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COMPARATIVE EFFECTIVENESS OF IONTOPHORESIS OF DICLOFENAC AND LIDOCAINE ION ON NON SPECIFIC CERVICALGIA

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Abstract:

Background:

Non-specific cervicalgia is defined as mechanical pain located anywhere between the occiput and upper thoracic spine and surrounding muscles without specific etiology[5]. The incidence of non-specific neck pain was found 81% for men and around 91% for women in India[2]. Non-specific cervicalgia occurs frequently in western societies.

Iontophoresis is a electrotherapeutic technique that involves the introduction of ions or drugs into the body tissues by applying direct galvanic current. Originally referred to as ion transfer, it was first described by LeDuc in 1903 as a technique of transporting chemicals across a membrane using an electrical current as a driving force. Recently new emphasis has been placed on iontophoresis, and it has become a commonly used technique in clinical settings. Prospective studies such as the iontophoresis of lidocaine for the pain management of acute soft tissue injuries in the emergency had been found to be more effective than the oral administration of non-steroidal anti-inflammatory medication. Similarly, patients with 'tennis elbow', showed clinical improvement when iontophoresis of lidocaine was administered. It is effective to decreasing pain and reduce inflammation[19]. In this study, effect of lidocaine and diclophenac sodium was seen in non-specific cervicalgia and drug was administered through iontophoresis technique.

Methodology: Sixty patients were included in this study and distributed into 2 experimental groups, Group A and Group B based on inclusion and exclusion criteria. Each group consisted of 30 patients diagnosed with non-specific cervicalgia from Physiotherapy OPD, Lovely Professional University. In Group A, 30 patients of nonspecific cervicalgia were treated with Diclofenac iontophoresis and in group B 30 patients of nonspecific cervicalgia were treated with lidocaine iontophoresis. In Group A 2% of Diclofenac gel was placed under the negative electrode whereas electrode gel has been used as media under positive electrode and placed 5cm far from the active electrode. Similarly, In Group B, 2% of lidocaine hydrochloride gel was placed under the positive active electrode and electrode was placed over the body part to be treated, whereas, electrode gel was used as media under negative electrode and placed 5cm far from the active electrode. Direct galvanic current was used for iontophoresis for 10 minute with 0.5 milliampere intensity in both the Groups. Treatment was given

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for 10 days in both groups and Data for pain, Cervical range of motion and disability was collected on 5th, 7th and 10th day with NPRS, Goniometer and neck disability index.

Result: Statistical analysis revealed no significant difference between two groups but within the group highly statistically significant difference was seen in all variables under studies in both the group. KRUSKAL WALLIS TEST was used for ranking the group and result showed lidocaine group rank was higher than diclofenac group.

Conclusion: The result of present study showed iontophoresis of diclofenac ion and lidocaine ion are effective. However, Iontophoresis with lidocaine drug produce better result as compared to diclofenac Iontophoresis with diclofenac drug.

Paper Text

Introduction

Non-specific cervicalgia is defined as mechanical pain located anywhere from the occiput and upper thoracic spine and could spread to surrounding muscles without specific etiology[5]. The incidence of non-specific neck pain was found 81% for men and around 91% for women in India[2]. Non-specific cervicalgia occurs frequently in western societies. A netherlands study reported a life-time prevalence of non-specific cervicalgia in 30% of the male and in 43% of the female participants. Punjabi et al estimated that muscles contribute 80% to the mechanical stability and osseoligamentous system contributes the remaining stability of the cervical spine[6]. Rattapam Shiawong et al Non-specific cervicalgia is a neck pain radiating or non-radiating pain without any systematic disease being detected as the underlying causes of the complaint. Numerous structures in the cervical and nearby region could be the source of non-specific cervicalgia such as intervertebral disks, ligaments, muscles, joints and neural structures [7].

Non-specific cervicalgia is also very common among office workers. Office workers usually involves prolonged hours working on a computer. Evidence suggest that prolonged time used computer can cause tension neck syndrome, which is the most common diagnostic factor of neck region among prolong time office workers [7].

Iontophoresis is a electrotherapeutic technique that involves the introduction of drugs in ionic form into the body tissues by applying direct galvanic current. It was first described by LeDuc in 1903. Recently new emphasis has been placed on iontophoresis, and it has become a commonly used technique in clinical settings.

Iontophoresis of diclofenac is a NSAIDs (nonsteriod anti- inflammatory) drug that have pain relieving and anti- inflammatory properties, and has been found effective in treating acute and chronic pain and inflammatory conditions. Diclofenac inhibit prostaglandin synthesis by

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inhibiting cyclooxygenase-1 and cyclooxygenase- 2. Diclofenac sodium patch provide relief from acute and chronic pain due to sprain, strain and bruies[20]

Prospective studies such as the iontophoresis of lidocaine for the pain management of acute soft tissue injuries in the emergency had been found to be more effective than the oral administration of non-steroidal anti-inflammatory medication. Similarly, patients with 'tennis elbow', showed clinical improvement when iontophoresis of lidocaine was administered. It is effective to decreasing pain and reduce inflammation [19]. In this study, effect of lidocaine and diclophenac sodium was seen in non-specific cervicalgia and drug was administered through iontophoresis technique.

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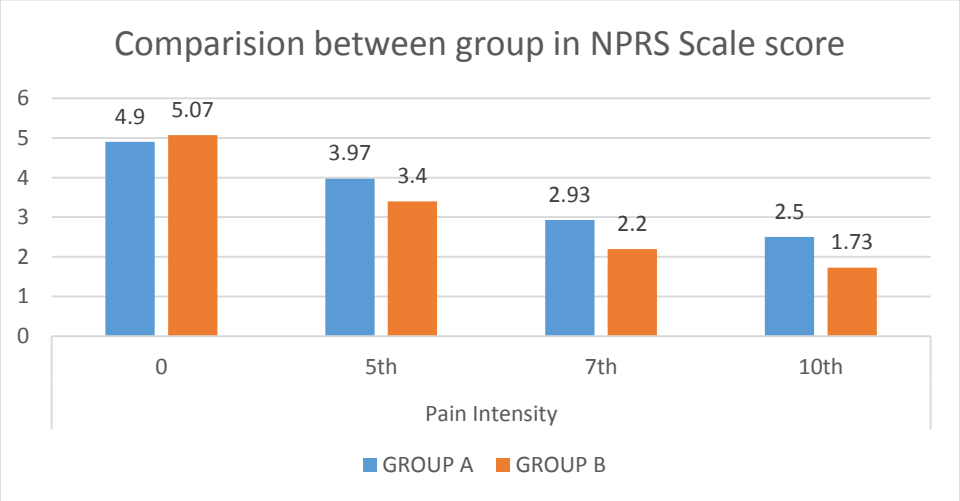
Methodology

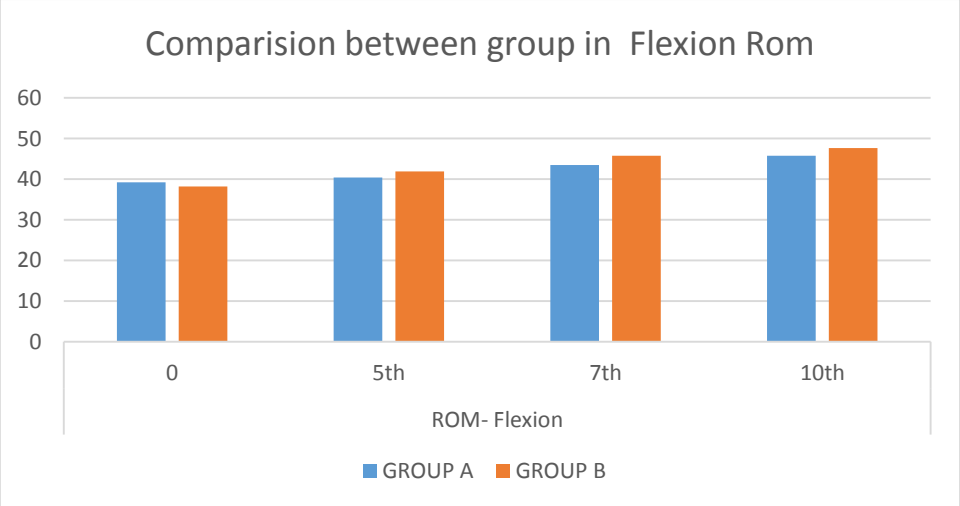
Sixty patients were included in this study and distributed into 2 experimental groups, Group A and Group B based on inclusion and exclusion criteria. Inclusion criteria was males and female between 18 – 35-year age group, acute and subacute neck pain from 4-12 weeks, limited cervical active range of motion. However, Patients having cervical radiculopathy, fractures, who underwent any neck surgery, Neck trauma and any skin allergy were excluded from this study. Each group consist of 30 patients diagnosed with non-specific cervicalgia from Physiotherapy OPD, Lovely Professional University. In group A, 30 patients of non specific cervicalgia were treated with Diclofenac iontophoresis and in group B 30 patients of non specific cervicalgia were treated with lidocaine iontophoresis. In group A – Skin was cleaned with spirit to remove the dust particles and to reduce the skin resistance, 2% of Sodium Diclofenac gel was placed under the negative electrode whereas electrode gel has been used as media under positive electrode and placed 5cm far from the active electrode. Similarly, In group B – Skin was cleaned with spirit, 2% of lidocaine hydrochloride gel was placed under the positive active electrode and electrode was placed over the body part to be treated, whereas, electrode gel was used as media under negative electrode and placed 5cm far from the active electrode. Direct galvanic current was used for iontophoresis for 10 minute with 0.5 milliampere intensity in both the Groups. Treatment was given for 10 days in both groups and Data for pain, Cervical range of motion and disability was collected on 5th, 7th and 10th day with NPRS, Goniometer and neck disability index.

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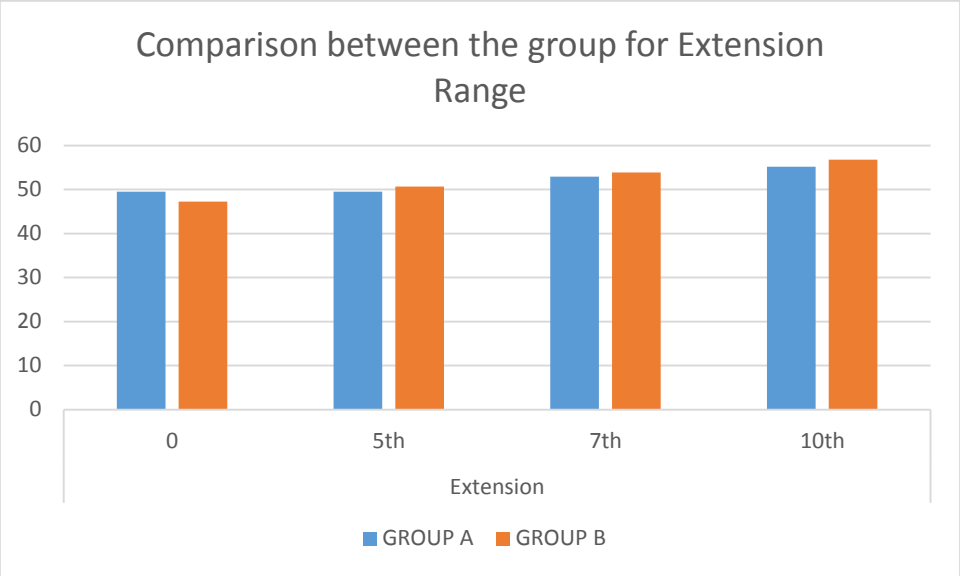
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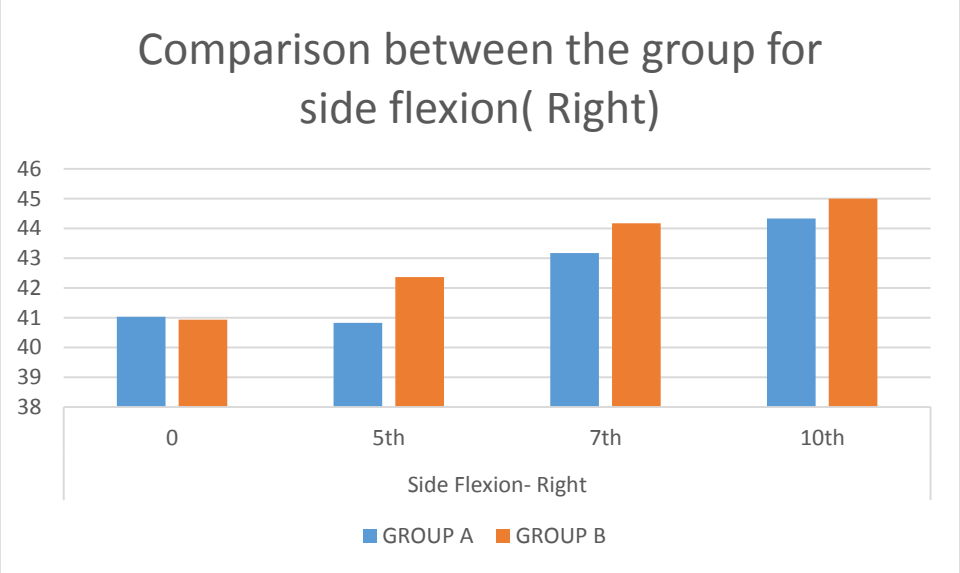


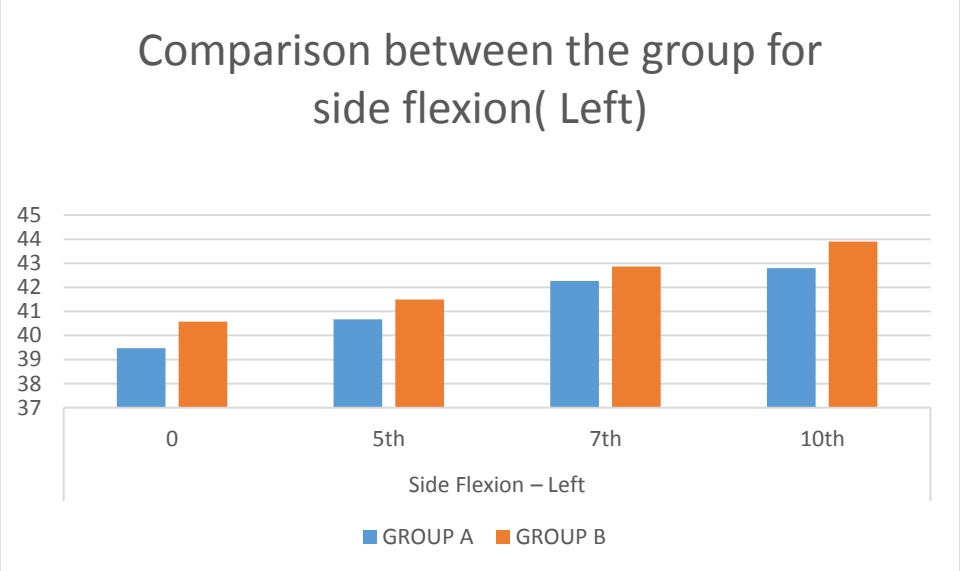


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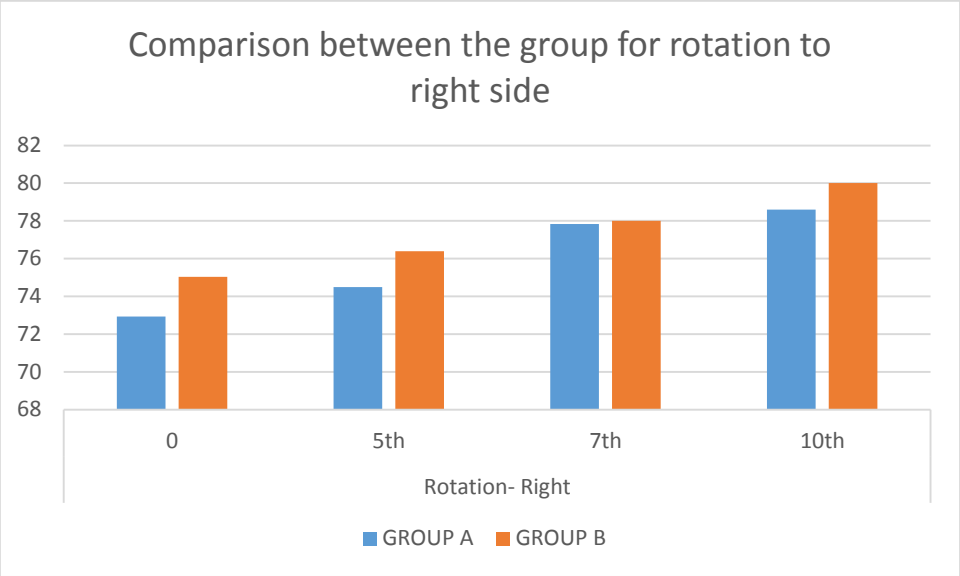


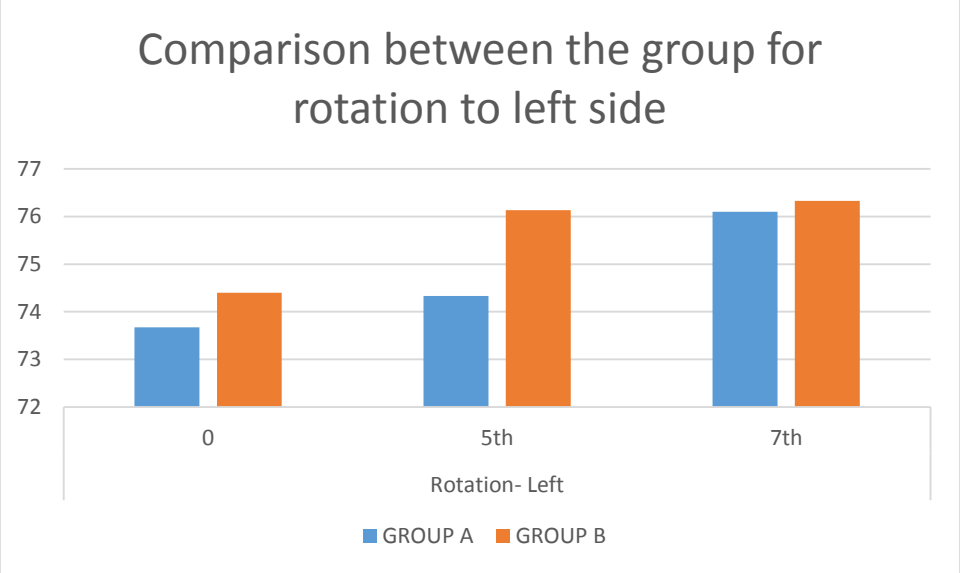


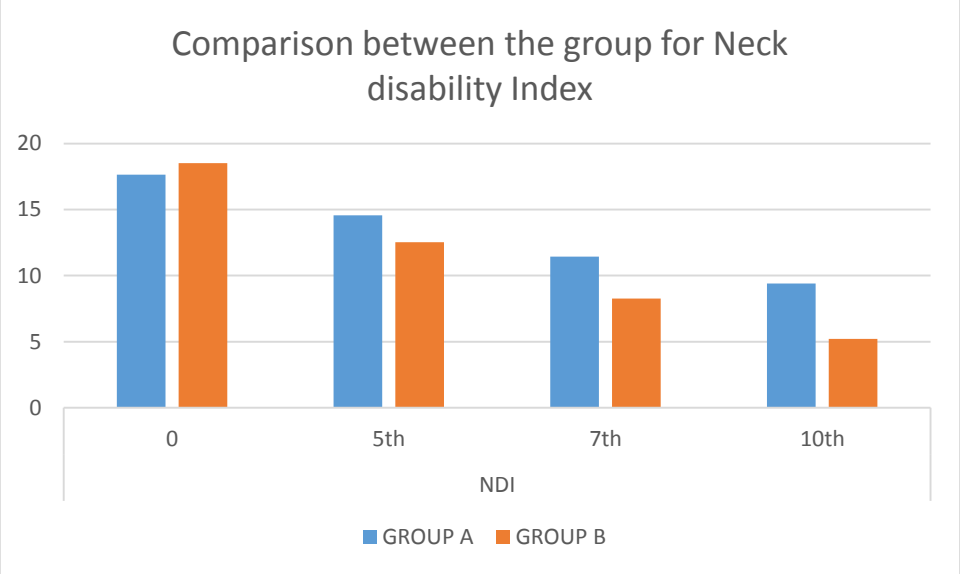


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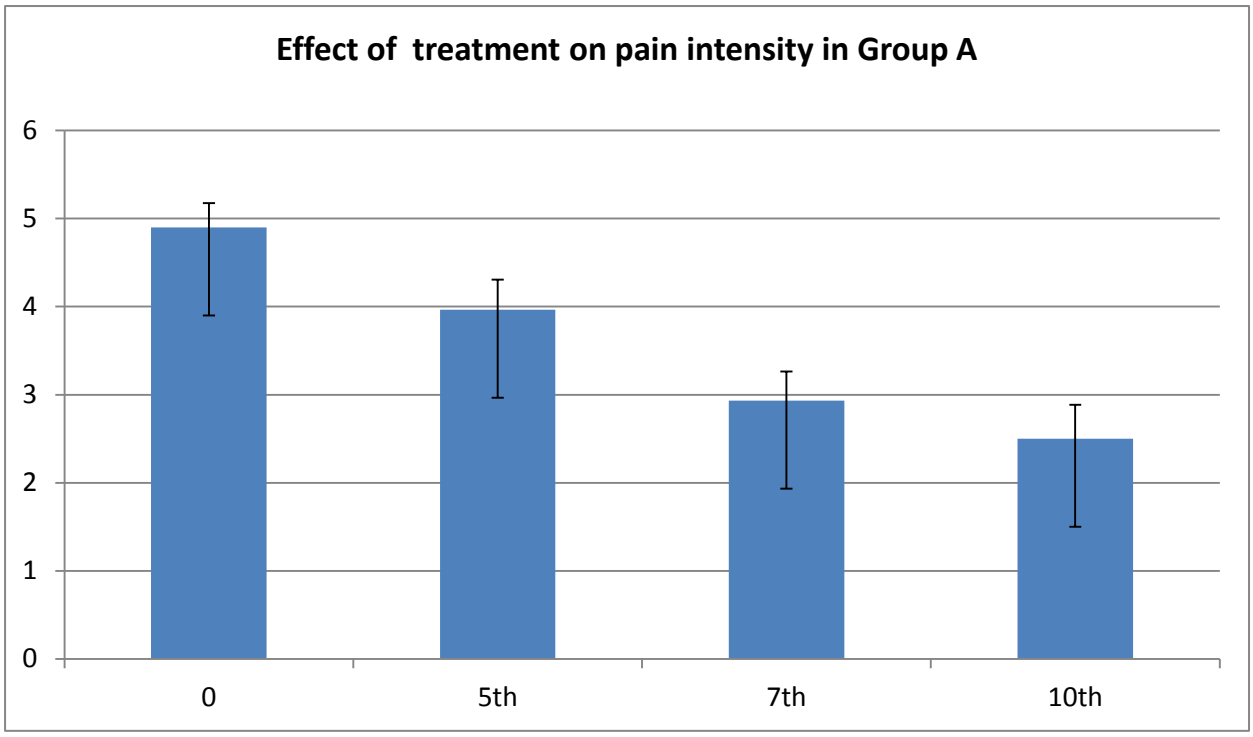


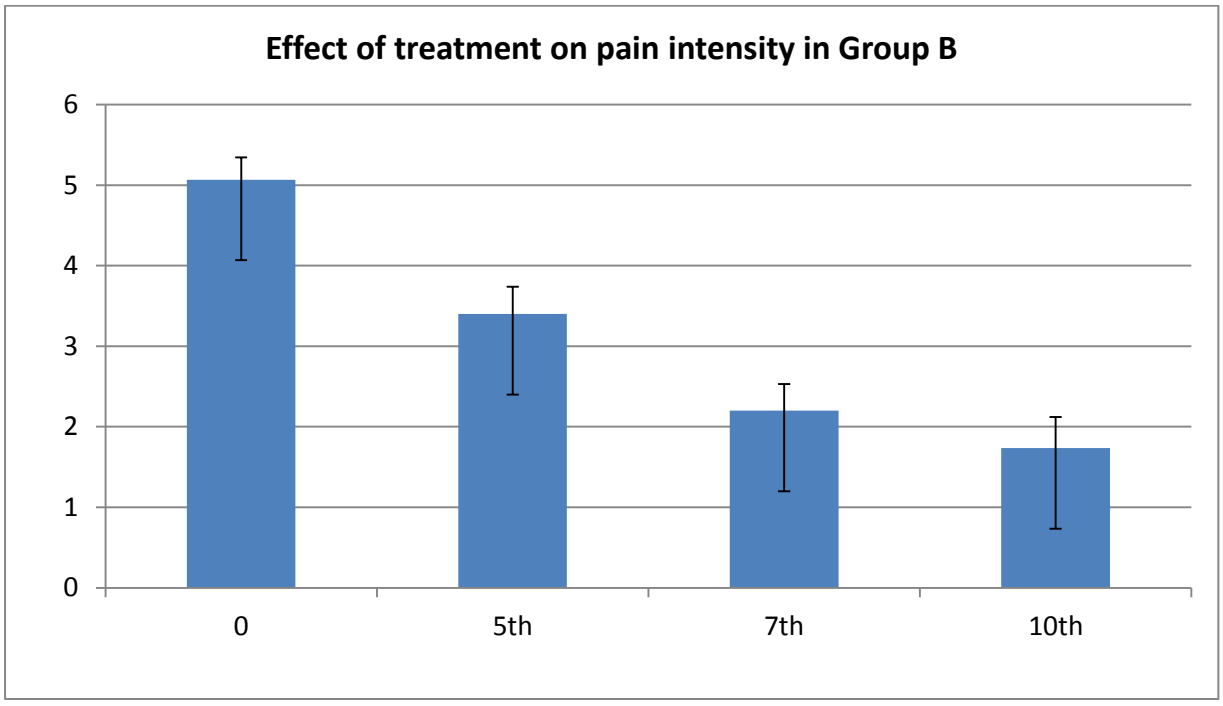




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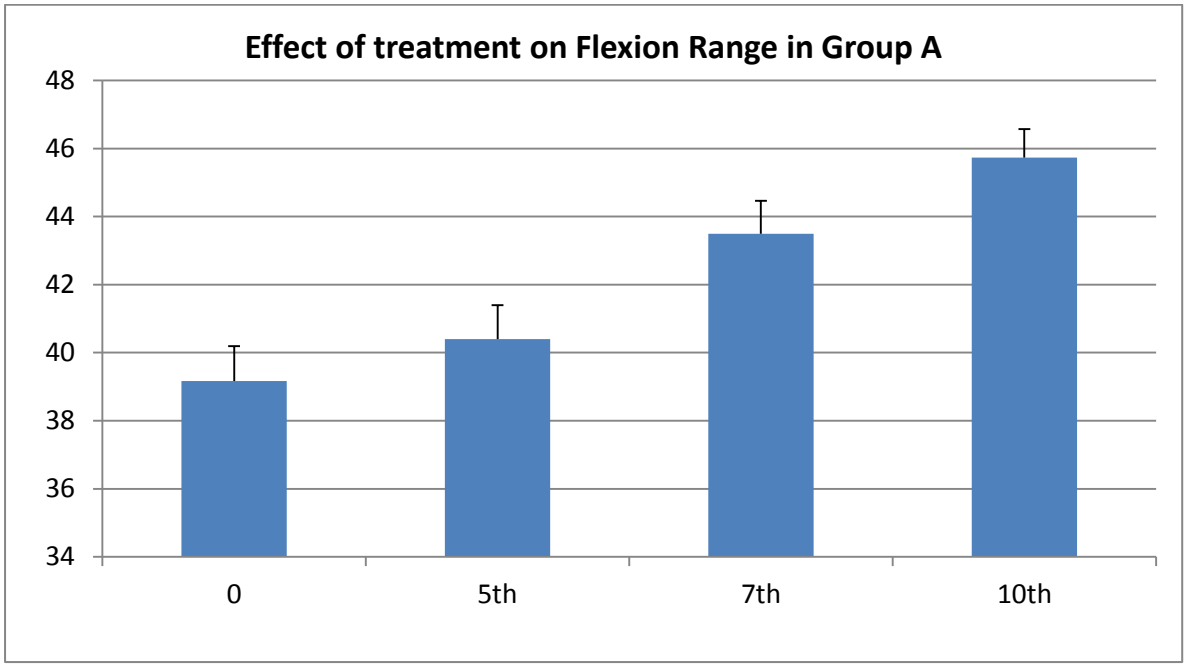
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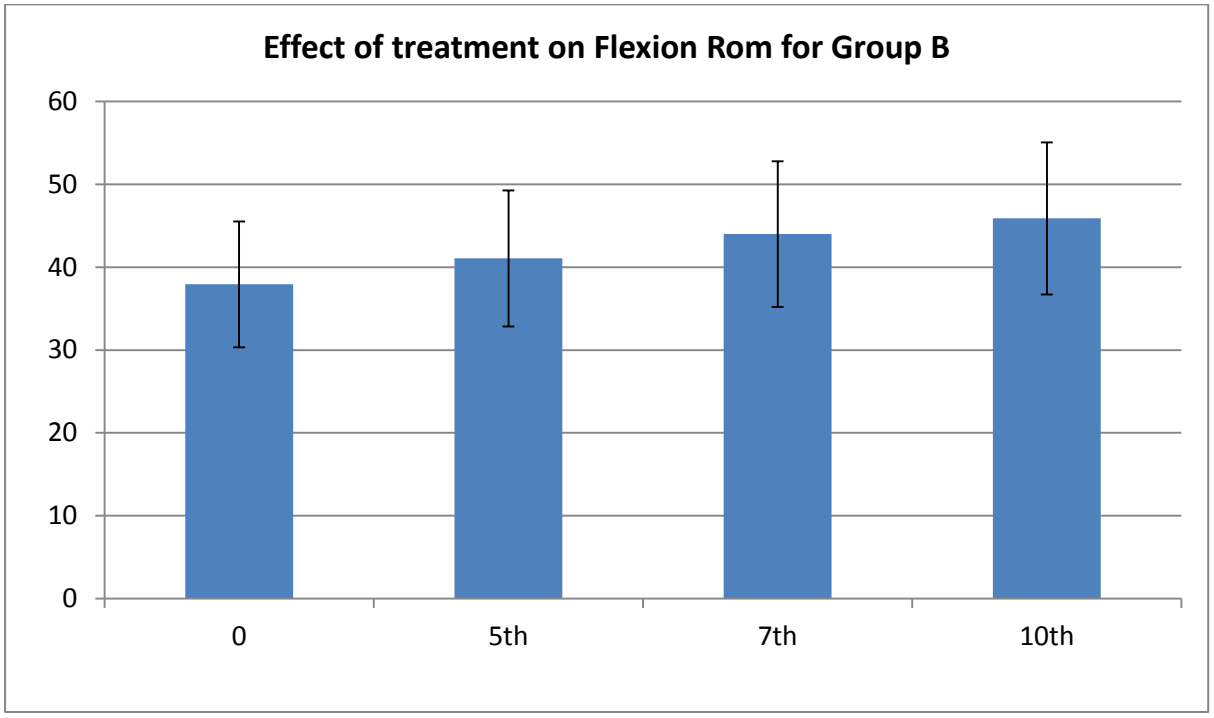




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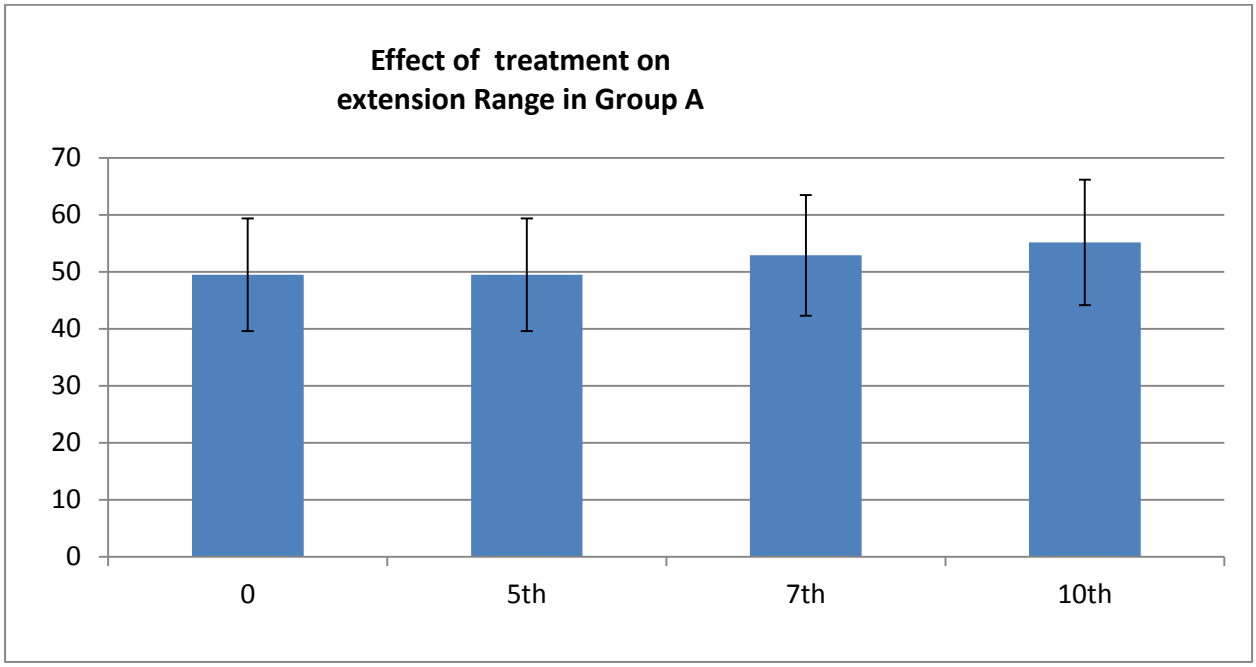
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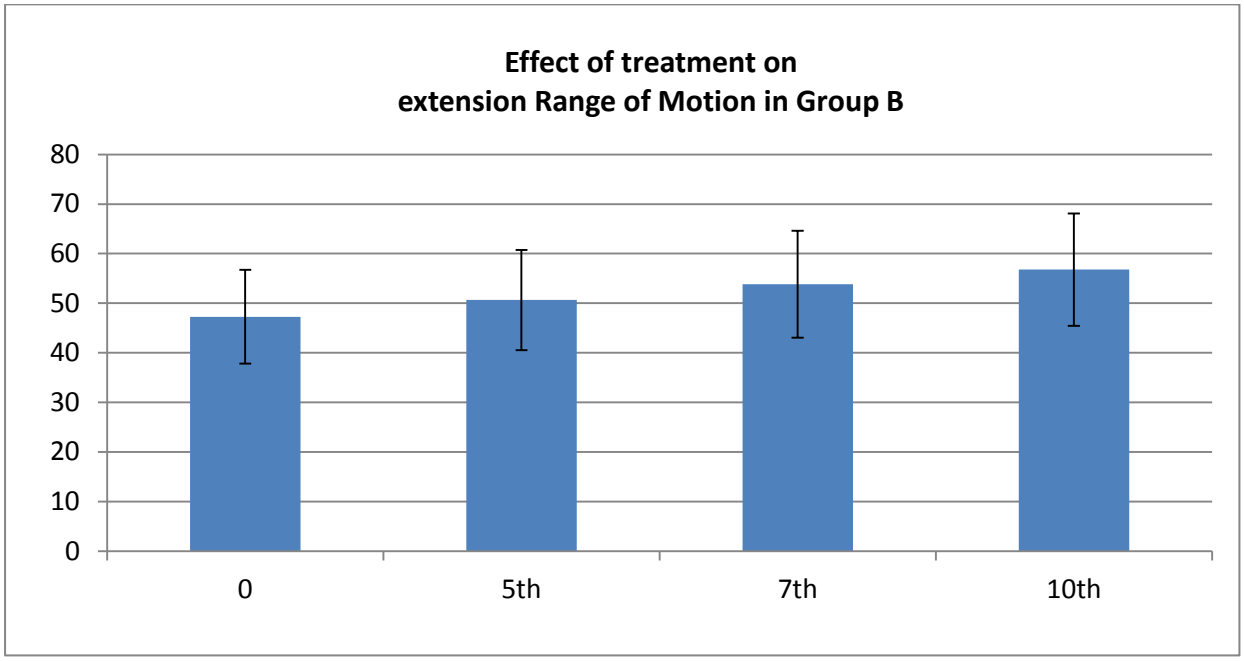




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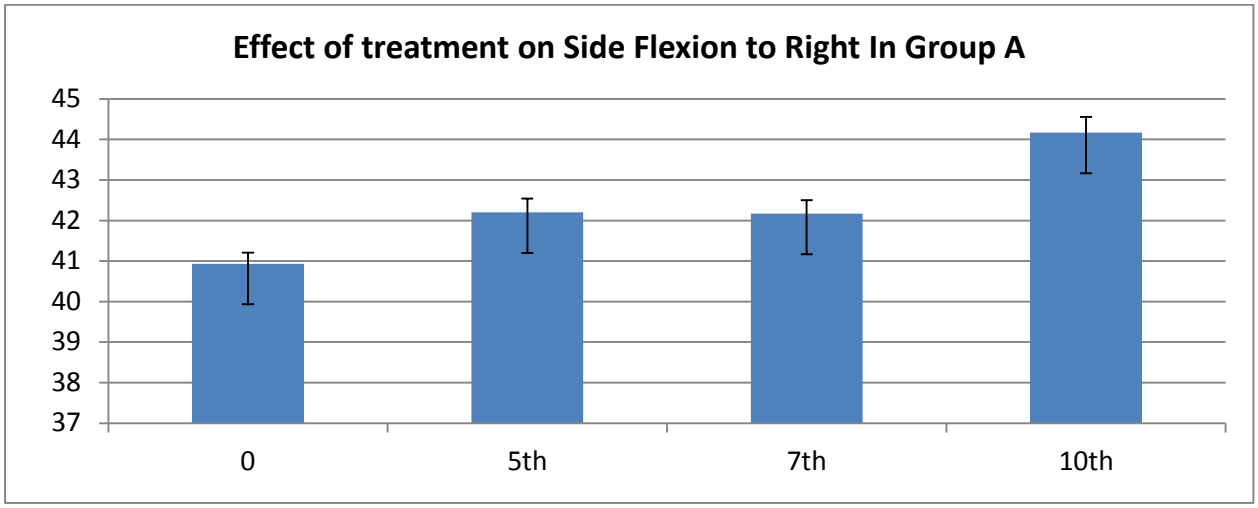
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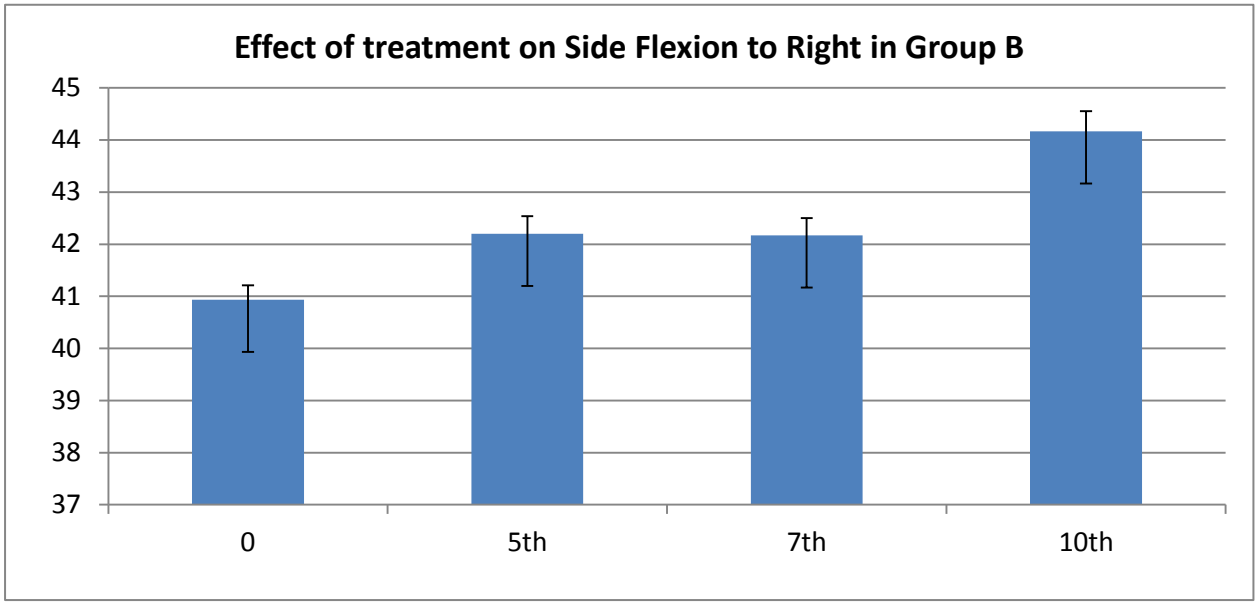
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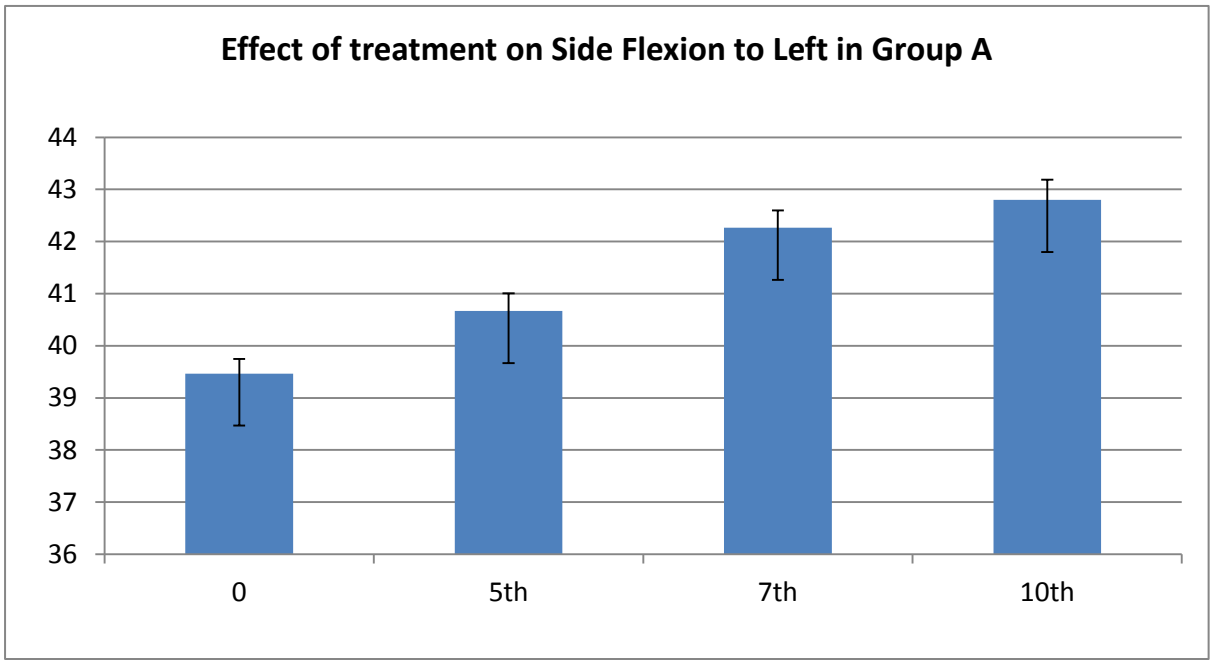
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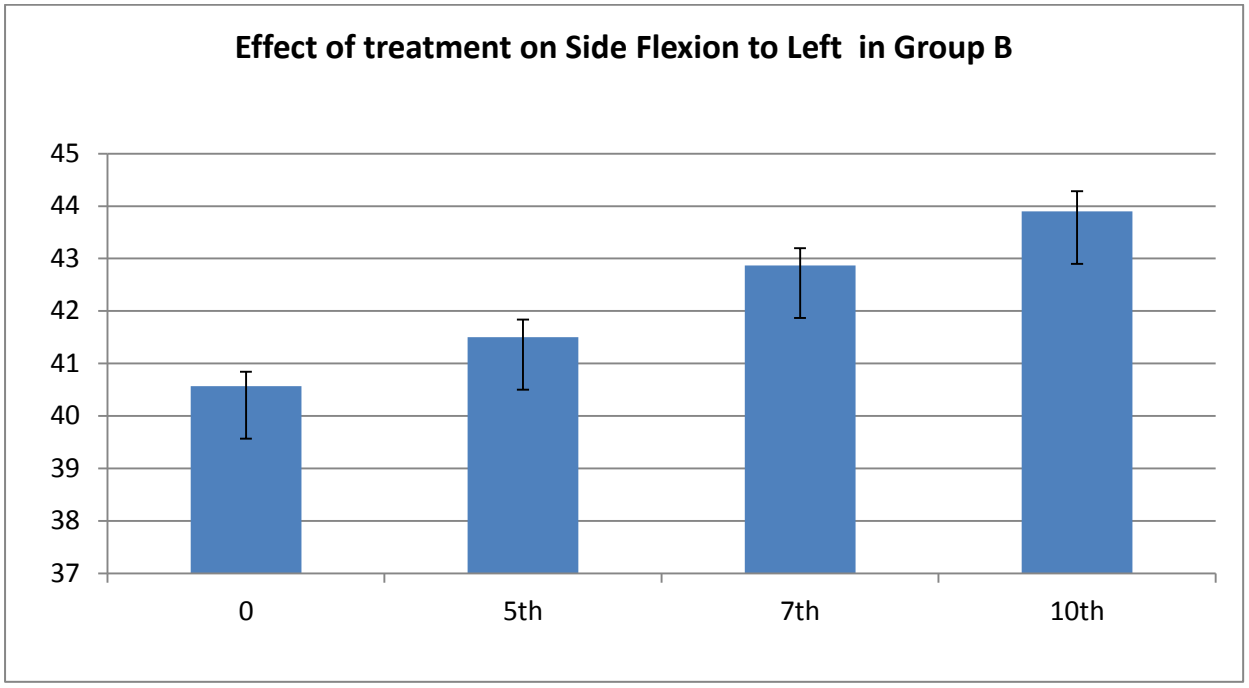
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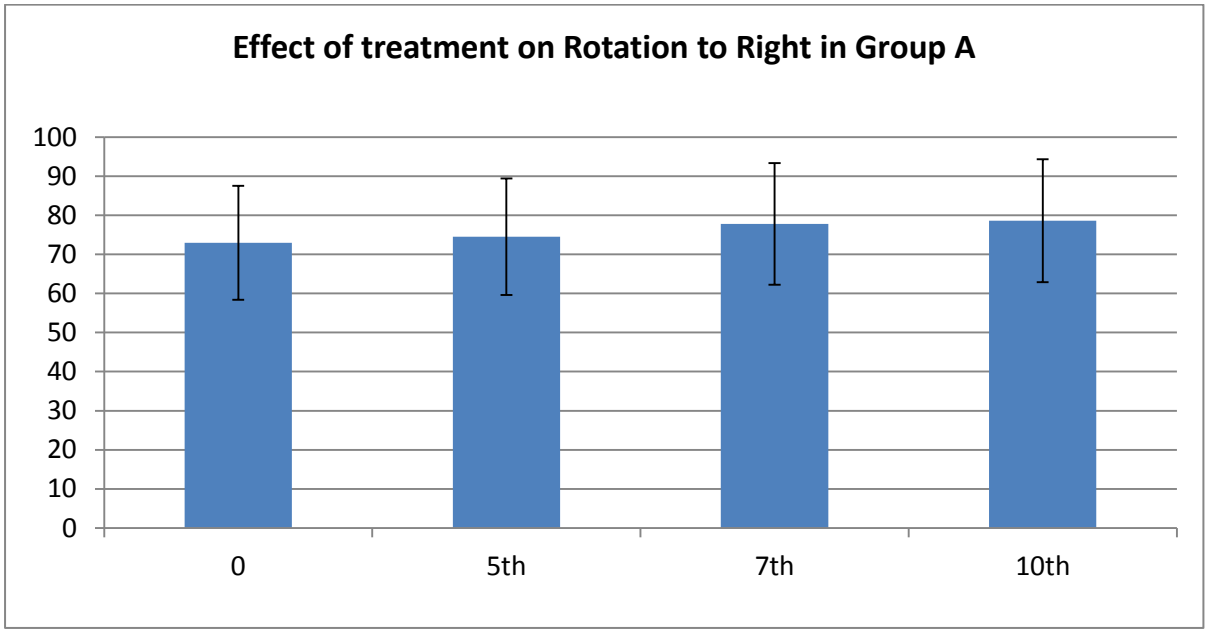




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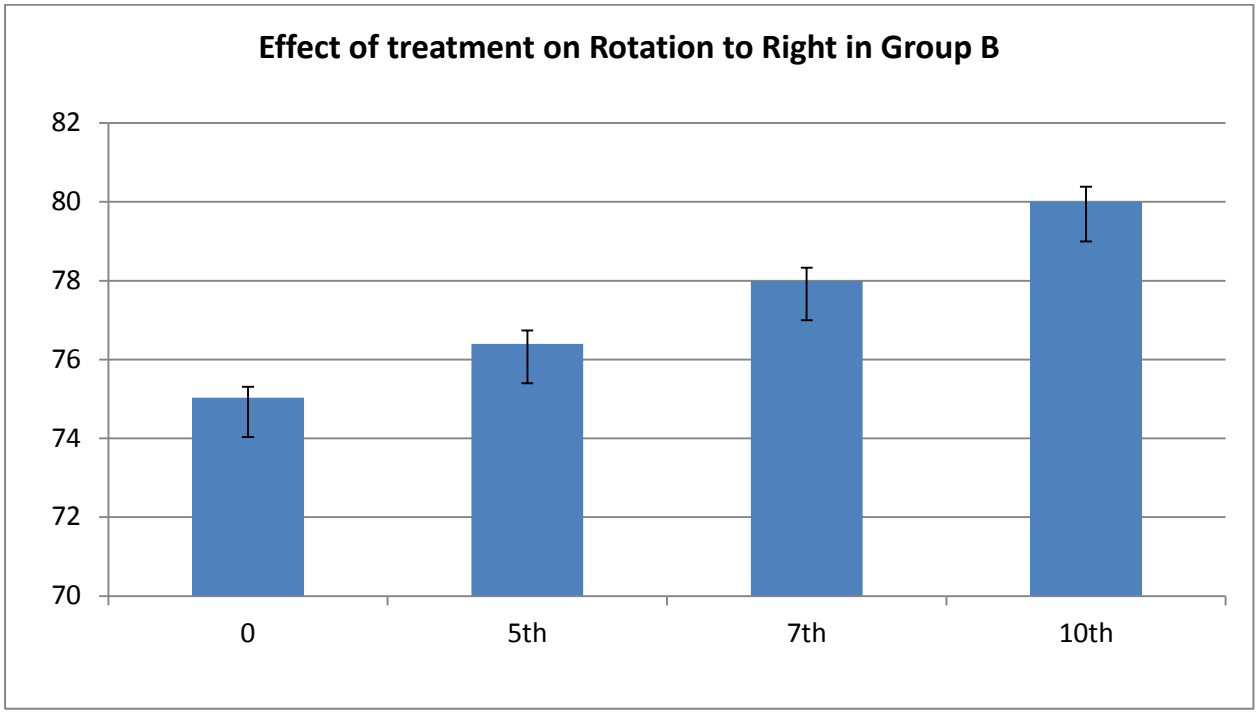
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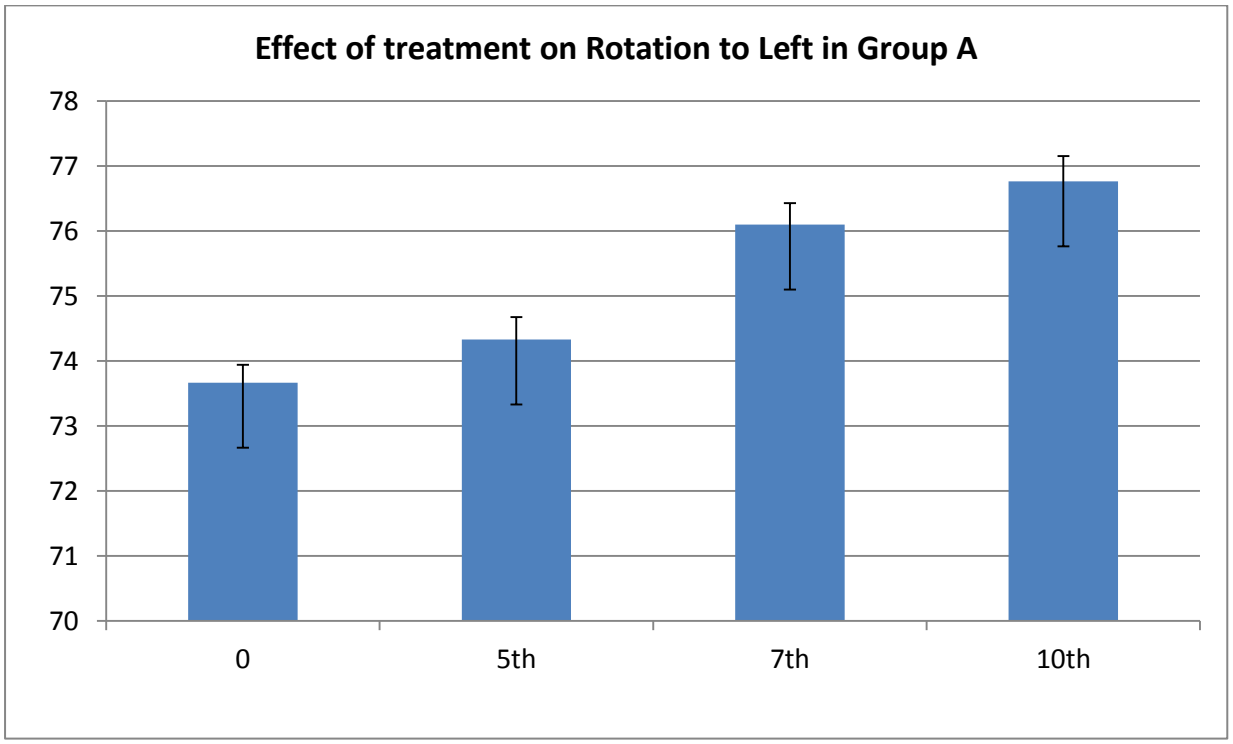




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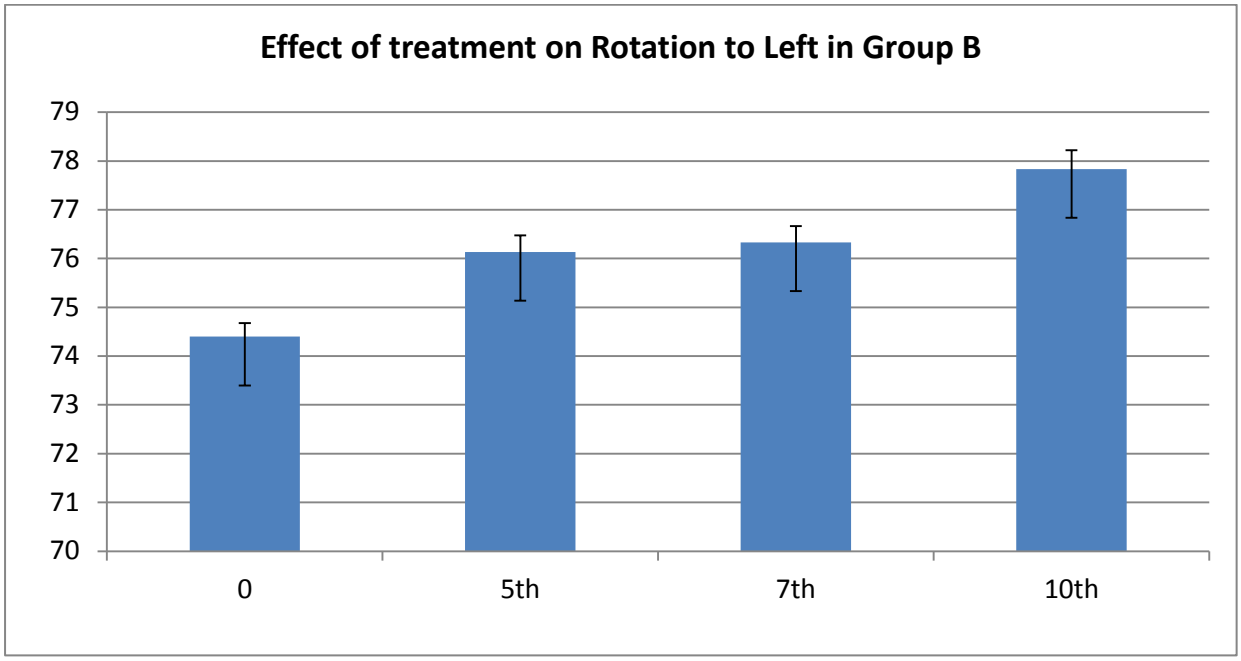
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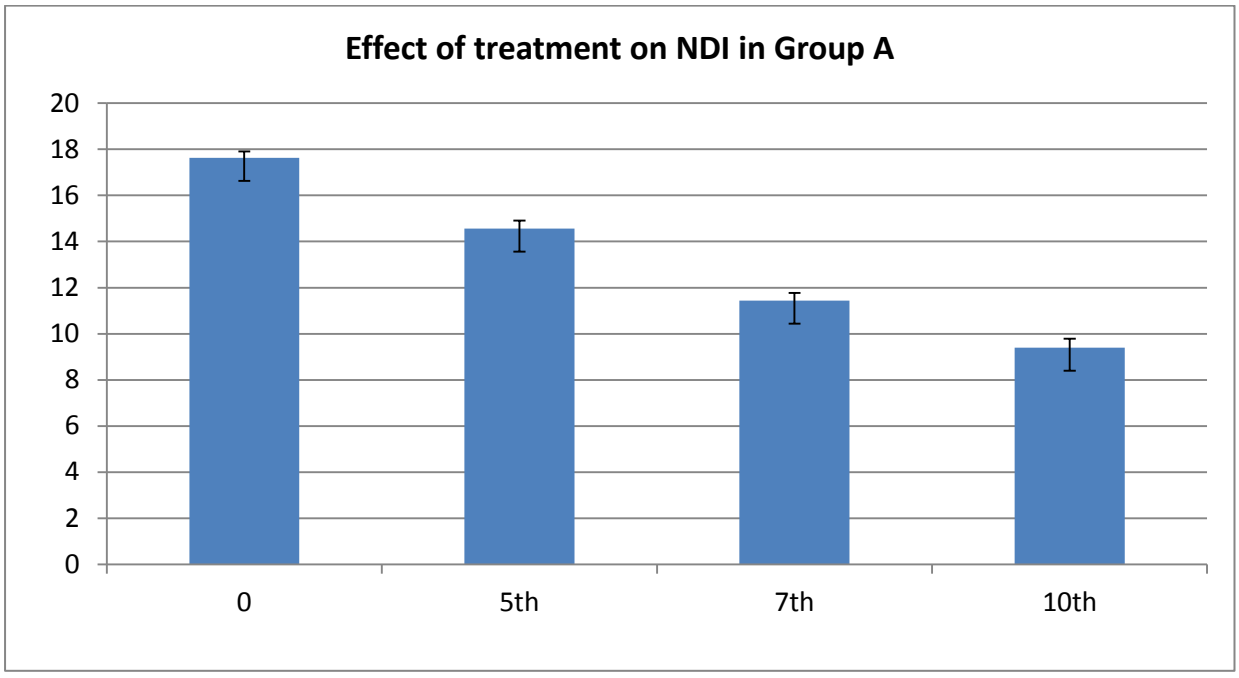




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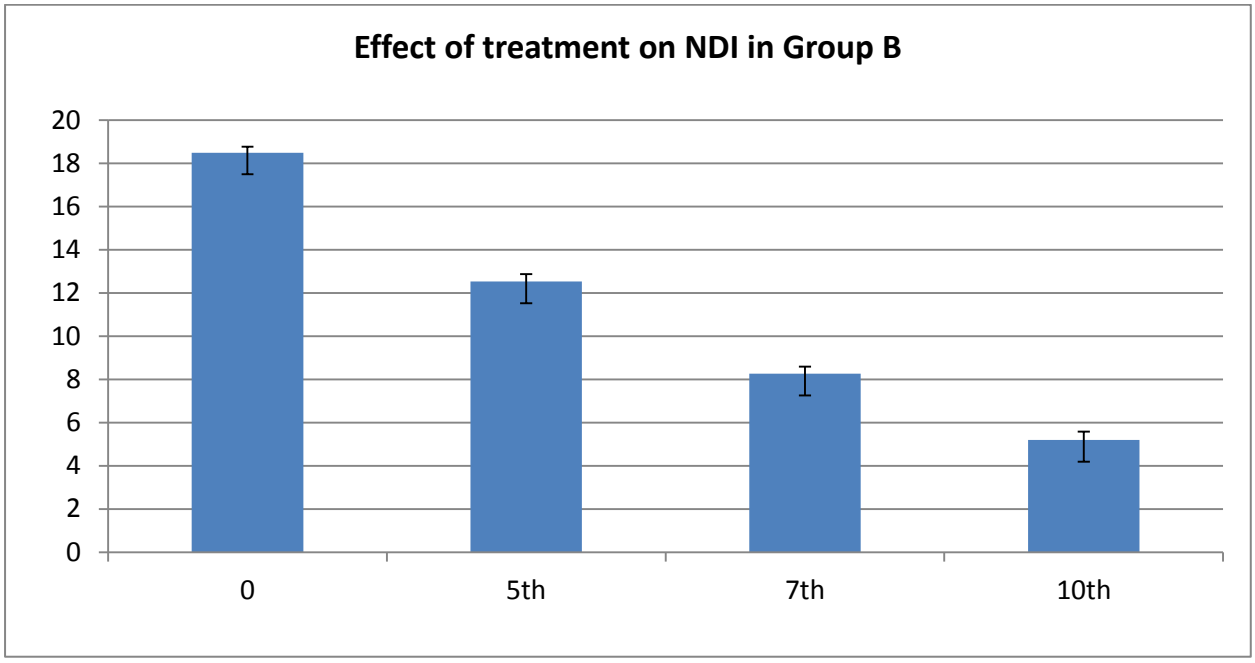
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Kruskal wallis test (H-test)

Parameters	Mean rank score		H-statistics	Significance
	Group A	Group B		
Pain Intensity	128.27	112.73	3.067*	0.050
ROM- Flexion	116.04	124.96	3.103*	0.050
Extension	117.42	123.58	4.604*	0.032
Side Flexion- Right	113.63	127.37	3.232*	0.050
Side Flexion – Left	113.36	127.64	4.065*	0.044
Rotation- Right	112.81	128.19	3.388*	0.050
Rotation- Left	111.42	129.58	4.529*	0.033
NDI	131.34	109.66	5.885*	0.015

KRUSKAL WALLIS TEST shown rank of group A and group B. Mean rank was higher of Group B than Group A.

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DISCUSSION

The study results showed that Iontophoresis with Diclofenac sodium and Lidocaine hydrochloride both reduce pain, increased cervical range of motion of flexion, extension, side flexion right and left side, rotation right and left and decrease neck disability index score of the patients with non specific cervicalgia. Thus both the interventions were effective within the group but on comparing both the groups there was non- significant changes seen. Kruskall wallis test showed lidocaine Group(B) had higher rank than diclofenac Group(A).

Present study used iontophoresis with diclofenac ion and lidocaine ion. The physiological mechanism of ion movement toward tissue depends on whether ions are positive or negative. In present study, Diclofenac ion placed under cathode electrode and lidocaine ion placed under anode. Ions placed under same charged electrode, this could worked as a like pole repel with each other and unlike pole attract with each other. After application of electrical current, ions moved through the skin barrier via hair follicles and sweat glands and produce physiological effects[41]. The physiological effects of direct electrical current alone was used in the technique of iontophoresis. The positive pole (lidocaine) anode produce acidic reaction, which produced sclerotic effect and this decreased nerve irritability. However, the negative pole (diclofenac) produced alkaline reaction which also produced sclerotic effects to increase nerve irritability. Both positive and negative poles produce heating effect due to vasomotor stimulation[39].

Both the drug ions were effective in decreasing pain. In present study group A (diclofenac), there was decrease in pain level, The reason behind that might be the diclofenac by inhibiting the transmission of pain through A- beta fibre to close the pain gate.

Diclofenac inhibited the mediators of the inflammatory response to injury such as a prostaglandins. As regarding diclofenac reducing pain the present study agreed with S. Hariharan et al(2006) iontophoresis increase the penetration of diclofenac into the tissues and increased analgesic effects[34]. Another study R.N. Dermites who found that iontophoresis of diclofenac sodium is more effective to decrease pain than sodium salicylate on lateral epicondylitis[36].

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In Group B, Study showed iontophoresis of lidocaine ion decreased pain on nonspecific cervicalgia. The mechanism behind decreasing pain with lidocaine drug could be due to blockage of sodium channels. Pharmacodynamics mechanism of lidocaine drug decreases pain by blocking upregulated sodium channels on peripheral nociceptive afferent pathway, This study agree with chabal et al (1989).

Thomas E Yarrobino showed similar results, they concluded iontophoresis of lidocaine ion decrease pain and improving functions on lateral epicondylitis[33]. Another study shown dexamethasone with lidocaine hydrochloride iontophoresis reduce pain, increase range of motion (ROM), and improved function in tennis players suffering lateral elbow tendinopathy[25].

Louis P Gangarosa et al concluded iontophoresis of lidocaine drug can provide deeply analgesic effects with shorter time span. Pain could have been decreased due to lidocaine drug penetrate more deeply through stratum corneum . Stratum corneum is most resistant layer of the skin, Iontophoresis with lidocaine prevent skin resistance and transferred drug through this layer Kalbitz et al 1996. Lidocaine ion even overcome resistance and passed through all layers of tissue through active electrode including ligaments and tendon. Massimiliano Nino et al (2010) shown the result of lidocaine iontophoresis over other conventional therapy(Passive mobilization, ultrasound) in decreasing pain, increasing range of motion and functional activities of adhesive capsulitis patients[26].

The result of present showed that range of motion improved in both the groups. Several studies shown that range of motion increases and functions improve after iontophoresis treatment. Massimiliano Nino et study shown iontophoresis of lidocaine ion improve range of motion and functional activities of adhesive capsulitis patients[26].

Present study shown range of motion and functional improvement in non specific cervicalgia patients may be due to decrease pain lead to increasing range of motion and function. Another study shown that range of motion increases due to resolution of pain and concluded that iontophoresis treatment on temporomandibular joint in juvenile arthritis shown decrease in pain and increase in range of temporomanibular joint[29]. Barbara et al (1987) concluded iontophoresis of dexamethasone with lidocaine ion decrease pain and improve jaw range of motion immediately after treatment of acute disk displacement of temporomandibular joint[42].

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In the present study, Iontophoresis of lidocaine ion increased range of motion than diclofenac group. Fred et al(1982) compared three modalities on shoulder girdle myofascial syndrome and concluded a result of dexamethasone sodium phosphate and lidocaine hydrochloride as most effective treatment in improving shoulder range of motions[42]. Another study stergioulas apostolas et al (2014) was shown dexamethasone with lidocaine hydrochloride improved range of motions of tennis players suffering with lateral epicondylitis[25].

Improvement in neck disability on both group might be due to direct current. Arzu kaya et al(2009) agreed with present study that disability decreases after treatment with iontophoresis of lidocaine ion via direct current in myofascial pain syndrome[40]. Another study max zusman (1998) concluded that disability occur due to reduction in pain[43]. Gour et al concluded improvement in neck disability on radiculitis after iontophoresis of dexamethasone and lidocaine hydrochloride 4% with other physical therapy modalities in radiculitis patient [30]. Stergioulas apostolas et al (2014) concluded a result of improved functions of tennis players who are suffering lateral epicondylitis[25].

Conclusion: The result of present study showed iontophoresis of diclofenac ion and lidocaine ion are effective. However, Iontophoresis with lidocaine drug produce better result as compared to diclofenac Iontophoresis with diclofenac drug.

Limitation: -

Short follow up.

Sample size was small.

Gel based drugs was used in present study.

Study was not randomized controlled trail.

Future Scope: -

Further studies with large sample size and longer follow up.

Conventional physiotherapy treatment with iontophoresis could be added.

Liquid ions could be used in future.

Chronic mechanical neck pain with radiating pain patients could be take in future study.

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