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To Compare Blackburn Exercises with Conventional Physiotherapy in Rehabilitation of Rotator Cuff Injuries - A Randomized Control Study

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ABSTRACT

OBJECTIVE: To find out effect of Blackburn exercises on pain, range of motion and strengthand compare Blackburn and conventional physiotherapy treatment in rotator cuff injury.**METHODS:**30 subjects having partial thickness rotator cuff tear were included in the study. Subjects were randomly allocated to Blackburn Group (Group A, Experimental Group) and Conventional Group (Group B). Pain, Range of motion (ROM) and strength were measured by using VAS, Goniometry and 1 RM. MWD and Blackburn exercises were given to Experimental Group i.e. Group A and MWD and isometric exercises were given to Conventional Group i.e. Group B . Blackburn exercises include prone horizontal abduction, prone horizontal abduction with ER, prone horizontal caption, prone horizontal caption with ER, prone horizontal ER, prone extension .These exercises were performed 5 times per week for 2 weeks. After 2 weeks pain, ROM and strength were measured and data was analyzed.**RESULTS**:Data analysis was done usingStudents test which showed significant reduction in pain increase in Range of Motion and strength in Experimental Group.**CONCLUSION**:Blackburn exercises are effective on decreasing pain, increasing Range of motion,andstrength in rotator cuff injury.

KEYWORDS: Partial thickness rotator cuff, Blackburn exercises, Isometric exercises, Range of Motion and Visual Analog Scale (VAS)

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INTRODUCTION:

Rotator cuff disease is a common cause of shoulder pain and dysfunction. The prevalence of rotator cuff tears in the general population has been found in MRI studies to range from 5% to 39%. Because the prevalence of rotator cuff disease increases with age, it is expected to become an even more common clinical condition as the population ages. Disease of the rotator cuff first was described in the literature in 1788 by Munro.Rotator cuff injury is one of the most common disorders of the shoulder. The spectrum of injury includes tendinitis, partial-thickness tear, and complete tear [1, 2.]Most important, factor is that tendon tears in older patients generally occur because of tendon degeneration. There are changes in the structure, cellularity, and strength of tendons that make healing of a lesion an exception and continued degeneration the norm.[3, 4.] MRI is considered the gold standard in the work-up of any patient presenting with shoulder pain. The tears of the rotator cuff tendons are usually small and involve the particular surface. Internal impingement tears are better diagnosed on MR orthography as a small under surface linear contrast extension into the tendon. Abduction and external rotation (ABER) positioning may be useful for tear detection in suchpatients.[3]Non operative treatment benefits most patients with rotator cuff tendonitis or partial-thickness tears. This includes non-steroidal anti-inflammatory drugs (NSAIDs), occasionally a corticosteroid injection, and physical therapy modalities such as iontophoresis and Microwave diathermy if the case is chronic.Blackburn exercises are a new protocol to strengthen rotator cuff muscles and there are very limited studies and dearth of literature to prove the effectiveness in rotator cuff injury. So the present study aims to determine the effect of Blackburn exercises in comparison with conventional physiotherapy treatment in rotator cuff injury.

METHODS

Study design

Experimental Study Design

Study set-up

Subjects were recruited from the Department of Physiotherapy.

Sampling method

Random sampling

Study population

Total of 30 patients having partial thickness rotator cuff injury

Inclusion criteria

1. Both male and female
2. Patients age between 40 and 50 years
3. Based on the MRI findings, Pre diagnosed by the Orthopedican
4. Abduction of shoulder at least 90 degree.

Exclusion criteria

1. History of fracture or dislocation of the shoulder joint
2. Cervical Pathology like disc problem
3. History of neurological disorder like tumors or epilepsy
4. Systemic disorders such as tuberculosis or rheumatoid arthritis
5. Diabetes
6. Non cooperative patients
7. Amputation of upper limb
8. Hypertension especially patients having angina symptoms

MATERIALS REQUIRED:

1. Plinth
2. Towel roll
3. Goniometer
4. Visual analogue scale

PROCEDURE:

Patients who fulfilled the inclusion criteria and diagnosed as partial thickness rotator cuff injury by the orthopedic surgeon and by routine clinical examination were taken for the study purpose. The physical examination for pain was checked by using visual analogue scale, Strength was checked by using 1 RM and Range of motion was checked by using goniometer. All the procedures were adequately explained to the patients, and written consent was taken from each of them.

TREATMENT PROTOCOLFOR EXPERIMENTAL GROUP (GROUPA)

915 MHz Micro Wave Diathermy over the shoulder joint for 10 minutes

BLACKBURN EXERCISE PROTOCOL

Figure: 1 (A) Prone horizontal abduction (neutral)

- Lie on the table, face down, with arms hanging straight down to the floor and palms facing down
- Raise arms out to the side, parallel to the floor
- Hold for 2 seconds and lower slowly

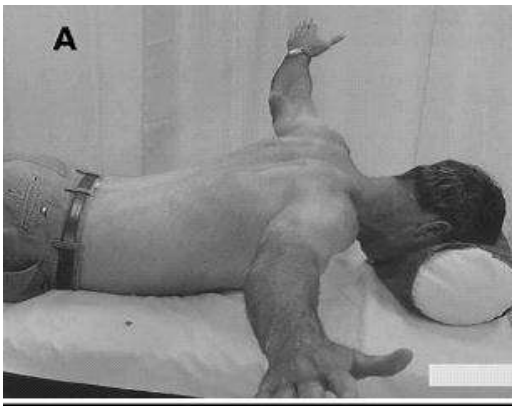

Figure: 2(B)Prone horizontal abduction (full external rotation)

- Lie on the table, face down, with arms hanging straight to the floor, and thumbs rotated up (hitch-hiker position)
- Raise arms out to the side with slightly in front of shoulder, parallel to the floor
- Hold for 2 seconds and lower slowly

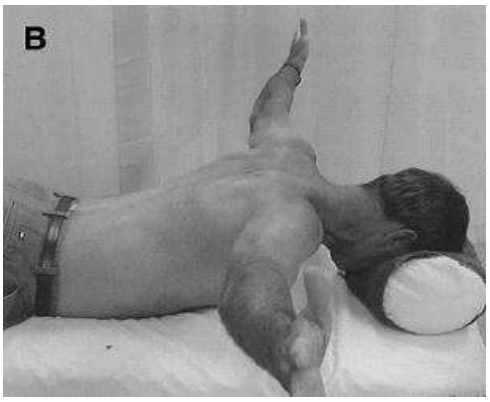

Figure: 3(C)Prone horizontal scaption (neutral)

- Lie on the table, face down, with arms hanging straight down to the floor and palms facing down.
- Raise your arms to the side but slightly forward by about 30 degree compared to horizontal abduction.
- Hold for 2 seconds and lower slowly

Figure: 4(D)Prone horizontal scaption (full external rotation)

- Lie on the table face down, with arms hanging straight to the floor, and thumbs rotated up (hitch-hiker position)
- Raise your arms to the side but slightly forward by about 30û compared to horizontal abduction
- Hold for 2 seconds and lower slow

Figure: 5(E)Prone horizontal external rotation

Lie on the table; face down, with arms abducted horizontal to side and elbows bent 90 degree pointing down.

- Rotate arms externally so that forearms come parallel to ground point Forward
- Hold for 2 seconds and lower slowly

Figure: 6 (F)Prone horizontal extension

- Lie on the table, face down, with arms hanging straight down to the floor and palms facing forward.
- Raise your arms to the horizontal parallel the thorax.
- Hold for 2 seconds and lower slowly.

Patients were asked to perform the said exercises as 3 sets of 20 repetitions 2 times/ day. These exercises were continued for 2 weeks (5 days / week). The base line data was collected at the beginning of the protocol. The patients were evaluated at the end of 1st week and the end of the 2nd week

TREATMENT PROTOCOL FOR CONVENTIONAL GROUP (GROUP B):

915 MHz Micro Wave Diathermy over the shoulder joint for 10 minutesIsometric exercises for shoulder flexors, extensors, abductors, medial and lateral rotatorsisometric exercise was given for 10 repetitions with the 10 seconds of hold. The subjects were instructed to breathe normally during each contraction. 20 seconds of rest between the contractions was suggested. These exercises should be performed twice a day for 2 weeks (5 days/ week) Progression of these exercises was done by giving isometric exercises in different degree of range of motion of shoulder joint.

OUTCOME MEASURES:

1. Pain
2. Strength
3. Range of motion

DATA ANALYSIS:

Statistics were performed using SPSS software 22.0. Level of significance selected for the study was $p<0.05$.

RESULTS:

Comparison between the two groups was done using Students T test (Table 1-6)

Table 1: Comparison of VAS in group A

VAS	Mean	SD ±	t value	p value
Pre Treatment	7.011	1.311	20.996	0.000
Post Treatment	3.098	1.401		

Table 2: Comparison of VASin group B

VAS	Mean	SD +	t value	p value
Pre Treatment	6.989	0.694	13.865	0.000
Post Treatment	3.98	0.911		

Table 3: Comparison of range of motion in group A

RANGE OF MOTION	SD		MEAN		t VALUE	p VALUE
	Pre	Post	Pre	Post		
ABDUCTION	2.56	11.98	92.59	145.52	15.258	0.000
FLEXION	17.44	14.72	103.62	149.76	11.712	0.000
MEDIAL ROTATION	3.95	2.89	39.51	53.16	16.971	0.000
LATERAL ROTATION	4.49	3.86	42.75	57.79	12.099	0.000

Table 4: Comparison of range of motion in group B

RANGE OF MOTION	SD		MEAN		t VALUE	p VALUE
	Pre	Post	Pre	Post		
ABDUCTION	3.44	6.89	92.32	135.42	25.126	0.000
FLEXION	11.94	13.89	102.11	143.21	14.987	0.000
MEDIAL ROTATION	4.65	4.23	35.86	49.36	12.471	0.000
LATERAL ROTATION	5.29	4.89	40.89	54.41	20.890	0.000

TABLE 5: comparison of strength in group A

STRENGTH	SD		MEAN		t VALUE	p VALUE
	Pre	Post	Pre	Post		
ABDUCTORS	0.571	0.675	0.81	3.98	13.687	0.000
FLEXORS	0.501	0.640	0.90	2.989	19.889	0.000
MEDIAL ROTATORS	0.469	0.687	1.001	3.009	8.890	0.000
LATERAL ROTATORS	0.511	0.746	0.912	3.011	7.821	0.000

Table 6: comparison of strength in group B

STRENGTH	SD		MEAN		t VALUE	p VALUE
	Pre	Post	Pre	Post		
ABDUCTORS	0.569	0.651	0.69	1.68	8.011	0.000
FLEXORS	0.495	0.78	0.71	2.002	7.612	0.000
MEDIAL ROTATORS	0.400	0.70	0.52	1.598	7.280	0.000
LATERAL ROTATORS	0.451	0.818	0.701	2.001	7.499	0.000

DISCUSSION:

The statistical and analysis shows (Table 1-6) that there is significant improvement in pain, range of motion, strength and functional activity in both the groups but it is more significant in experimental group. Significant improvement in pain is observed in both the groups. As both the groups received micro wave diathermy and one of the physiological effects of diathermy is that Oscillating electric and magnetic fields produce heat in biological tissues by inducing a rapidly alternating movement of ions, rotation of dipolar molecules and the distortion of non-polar molecules. A movement of ions represents a real flow of current and occurs readily in tissues rich in electrolytes such as blood vessels and muscle. Resistance to this flow leads to heat production. Diathermy heats mainly deep structures.[4, 5, 6, 7]People with rotator cuff injury Syndrome present weakness of scapulohumeral muscles [8] and improper control of the glen humeral (G/H) and scapulothoracic (S/T) movements during arm elevation.[9]Strengthening exercises are most important non operative and postoperative treatment in rotator cuff injuries.Blackburn, McLeod, white and Wofford suggested a different position for training supraspinatus.[11, 12]. To strengthen external rotators of the shoulder (infraspinatus and terse minor), Blackburn reported increase external rotator activation with horizontal abduction exercises.[13]Blackburn recommended prone position with elbow extended and shoulder abducted to 100 degree and external rotation with the subject lifting it in abduction.[10]Isometric exercises, in the control group increase the mass of the tendon because of the enhanced deposition of type I collagen The stimulation of type I collagen production may be of

particular benefit because fibroblast from areas of rotator cuff tear normally synthesize a greater proportion of mechanically inferior type III collagen than their healthy counterparts.[14]

CONCLUSION:

Results of the present study shows that a minimum 2-week program including micro wave diathermy and Blackburn exercises (Rotator Cuff strengthening exercises) reduces shoulder pain and improves ROM and in turn function in persons with partial thickness rotator cuff injury.

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