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Comparative Study Of Hot Pack Along With Therapeutic Ultrasound And Exercise Verses Cupping Therapy On Cervical Spondylosis

Rajiv kumar[1*], Dr.Monika Sharma[2]

[1*]Institute of Applied Medicines and Reasearch Ghaziabad, Email id rk4758988@gmail.come
[2]Institute of Applied Medicines and Research, Ghaziabad drmonikasharma05@gmail.com

ABSTRACT
Cervical spondylosis, a prevalent degenerative condition, significantly impacts patients' quality of life by causing pain, stiffness, and restricted cervical mobility. This study investigates the comparative effectiveness of cupping therapy and a combination of hot pack, therapeutic ultrasound, and exercise in alleviating pain and improving cervical range of motion (ROM). Conducted as a pre-test and post-test experimental design, the research involved 30 participants divided into control and experimental groups. The control group received a standard physiotherapy protocol comprising hot pack application, therapeutic ultrasound, and targeted exercises, while the experimental group underwent cupping therapy.
The results demonstrated that cupping therapy provided superior improvements in pain relief and cervical ROM compared to conventional physiotherapy approaches. Specifically, the experimental group showed a more significant reduction in pain intensity, as measured by the Numeric Pain Rating Scale (NPRS), and a greater increase in cervical ROM in multiple directions. These findings suggest that cupping therapy, through its effects on local circulation, neuromuscular relaxation, and tissue healing, can be an effective alternative or adjunct to conventional physiotherapy.
This study contributes to the growing body of evidence supporting the integration of alternative therapies into mainstream physiotherapy practices for managing musculoskeletal disorders such as cervical spondylosis. However, further research with larger sample sizes and extended follow-up periods is recommended to assess the long-term efficacy and potential mechanisms underlying these observed benefits.

Keywords: Cervical Spondylosis, Cupping Therapy, Physiotherapy, Therapeutic Ultrasound, Range of Motion, Pain Management.

INTRODUCTION

Cervical spondylosis, also known as cervical osteoarthritis, is a common degenerative disorder affecting the cervical spine. It results from age-related changes in the intervertebral discs and vertebrae, leading to the formation of osteophytes, disc degeneration, and potential spinal canal narrowing. These structural alterations contribute to pain, stiffness, and, in some cases, nerve compression, leading to symptoms such as radiculopathy and myelopathy. The prevalence of cervical spondylosis increases with age, affecting approximately 50% of individuals over 40 and up to 85% of those over 60. The condition significantly impacts daily activities, reducing the quality of life due to chronic pain and limited mobility. The etiology of cervical spondylosis includes factors such as genetic predisposition, repetitive stress, poor posture, and sedentary lifestyle habits. Given the progressive nature of the disorder, effective management strategies are essential to alleviate symptoms and prevent functional decline. Conservative treatment remains the primary approach for managing cervical spondylosis, with physical therapy playing a crucial role. Among the most commonly used physiotherapy interventions are hot pack application, therapeutic ultrasound, and structured exercise programs. These methods aim to relieve pain, improve cervical ROM, and enhance neuromuscular function. However, alternative treatments such as cupping therapy have gained popularity due to their potential benefits in improving circulation, reducing muscle tension, and promoting tissue healing. Cupping therapy, an ancient practice rooted in traditional Chinese medicine, involves creating suction on the skin using cups to increase local blood flow and alleviate musculoskeletal discomfort. It has been suggested to facilitate myofascial release, enhance oxygenation of tissues, and modulate pain perception by stimulating mechanoreceptors in the skin and muscles. Despite its widespread use, limited high-quality research compares its efficacy to conventional physiotherapy approaches. This study aims to compare the effects of cupping therapy with the combined intervention of hot pack, therapeutic ultrasound, and exercise in managing cervical spondylosis. By assessing improvements in pain intensity and cervical ROM, this research seeks to provide empirical evidence on the relative effectiveness of these treatment modalities. The findings will contribute to evidence-based clinical decision-making and guide the integration of alternative therapies into mainstream rehabilitation programs for cervical spondylosis.

MATERIALS AND METHODS

1 Study Design and Setting This study was conducted as a pre-test and post-test experimental research at Ghaziabad and Poddar hospital OPD. The total study duration was three weeks. The study design allowed for controlled comparison between the two intervention groups to evaluate their effectiveness.

2 Sample Size and Allocation A total of 30 participants aged 24-55 years were recruited using a convenience sampling method. Participants were randomly assigned to two groups:

- **Control Group (n=15):** Received hot pack, therapeutic ultrasound, and exercise.
- **Experimental Group (n=15):** Received cupping therapy.

Randomization was achieved using a chit method to ensure equal distribution of participants across both groups.

3 Inclusion and Exclusion Criteria

Inclusion Criteria:

- Adults aged 24-55 years diagnosed with cervical spondylosis.
- NPRS score greater than 4.
- Limited cervical ROM as assessed through goniometry.
- Participants willing to comply with the intervention protocol.

Exclusion Criteria:

- Severe medical conditions such as uncontrolled hypertension, recent cardiovascular events, or neurological disorders.
- History of cervical spine surgeries or recent fractures.
- Pregnant women.
- Individuals with severe psychological conditions affecting participation.

4 Outcome Measures The primary outcome measures assessed before and after the intervention were:

- **Pain Intensity:** Measured using the Numeric Pain Rating Scale (NPRS), ranging from 0 (no pain) to 10 (worst pain imaginable).
- **Cervical Range of Motion (ROM):** Assessed using a goniometer for flexion, extension, lateral flexion, and rotation.

5 Data Collection and Statistical Analysis Data was collected at baseline and after the three-week intervention. Statistical analysis was conducted using SPSS software:

- Paired t-tests were used for within-group comparisons of pre- and post-intervention scores.
- Independent t-tests were used to compare post-intervention outcomes between the control and experimental groups.
- Statistical significance was set at $p<0.05$.

PROCEDURE

Each participant received their respective intervention over three weeks, with three sessions per week.

- **Cupping Therapy (Experimental Group):**
  - Patients were placed in a prone or seated position for optimal application.
  - Dry cupping was applied to the cervical and upper trapezius regions using suction cups for 5-10 minutes.
  - Negative pressure was created using either manual suction pumps or fire cupping techniques.
  - Patients were monitored for any adverse reactions during and after therapy.
- **Control Group Therapy:**
  - **Hot Pack Application:** Applied for 15-20 minutes on the cervical region to relieve muscle tension and increase circulation.
  - **Therapeutic Ultrasound:** Applied to the cervical spine using 1 MHz frequency for 5-10 minutes with intensity adjusted based on patient tolerance.
  - **Exercise Program:** Included cervical isometric exercises, stretching, and active ROM exercises to enhance mobility and reduce stiffness.

RESULT

Table 1 Age distribution across the groups.

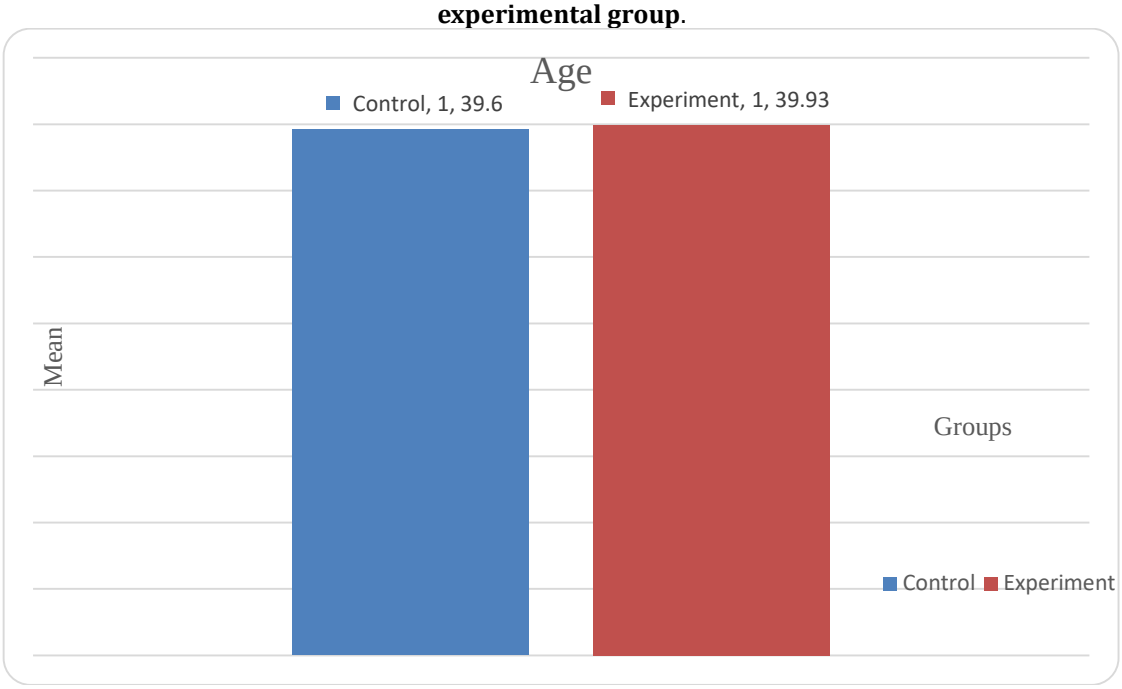
GROUPS	Control group (Mean ± SD)	Experimental group (Mean ± SD)	Total (Mean ±SD)	F-value	p-value
Age (years)	39.60 ±10.92	39.93 ±10.72	39.76 ±10.82	5.310	0.011
S.E.	1.68	1.61	1.62		

SD: Standard deviation, S.E: Standard error, (p<0.05)

Table 1 shows that mean age of total sample was 39.76 years and that of control group had mean age of 39.60 while the experimental group had a mean age of 39.93.

Fig 1 shows that the mean age of control group was 39.60 years and that of experimental group was 39.93 years. The majority of 40% had 25-25 years of age. 33.33% patients had 36-45 years of age and 26.66% patients had 46-55 years of age in control group, and equal percentage of 33.33% patients had in all of 25-35 , 36-45, 46-55 years of age in experimental group.

Fig 1 shows: (A) mean age in both groups, (B) age distribution in control group and (C) age distribution in experimental group.



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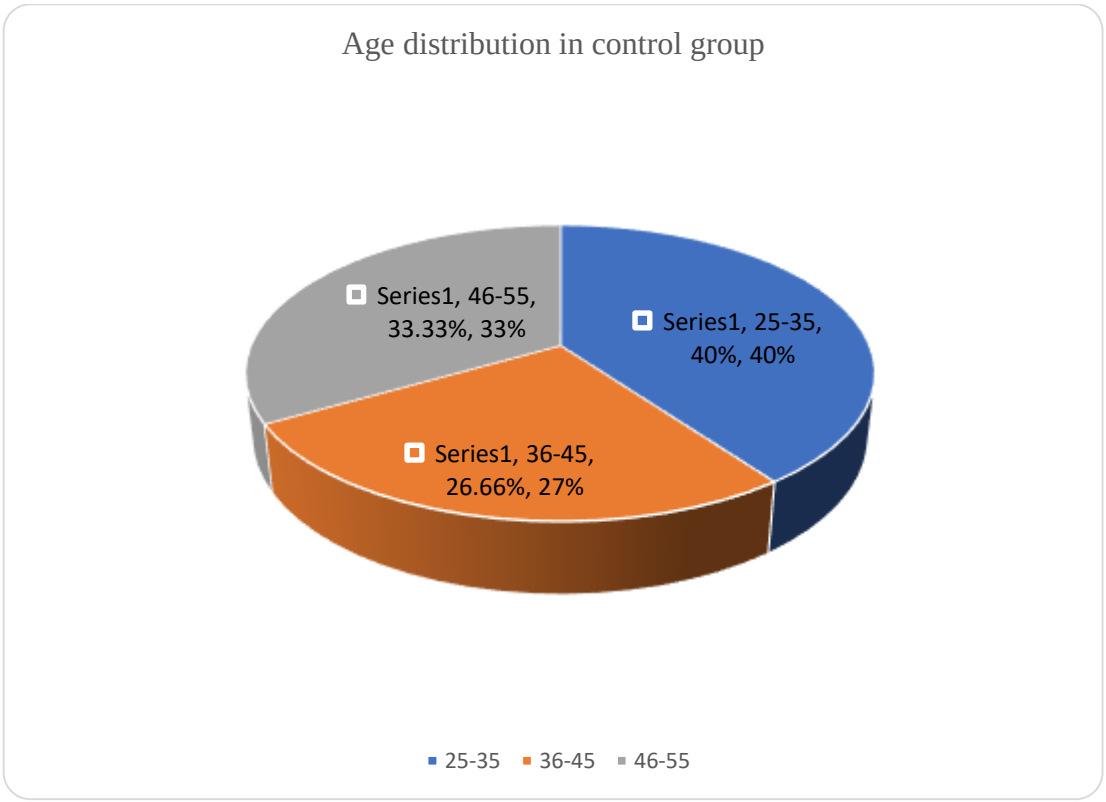

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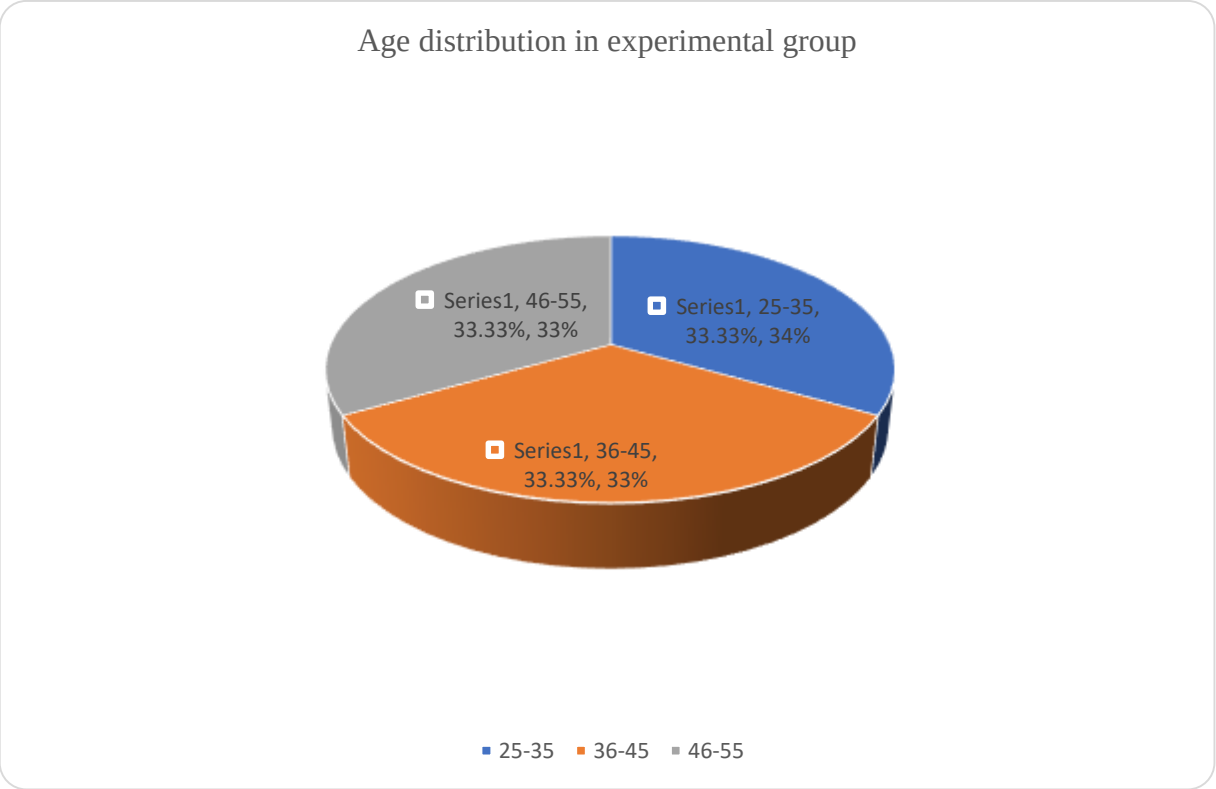

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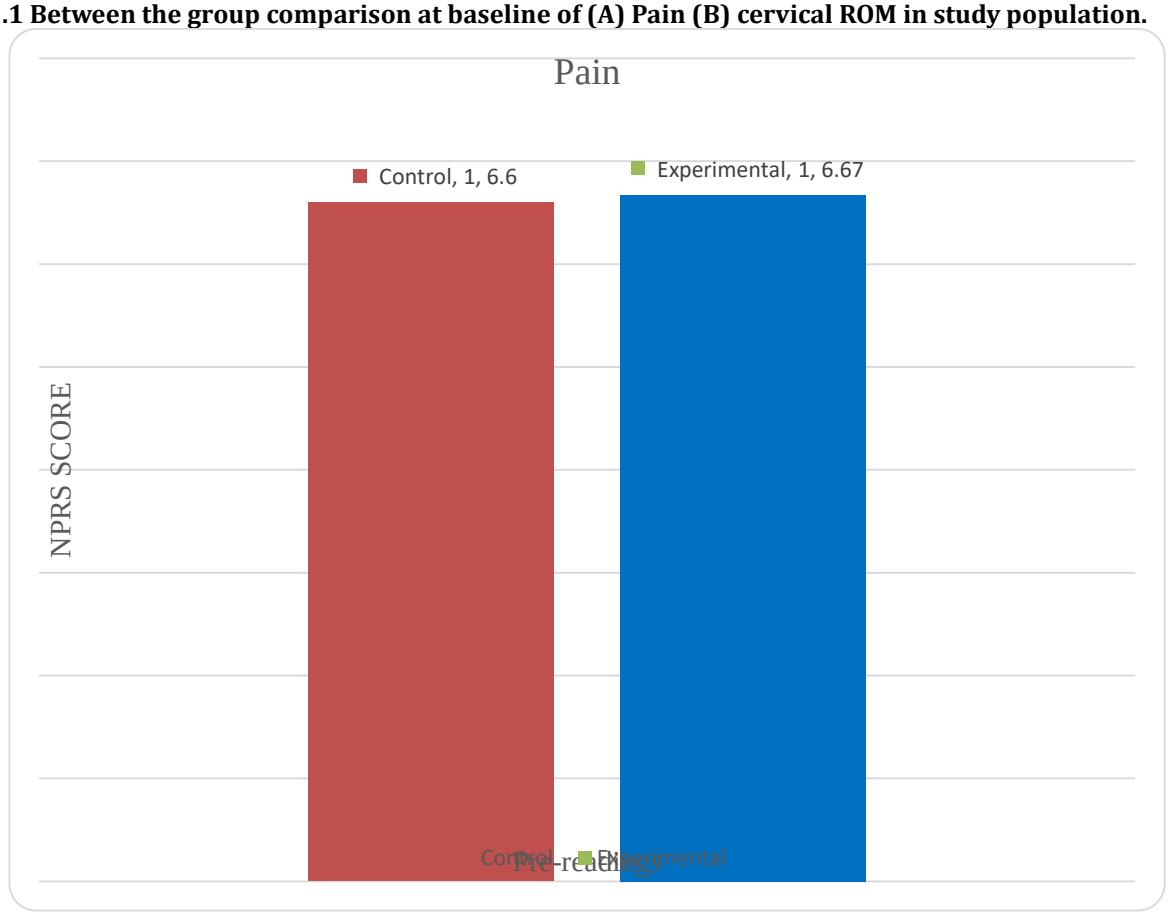
TABLE 2 BETWEEN THE GROUP ANALYSIS AT BASELINE

Table.2.1 between group comparison of variables at baseline in both groups.

Outcome measures	Control group (Mean ± SD)	Experimental group (Mean ± SD)	n	S.E.	t-value	p-value
Pain	6.60±1.63	6.67±1.57	30	0.600	0.222	0.827
Cervical flexion	29.33±6.5	28.13±6.64	30	2.467	-0.486	0.653
Cervical extension	36.53±4.25	37.33±4.63	30	1.338	0.598	0.560
Cervical lateral flexion (right)	20.53±2.99	20.13±2.87	30	1.094	-0.365	0.720
Cervical lateral flexion (left)	20.73±3.49	20.40±3.24	30	1.229	-0.271	0.790
Cervical rotation (right)	29.53±5.68	29.73±5.54	30	1.864	0.107	0.916
Cervical rotation (left)	29.66±5.35	29.67±5.57	30	1.899	0.000	1.900
SD= Standard deviation. S.E= Standard error, n= no. of participants, (p<0.05)						

Table 2.1 shows that comparison between the baseline data of both groups. There was no statistically significance comparison between control and experimental group in pain, cervical flexion, cervical extension, cervical lateral flexion (right), cervical lateral flexion (left), cervical rotation (right), cervical rotation (left) with p>0,05 in pre intervention stage. This indicates uniform distribution of subjects across the groups.

Fig.2.1 Between the group comparison at baseline of (A) Pain (B) cervical ROM in study population.



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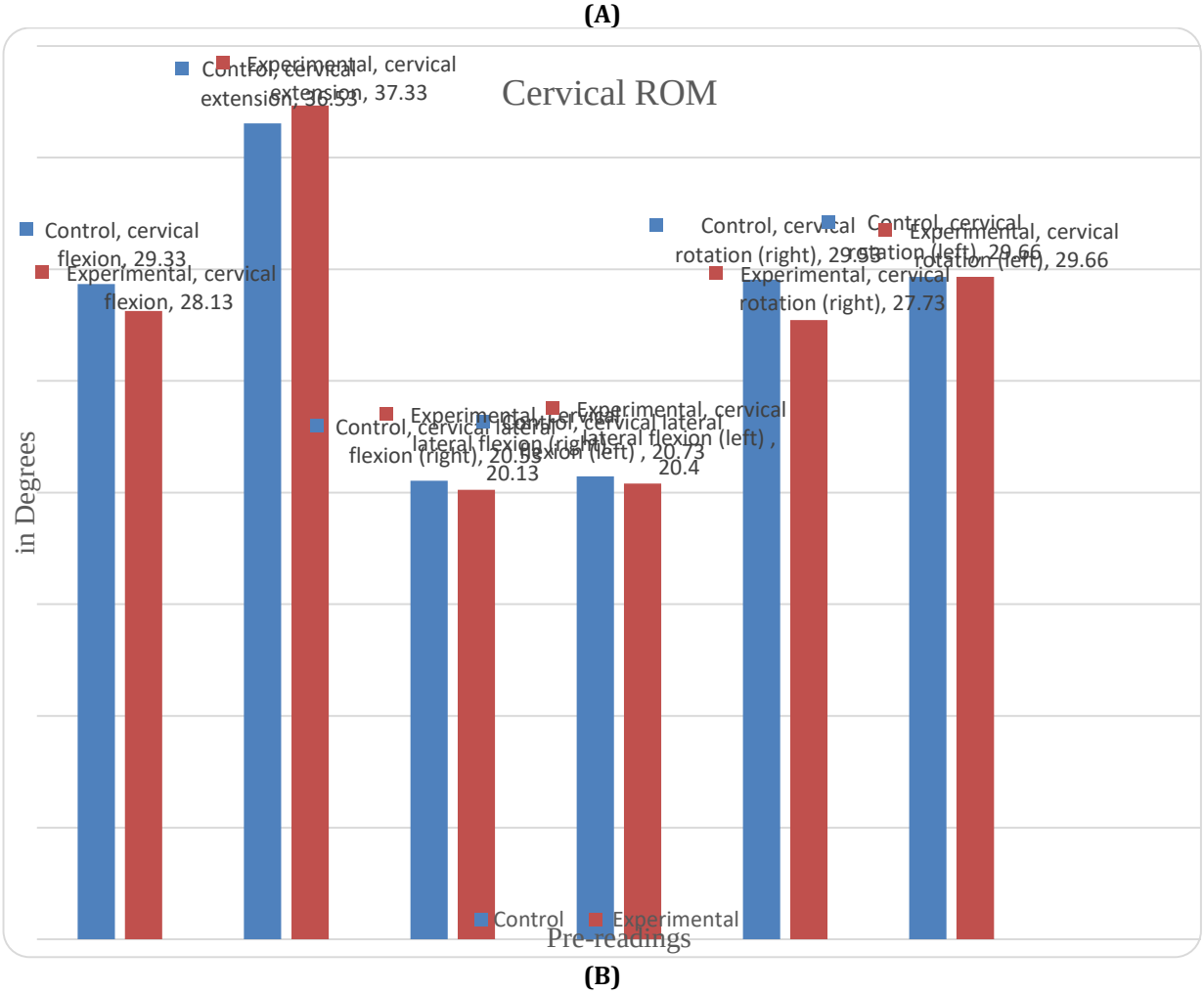

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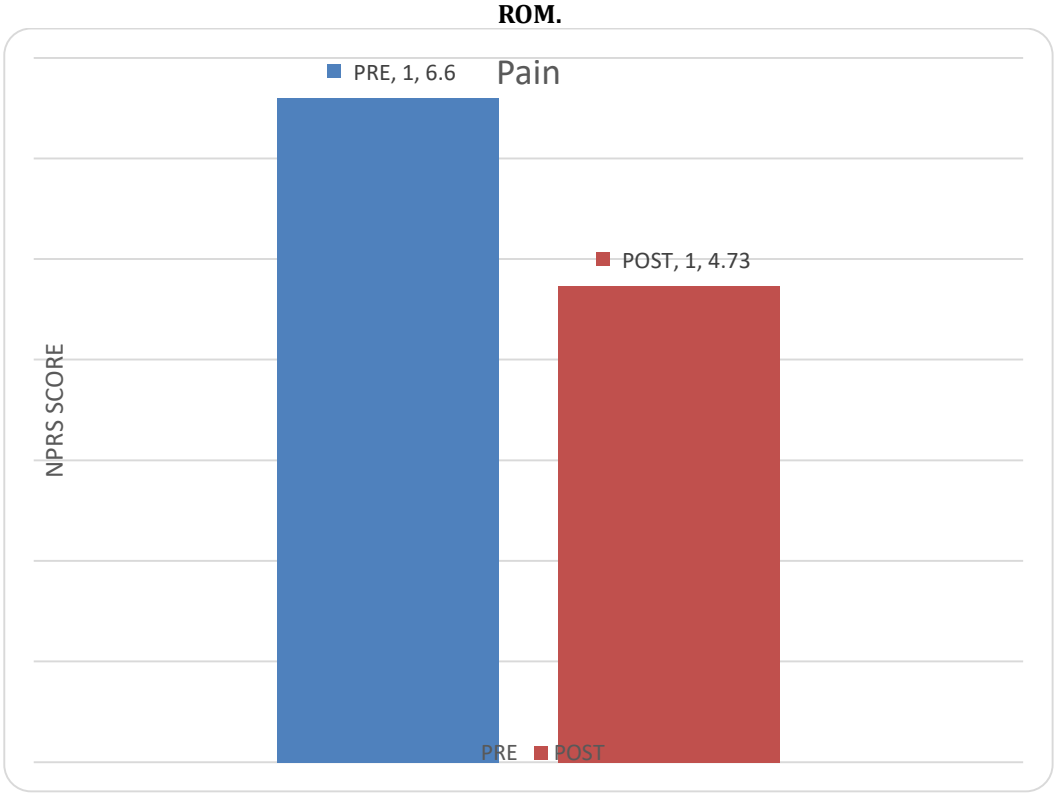
TABLE 3. WITHIN THE GROUP ANALYSIS OF VARIABLES IN CONTROL GROUP

Table 1 Within group analysis of variables in control group.

Outcome measures	Pre-test (Mean ± SD)	Post-test (Mean ± SD)	n	S.E.	t-value	p-value
Pain	6.60±1.63	4.73±1.62	15	0.165	11.297	0.001*
Cervical flexion	29.33±6.51	43.33±6.51	15	4.551	-11.063	0.002*
Cervical extension	36.53±4.25	45.53±6.51	15	3.505	-9.945	0.003*
Cervical lateral flexion (right)	20.53± 2.99	25.46±2.87	15	1.980	-9.646	0.003*
Cervical lateral flexion (left)	20.73±3.49	26.06±3.03	15	3.039	-6.796	0.002*
Cervical rotation (right)	29.53±5.68	41.66±6.17	15	6.162	-7.625	0.001*
Cervical rotation (left)	29.66±5.35	40.13±4.08	15	3.440	-11.782	0.000*
SD= Standard deviation. S.E= Standard error, n= no. of participants, (p<0.05)						

Table 3.1 shows comparison between pre and post 3 weeks intervention in cervical spondylosis measuring tools among the subjects in control group. There was statistically significant (p<0.05) decrease in pain from day 1 (6.60±1.63) to day 21 (4.73±1.62). Similarly there was statistically significant increase in cervical flexion from day 1 (29.33±6.51) to day 21 (43.33±6.51). There was statistically significant increase in cervical extension from day 1 (36.53±4.25) to day 21 (45.53±6.51).There was statistically significant increase in cervical lateral flexion (right) from day 1 (20.53± 2.99) to day 21 (25.46±2.87).There was statistically significant increase in cervical lateral flexion (left) from day 1 (20.73±3.49) to day 21 (26.06±3.03).There was statistically significant increase in cervical rotation (right) from day 1 (29.53±5.68) to day 21 (41.66±6.17).There was statistically significant increase in cervical rotation (left) from day 1 (29.66±5.35) to day 21 (40.13±4.08) in control group.

Fig.3.1 Comparison between pre and post 3 weeks intervention in control group on (A) Pain, (B) Cervical ROM.



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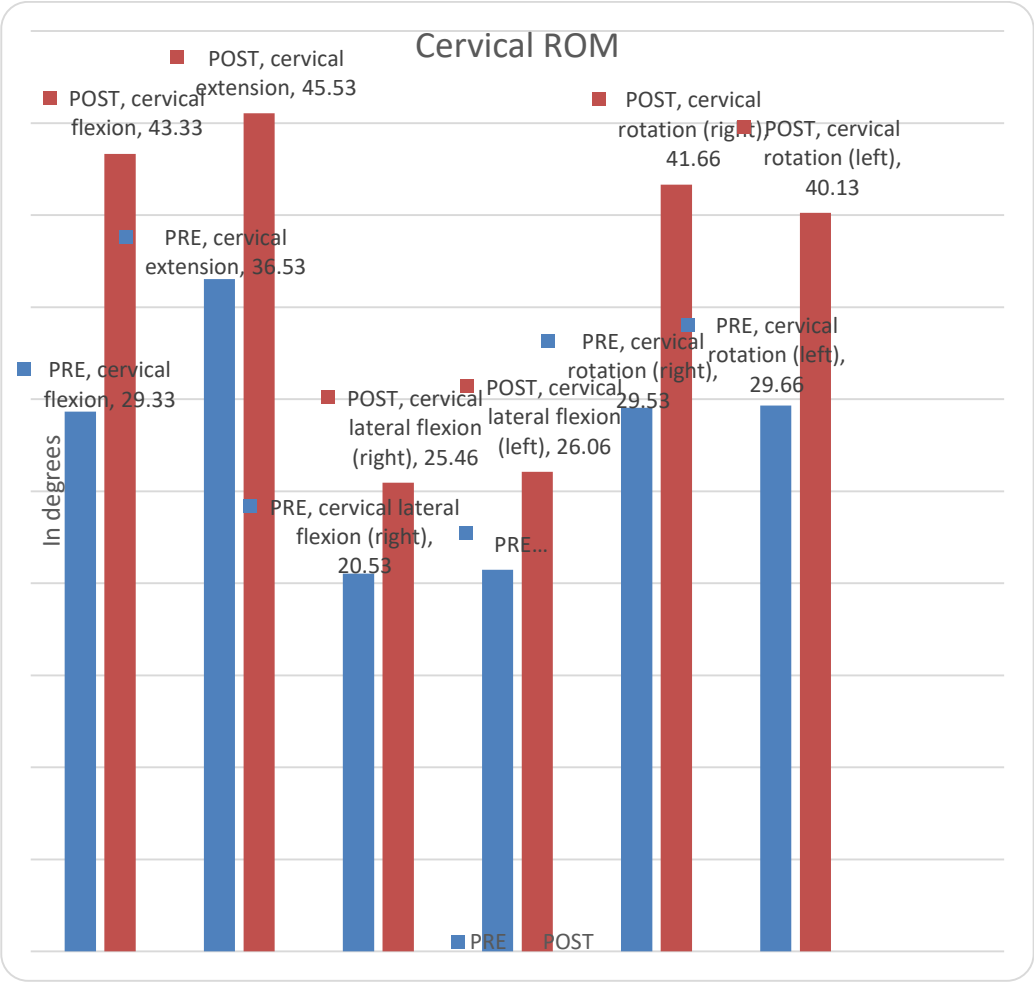

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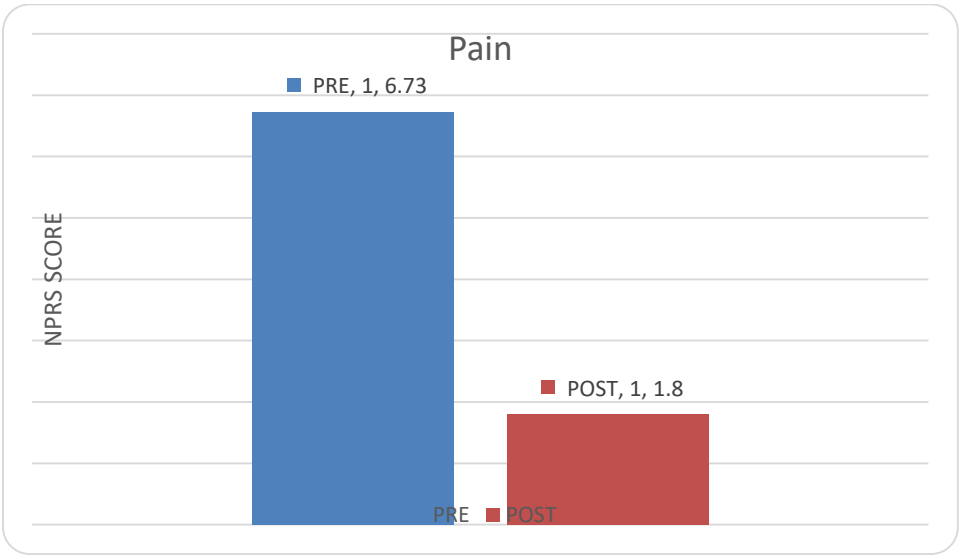
TABLE 4 WITHIN THE GROUP ANALYSIS OF VARIABLES IN EXPERIMENTAL GROUP

Table 4.1 within the group analysis of variables in experimental group.

Outcome measures	Pre-test (Mean ± SD)	Post-test (Mean ± SD)	n	S.E.	t-value	p-value
Pain	6.73±1.57	1.80±1.01	15	0.330	14.929	0.0001*
Cervical flexion	28.13±6.64	80.33±5.49	15	2.002	-26.063	0.001*
Cervical extension	37.33±4.63	63.93±5.26	15	2.237	-11.761	0.000*
Cervical lateral flexion (right)	20.13±2.87	39.93±4.46	15	1.512	-13.091	0.002*
Cervical lateral flexion (left)	20.40±3.24	41.26±4.18	15	1.466	-14.227	0.0001*
Cervical rotation (right)	29.73±5.54	77.66±7.52	15	2.402	-19.469	0.002*
Cervical rotation (left)	29.66±5.57	76.33±9.15	15	2.220	-21.017	0.001*
SD= Standard deviation. S.E= Standard error, n= no. of participants, (p<0.05)						

Table 4.1 shows comparison between pre and post 3 weeks intervention in cervical spondylosis measuring tools among the subjects in experimental group. There was statistically significant (p<0.05) decrease in pain from day 1 (6.73±1.57) to day 21 (1.80±1.01). Similarly there was statistically significant increase in cervical flexion from day 1 (28.13±6.64) to day 21 (80.33±5.49). There was statistically significant increase in cervical extension from day 1 (37.33±4.63) to day 21 (63.93±5.26).There was statistically significant increase in cervical lateral flexion (right) from day 1 (20.13±2.87) to day 21 (39.93±4.46).There was statistically significant increase in cervical lateral flexion (left) from day 1 (20.40±3.24) to day 21 (41.26±4.18).There was statistically significant increase in cervical rotation (right) from day 1 (29.73±5.54) to day 21 (77.66±7.52).There was statistically significant increase in cervical rotation (left) from day 1 (29.66±5.57) to day 21 (76.33±9.15) in experimental group.

Fig.4.1 Comparison between pre and post 3 weeks intervention in experimental group on (A) Pain, (B) Cervical ROM.



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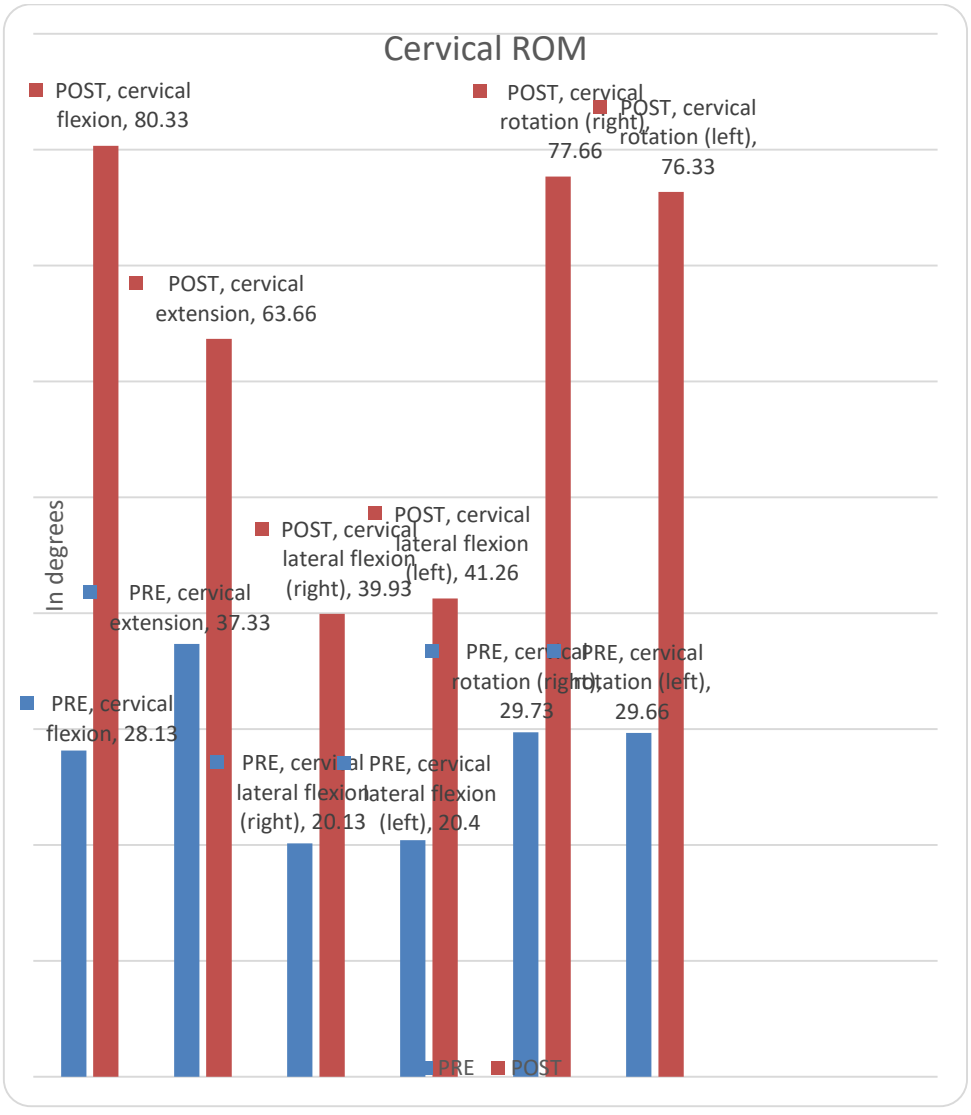


(B)

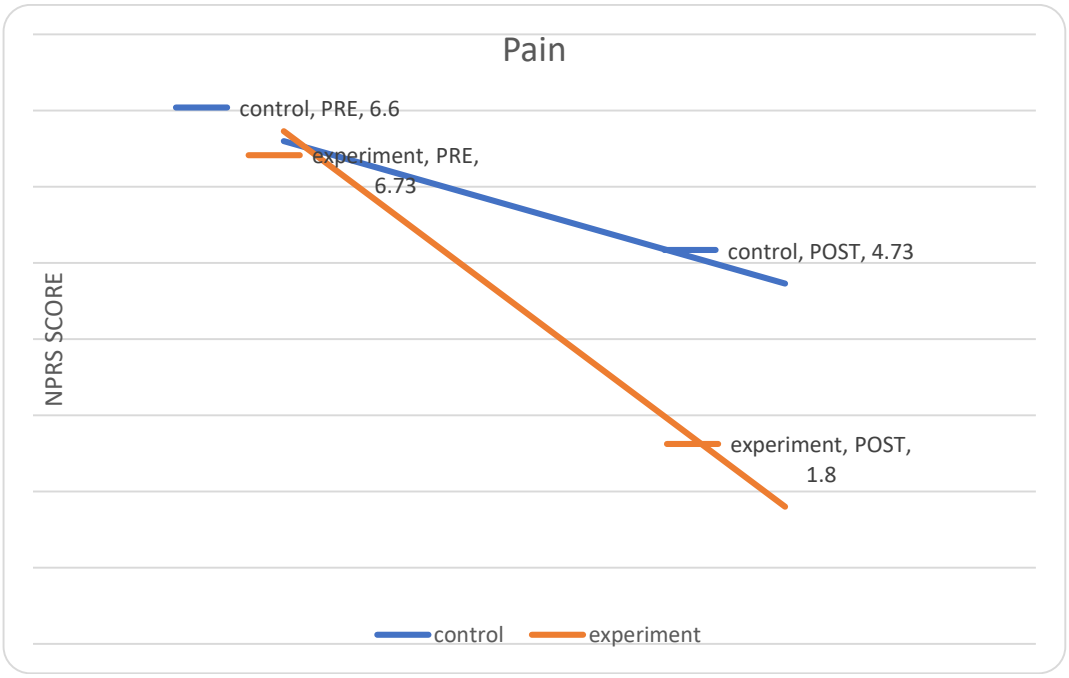
TABLE 5 POST-PRETEST ANALYSIS BETWEEN THE GROUPS.

Table 5.1 Comparison between post-pretest intervention in control and experimental group.

Outcome measures	Control group (Mean ± SD)	Experimental group (Mean ± SD)	n	S.E.	t-value	p-value
Pain	1.88±0.63	4.93±1.27	30	0.407	-7.519	0.001*
Cervical flexion	13.00±4.55	52.20±2.75	30	2.215	17.697	0.001*
Cervical extension	9.00±3.50	26.33±8.66	30	2.258	7.674	0.001*
Cervical lateral flexion (right)	4.93±1.98	19.80±5.85	30	1.632	9.106	0.0001*
Cervical lateral flexion (left)	5.33±3.03	20.86±5.68	30	1.799	8.634	0.001*
Cervical rotation (right)	12.13±6.16	47.93±9.53	30	2.908	12.309	0.001*
Cervical rotation (left)	10.46±3.44	46.66±8.59	30	2.234	16.201	0.0001*
SD= Standard deviation. S.E= Standard error, n= no. of participants, (p<0.05)						

Table 5.1 shows the comparison between post-pretest intervention of cervical spondylosis measuring tools in control and experimental group among study population. There was statistically significant (p<0.05) decrease in pain between control group (1.88±0.63) and experimental group (4.93±1.27). There was statistically significant (p<0.05) increase in cervical flexion between control group (13.00±4.55) and experimental group(52.20±2.75). There was statistically significant (p<0.05) increase in cervical extension between control group (9.00±3.50) and experimental group(26.33±8.66).There was statistically significant (p<0.05) increase in cervical lateral flexion (right) between control group (4.93±1.98) and experimental group(19.80±5.85).There was statistically significant (p<0.05) increase in cervical lateral flexion (left) between control group (4.93±1.98) and experimental group(20.86±5.68).There was statistically significant (p<0.05) increase in cervical rotation (right) between control group (12.13±6.16) and experimental group(47.93±9.53).There was statistically significant (p<0.05) increase in cervical rotation (left) between control group (10.46±3.44) and experimental group(46.66±8.59). Thus there was more significant (p<0.05) difference in treatment effect between control and experimental group.

Fig. 5.1 Comparison between post-pretest intervention in control and experimental group: (A) Pain, (B) Cervical ROM.



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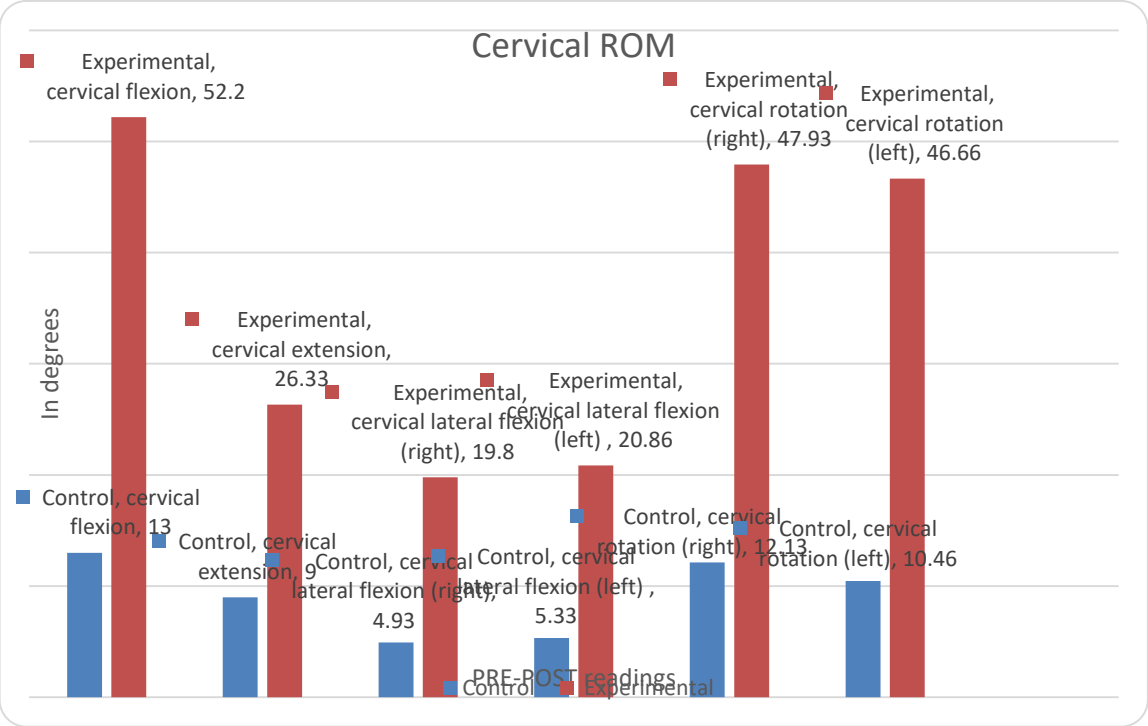

(B)

DISCUSSION

The findings suggest that cupping therapy provides significant benefits over conventional physiotherapy modalities. The increased local circulation, muscle relaxation, and neurovascular effects of cupping therapy may contribute to greater pain relief and functional recovery. Cupping therapy works by creating a vacuum effect that enhances blood circulation, reduces muscle stiffness, and promotes lymphatic drainage. These mechanisms may contribute to the superior outcomes observed in the experimental group. One key factor behind cupping therapy's efficacy is its ability to improve microcirculation in the treated area, thereby enhancing oxygenation and nutrient delivery to tissues. This process facilitates the removal of metabolic waste products, potentially reducing inflammation and pain sensitivity. Additionally, the negative pressure exerted by the cups may help release myofascial restrictions and trigger neuromuscular relaxation, leading to improved mobility. In contrast, traditional physiotherapy modalities such as hot packs and ultrasound therapy primarily focus on passive heating and mechanical stimulation to alleviate symptoms. While effective, these methods may not provide the same level of myofascial decompression and deep tissue stimulation as cupping therapy. Furthermore, therapeutic exercises incorporated in conventional physiotherapy play a crucial role in strengthening the cervical musculature and improving postural stability. However, their effects may take longer to manifest compared to the immediate pain relief observed with cupping therapy. Despite these promising findings, it is essential to acknowledge potential limitations. The study's sample size was relatively small, and the duration of the intervention was short. As a result, long-term effects of cupping therapy remain unclear. Additionally, the psychological impact of alternative therapies, including placebo effects, cannot be ruled out. Future research should incorporate larger participant groups and longer follow-up periods to validate these results and explore underlying physiological mechanisms in greater depth. Overall, while traditional physiotherapy remains an effective treatment for cervical spondylosis, cupping therapy emerges as a viable complementary approach with potential advantages in pain reduction and functional improvement. The integration of cupping therapy into standard physiotherapy protocols may enhance patient outcomes, particularly for individuals with chronic cervical pain and mobility restrictions.

CONCLUSION

Cupping therapy demonstrated superior efficacy in pain reduction and cervical ROM improvement compared to conventional physiotherapy. Further studies with larger sample sizes and extended follow-ups are recommended to validate these findings and integrate cupping therapy into mainstream rehabilitation protocols.

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