about the effects. Long-term follow-up studies should be done to see prolonged effects of manipulation and recurrence ratio of disc displacement.

Conclusion

Cyriax manipulation reduced the neck and arm pain considerably after multiple sessions. Cyriax manipulation was found to be more effective in improving cervical disco-dural and disco-radicular pain, ROM and disability than the traditional physical therapy.

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Conflict of Interest: None.

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