



Faculty of Medicine  
**University of Dhaka**

## **EFFECTIVENESS OF SCAPULAR STRETCHING VERSUS HIGH GRADE MOBILIZATION FOR THE PATIENT WITH ADHESIVE CAPSULITIS**

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October, 2019

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**EFFECTIVENESS OF SCAPULAR STRETCHING VERSUS HIGH GRADE MOBILIZATION FOR THE PATIENT WITH ADHESIVE CAPSULITIS**

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## **DECLARATION**

I declare that the work presented here is my own. All sources used have been cited appropriately. Any mistakes or inaccuracies are my own. I also decline that for any publication, presentation or dissemination of information of the study. I would bound to take written consent from the Department of Physiotherapy, BHPI.

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## Acknowledgement

In the name of ALLAH, most merciful and most gracious. It would not have been possible to complete this research without the help and support of kind people around me, only some of whom it is possible to give particular mention here.

I would like to express the deepest appreciation to my supervisor Associate professor of BHPI, Senior consultant & Head, Department of Physiotherapy, CRP, Savar **Mohammad Anwar Hossain** who has the attitude and the substance of a genius: he continually and convincingly conveyed a spirit of adventure in regard to research, and an excitement in regard to teaching. Without his guidance and persistent help this research would not have been possible.

I would like to express my gratitude to **Professor Md Obaidul Haque**, Head of Physiotherapy Department, Vice Principal, BHPI, CRP, Savar for recommend me to begin the study procedure and for giving me the courageous to conduct the study.

I am glad to acknowledge **Md. Shofiquil Islam**, Assistant Professor, Department of Physiotherapy, BHPI, who dedicatedly taught us Research Methodology subject and supervised us to accomplish the Research Project from the very beginning. **Ehsanur Rahman**, Assistant Professor, Department of Physiotherapy, BHPI, **Kazi Md. Amran Hossain**, Lecturar, Department of Physiotherapy, BHPI, for giving me their valuable times to critically review my project and guide me to overcome the limitations.

I would like to thanks all physiotherapy staff and interns at Physiotherapy musculoskeletal unit for helping me during data collection and treating patient for this project.

I would like to thank to all participants of the study for their enormous co-operation. My special thanks to my friends Tofayel, Sumaiya, Binty, Sheema, Trisha, Koushi, Fabiha, Sohel, Monir for their continuous suggestions and supports to taking challenges and that have inspired me throughout the project.

## Acronyms

BHPI	Bangladesh Health Professions Institute
CRP	Centre for the Rehabilitation of the Paralysed
MS	Musculo-skeletal
NSAID	Nonsteroidal Anti Inflammatory Drug's
HGMT	High Grade Mobilization Technique
LGMT	Low Grade Mobilization Technique
PT	Physiotherapy
RCT	Randomized Control trial
ROM	Range of Motion
TENS	Transcutaneous Electrical Nerve Stimulation
UST	Ultrasound Therapy
NPRS	Numeric Pain Rating Scale
WHO	World Health Organization

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## Abstract

**Purpose:** The purpose of the study was to explore the effectiveness of Scapular stretching with conventional physiotherapy versus High grade mobilization with conventional physiotherapy for the patient with Adhesive capsulitis.

**Objectives:** To compare pain intensity at Abduction, Lateral rotation, Medial rotation, Rest, lying in affected side, Different functional position of shoulder and ROM in Flexion, Abduction, Lateral rotation, Medial rotation before and after Scapular stretching with conventional physiotherapy and High grade mobilization with conventional physiotherapy for the Patients with adhesive capsulitis.

**Methodology:** Fourty two patients with adhesive Capsulitis were randomly selected from outdoor musculo-skeletal unit, CRP and then 21 patients with Adhesive Capsulitis were randomly assigned to Scapular stretching with conventional physiotherapy group and 21 patients to the High grade mobilization with conventional physiotherapy group for this randomize control trial study. As The study was a single blinded study which has been conducted at musculoskeletal department of CRP, Savar. Numeric Pain Rating Scale was used to measure pain intensity in different functional position and Goniometer to measure ROM. Wilcoxon test and paired 't' test is done to find out effectiveness in within group and Man Whitney U test and Unpaired 't' test is done to compere the effectiveness in between two groups.

**Results:** In this study in Wilcoxon statistics Scapular stretching found very effective to decrease pain in NPRS in Scapular stretching group and High grade mobilization also found effective to decrease pain in NPRS in High grade mobilization group following the significance level ( $P < 0.05$ ). But in the Man Whitney U statistics Scapular stretching found more effective (as most of the calculated U value were less than the table U value)

than High grade mobilization to decrease pain in NPRS following the significance level ( $P < 0.05$ ). To determine the range of motion (ROM) in Paired 't' statistics Scapular stretching and High grade mobilization found effective to increase ROM in separate groups where the significance level was ( $P < 0.05$ ). But in comparison between two groups Unpaired 't' statistics found High grade mobilization more effective (as all of the variables are not significant) than Scapular stretching to increase ROM in the shoulder joint following the significance level ( $P < 0.05$ ).

**Conclusion:** This experimental study shows that each group are separately effective to decrease pain and increase ROM but in comparison Scapular stretching found more effective than High grade mobilization to reduce pain on the other hand High grade mobilization is found more effective than Scapular stretching to increase ROM for the patient with Adhesive Capsulitis.

**Key words:** Adhesive Capsulitis, Scapular stretching, High grade mobilization Conventional physiotherapy.

**1.2 Background**

Adhesive capsulitis which is also known as frozen shoulder, is a condition that is characterized by pain and significant loss of both active range of motion (AROM) and passive range of motion (PROM) of the shoulder (Nath, 2015). Among of all musculoskeletal disease adhesive capsulitis is one of the most common (Yang et al., 2007).

Adhesive capsulitis is a general cause of shoulder pain and disability. It is differentiated by spontaneous onset of shoulder pain associated with progressive limitation of both active and passive gleno-humeral movement (Carette et al., 2005).

Adhesive capsulitis is a common but poorly understood syndrome of painful shoulder stiffness. Duply was first described Frozen shoulder in 1872. He believed that manipulation under anesthesia had a role in its treatment and he used the term peri-arthritis scapulo- humerale to describe it . Codman first used the term frozen shoulder to describe this condition In 1934. He establish that most of cases becomes normal in about two years without any kind of treatment (Griggs et al., 2000).

In 1945, Neviaser generated the term adhesive capsulitis to describe his findings at surgery and autopsy in patients treated for a painful, stiff shoulder. Frozen shoulder or idiopathic adhesive capsulitis, as a condition of unknown etiology characterized by substantial loss of both active and passive shoulder motion that occurs in the absence of a known intrinsic shoulder disorder which was defined by Zuckerman and Cuomo (Griggs et al., 2000).

Adhesive capsulitis (frozen shoulder) is an intrinsic painful condition with continuous restriction or loss of all planes of movement in the shoulder. For shoulder pain and stiffness it is called the main cause. For this condition, the pain and stiffness can limit or

stiffness it is called the main cause. For this condition, the pain and stiffness can limit or restrict the ability to do simple daily activities like wearing dressed, itching back, combing hair, get the moneybag out from the pant (Guler & Kozaoglu, 2004).

Factors that can be the cause of adhesive capsulitis include female gender, age older than 40 years, trauma, immobilization, diabetes, the presence of autoimmune diseases, thyroid disease, stroke, myocardial infarction, cervical spine disorders and reflex sympathetic dystrophy syndrome. Fibrosis of the capsule resulting with progressive, painful loss of active and passive shoulder motion which is characterized as Idiopathic (primary) adhesive capsulitis (Guler & Kozaoglu, 2004).

There are three stages of this disease: Stage I (painful stage); main complain is pain usually lasting 2–9 months. In Stage II (frozen stage); pain gradually decreases but stiffness is marked lasting 4–12 months. In Stage III (thawing phase); pain resolves and improvement in range of motion (ROM) appears (Guler & Kozaoglu, 2004).

Adhesive capsulitis of the shoulder is a common affliction, occurring 2–5% of the general adult population and up to 20% of patients with diabetes. An average general practice list of 6250 patients in England would expect to see 15 to 16 new cases each year (Shah & Lewis, 2007). The annual incidence of adhesive capsulitis in the world is 3% to 5% in the general population and up to 20% in people with diabetes and the etiology and pathology of this syndrome remains enigmatic (Vermeulen et al., 2006).

About 3% of European people develop adhesive capsulitis in their lifetime. There is no known cause that adhesive capsulitis is associated with certain conditions, like insulin-dependent diabetes. Some people with adhesive capsulitis may get better recover over a period of 18-24 months. In other cases, symptoms can be present for several years. Studies suggest that sometimes about 50% of people with adhesive capsulitis can experience symptoms up to seven years after the condition starts. However, it is possible to shorten the period of disability by taking appropriate treatment (Captuli, 1999).

In physical therapy, a variety of interventions are used; these include heat or ice applications, ultrasound, interferential therapy, transcutaneous electrical nerve stimulation (TENS), proprioceptive neuromuscular facilitation (PNF) techniques, active and passive range-of-motion (ROM) exercises, shoulder girdle muscle stretching and mobilization techniques ( Bulgen et al.,1984).

A recent systematic review of the effectiveness of physical therapy interventions for shoulder pain, proved that there is no evidence that physical therapy without accompanying interventions, such as corticosteroid injections, is benefit for adhesive capsulitis. The authors of this review stressed the need for trials of physical therapy interventions for specific clinical conditions associated with shoulder pain (Green et al.,2003).

Although adhesive capsulitis is usually considered as a self-limiting condition that can be treated with physical therapy, to restore the normal extensibility of the shoulder capsule, passive stretching of the shoulder capsule in all planes of motion . In many physical therapy programs, mobilization techniques are an important part of the intervention. Mobilization techniques can be performed as physiologic movements or accessory movements (Mangus et al.,2002).

Physiologic movements at the glenohumeral joint are movements of the humerus in the different planes (eg, flexion, extension, abduction, adduction, external rotation, and internal rotation). Accessory movements are movements that are passively induced by a therapist and consist of rolling, gliding (or sliding), spinning, and distraction within the joint. The intensity of the mobilization techniques with rhythmic oscillatory movements usually is categorized according to the 5-grade classification system of Maitland (Mangus et al.,2002).

## **1.2 Rationale**

The aim of the study was to find out effectiveness of scapular stretching versus high grade mobilization for the patient with Adhesive Capsulitis. Literature shows that, Patients with Adhesive Capsulitis exhibit significant deficits in shoulder kinematics, including shoulder elevation and upward scapular rotation. Jewell and colleagues Pt (2000), suggested in their meta-analysis of physical therapy interventions for Adhesive Capsulitis syndrome that joint mobilization and exercise were the most effective interventions. In the field of research in physiotherapy, hasn't encoded any research on effectiveness of scapular stretching versus high grade mobilization for the patient with Adhesive Capsulitis. There are some achievements in overall Physiotherapy intervention in Adhesive capsulitis but experts suggests that scapular stretching and high grade glenohumeral mobilization is one of the important interventions for this.

The purpose of this study is to compare the effectiveness of scapular stretching with conventional physiotherapy and glenohumeral high grade mobilization with conventional physiotherapy for the patient with Adhesive capsulitis. There were some research articles published about physiotherapy intervention for patient with Adhesive capsulitis, but scapular stretching versus high grade mobilization for the patient with Adhesive Capsulitis is not so focused among them. So, in this study "Effectiveness of scapular stretching versus high grade mobilization for the patient with Adhesive Capsulitis will give the evidence. However, research helps to improve the knowledge of health professionals, as well as develops the profession. The results of the study may help to guide physiotherapists to give evidence based treatment in patient with Adhesive capsulitis, which will be beneficial for both the patient with Adhesive Capsulitis and for developing the field of physiotherapy profession.

## **1.3 Aim and Objectives**

### **1.3.1 Aim**

The aim of this study is to compare the Effectiveness of Scapular Muscle Stretching Versus High Grade Mobilization along with Conventional Physiotherapy for the patient with Adhesive Capsulitis.

### **1.3.2 Objectives**

#### **General objective**

- To identify the effectiveness of scapular stretching versus high grade mobilization for the patient with Adhesive Capsulitis.

#### **Specific objective**

- To explore socio-demographic (age, gender, marital status, family type, living area, educational status) characteristics of patients with Adhesive capsulitis.
- To find out the activity limitation for patients with Adhesive capsulitis.
- To evaluate severity of pain after introducing scapular stretching and high grade mobilization for the patient with Adhesive Capsulitis.
- To measure Improvement of Range of Movement (ROM) for patients with Adhesive capsulitis.
- To compare pain intensity at different shoulder movement before and after conventional physiotherapy with scapular stretching and conventional physiotherapy with high grade mobilization for the patient with Adhesive capsulitis.
- To evaluate pain intensity during sleeping in affected side before and after conventional physiotherapy with scapular stretching and conventional physiotherapy with high grade mobilization for the patient with Adhesive capsulitis.

## **1.4 Hypothesis**

### **1.4.1 Null hypothesis**

$$H_0 : \mu_1 - \mu_2 = 0$$

where,

$H_0$  = the null hypothesis,

$\mu_1$  = the sample mean of scapular stretching group

$\mu_2$  = the sample mean of high grade mobilization group

Scapular stretching exercise with conventional physiotherapy is less effective than high grade mobilization with conventional physiotherapy for the patient with Adhesive capsulitis.

### **1.4.2 Alternative hypothesis**

$$H_a : \mu_1 - \mu_2 \neq 0$$

where,

$H_a$  = the null hypothesis,

$\mu_1$  = the sample mean of scapular stretching group

$\mu_2$  = the sample mean of high grade mobilization group

Scapular stretching exercise with conventional physiotherapy is more effective than high grade mobilization with conventional physiotherapy for the patient with Adhesive capsulitis.



## **1.5 Operational definition**

### **1.5.1 Adhesive Capsulitis**

Adhesive capsulitis is a common, painful condition of the shoulder that is associated with loss of range of motion in the glenohumeral joint. It results from contraction of the glenohumeral joint capsule and adherence to the humeral head. The term „frozen shoulder“ commonly used to describe adhesive capsulitis and other conditions associated with loss of range of motion at the joint. Although adhesive capsulitis is often self-limited, it can persist for years and may never fully resolve.

### **1.5.2 Conventional physiotherapy**

Physiotherapeutic interventions that are widely accepted and commonly practiced by medical community. The researcher formulated a list of evidence based physiotherapy interventions of Adhesive Capsulitis and provided those to the physiotherapist to mark the interventions commonly used as conventional physiotherapy for Adhesive capsulitis. Capsular stretching, Accessory movements, pendulum exercise, pulley exercise, Infra-red radiation and Ultrasound were the most commonly used interventions, the frequency of use was 100%, Movement with mobilization and oral NSAID were the second most commonly used interventions and the frequency was 75-99% and corticosteroid injection were the partially used interventions and the frequency of use was 25-49%.

### **1.5.3 Scapular muscles stretching exercise**

Researcher developed a parameter of stretching exercise of scapular muscles based on expert's opinion and Some study programme for enhancing glenohumeral rhythm and joint mobility along with strengthen the muscles performing particular joint play. It also proved that stretching of scapular muscles help to reduce the pain intensity around the shoulder girdle and increase scapula-thoracic motion.

#### **1.5.4 High grade mobilization**

The High Grade Mobilization was developed by Geoffrey Maitland. The application of the Maitland concept can be on the peripheral or spinal joints. This technique combines with 5 grade where grades III & IV consider as a high grade mobilization. Higher grades are used to stretch the joint capsule and passive tissues which support and stabilize the joint so increase range of movement.

Adhesive capsulitis is a condition of unknown etiology characterized by a progressive loss of both active and passive shoulder motion (Yang et al., 2007).

It is characterized by pain, stiffness, and limited the function of glenohumeral joint, which adversely affects the total upper extremity. Patients mainly describe onset of shoulder pain with a loss of different motion. The most common limitations in range of motion are lateral rotation, abduction and medial rotation. About 70% of adhesive capsulitis patients are women; however, males with adhesive capsulitis are at greater risk for longer recovery and greater disability(Kirkley et al., 2005).

Although the exact pathophysiologic cause of this pathology remains unknown, there are two types identified in the literature: one is idiopathic and the other is secondary adhesive capsulitis. Idiopathic (“primary”) adhesive capsulitis occurs spontaneously without having a specific precipitating event. It results from a chronic inflammatory response along with fibroblastic proliferation, which may cab be an abnormal response from the immune system. Secondary adhesive capsulitis mainly occurs after a shoulder injury or surgery, or may be associated with another condition such as diabetes, rotator cuff injury, cerebrovascular accident (CVA) or cardiovascular disease, which needs prolong recovery and limit outcomes (Kirkley et al., 2005).

In a study found that, 19% of older diabetic patients had adhesive capsulitis; however, now it take place the incidence as high as 71% when patients with pre-diabetes are included. Both Type I and II diabetics are susceptible to adhesive capsulitis; unfortunately, the patients with diabetics have worse functional outcomes as measured by disability and quality of life questionnaires compared to non-diabetics patient with adhesive capsulitis (Laska & Hanning, 2010). adhesive capsulitis is also a common complication following stroke, occurring in 25% of patients within 6 months in USA (Riley et al., 2006).

In a profile study of 32 patients who have adhesive capsulitis, diabetes and heart disease were more prevalent in those suffering from adhesive capsulitis than a control group (McNeely et al., 2005).

In the literature three stages of frozen shoulder have been described, they are: painful stage, stiffness or “frozen” stage, and recovery or “thawing” stage, with the average length of symptoms lasting for 30 months. The average range of motion in frozen-shoulder patients is 98° of abduction, 117° of flexion, 33° lateral rotation and 18° of medial rotation with the shoulder abducted to 90°. While the “stiffness stage” is the longest among of the stages, adhesive capsulitis can be reversible in the acute pain stage (Thomas et al., 2007).

In addition to limited range of motion, altered shoulder motion can be occurred by the imbalance of shoulder complex muscle . The upper trapezius needs to be more activated than the lower trapezius and creating an imbalance of the scapular stabilizers that leads to increase elevation and upward rotation of the scapula during elevation of the glenohumeral joint in both the frontal and sagittal planes. Patients with adhesive capsulitis the upper trapezius have higher EMG ratios than the lower trapezius during arm elevation when compared to asymptomatic subjects, indicating a muscular imbalance (Thomas et al., 2007).

The literature found that the progression of adhesive capsulitis depends on three overlapping clinical phases: Acute/freezing/painful phase- where the gradual onset of shoulder pain at rest with sharp pain at extremes of motion, and pain at night causes sleep interruption which may last anywhere from 3-9 months. Adhesive/frozen/stiffening phase- Pain starts to decrease, progressive loss of glenohumeral motion in capsular pattern. Pain occurs only at extremes of movement. This phase may occur at around 4 months and last till about 12 months. Resolution/thawing phase- Spontaneous, progressive improvement is found in functional ROM which can last anywhere from 1 to 3.5 years (Wirth et al., 2011).

Patients with adhesive capsulitis exhibit significant deficits in shoulder kinematics, including increased elevation and upward scapular rotation. Eventually, patients with adhesive capsulitis develop the characteristic “shrug sign” during glenohumeral joint elevation, where the scapula migrates upward prior to 60 degrees of abduction. This indicates compensation due to lack of capsular extensibility and also change in the central nervous system motor patterning due to maladaptive movement (Morrison et al., 2005).

Patients with adhesive capsulitis may also develop adaptive postural deviations such as protruded shoulders or increased thoracic kyphosis because the shoulder complex remains limited and painful. Adhesive capsulitis is mainly related to the shortening and fibrosis of the joint capsule (ligaments) around the shoulder joint. Nevasier first reported that thickening and contraction of the shoulder capsule as well as inflammatory changes through histologic analysis (Ludewig & Reynolds, 2009).

The contracture of the shoulder ligaments actually decreases the volume of the capsule, thus limits the range of motion. It is likely that limitations in range of motion and the pain associated with adhesive capsulitis are not only related to capsular and ligamentous tightness, but also fascia restrictions, muscular tightness, and trigger points within the muscles. Physical therapists can address impairments and limitations associated each of these contributors to the pathology of adhesive capsulitis with a variety of treatment methods (Thomas et al., 2007).

Physical therapy interventions for adhesive capsulitis are joint mobilization and exercise. Physical therapy is the most effective interventions. Non-aggressive physical therapy interventions are likely more effective than aggressive or intensive interventions (Roubal et al., 2012).

Physical therapy interventions used with patients with adhesive capsulitis frequently include modalities, manual techniques, and therapeutic exercise. While some of these interventions have been studied in patients with adhesive capsulitis,

It is important to remember that not all clinical interventions have the evidence of supporting their use in specific patient populations. Recall that evidence-based practice is best defined as the use of the best evidence available along with clinical experience while taking into consideration the unique needs of an individual patient (Bunker & Anthony, 2005).

The rationale for using modalities in patients with adhesive capsulitis includes pain relief and affecting the scar tissue (collagen). However, the use of modalities such as ultrasound, massage, iontophoresis, and phonophoresis has not been proven to be beneficial in treatment of patients with adhesive capsulitis. Interestingly, transcutaneous electrical stimulation (TENS) has been shown to significantly increase range of motion more than heat combined with exercise and manipulation (Bal et al., 2008)

Research also suggests that low-power laser therapy is more effective than a placebo for treatment of patients with adhesive capsulitis. Nowadays, deep heating diathermy combined with stretching was shown to be more effective than superficial heating for treating adhesive capsulitis patients (Vermeulen et al., 2006).

As adhesive capsulitis involves fibrotic changes to the capsuloligamentous structures, continuous passive motion (CPM) or dynamic splinting are thought to help elongate collagen fibers. Continuous passive motion (CPM) was recently compared with conventional physiotherapy in 57 patients with adhesive capsulitis. Both groups improved after 4 weeks of treatment; while there was no big difference between the groups, the CPM patients had greater reduction in pain levels (McHardy et al., 2008).

In many physical therapy programs, mobilization techniques play an important role of the intervention. Mobilization techniques can be performed as physiologic movements or accessory movements . Physiologic movements at the glenohumeral

joint are the movements of humerus in the cardinal planes (eg, flexion, extension, abduction, adduction, external rotation, and internal rotation). Accessory movements are the movements that are passively done by a therapist and consist of rolling, gliding (or sliding), spinning, and distraction within the joint. The intensity of the mobilization techniques with rhythmic oscillatory movements usually is categorized according to the 5-grade classification system of Maitland (Mangus et al.,2002).

From 1984 to 2004, 5 controlled studies describing the effectiveness of mobilization techniques in subjects with adhesive capsulitis of the shoulder were published. In one randomized controlled trial comparing passive mobilization techniques (3 times per week for 6 weeks, intensity unknown) with intra-articular steroid injections, ice therapy followed by PNF, or no therapy, few long-term (6 months) advantages of any of the treatment regimens over no treatment were seen (Diercks & Stevens,2004).

. In 1 of 2 studies comparing the effects of passive mobilization techniques (2 or 3 times per week for 4 weeks, up to grade IV accessory motions according to the Maitland classification system) in addition to active exercises with active exercises alone, a positive effect regarding passive abduction was seen after 4 weeks in the mobilization group, whereas in the other study, no additional effect of passivemobilization techniques (once per week for 5–8 weeks, grades III and IV according to the Maitland classification system, without further specification of techniques) could be demonstrated (Diercks & Stevens,2004).

In another study comparing local steroid injections, mobilization (for 4–6 weeks, without further specification), and a combination of both, local steroid injections proved to be as effective as mobilization alone or in combination after 6 weeks and 6 months. In a study with a quasi-experimental design, subjects were treated with intensive physical rehabilitation (a standardized treatment protocol executed by a physical therapist of active exercises up to and beyond the pain threshold, passive stretching and manipulation of the glenohumeral joint, and home exercises aimed at stretching and maximal reaching) or supervised neglect(Vermeulen et al,2000).

Whenever necessary, anti-inflammatory medication (NSAID) or analgesics were prescribed to patients in both groups. There was no information provided about the duration or intensity of the mobilization techniques. Supervised neglect proved to be superior to passive mobilization and stretching with regard to the functional status and the speed of recovery. In addition to controlled clinical trials, one uncontrolled study described a positive and good effect of grade III and IV mobilization techniques (2 times per week for 12 weeks) after 3 months in 7 subjects with adhesive capsulitis (Vermeulen et al,2000).

Dynamic splinting was also recently evaluated in patients with Stage 2 (“frozen stage”) adhesive capsulitis. The experts noted better outcomes when physical therapy was combined with the protocol, although there was no statistically significant difference between standard physical therapy or the Dynamic splint alone. The concept of total end-range time (TERT) has also been described in the treatment of patients with adhesive capsulitis, suggesting maintenance of a stretch in the maximally lengthened range of motion for a total of 60 minutes per day (Bunker, 2011).

As stated previously, joint mobilization is an effective intervention for adhesive capsulitis. Several studies have demonstrated the effectiveness of joint mobilization in adhesive capsulitis patients. In particular, posterior glide mobilization was determined to be more effective than anterior glide for improving external rotation in patients with adhesive capsulitis (Mantone et al., 2006).

Chang (2008), randomly assigned 20 consecutive adhesive capsulitis patients for physical therapy interventions including grade III stretch mobilization with distraction at end range of abduction and external rotation using either an anterior or posterior directed of linear translation. After 3 sessions, the posterior mobilization group had significantly improved their external rotation range of motion by 31 degrees versus only 3 degrees in the anterior mobilization group.



In addition, high-grade joint mobilization techniques were more effective than low-grade mobilization in improving glenohumeral mobility and reducing disability in a recent randomized controlled trial of treatment of patients with adhesive capsulitis (Sattar&Luqman,2007).

Myofascial trigger points, focal areas of increased tension within a muscle may be present around the shoulder complex in patients with adhesive capsulitis. In Travel and Simons' classic textbook, the authors describe how the subscapularis muscle in particular is referred to as the “Frozen Shoulder” muscle because trigger points in the subscapularis cause limitations in shoulder elevation and external rotation. The Spray and Stretch technique for the subscapularis and latissimusdorsi muscle may be effective at reducing trigger point irritation, pain, and helps to gradually lengthen the tight muscles (Critchley et al., 2005).

Soft tissue mobilization and deep friction massage may be beneficial for adhesive capsulitis patients. Deep friction massage using the Cyriax method was shown to be superior to superficial heat and diathermy in treatment of patients with adhesive capsulitis (McNeely et al., 2008).Recently, instrument-assisted soft tissue mobilization (IASTM) as used in such interventions as Graston Technique, ASTYM, has become increasingly popular in physical therapy practice. The inferior glenohumeral capsule and pectoral fascia are often restricted, also the insertion of the latissimusdorsi and subscapularis. IASTM improves fibroblast proliferation and promote normal collagen alignment,although no studies have evaluated outcomes of the use of IASTM on patients with adhesive capsulitis (Bulgen et al., 2006).

Probably the most commonly prescribed therapeutic exercises for adhesive capsulitis are active-assisted range of motion (AAROM) exercises. These typically involve the patient using the uninvolved arm, or using equipment such as rope-and-pulley, wand/T-bar, or exercise balls. Generally, these exercises are performed for flexion, abduction and external rotation ranges of motion which are frequently the most limited (Kazemi, 2009).

Griggs and colleagues found that physical therapy including 4 self-stretches (passive flexion, horizontal adduction, internal rotation behind the back with the unaffected arm, and external rotation at 0° using a cane) performed at least twice a day may produce a satisfactory outcome in 90 percent of stage 2 adhesive capsulitis patients. These patients significantly improved in pain, range of motion, and shoulder function. Although having this limitation, the authors suggested that more aggressive treatments such as manipulation are rarely necessary (Ludewig & Braman, 2011).

Resistive exercises typically include strengthening of the scapular stabilizers and rotator cuff, when range of motion has improved enough for strengthening to be an appropriate intervention. Muscles prone to weakness in a variety of shoulder dysfunctions include the lower trapezius, serratus anterior, and infraspinatus. Patients with adhesive capsulitis have significantly weaker lower trapezius muscles. It is important that therapists facilitate normal movement patterns rather than allowing pathological adaptive patterns to prevail during movement for the sake of completing an exercise (Jobe, 2012).

If a patient demonstrates a „shrug sign“ while performing resisted abduction, the exercise should be stopped and modified with less resistance or be attempted in an altered position. The “Shoulder Sling” exercise can be used to help re-train the initial setting phase of the rotator cuff when initiating abduction. The Shoulder Sling exercise for a “rotator cuff set” is considered analogous to a “quad set” exercise in the lower extremity. This movement simulates the initiation of abduction as well as the depression and stabilization functions of the rotator cuff, which occur prior to and during abduction. Anecdotally, this exercise helps reduce early activation of the upper trapezius during abduction in patients demonstrating a shrug sign (Andersen et al., 2005).

Although no studies have been published on the efficacy of taping (such as rigid strapping tape or kinesiological taping [KT]) with patients who have adhesive capsulitis, taping may be helpful in reducing pain and providing tactile cues through proprioceptive and afferent mechanisms. The mechanisms and efficacy of

taping applications remain unclear. Because adhesive capsulitis patients often exhibit poor posture and scapular mechanics, KT may provide postural cues and assist with promoting proper scapular motion (Hazleman, 2009).

Non-operative treatment may also include injections directly into the glenohumeral joint. These injections often contain both a corticosteroid and an anesthetic, and can also include saline to distend the capsule, stretching the fibers. When saline is used to distend the capsule, it is known as “distension arthrography” or “hydroplasty”. Corticosteroid injections have been shown to be as effective as exercise for treating frozen shoulder, particularly when provided in the early stages of the pathology (Manske & Prohaska, 2010).

In their systematic review, Blanchard et al. suggested that corticosteroid injections have a greater effect when compared to physical therapy when utilized within the first 6 weeks of treatment, although these differences diminished over time. They noted a moderate effect of corticosteroid injections on pain, external rotation ROM, and disability at 6 weeks, and only small effects after 12 weeks (Trampas & Kitsios, 2006). Distension arthrography is often successfully combined with physical therapy. In fact, therapeutic exercise, including physical therapy, is more effective when combined with a corticosteroid injection (Lin et al., 2009).

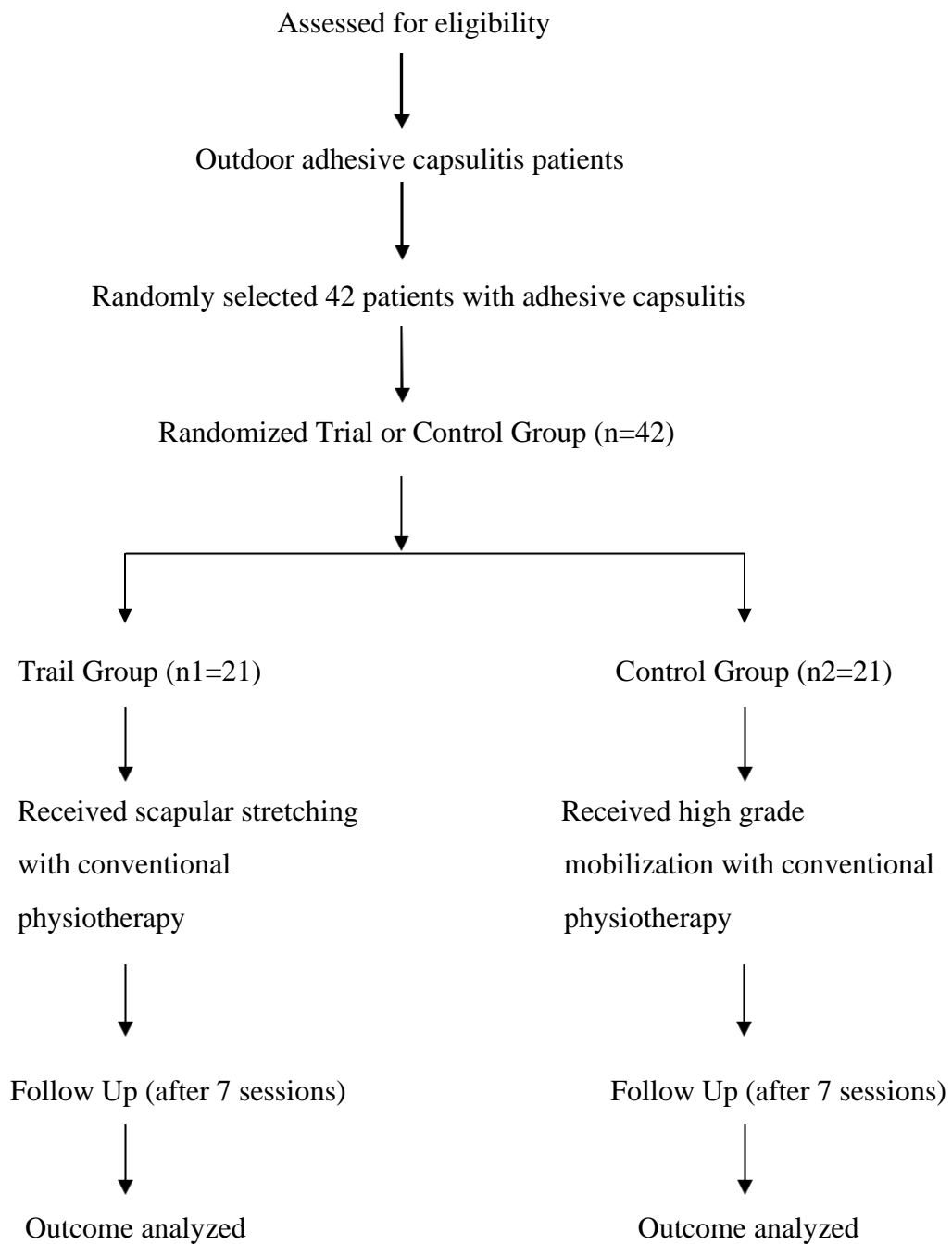
Adhesive capsulitis patients not responding to physical therapy are often treated with manipulation under anesthesia (MUA), where the shoulder is forcefully moved by the physician into the full ranges of motion, breaking the adhesions located within of the shoulder capsule. In addition to increased risk of complications from anesthesia, MUA can cause severe damage including labral tears, tendon tears, fractures, and ruptures of the shoulder ligaments. Most recently, steroid injections with distention arthrography have been shown to be as effective as MUA and are therefore the recommended course of treatment because of the risks associated with MUA (Dodenhoff et al., 2014).

This research was a clinical trial design to evaluate the effectiveness of scapular stretching versus high grade mobilization in patients with adhesive capsulitis. To identify the effectiveness of this treatment approach Numeric Pain Rating Scale(NPRS) and Goniometer was used as measurement tools for measuring the pain intensity in several functional positions.

### **3.1 Study Design**

The study was conducted by using a quantitative clinical trial design with two different subject groups. Clinical trial design is a method of testing hypothesis by which cause and effect can be established. The study was true experimental between different subject designs. Both groups received a common treatment regimen. In this study, one group received scapular stretching along with conventional physiotherapy and another group received high grade mobilization along with conventional physiotherapy. A pre-test (before exercise) and post-test (after exercise) was administered with each subject of both groups to compare the pain effects, and functional ability and range of motion before and after the treatment. The design could be shown by flowchart –

### Flowchart of the phases of randomized clinical trial



A flowchart for a clinical trial of a treatment program including scapular stretching along with conventional physiotherapy and high grade mobilization along with conventional physiotherapy for patients with adhesive capsulitis.

### **3.2 Study Site:**

The study area was Musculoskeletal Outpatient Unit of Physiotherapy Department of Centre for the Rehabilitation of the Paralysed (CRP), Savar, Dhaka.

### **3.3 Study Duration**

From February 2019 to August 2019

### **3.4 Study Population**

The study population was the patients diagnosed as adhesive capsulitis in the Musculoskeletal Unit of Physiotherapy Department at CRP, Savar, Dhaka.

### **3.5 Sample Size**

In this study, 42 participants were selected according to inclusion and exclusion criteria. 21 participants were in scapular stretching group and 21 participants were in high grade mobilization group.

### **3.6 Sampling**

Simple Random Sample Technique are used in this study. Subjects, who met the inclusion criteria, were taken as sample in this study. 42 patients with adhesive capsulitis were selected from outpatient musculoskeletal unit of physiotherapy department of CRP, Savar and then 21 patients were assigned to scapular stretching group for the treatment approaches of scapular stretching along with conventional physiotherapy and 21 patients to the high grade mobilization group for high grade mobilization along with conventional physiotherapy treatment. The samples were given numerical number E1, E2, E3 etc. for experimental group and C1, C2, C3 etc. for the control group. The study was a single blinded technique.

### **3.7 Inclusion Criteria**

- Patient who is diagnosed by adhesive capsulitis. Because this research is based on only the patient with adhesive capsulitis (McNeely et al., 2004).
- Both male and female are included. It helped to identifying the gender who is more affected by adhesive capsulitis (Thomas et al., 2007).

- Age group: 20-80 years old of both sexes. Under 20 years of age it is unfamiliar to affected by adhesive capsulitis and above 80 years there occurs no improvement by physiotherapy treatment (Ludewig& Reynolds, 2009).
- Subject who are willingly participate.
- Patients who are receiving to Physiotherapy from musculoskeletal unit of CRP.

### **3.8 Exclusion Criteria**

Exclusion criteria was set up according to the guideline of adhesive capsulitis by (Dodenhoff et al., 2014).

- Any history of recent surgery or fracture of humerus. Because of this patient can not take any physiotherapy treatment.
- Any history of pathological condition (malignancy, heart disease etc). There is a chance for fracture or decline the disease.
- The participants who had other deformity of the affected shoulder. It will not bring the expected effect as wanted.
- Any previous or current history of psychiatric or psychological treatment.
- Any intra-articular or epidural injection in the last 6 months.

### **3.9 Method of data collection**

#### **3.9.1 Data collection tools**

A written questionnaire, pen, paper and a Goniometer were used as data collection tools in this study.

### **3.9.2 Questionnaire**

The questionnaire was developed under the advice and permission of the supervisor following certain guidelines. There were ten close ended questions with Numeric Pain Rating Scale (NPRS) with some objective questions which were measured by examiner and each question was formulated to identify the change of pain and ROM with each activity.

### **3.10 Measurement tool**

#### **3.10.1 Numeric Pain Rating Scale (NPRS)-**

In this study researcher used Numeric Pain Rating Scale for measuring the intensity of pain. The NPRS is a simple and accurate way of subjectively assessing pain along a continuous visual spectrum. NPRS consists of a straight line with marked from 0 to 10 on which the individual being assessed marks the level of pain. The ends of the straight line are the extreme limits of pain with 0 representing no pain and 10 representing the worst pain ever experienced.

#### **3.10.2 Goniometer**

In this study researcher used Goniometer for measuring the Range of Movement (ROM) of shoulder Flexion, Lateral rotation, Abduction and Medial rotation. The Goniometer is a simple and accurate way of objective assessment of ROM.

### **3.11 Data collection procedure**

The study procedure was conducted through assessing the patient, initial recording, treatment and final recording. After screening the patient at department, the patients were assessed by qualified physiotherapist. Seven sessions of treatment was provided for every subject. Forty two subjects were chosen for data collection according to the inclusion criteria. The researcher divided all participants into two groups Scapular stretching group and High grade mobilization group. Scapular stretching group received scapular stretching with conventional physiotherapy and High grade mobilization group received high grade mobilization with conventional physiotherapy. Data was gathered through a pre-test, intervention and post-test and the data was collected by using a written questionnaire form which was formatted by the researcher.



Pre test was performed before beginning the treatment and the intensity of pain and ROM of shoulder movements were noted with NPRS score and degrees on questionnaire form. The same procedure was performed to take post-test at the end of six session of treatment. Researcher gave the assessment form to each subject before starting treatment and after six session of treatment and instructed to put mark on the line of NPRS according to their intensity of pain. The researcher collected the data both in scapular stretching and high grade mobilization group in front of the qualified physiotherapist in order to reduce the biasness. At the end of the study, specific test was performed for statistical analysis.

### **3.12 Intervention**

A common intervention program was executed for both groups as conventional physiotherapy, it includes- . Capsular stretching, Accessory movements, pendulum exercise, pulley exercise, Infra-red radiation and Ultrasound, which are the most frequently, used interventions. In this study, the experimental group was treated with scapular stretching in addition with conventional physiotherapy and treated with scapular stretching in addition with conventional physiotherapy and control group was treated with high grade mobilization in addition with conventional physiotherapy. Clinical physiotherapist applied the scapular stretching and high grade mobilization and the conventional physiotherapies. Each group got 7 sessions of treatment. There is no evidence of exact repetition for stretching and strengthening exercise, but in practice expert opinion suggests that 7 sessions is minimal enough for patients with adhesive Capsulitis to get more effectiveness.

### **3.13 Ethical consideration**

The whole process of this research project was done by following the Bangladesh Medical Research Council (BMRC) guidelines, Institution Review Board (IRB) and World Health Organization (WHO) Research guidelines. The proposal of the dissertation including methodology was approved by Institutional Review Board and obtained permission from the concerned authority of ethical committee of Bangladesh Health Professions Institute (BHPI). Again before the beginning of the data collection, the researcher obtained the permission ensuring the safety of the participants from the

concerned authorities of the clinical setting and was allotted with a witness from the authority for the verification of the collected data. The researcher strictly maintained the confidentiality regarding participant's condition and treatment.

### **3.14 Informed Consent**

The researcher obtained consent to participate from every subject. A signed informed consent form was received from each participant. The participants were informed that they have the right to meet with outdoor doctor if they think that the treatment is not enough to control the condition or if the condition become worsen. The participants were also informed that they were completely free to decline answering any question during the study and were free to withdraw their consent and terminate participation at any time. Withdrawal of participation from the study would not affect their treatment in the physiotherapy department and they would still get the same facilities. Every subject had the opportunity to discuss their problem with the senior authority or administration of CRP and have any questioned answer to their satisfaction.

### **3.15 Data analysis**

In order to ensure that the research have some values, the meaning of collected data has to be presented in ways that other research workers can understand. In other words the researcher has to make sense of the results. As the result came from an experiment in this research, data analysis was done with statistical analysis. All participants were code according to group to maintain participant's confidentiality. All subjects of both Scapular stretching and High grade mobilization group score their pain intensity on neumeric pain rating scale before starting treatment and after completing treatment. Reduction of pain intensity for both groups and improvement of ROM of different movements of shoulder are the differences between pre-test and post-test score. Experimental studies with the different subject design where two groups are used and each tested in two different conditions which should be analyzed with non-parametric "Man Whitney U" test and parametric Unpaired 't' test. Where the significant level of Scapular stretching and High grade mobilization group was found out by using "Wilcoxon" test and Paired 't' test. To test the hypothesis both test is done on SPSS version 22.

### **3.16 Statistical analysis**

#### **3.16.1 Mann Whitney U test**

Mann-Whitney U test is a non-parametric test that is simply compares the result obtained from the each group to see if they differ significantly.

#### **Assumption**

- All the observations from both groups are independent of each other.
- The responses are ordinal
- Under the null hypothesis  $H_0$ , the distribution of both populations are equal.

**Formula:** test statistic is follows:

$$U = n_1 n_2 + \frac{n_x(n_x+1)}{2} - T_x$$

Where,

$n_1$  = The number of subjects in experimental group

$n_2$  = The number of subjects in control group

$T_x$  = The larger rank total

$n_x$  = The number of subject in the group with large rank total

### **Level of Significant**

In order to find out the significance of the study, the researcher calculated the “p” value. The p values refer the probability of the results for experimental study. The word probability refers to the accuracy of the findings. A p value is called level of significance for an experiment and a p value of <0.05 was accepted as significant result for health service research. If the p value is equal or smaller than the significant levels, the results are said to be significant.

**Calculation:** Mann Whitney U for pain during abduction in NPRS in scapular stretching group,

Where,

$n_1$  = The number of subjects in scapular stretching group (21).

$n_2$  = The number of subjects in high grade mobilization group (21).

$T_x$  = The larger rank total (531).

$n_x$  = The number of subject in the group with large rank total (21).

$$\begin{aligned}U &= 21 \times 21 + \frac{21(21+1)}{2} - 531 \\&= 441 + \frac{462}{2} - 531 \\&= 441 + 231 - 531 \\&= 141\end{aligned}$$

In this way Mann Whitney U test is done for all the variables in NPRS which is given in a table below:

**Table 1: Analysis of post-test pain in NPRS scale (Between group analysis)**

Variables	U	Mean rank		Sig. value
		Scapular stretching	High grade mobilization	
Pain during abduction.	141	17.71	25.29	0.016*
Pain during Lateral rotation	101	15.81	27.19	0.001*
Pain during Medial rotation.	126.5	17.02	25.98	0.011*
Pain at rest.	66	14.14	28.86	0.000*
Pain during lying in affected side.	123	17.14	24.76	0.011*
Pain during working in job place.	214.5	21.21	21.79	0.868
Pain during carrying weight in affected side.	135	17.43	25.57	0.021*
Pain during wearing cloth.	120	16.71	26.29	0.007*
Pain during off cloth.	164.5	18.83	24.17	0.126
Pain during bathing.	119	16.67	26.33	0.006*

\*= significant, Level of Significance (<0.05)

### 3.16.2 Unpaired 't' test for between group ROM

Unpaired t test was used to compare difference between two means of independent variables. Selection of test of hypothesis was two independent mean differences under independent t distribution.

#### Assumption

- Different and independent variables
- Variables were quantitative
- Normal distribution of the variables

**Formula:** test statistic t (unrelated) is follows:

$$T = \frac{\bar{x}_1 + \bar{x}_2}{s \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

Where,

$\bar{x}_1$  = Mean of scapular stretching group

$\bar{x}_2$  = Mean of high grade mobilization group

$n_1$  = Number of participants in scapular stretching group

$n_2$  = Number of participants in high grade mobilization group

S = Combined standard deviation of both groups

**Calculation:** Unpaired t test for AROM in flexion in ROM in scapular stretching group,

Where,

$\bar{x}_1$  = Mean of scapular stretching group (4.05).

$\bar{x}_2$  = Mean of high grade mobilization group (4.57).

$n_1$  = Number of participants in scapular stretching group (21).

$n_2$  = Number of participants in high grade mobilization group (21).

S = Combined standard deviation of both groups (66.98).

$$\begin{aligned} T &= \frac{4.05 + 4.57}{66.98 \sqrt{\frac{1}{21} + \frac{1}{21}}} \\ &= \frac{8.62}{66.98 \times 0.308606} \\ &= \frac{8.62}{20.67} \\ &= .4168 \end{aligned}$$

In this way Unpaired t test is done for all the variables in ROM both in scapular stretching and high grade mobilization group which is given in a table below:



**Table 2: Analysis of Unpaired t test ROM (Between group analysis).**

<b>Variables</b>	<b>t</b>	<b>Sig. value</b>
AROM in flexion	.417	0.679
PROM in flexion	.327	0.746
AROM in lateral rotation	1.256	0.216
PROM in lateral rotation	.538	0.593
AROM in abduction	.082	0.935
PROM in abduction	.438	0.664
AROM in medial rotation	-.376	0.709
PROM in medial rotation	-.500	0.620

**\*= significant, Level of Significance (<0.05)**

### 3.16.3 Wilcoxon test

Wilcoxon test has been determined to measure the changes or any significant between pretest and posttest within each group.

#### Assumptions

- Ordinal data from a continuous distribution.
- Symmetric population distribution around mean.

**Formula:** test statistic is follows:

$$Z = \frac{T - \frac{N(N+1)}{4}}{\sqrt{\frac{N(N+1)(2N+1)}{24}}}$$

Where,

Z= Value of the Wilcoxon matched pair signed rank test.

N= Total number of the participant.

T= Lowest value of positive and negative rank.

**Calculation:** Wilcoxon test for pain during abduction in scapular stretching group,

Where,

Z= Value of the Wilcoxon matched pair signed rank test.

N= Total number of the participant (21).

T= Lowest value of positive and negative rank (11).

$$\begin{aligned} Z &= \frac{11 - \frac{21(21+1)}{4}}{\sqrt{\frac{21(21+1)(2 \times 21+1)}{24}}} \\ &= \frac{11 - 115.5}{\sqrt{638.0676}} \\ &= \frac{-104.5}{638.0676} \\ &= -4.137 \end{aligned}$$

In this way Wilcoxon test is done for all the variables in NPRS in scapular stretching and high grade mobilization group which is given in a table below:

**Table 3: Analysis of pretest and posttest pain in NPRS (scapular stretching group).**

<b>Variables</b>	<b>Wilcoxon z</b>	<b>Sig. value</b>
Pain during abduction.	-4.137	0.00*
Pain during lateral rotation	-4.137	0.00*
Pain during Medial Rotation	-3.923	0.00*
Pain at Rest.	-4.001	0.00*
Pain during lying in affected side.	-4.053	0.00*
Pain during working in job place.	-3.827	0.00*
Pain during carrying weight in affected side.	-3.923	0.00*
Pain during wearing cloth.	-4.158	0.00*
Pain during off cloth.	-3.946	0.00*
Pain during bathing.	-3.866	0.00*

**\*= significant, Level of Significance (<0.05)**

**Table 4: Analysis of pretest and posttest pain in NPRS (high grade mobilization group).**

<b>Variables</b>	<b>Wilcoxon z</b>	<b>Sig. value</b>
Pain during abduction.	-3.946	0.00*
Pain during lateral rotation	-3.825	0.00*
Pain during Medial Rotation.	-3.866	0.00*
Pain at Rest.	-3.358	0.001*
Pain during lying in affected side.	-4.345	0.00*
Pain during working in job place.	-4.099	0.00*
Pain during carrying weight in affected side.	-3.337	0.001*
Pain during wearing cloth.	-4.062	0.00*
Pain during off cloth.	-3.384	0.001*
Pain during bathing.	-3.866	0.00*

\*= significant, Level of Significance (<0.05)

### 3.16.4 Paired 't' test for within group ROM

Paired t test was used to compare difference between means of paired variables. Selection of test of hypothesis is mean difference under t distribution.

#### Assumption

- Paired variables.
- Variables where quantitative.
- Present population of sample observation follows normal distribution.

**Formula:** test statistics t (paired) is following;

$$t = \frac{\bar{d}}{SE(\bar{d})} = \frac{\bar{d}}{\frac{SD}{\sqrt{n}}}$$

Where,

$\bar{d}$  = Mean of difference (d) between paired values

SE( $\bar{d}$ ) = Standard error of the mean difference

SD = Standard deviation of the differences d

n = Number of paired observation

**Calculation:** Paired t test for AROM in flexion in scapular stretching group,

Where,

$\bar{d}$  = Mean of difference (d) between paired values (-1.47)

SE( $\bar{d}$ ) = Standard error of the mean difference (0.113)

$$t = \frac{-1.47}{0.113}$$

= -13

In this way Paired t test is done for all the variables in ROM in scapular stretching and high grade mobilization group which is given in a table below

**Table 5: Analysis of pretest and posttest ROM (scapular stretching group).**

<b>Variables</b>	<b>t</b>	<b>Sig. value</b>
AROM in flexion	-13.00	0.00
PROM in flexion	-14.013	0.00
AROM in lateral rotation	-12.197	0.00
PROM in lateral rotation	-11.001	0.00
AROM in abduction	-12.568	0.00
PROM in abduction	-10.954	0.00
AROM in medial rotation	-9.413	0.00
PROM in medial rotation	-13.551	0.00

**\*= significant, Level of Significance (<0.05)**

**Table 6: Analysis of pretest and posttest ROM (high grade mobilization group).**

<b>Variables</b>	<b>t</b>	<b>Sig. value</b>
AROM in flexion	-2.500	0.021
PROM in flexion	-2.842	0.010
AROM in lateral rotation	-7.204	0.00
PROM in lateral rotation	-7.678	0.00
AROM in abduction	-9.234	0.00
PROM in abduction	-6.669	0.00
AROM in medial rotation	-10.733	0.00
PROM in medial rotation	-7.004	0.00

**\*= significant, Level of Significance (<0.05)**



### **3.17 Elimination of confounding variables**

Confounding variable has an effect on the study variables which can affect the result of the study. There were some confounding variables in this study such as patient's age, history of taking recent physiotherapy intervention, oral NSAID, steroid injection or other treatment which could influence the result of the study. Researcher found no significant difference between the mean age of two groups and the mean age of control group was 48 years and mean age of experimental group was 53 years, so there was no effect of age which can influence the result. To control the confounding variables, researcher set the inclusion criteria as to include only those subjects who have no history of taking recent physiotherapy intervention, oral NSAID, steroid injection or other treatment.

## 4.1 Baseline demographic variables

<u>Variable</u>	<u>Values</u>
Age (Years) $\pm$ SD	50 $\pm$ 13.27
Gender , no (%)	
Male	27 (64.3%)
Female	15 (35.7%)
Occupations, no (%)	
Farmer	5 (11.9%)
Day labour	1 (2.4%)
Service holder	7 (16.7%)
Garments worker	7 (16.7%)
Driver	0 (00%)
Rickshaw pullar	0 (00%)
Businessman	7 (16.7%)
Unemployed	6 (14.3%)
Housewife	14 (33.3%)
Student	0 (00%)
Others	2 (4.8%)
Marital stutus ,no(%)	
Married	37 (88.1%)
Unmarried	5 (11.9%)

Family type, no (%)	
Nuclear family	11 (26.2%)
Extended family	31 (73.8%)
Living area, no (%)	
Rural	24 (57.1%)
Urban	18 (42.9%)
Religion, no (%)	
Islam	38 (90.5%)
Hindu	4 (9.5%)
Christian	0 (00%)
Buddhist	0 (00%)
Educational level no (%)	
Illiterate	2 (4.8%)
Literate	11 (26.2%)
Primary	6 (14.3%)
Secondary	5 (11.9%)
S.S.C	6 (14.3%)
H.S.C	6 (14.2%)
Graduate	4 (9.5%)
Post Graduate	2 (4.8%)
Monthly family income (BDT) $\pm$ SD	27642 $\pm$ 23695

Table 1: Baseline demographic variables

### **Age of the respondents**

Among the respondents the minimum age was 24 years and maximum age was 80 years. From 21-30 years there was 4 respondents (9.5%), 31-40 years there was 5 respondents (11.9%), 41-50 years there was 15 respondents (35.7%), 51-60 years there was 11 respondents (26.2%), 61-70 years there was 4 respondents (9.5%) and 71-80 years there was 3 respondents (7.1%)

### **Gender of the respondents**

Among the patients 27 was male (64.3%) and 15 patients was female (35.7%)

### **Occupation of the respondents**

Among the patients 5 (11.9%) was farmer, 1 (2.45%) was day labour, 7 (16.7%) was service holder, 7 (16.7%) was businessman, 6(14.3%) was unemployed, 14 (33.3%) was housewife and 2 (4.8%) was from others professions.

### **Marital status of the respondents**

Among the patients 37 were married (88.1%) and 5 patients were unmarried (11.9%).

### **Family type of the respondents**

Among the patients 11 were from nuclear family (26.2%) and 31 were from extended family (73.8%).

### **Living area of the respondents**

Among the patients 24 were from rural area (57.1%) and 18 were from urban area (42.9%).

### **Religion of the respondents**

Among the patients 38 were Islam (90.5%) and 18 were Hindu (9.5%).

### **Educational status of the respondents**

Among the patients 2 were illiterate (4.8%), 11 were literate (26.2%), 6 were primary level (14.3%), 5 were secondary level (11.9%), 6 were SSc level (14.3%), 6 were HSc level (14.3%), 4 were graduate (9.5%) and 2 were post-graduate (4.8%).

### **Affected hand of the respondents**

Among the 21 patient of scapular stretching group 15 were right hand affected (71.4%) and 6 were left hand affected (28.6%), among the 21 patients of high grade mobilization group 10 were right hand affected (47.6%) and 11 were left hand affected (52.4%).

#### **4.2.1 Mann Whitney U test analysis of post- test NPRS pain condition among the participants (Between Group Analysis, Table-1).**

Here Man Whitney U test is done to find out the significant level between two groups Scapular stretching group and High grade mobilization group of Numeric Pain Rating Scale (NPRS) followed by physiotherapy intervention.

The Man Whitney U test have a significant result according to statistical test revealing changes in Pain during abduction (P= 0.016), Pain during lateral rotation (P= 0.001), Pain during Medial Rotation (P= 0.011), Pain at Rest (P= .000), Pain during lying in affected side (P= 0.011), Pain during carrying weight in affected side (P= 0.021), Pain during wearing cloth (P= 0.007), Pain during bathing (P= 0.006) all of this is significant(<0.05). On the other hand Pain during working in job place (P= 0.868) and Pain during off cloth (P= 0.126) are not significant (>0.05).

Again table-1 shows the calculated U value in Pain during lateral rotation (U=101), Pain during Medial Rotation (U=126.5), Pain at Rest (U=66), Pain during lying in affected side (U=123), Pain during wearing cloth (U=120), Pain during bathing (U=119) which are less than the table value of U which is 127 at 0.05. On the other hand calculated U value in Pain during abduction (U=141), Pain during carrying weight in affected side (U=135), Pain during working in job place (U=214.5) and Pain during off cloth (U=164.5) Which are more than the table value of U which is 127 at 0.05.

For this result as the maximum calculated U value is less than the table U value. So here alternative hypothesis is accepted and null hypothesis is rejected.

#### **4.3.1 Unpaired 't' test analysis of post-test ROM among the participants (Between Group Analysis, Table-2).**

Here Unpaired 't' test is done to find out the significant level between two groups Scapular stretching group and High grade mobilization group of Range of Motion (ROM) followed by physiotherapy intervention.

The Unpaired 't' test do not have a significant result according to statistical test revealing changes between Scapular stretching group and High grade mobilization group in AROM in flexion ( $t= .417$ ,  $P= 0.679$ ), PROM in Flexion ( $t= .327$ ,  $P= 0.746$ ), AROM in Lateral Rotation ( $t= 1.256$ ,  $P= 0.216$ ), PROM in Lateral Rotation ( $t= .538$ ,  $P= 0.593$ ), AROM in Abduction ( $t= .082$ ,  $P= 0.935$ ), PROM in Abduction ( $t= .438$ ,  $P= 0.664$ ), AROM in Medial Rotation ( $t=-.376$ ,  $P= 0.709$ ), PROM in Medial Rotation ( $t= -.500$ ,  $P= 0.620$ ); all of this variables are not significance ( $>0.05$ ).

For this result as the maximum variables are not significant so here alternative hypothesis is rejected and null hypothesis is accepted.

#### **4.4.1 Wilcoxon test for changes in NPRS in Scapular stretching (Table-3) :**

Wilcoxon test has been determined to measure the changes in NPRS between pretest and posttest of scapular stretching group followed by physiotherapy intervention.

The Wilcoxon test have a significant result according to statistical test revealing changes between pretest and posttest of scapular stretching group in Pain during abduction ( $Z = -4.137$ ,  $P = .000$ ), Pain during lateral rotation ( $Z = -4.137$ ,  $P = .000$ ), Pain during Medial Rotation ( $Z = -3.923$ ,  $P = .000$ ), Pain at Rest ( $Z = -4.001$ ,  $P = .000$ ), Pain during lying in affected side ( $Z = -4.053$ ,  $P = .000$ ), Pain during working in job place ( $Z = -3.827$ ,  $P = .000$ ), Pain during carrying weight in affected side ( $Z = -3.923$ ,  $P = .000$ ), Pain during wearing cloth ( $Z = -4.158$ ,  $P = .000$ ), Pain during off cloth ( $Z = -3.946$ ,  $P = .000$ ), Pain during bathing ( $Z = -3.866$ ,  $P = .000$ ); all of this variables are significant ( $< 0.05$ ). So here alternative hypothesis is selected and null hypothesis is rejected. It can be said that scapular stretching is effective to reduce pain for the patient with Adhesive capsulitis.

#### **4.4.2 Wilcoxon test for changes in NPRS in High grade mobilization (Table-4):**

Wilcoxon test has been determined to measure the changes in NPRS between pretest and posttest of High grade mobilization group followed by physiotherapy intervention.

The Wilcoxon test have a significant result according to statistical test revealing changes between pretest and posttest of scapular stretching group in Pain during abduction ( $Z = -3.946$ ,  $P = .000$ ), Pain during lateral rotation ( $Z = -3.825$ ,  $P = .000$ ), Pain during Medial Rotation ( $Z = -3.866$ ,  $P = .000$ ), Pain at Rest ( $Z = -3.358$ ,  $P = .001$ ), Pain



during lying in affected side ( $Z = -4.345$ ,  $P = .000$ ), Pain during working in job place ( $Z = -4.099$ ,  $P = .000$ ), Pain during carrying weight in affected side ( $Z = -3.337$ ,  $P = .001$ ), Pain during wearing cloth ( $Z = -4.062$ ,  $P = .000$ ), Pain during off cloth ( $Z = -3.384$ ,  $P = .001$ ), Pain during bathing ( $Z = -3.866$ ,  $P = .000$ ); all of these variables are significant ( $< 0.05$ ). So here alternative hypothesis is selected and null hypothesis is rejected. It can be said that High grade mobilization is effective to reduce pain for the patient with Adhesive capsulitis.

#### **4.3.3 Paired 't' test for changes ROM in Scapular stretching (Table-5) :**

Paired 't' test has been determined to measure the changes in ROM between pretest and posttest of scapular stretching group followed by physiotherapy intervention.

Paired 't' test have a significant result according to statistical test revealing changes between pretest and posttest of scapular stretching group in AROM in Flexion ( $t = -13.00$ ,  $P = 0.00$ ), PROM in Flexion ( $t = -14.013$ ,  $P = 0.000$ ), AROM in Lateral Rotation ( $t = -12.197$ ,  $P = 0.000$ ), PROM in Lateral Rotation ( $t = -11.001$ ,  $P = 0.000$ ), AROM in Abduction ( $t = -12.568$ ,  $P = 0.000$ ), PROM in Abduction ( $t = -10.954$ ,  $P = 0.000$ ), AROM in Medial Rotation ( $t = -9.413$ ,  $P = 0.000$ ), PROM in Medial Rotation ( $t = -13.551$ ,  $P = 0.000$ ); all of these variables are significant ( $< 0.05$ ). So here alternative hypothesis is selected and null hypothesis is rejected. It can be said that scapular stretching is effective for increasing ROM for the patient with Adhesive capsulitis.

#### **4.3.4 Paired 't' test for changes ROM in High grade mobilization (Table-6):**

Paired 't' test has been determined to measure the changes in ROM between pretest and posttest of High grade mobilization group followed by physiotherapy intervention.

Paired 't' test test have a significant result according to statistical test revealing changes between pretest and posttest of scapular stretching group in AROM in Flexion ( $t = -2.500$ ,  $P=0.021$ ), PROM in Flexion ( $t = -2.842$ ,  $P=0.010$ ), AROM in Lateral Rotation ( $t = -7.204$ ,  $P=0.000$ ), PROM in Lateral Rotation ( $t = -7.678$ ,  $P=0.000$ ), AROM in Abduction ( $t = -9.234$ ,  $P=0.000$ ), PROM in Abduction ( $t = -6.669$ ,  $P=0.000$ ), AROM in Medial Rotation ( $t = -10.733$ ,  $P=0.000$ ), PROM in Medial Rotation ( $t = -7.004$ ,  $P=0.000$ ); all of this variables are significant ( $<0.05$ ). So here alternative hypothesis is selected and null hypothesis is rejected. It can be said that High grade mobilization is effective for increasing ROM for the patient with Adhesive capsulitis.

The researcher was devoted to find out the effectiveness of Scapular stretching versus High grade mobilization for the patient with Adhesive capsulitis. The different measurement tools were used to examine the hypothesis and test the hypothesis whether the null hypothesis were accepted or not based on the smaller or larger p. Self-oriented questionnaire was used to find out the socio-demographical indicators. Significant improvements occurred in most of the measures that were recorded before and after treatment. The result found that the mean age o was 50 years. Among all of the participants 64.3% was male and 35.7% was female. 11.9% of the patients occupation were farmer, 2.45% were day labour, 16.7% were service holder, 16.7% were garments worker, 16.7% were businessman,14.3% were unemployed, 33.3% were housewife. In this study 88.1% patients were married and other 11.9% were unmarried. 26.2% were from the nuclear family and 73.85 were from extended family. 57.1% among of all the patients were from rural area and 42.9% were from urban area. 90.55% patients were muslim and 9.55% were hindu. Among all the patients 4.8% were illiterate, 26.2% were literate, 14.3% were primary level, 11.9% were secondary level,14.3% were S.S.C passed, 14.2% were H.S.C passed, 9.5% were graduate, 4.8% were post graduate. The mean monthly family income was BDT 27642.

In this experimental study 42 patients with Adhesive capsulitis were randomly assigned to the Scapular stretching group and to the High grade mobilization group. Among these 42 patients, 21 patients were included in the Scapular stretching group who received Scapular stretching exercise of scapular muscles

with conventional physiotherapy and the rest of the 21 patients were included in the High grade mobilization group, who received High grade mobilization in the glenohumeral joint with conventional physiotherapy. Each group attended for 7 sessions of treatment within two weeks in the physiotherapy outdoor department of CRP Savar in order to demonstrate the improvement. The outcome was measured by using Numeric Pain Rating Scale for pain intensity in different functional position, and goniometer for measuring ROM in shoulder joint. Man Whitney U test and Unpaired 't' test was done to compare the effectiveness between two groups Scapular stretching and High grade mobilization on the other hand Wilcoxon test and Paired 't' test was done to find out the effectiveness in pre and post test in within group.

In this study in Wilcoxon statistics Scapular stretching found very effective to decrease pain in NPRS in Scapular stretching group and High grade mobilization also found effective to decrease pain in NPRS in High grade mobilization group following the significance level ( $P < 0.05$ ). But in the Man Whitney U statistics Scapular stretching found more effective (as most of the calculated U value were less than the table U value) than High grade mobilization to decrease pain in NPRS following the significance level ( $P < 0.05$ ). To determination the range of motion (ROM) in Paired 't' statistics Scapular stretching and High grade mobilization found effective to increase ROM in separate groups where the significance level was ( $P < 0.05$ ). But in comparism between two groups Unpaired 't' statistics found High grade mobilization more effective (as all of the variables were not significance) than Scapular stretching to increase ROM in the shoulder joint following the significance level ( $P < 0.05$ ).

In 2003, an evaluation of a therapeutic exercise programme was held intended to reduce pain and improve shoulder function. Sixty seven male symptomatic workers (mean age 49) were randomized into a treatment intervention group (n =34) and a control group (n = 33); asymptomatic subjects (n = 25) participated as an additional control group. Subjects in the intervention group were instructed in a standardized eight week home exercise programme of five shoulder stretching and strengthening exercises. Subjects in the control groups received no intervention. Subjects returned after 8–12 weeks for follow up testing. Results suggest a home exercise programme can be effective in reducing symptoms and improving function in construction workers with shoulder pain. Intervention subjects also reported significantly greater reductions in pain and disability than controls (Ludewig & Borstad, 2003).

In 2006, a study comparing the effectiveness of 2 treatment strategies including mobilization techniques with different levels of intensity in 163 subjects with unilateral adhesive capsulitis of the shoulder. It appeared that HGMTs were more effective than LGMTs in increasing mobility and functional ability. However, the differences were small overall, and with both treatment strategies, subjects showed clinically significant improvement (Henricus M Vermeulen,2006).

Shrivastava et al. (2011) showed that his study, statistically significant in Movement With Mobilization group and conventional physiotherapy group separately. The Mean percentage improved of pain for conventional physiotherapy with MWM group from 5.85% to 3.6% in two weeks and p value <0.05. This study also found significant Improvement of ROM in case of Abduction (p<.05), lateral rotation (p<.05), and not statistically significant Medial rotation (p<.05).

In this Research, Researcher found improvement of ROM in both conventional physiotherapy and movement with mobilization group. But the comparison of both improvements shows that, shoulder abduction had significant improvement in movement with mobilization group than conventional physiotherapy group. Lateral rotation and medial rotation has shown almost same improvement rate.

By a single blinded randomized controlled trial was to investigate the effects of stretching exercises and range of motion, reported pain and reported function in patients with shoulder pain. Twenty-nine patients referred to physiotherapy for shoulder pain were randomly assigned to a treatment group that received six treatments of stretching exercise of the shoulder (n = 15) or to a control group that received no treatment while on the waiting list for two weeks (n = 14). Measurements were taken both before and after the experimental period by a blinded assessor. Active range of motion was measured for flexion, abduction and hand-behind-back movements. Pain was assessed with the Short Form McGill Pain Questionnaire (SFMPQ) and functional ability was assessed with the Patient Specific Functional Disability Measure (PSFDM). The treatment group showed significant improvements in range of motion compared with the control group for abduction (mean 42.2 degrees, 95% CI 24.1 to 60.4 degrees), flexion (mean 22.6 degrees, 95% CI 12.4 to 32.8 degrees) and hand-behind-back (mean 11.0 cm improvement, 95% CI 6.3 to 15.6 cm). Massage reduced pain as reported on the descriptive section of the SFMPQ by a mean of 4.9 points (95% CI 2.5 to 7.2 points) and on the visual analogue scale by an average of 26.5 mm (95% CI 5.3 to 47.6 mm), and it improved reported function on the PSFDM by a mean of 8.6 points (95% CI 4.9 to 12.3 points). We conclude that stretching exercise of the shoulder is effective in improving range of motion, pain and function in patients with shoulder pain (Dolar& Roberts, 2003).

**Limitations of the study:**

- The main limitation of this study was its short duration.
- The study was conducted with 42 patients of Adhesive Capsulitis, which was a very small number of samples in both groups and was not sufficient enough for the study to generalize the wider population of this condition.
- It is limited by the fact daily activities of the subject were not monitored which could have influenced. Researcher only explored the effect of Scapular stretching and High grade mobilization exercise only for 7 session, so the long term effect of Scapular stretching and High grade mobilization exercise was not explored in this study.
- The research was carried out in CRP Savar such a small environment, so it was difficult to keep confidential the aims of the study for blinding procedure. Therefore, single blind method was used in this study.
- There was no available research done in this area in Bangladesh. So, relevant information about Adhesive Capsulitis patient with specific intervention for Bangladesh was very limited in this study.

## CHAPTER- VI: CONCLUSION AND RECOMMENDATIONS

### 6.1 Conclusion

The result of this experimental study have identified the effectiveness of Scapular stretching with conventional physiotherapy is more effective than High grade mobilization with conventional physiotherapy to reduce pain at different functional position and High grade mobilization with conventional physiotherapy is more effective than Scapular stretching with conventional physiotherapy to increase ROM in gleno-humeral joint for the patients with adhesive capsulitis. Participants in the conventional physiotherapy with Scapular stretching exercise of scapular muscles group showed a greater benefit than those in the conventional physiotherapy with High grade mobilization group to reduce pain and conventional physiotherapy with High grade mobilization group showed a greater benefit than those in the conventional physiotherapy with Scapular stretching exercise of scapular muscles group to increase ROM in gleno-humeral joint. Which indicate that the Scapular stretching exercise and High grade mobilization both can be an effective therapeutic approach for patient with Adhesive capsulitis.

Adhesive Capsulitis is a global gleno-humeral disease that just not affects a specific joint but the entire complex. The manifestations are not only pain but also limitation in movements and restriction to activities of daily living. From this research, researcher also concluded the specific variables and comparison of their improvement rates. This will aid the professionals to decide the specific evidence based protocol for applying interventions in Adhesive capsulitis.



## **Recommendations**

As a consequence of this researcher it is recommended to do further study including comparison of the conventional physiotherapy with Movement With Mobilization (MWM) and conventional physiotherapy with High grade mobilization to assess the effectiveness of these interventions with-

- Double blinding procedure.
- A specific protocol should be included that in which stage patient will start this exercises and the protocol of home exercises.
- It is recommended to do further study with more number of subjects and with a longer time frame.
- It is also recommended to include the functional outcome assessment of patient and to identify the average number of sessions that are needed to be discharged from treatment to validate the treatment technique.

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## Appendix

### Verbal Consent Statement

(Please read out to the participants)

Assalamualaikum/Namasker,

My name is Tuhin Ahammed, I am conducting this study as a part of my academic work of B. Sc. in Physiotherapy under Bangladesh Health Professions Institute (BHPI), which is affiliated to University of Dhaka. My study title is **“Effectiveness of scapular stretching versus high grade mobilization for the patient with Adhesive Capsulitis”**. I would like to know about some personal and other related information regarding Adhesive capsulitis. You will need to answer some questions which are mentioned in this form. It will take approximately 20-25 minutes.

I would like to inform you that this is a purely academic study and will not be used for any other purpose. All information provided by you will keep in a locker as confidential and in the event of any report or publication it will be ensured that the source of information remains anonymous and also all information will be destroyed after completion of the study.

Your participation in this study is voluntary and you may withdraw yourself at any time during this study without any negative consequences. You also have the right not to answer a particular question that you don't like or do not want to answer during interview.

If you have any query about the study or your right as a participant, you may contact with me and/or Mohammad Anwar Hossain, Associate Professor of Physiotherapy, Bangladesh Health Professions Institute (BHPI), Savar, Dhaka.

Do you have any questions before I start? Yes / No

So, may I have your consent to proceed with the interview or work?

Yes.....

No.....

Signature of the Participant \_\_\_\_\_

Signature of the Interviewer \_\_\_\_\_

**মৌখিক অনুমতিপত্র/সম্মতিপত্র**  
(অংশগ্রহনকারী কে পড়ে শোনাতে হবে)

আসসালামুআলাইকুম/ নমস্কার,

আমার নাম তুহিন আহম্মেদ, আমি এই গবেষণা প্রকল্পটি বাংলাদেশ হেলথ প্রফেশনস ইনস্টিটিউট (বিএইচপিআই)-এ পরিচালনা করছি যা আমার ৪র্থ বর্ষ বিএসসি ইন ফিজিওথেরাপী কোর্সের অধিভুক্ত। আমার গবেষণার শিরোনাম হল-এডহেসিভ ক্যাপসুলাইটিস এ স্ক্যাপুলার স্ট্রেচিং বনাম উচ্চ গ্রেডের মোভাইলাইজেশন এর কার্যকারিতা। আমি এক্ষেত্রে আপনাকে কিছু ব্যক্তিগত এবং আনুষঙ্গিক প্রশ্ন করতে চাচ্ছি। এতে আনুমানিক ২০-২৫ মিনিট সময় নিবো।

আমি আপনাকে অনুগত করছি যে, এটা আমার অধ্যয়নের অংশ এবং যা অন্য কোন উদ্দেশ্যে ব্যবহৃত হবে না। আপনি যে সব তথ্য প্রদান করবেন তার গোপনীয়তা বজায় থাকবে এবং আপনার প্রতিবেদনের ঘটনাপ্রবাহে এটা নিশ্চিত করা হবে যে এই তথ্যের উৎস অপ্রকাশিত থাকবে।

এই অধ্যয়নে আপনার অংশগ্রহণ ফোঁছা প্রণোদিত এবং আপনি যে কোন সময় এই অধ্যয়ন থেকে কোন নেতিবাচক ফলাফল ছাড়াই নিজেকে প্রত্যাহার করতে পারবেন। এছাড়াও কোন নির্দিষ্ট প্রশ্ন অপছন্দ হলে উত্তর না দেয়ার এবং সাক্ষাৎকারের সময় কোন উত্তর না দিতে চাওয়ার অধিকারও আপনার আছে।

এই অধ্যয়নে অংশগ্রহনকারী হিসেবে যদি আপনার কোন প্রশ্ন থাকে তাহলে আপনি আমাকে অথবা/এবং মুহাম্মদ আনোয়ার হোসেন, সহযোগী অধ্যাপক, ফিজিওথেরাপি বিভাগ, সি আর পি, সাভার, ঢাকা-১৩৪৩-তে যোগাযোগ করতে পারেন।

সাক্ষাৎকার শুরু করার আগে আপনার কি কোন প্রশ্ন আছে?হ্যাঁ/না

আমি কি আপনার অনুমতি নিয়ে এই সাক্ষাৎকার শুরু করতে পারি?

হ্যাঁ.....

না.....

১। অংশগ্রহনকারীর সাক্ষর.....

২। সাক্ষাৎগ্রহনকারীর সাক্ষর.....



# English Questionnaire

## Pre-test Questionnaire

**Title: Effectiveness of scapular stretching versus high grade mobilization for the patient with adhesive capsulitis.**

**Code no :**

### 1. Personal details

1.1. Name of participant:

1.2. Address:

Permanent

Present

Village/house no.....

Village/house no.....

Post office.....

Postoffice.....

Thana.....

Thana.....

District.....

District.....

1.3. Contact number/mobile number:

Respondent's Contact No:

Dependent's Contact No:

1.4. Date of interview: DD/MM/YY.....

**Title:Effectiveness of scapular stretching versus high grade mobilization for the patient with adhesive capsulitis.**

Code no:

**2. Socio demographic information**

2.1. Age: .....years

2.2 Sex:

1= male

2= female

2.3. Occupation:

1=Farmer

5=Driver

9=Housewife

2=Day labour

6=Rickshaw pullar

10=Student

3=Service holder

7=Businessman

11=Others

4=Garments worker

8=Unemployed

2.4. Marital status:

1= Married

2= Unmarried

2.5. Family type:

1= Nuclear family

2= Extended family

2.6. Living area:

1= Rural

2= Urban

2.7. Religion:

1=Islam

2=Hindu

3=Christian

4=Buddhist

2.8. Educational level:

1 = Illiterate	5=S.S.C
2= Literate	6=H.S.C
3= Primary	7=Graduate
4=Secondary	8=Post Graduate

2.9. Monthly family income.....taka

**3: Symptoms related questions**

3.1: Where the pain is felt:

- 1 = Right upper limb
- 2 = Left upper limb

3.2: Muscle wasting:

- 1 = No muscle wasting
- 2 = Trapezius muscle
- 3 = Rhomboids muscle
- 4 = Supra & infra spinatus
- 5 = Deltoid muscle

3.3: Pain relieving factors:

- 1= Rest in sitting
- 2= Rest in lying
- 3= Activity modification
- 4= Positioning

3.3 Pain aggravating factors:

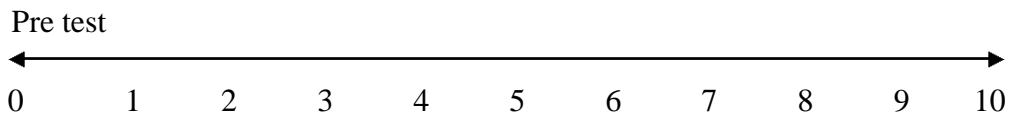
- 1 = Activities with movement
- 2 = Loading activities

**(Pain related questionnaire)**

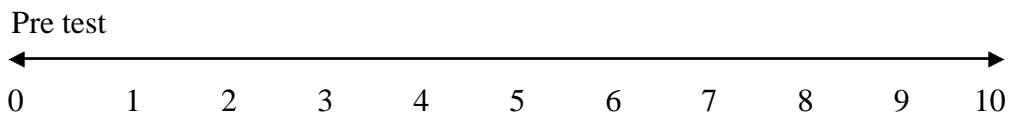
This questionnaire is designed for Adhesive Capsulitis patients. There are some questions (QN 1- QN 10) and with each question there is a long line. The line represents pain situation. The left hand end represents no pain and right hand end represents severe pain. Please a mark on the line where you feel it shows how much pain you have. The Answer of other questions (QN 11) will be enlisted by examiner by using some measurement tools.

(A Zero (0) means no pain and Ten (10) means extreme pain)

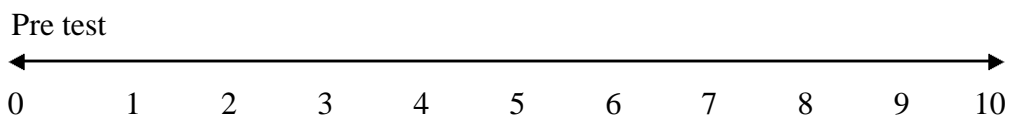
1. How severe is your pain during rising arm sideways (Abduction)?



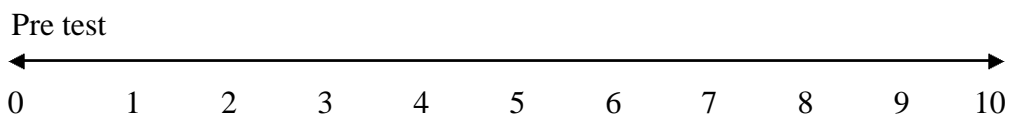
2. How severe is your pain during combing hair (Lateral Rotation)?



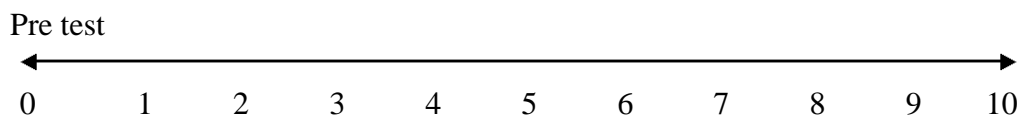
3. How severe is your pain during Scratching Lower back (Medial rotation)?



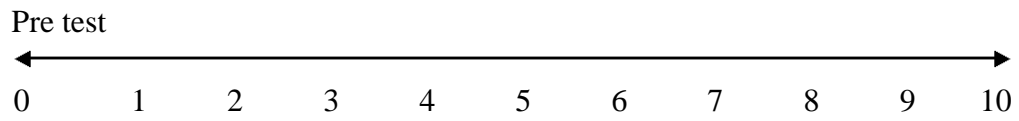
4. How severe your pain is at resting position?



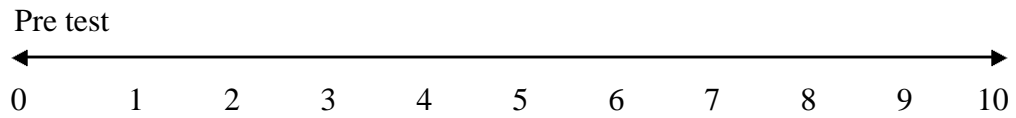
5. How severe is your pain during lying in affected side?



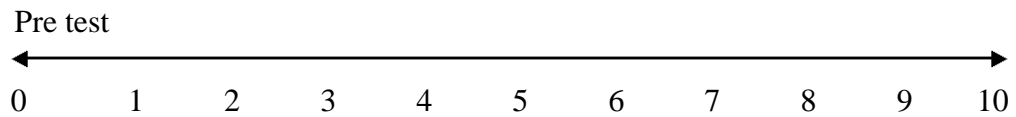
6. How severe is your pain during working hour in your job place?



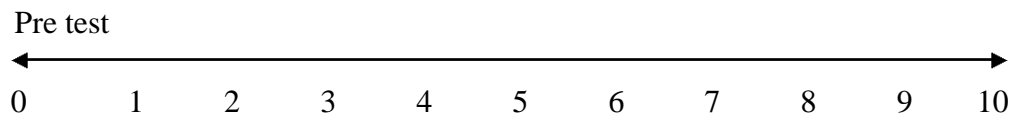
7. How severe is your pain during carrying weight in affected side?



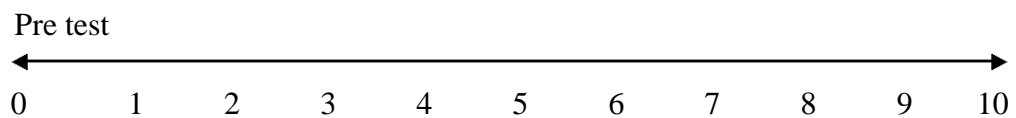
8. How severe is your pain during wearing your cloth?



9. How severe is your pain during off your cloth?



10. How severe is your pain during bathing?



11. Pre test ROM measurement (Measured by examiner).

<b>Movement</b>	<b>Active (Degree)</b>	<b>Passive (Degree)</b>
Flexion		
Lateral rotation		
Abduction		
Medial rotation		

Tuhin Ahammed  
B.Sc in physiotherapy  
Researcher

## Post-test Questionnaire

### Title: Effectiveness of scapular stretching versus high grade mobilization for the patient with adhesive capsulitis.

Code no :

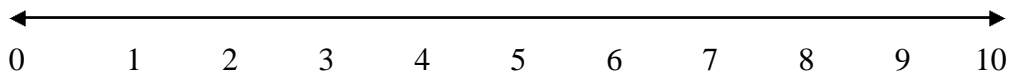
#### (Pain related questionnaire)

This questionnaire is designed for Adhesive Capsulitis patients. There are some questions (QN 1- QN 10) and with each question there is a long line. The line represents pain situation. The left hand end represents no pain and right hand end represents severe pain. Please a mark on the line where you feel it shows how much pain you have. The Answer of other questions (QN 11) will be enlisted by examiner by using some measurement tools.

(A Zero (0) means no pain and Ten (10) means extreme pain)

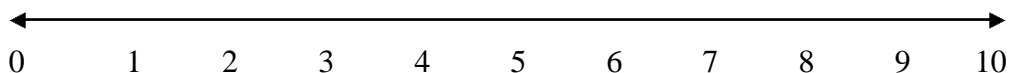
1. How severe is your pain during rising arm sideways (Abduction)?

Post test



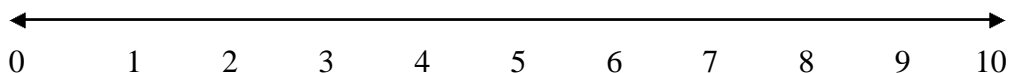
2. How severe is your pain during combing hair (Lateral Rotation)?

Post test



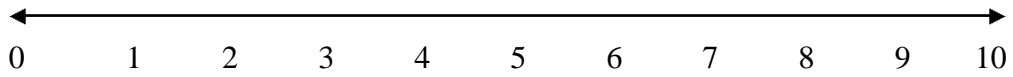
3. How severe is your pain during Scratching Lower back (Medial rotation)?

Post test



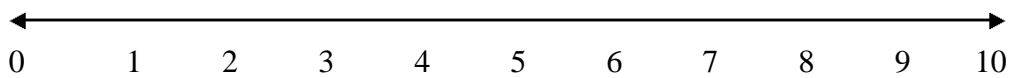
4. How severe your pain is at resting position?

Post test



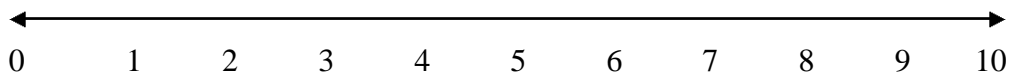
5. How severe is your pain during lying in affected side?

Post test



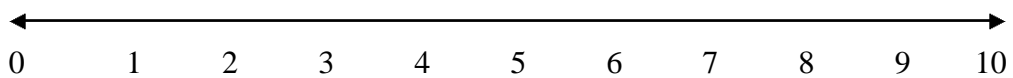
6. How severe is your pain during working hour in your job place?

Post test



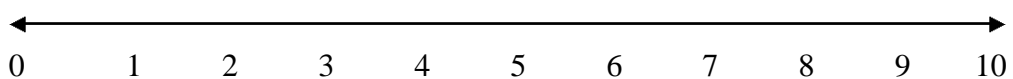
7. How severe is your pain during carrying weight in affected side?

Post test



8. How severe is your pain during wearing your cloth?

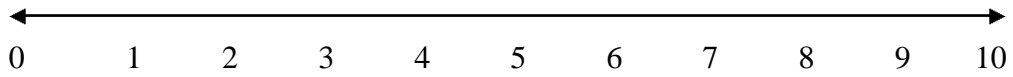
Post test





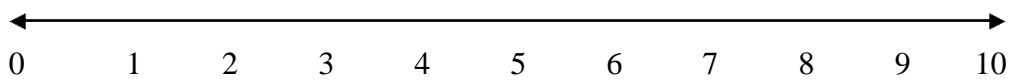
9. How severe is your pain during off your cloth?

Post test



10. How severe is your pain during bathing?

Post test



11. Post test ROM measurement (Measured by examiner).

<b>Movement</b>	<b>Active (Degree)</b>	<b>Passive (Degree)</b>
Flexion		
Lateral rotation		
Abduction		
Medial rotation		

Tuhin Ahammed  
B.Sc in physiotherapy  
Researcher

# Bangla Questionnaire

চিকিৎসার আগের প্রশ্নাবলী

শিরোনামঃ “এডহেসিভ ক্যাপসুলাইটিস এ স্ক্যপুলার স্ট্রিচিং বনাম উচ্চ গ্রেডের মোভিলাইজেশন এর কার্যকারিতা”।

কোড নংঃ

## ১. ব্যক্তিগত তথ্যাবলী

১.১. অংশগ্রহনকারীর নামঃ

১.২. ঠিকানাঃ

স্থায়ী

বর্তমান

গ্রাম/বাসানম্বর.....

গ্রাম/বাসানম্বর.....

পোস্ট অফিস.....

পোস্ট অফিস.....

থানা.....

থানা.....

জেলা.....

জেলা.....

১.৩. মোবাইল নম্বরঃ

ব্যক্তিগতঃ

নিকট আত্মীয়ঃ

১.৪. সাক্ষাৎকার গ্রহনের তারিখ.....

শিরোনামঃ “এডহেসিভ ক্যাপসুলাইটিস এ স্ক্যপুলার স্ট্রেচিং বনাম উচ্চ মোভলাইজেশন এর কার্যকারিতা”।

কোড নংঃ

## ২. আর্থ-সামাজিক তথ্যাবলী

২.১ বয়সঃ.....বৎসর।

২.২ লিঙ্গঃ

১= পুরুষ

২= মহিলা

২.৩ পেশাঃ

১= কৃষক

৫= গাড়িচালক

৯= গৃহিণী

২= দিনমজুর

৬= রিকশা চালক

১০= ছাত্র

৩= চাকরিজীবী

৭= ব্যবসায়ী

১১= অন্যান্য

৪= গার্মেন্টস/কারখানা শ্রমিক

৮= বেকার

২.৪ বৈবাহিক অবস্থাঃ

১= বিবাহিত

২= অবিবাহিত

২.৫ পরিবারের ধরনঃ

১= একক পরিবার

২= যৌথ পরিবার

২.৬ বসবাসের এলাকাঃ

১= গ্রাম

২= শহর

২.৭ ধর্মঃ

১=মুসলিম

২=হিন্দু

৩=খ্রিস্টান

৪=বৌদ্ধ

২.৮ শিক্ষাগত যোগ্যতাঃ

১= নিরক্ষর

৫= এসএসসি

২= স্বাক্ষর করতে পারে

৬= এইচএসসি

৩= প্রাথমিক

৭= স্নাতক

৪= মাধ্যমিক

৮= স্নাতকোত্তর

২.৯ পরিবারের মাসিক আয়ঃ..... টাকা

### ৩ ব্যথার লক্ষন সংক্রান্ত তথ্যাবলী

#### ৩.১ কোথায় ব্যথা অনুভূত হয়ঃ

১= ডান হাত

২= বাম হাত

#### ৩.২ শুকিয়ে যাওয়া পেশীঃ

১=কোন পেশী শুকিয়ে যায় নি

৪=সুপ্রা এবং ইনফ্রা স্পাইনেটাস

২=ট্রিপিজিয়াসের

৫=ডেলটয়েড

৩=রমবয়ডাস

#### ৩.৩ যা করলে ব্যথা কমেঃ

১=বসে বিশ্রাম নিলে

৩=কাজ পরিবর্তন করলে

২=শুয়ে বিশ্রাম নিলে

৪=অবস্থান পরিবর্তন করলে

#### ৩.৪ যা করলে ব্যথা বাড়েঃ

১=কাজ করার সময়

২=ভাড়ী কাজ করলে

(ব্যথা সম্পর্কিত প্রশ্নাবলী)

এই প্রশ্নপত্র এডহেসিভ ক্যাপসুলাইটিস রোগীর জন্য প্রণীত। ১ নং থেকে ১০ নং প্রশ্ন রোগীর ব্যথা নির্দেশ করে, প্রতিটি প্রশ্নের শেষে একটি লম্বা লাইন আছে, আপনার হাতের বামপাশ নির্দেশ করে কোন ব্যথা নেই আর ডান পাশ নির্দেশ করে তীব্র ব্যথা। আপনি যতটুকু ব্যথা অনুভব করেন তা চিহ্নিত করুন। ১১ নং প্রশ্নের উত্তর পরিষ্কর লিপিবদ্ধ করবেন।

(এখানে ০ মানে কোন ব্যথা নেই, ১০ মানে তীব্র ব্যথা)

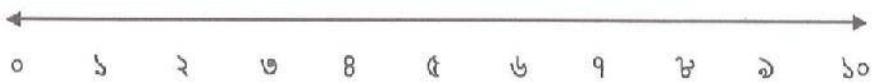
১। পাশাপাশি হাত তুলতে আপনার ব্যথার পরিমাণ কত? (এবডাকশন)

চিকিৎসার আগে



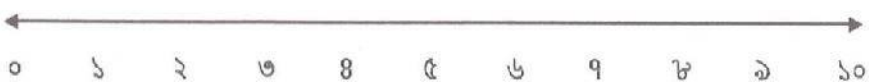
২। চুল আঁচড়াতে আপনি কেমন ব্যথা পান?

চিকিৎসার আগে



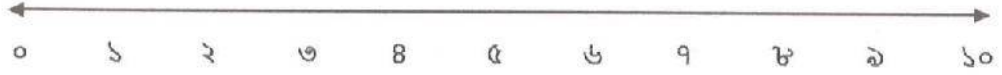
৩। হাত পেছনে নিয়ে চুলকাতে আপনার কেমন ব্যথা লাগে?

চিকিৎসার আগে



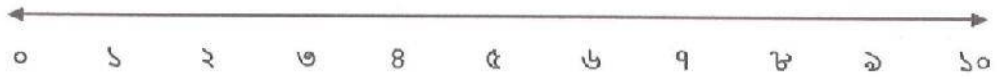
৪। বিশ্রামত অবস্থায় আপনার ব্যথার পরিমাণ কত?

চিকিৎসার আগে



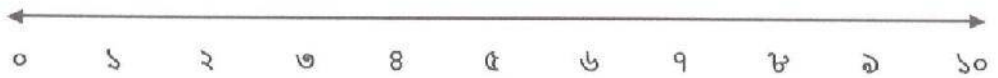
৫। আক্রান্ত পাশে ঘুমাতে আপনার কেমন ব্যথা হয়?

চিকিৎসার আগে



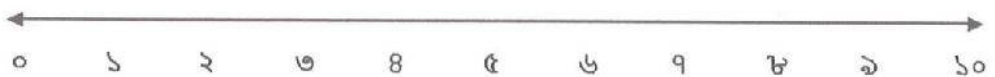
৬। কর্মক্ষেত্রে কাজের সময় আপনার ব্যথার পরিমাণ কত?

চিকিৎসার আগে



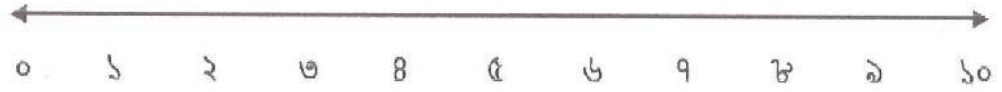
৭। আক্রান্ত পাশে ভাড়া জিনিস তুলতে আপনার ব্যথার পরিমাণ কত?

চিকিৎসার আগে



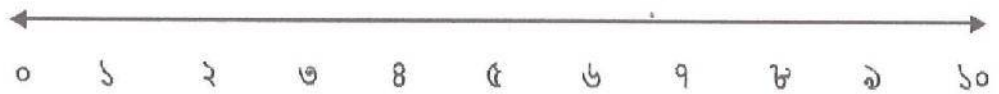
৮। জামা পরার সময় আপনার ব্যথার পরিমাণ কত?

চিকিৎসার আগে



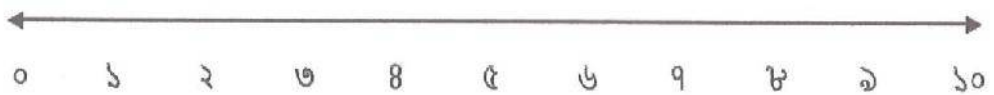
৯। জামা খোলার সময় আপনার ব্যথার পরিমাণ কত?

চিকিৎসার আগে



১০। গোসল করার সময় আপনার ব্যথার পরিমাণ কত?

চিকিৎসার আগে





১১। চিকিৎসার আগে কাঁধের রেঞ্জ অফ মোশন পরিমাপ (পরীক্ষক পরিমাপ করবেন)।

মোভমেন্ট	অ্যাক্টিভ(ডিগ্রি)	পেসিভ(ডিগ্রি)
ফ্লেকশন		
নেটোরাল রোটেশন		
এবডাকশন		
মিডিয়াল রোটেশন		

তুহিন আহম্মেদ  
বি এস সি ইন ফিজিওথেরাপী  
গবেষক

## চিকিৎসার পরের প্রশ্নাবলী

শিরোনামঃ “এডহেসিভ ক্যাপসুলাইটিস এ স্ক্যাপুলার স্ট্রেচিং বনাম উচ্চ গ্রেডের মোডালাইজেশন এর কার্যকারিতা”।

কোড নংঃ

(ব্যথা সম্পর্কিত প্রশ্নাবলী)

এই প্রশ্নপত্র এডহেসিভ ক্যাপসুলাইটিস রোগীর জন্য প্রণীত। ১ নং থেকে ১০ নং প্রশ্ন রোগীর ব্যথা নির্দেশ করে, প্রতিটি প্রশ্নের শেষে একটি লম্বা লাইন আছে, আপনার হাতের বামপাশ নির্দেশ করে কোন ব্যথা নেই আর ডান পাশ নির্দেশ করে তীব্র ব্যথা। আপনি ষতটুকু ব্যথা অনুভব করেন তা চিহ্নিত করুন। ১১ নং প্রশ্নের উত্তর পরিস্ফুট লিপিবদ্ধ করবেন।

(এখানে ০ মানে কোন ব্যথা নেই, ১০ মানে তীব্র ব্যথা)

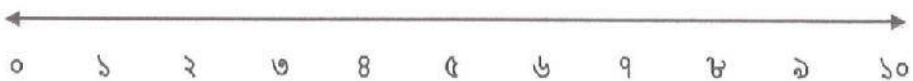
১। পাশাপাশি হাত তুলতে আপনার ব্যথার পরিমাণ কত? (এবডাকশন)

চিকিৎসার পরে



২। চুল আঁচড়াতে আপনি কেমন ব্যথা পান?

চিকিৎসার পরে



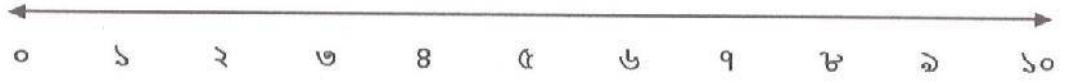
৩। হাত পেছনে নিয়ে চুল্লাতে আপনার কেমন ব্যথা লাগে?

চিকিৎসার পরে



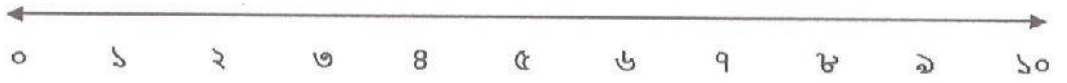
৪। বিশ্রামত অবস্থায় আপনার ব্যথার পরিমাণ কত?

চিকিৎসার পরে



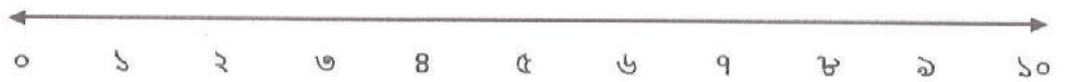
৫। আক্রান্ত পাশে ঘুমাতে আপনার কেমন ব্যথা হয়?

চিকিৎসার পরে



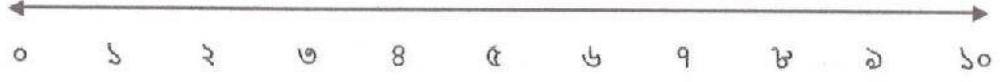
৬। কর্মক্ষেত্রে কাজের সময় আপনার ব্যথার পরিমাণ কত?

চিকিৎসার পরে



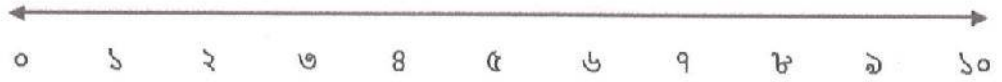
৭। আক্রান্ত পাশে ভাড়া জিনিস তুলতে আপনার ব্যথার পরিমাণ কত?

চিকিৎসার পরে



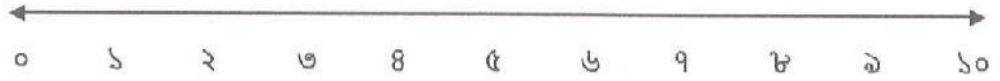
৮। জামা পরার সময় আপনার ব্যথার পরিমাণ কত?

চিকিৎসার পরে



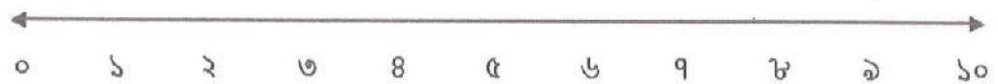
৯। জামা খোলার সময় আপনার ব্যথার পরিমাণ কত?

চিকিৎসার পরে



১০। গোসল করার সময় আপনার ব্যথার পরিমাণ কত?

চিকিৎসার পরে



১১। চিকিৎসার পরে কঁাধের রেঞ্জ অফ মোশন পরিমাপ (পরীক্ষক পরিমাপ করবেন)।

মোভমেন্ট	অ্যাকটিভ(ডিগ্রি)	পেসিভ(ডিগ্রি)
ফ্লেকশন		
লেটারাল রোটেশন		
এবডাকশন		
মিডিয়াল রোটেশন		

তুহিন আহম্মেদ  
বি এস সি ইন ফিজিওথেরাপী  
গবেষক

## Treatment Protocol for Adhesive capsulitis:

### Phase I:

<p><b>1. Patient education:</b></p>	<ul style="list-style-type: none"> <li>➤ Emphasize full ROM may never be recovered spontaneous resolution &amp; reduction of stiffness</li> <li>➤ Avoid painful activity/activity modification</li> </ul>
<p><b>2. Upper body cycle ergometer:</b></p>	<ul style="list-style-type: none"> <li>➤ 50 r.p.m.</li> <li>➤ 8 minute warm – up.</li> </ul>
<p><b>3. Modalities:</b> 10 - 15 minutes, before, during, or after exercise.</p>	<ul style="list-style-type: none"> <li>➤ Moist heat</li> <li>➤ Cold pack.</li> </ul>
<p><b>4. ROM exercise/stretch:</b> low intensity, short duration, 1-5 seconds, 2-3 times per day, pain-free, passive, AAROM</p>	<ul style="list-style-type: none"> <li>➤ Pendulums (1 min clockwise, 1 min counter-clockwise) internal rotation in standing.</li> <li>➤ Horizontal adduction in standing.</li> <li>➤ Pulley for elevation in sitting or standing forward flexion in supine using own hand external rotation using pipe/stick in supine extension in standing using pipe/stick in supine.</li> </ul>
<p><b>5. Manual Techniques:</b></p>	<ul style="list-style-type: none"> <li>➤ Low - grade mobilization (Grade I or II).</li> <li>➤ Positional stretching of CHL: 5 minutes-&gt; progress to 15 minutes.</li> </ul>
<p><b>6. Strengthening:</b></p>	<ul style="list-style-type: none"> <li>➤ Isometric in all planes, 5 second holds, 1 set of 10 each direction, against wall (Pt, 2000).</li> </ul>

## Phase II:

<b>1. Patient education:</b>	<ul style="list-style-type: none"><li>➤ Activity modifications.</li><li>➤ Basic functional activities .</li></ul>
<b>2. Upper body cycle ergometer:</b>	<ul style="list-style-type: none"><li>➤ 50 r.p.m.</li><li>➤ 8 minute warm – up.</li></ul>
<b>3. Modalities:</b> 10 - 15 minutes, before, during, or after exercise.	<ul style="list-style-type: none"><li>➤ Moist heat</li><li>➤ Cold pack.</li></ul>
<b>4. ROM exercise/stretch:</b> 5-15 seconds, passive AAROM to AROM, low load, prolonged.	<ul style="list-style-type: none"><li>➤ Same as in Phase I, but increase duration and length of stretch</li></ul>
<b>5. Manual Techniques:</b>	<ul style="list-style-type: none"><li>➤ High - grade mobilization (Grade I or II).</li><li>➤ Positional stretching of CHL: 10 minutes-&gt; progress to 20 minutes.</li><li>➤ Mobilization with Movement 3 sets of 10 repetitions with 1 minute rest in between.</li><li>➤ Last 3 minutes, passive PNF if needed to increase ROM.</li></ul>
<b>6. Strengthening:</b>	<ul style="list-style-type: none"><li>➤ Theraband: 5 directions, 3 sets of 12 reps, progress with colors of band (Pt, 2000).</li></ul>

**Phase III:**

<p><b>1. Patient education:</b></p>	<ul style="list-style-type: none"><li>➤ Increase activities.</li><li>➤ High demand activities pain decreased.</li></ul>
<p><b>2. ROM exercise/stretch:</b> low intensity, short duration, 1-5 seconds, 2-3 times per day, pain-free, passive, AAROM</p>	<ul style="list-style-type: none"><li>➤ Same as in Phase II, but increase duration and length of stretch.</li><li>➤ Can use stick or cane in standing overtable for prolonged elevation &amp; external rotation.</li></ul>
<p><b>3. Manual Techniques:</b></p>	<ul style="list-style-type: none"><li>➤ High Grade Mobilization/Sustained (HGMT) - Grades III &amp; IV.</li><li>➤ Distraction, posterior glides &gt; anterior glides (perform before HGMT) 3 sets of 15 repetitions with 1 minute rest in between.</li><li>➤ Last 3 minutes, passive PNF if needed to increase ROM.</li></ul>
<p><b>4. Strengthening:</b></p>	<ul style="list-style-type: none"><li>➤ Low - to - high resistance end range dumbbell in sitting: flexion, abduction, extension 1 - 2 lbs to begin with, 2 - 3 sets of 10.</li><li>➤ Sidelyingdumbbells IR, ER 3 sets of 10 - 12 (1 - 2 lbs) (Pt, 2000).</li></ul>



Permission letter

15<sup>th</sup> April, 2019

The Head of Department

Department of Physiotherapy

Centre for the Rehabilitation of the Paralysed (CRP),

Chapain, Savar, Dhaka-1343.

**Through:** Head, Department of Physiotherapy, BHPI

**Subject:** Seeking permission for Data collection of 4<sup>th</sup> year physiotherapy research project.

Dear Sir,

With due respect and humble submission to state that I am Tuhin Ahammed, student of 4<sup>th</sup> Professional B.Sc. in Physiotherapy at Bangladesh Health Professions Institute (BHPI). The ethical committee has approved my research project entitled on **“Effectiveness of scapular stretching versus high grade mobilization for the patient with adhesive capsulitis”** under the supervision of Mohammad Anwar Hossain Associate Professor of the Physiotherapy Department, CRP, Savar, Dhaka-1343, Bangladesh. Conducting this research project is partial fulfillment of the requirement for the degree of B.Sc in physiotherapy. I want to collect data for my research project from the patients of Musculoskeletal unit, department of Physiotherapy, CRP-Savar. So, I need permission for data collection from the Musculoskeletal unit of Physiotherapy department of CRP-Savar. I would like to assure that anything of my study will not be harmful for the participants.

May I, therefore pray and hope that you would be kind enough to grant my application & give me permission for data collection and oblige thereby.

Yours obediently,

*Tuhin Ahammed*  
Tuhin Ahammed

4<sup>th</sup> professional B.Sc in Physiotherapy

Roll: 03, Session: 2014-15

Bangladesh Health Professions Institute (BHPI)

(An academic Institute of CRP)

CRP, Chapain, Savar, Dhaka-1343.

*Forwarded & Recommended*

*16.04.19*  
Prof. Md. Obaidul Haque  
Head, Department of Physiotherapy  
BHPI, CRP, Savar, Dhaka-1343

*Rumana*  
*03.04.19*  
FARJANA SHARMIN  
Jr. Consultant Physiotherapist  
Department of Physiotherapy  
FARJANA SHARMIN

*Approved*

*please contact with Farjana Sharmin Rumana, OPD Incharge PTD, CRP.*

*21/04/19*  
Mohammad Anwar Hossain  
Associate Professor & H  
Physiotherapy Dept  
Chapain, Savar, Dh



বাংলাদেশ হেল্থ প্রফেশন্স ইনস্টিটিউট (বিএইচপিআই)  
BANGLADESH HEALTH PROFESSIONS INSTITUTE (BHPI)  
(The Academic Institute of CRP)  
CRP-Chapain, Savar, Dhaka-1343. Tel: 02-7745464-5, 7741404

Ref: CRP-BHPI/IRB/09/19/1336

Date: 18/09/2019

To  
Tuhin Ahammed  
B.Sc. in Physiotherapy  
Session: 2014-15, Student ID:112140234  
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

**Subject:** Approval of the thesis proposal “Effectiveness of Scapular Stretching versus High Grade Mobilization for the patient with Adhesive Capsulitis” by ethics committee.

Dear Tuhin Ahammed,

Congratulations.

The Institutional Review Board (IRB) of BHPI has reviewed and discussed your application to conduct the above mentioned dissertation, with yourself, as the Principal investigator. The Following documents have been reviewed and approved:

Sr. No.	Name of the Documents
1	Dissertation Proposal
2	Questionnaire (English & Bangla version )
3	Information sheet & consent form.

The study involves use of a questionnaire to explore the Effectiveness of Scapular Stretching versus High Grade Mobilization for the patient with Adhesive Capsulitis that may take 15 to 20 minutes to answer the question and there is no likelihood of any harm to the participants. Data collectors will receive informed consents from all participants. Any data collected will be kept confidential. The members of the Ethics committee have approved the study to be conducted in the presented form at the meeting held at 10.00 AM on 11<sup>th</sup> August, 2018 at BHPI.

The institutional Ethics committee expects to be informed about the progress of the study, any changes occurring in the course of the study, any revision in the protocol and patient information or informed consent and ask to be provided a copy of the final report. This Ethics committee is working accordance to Nuremberg Code 1947, World Medical Association Declaration of Helsinki, 1964 - 2013 and other applicable regulation.

Best regards,

Muhammad Millat Hossain  
Assistant Professor, Dept. of Rehabilitation Science  
Member Secretary, Institutional Review Board (IRB)  
BHPI, CRP, Savar, Dhaka-1343, Bangladesh

