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We, the undersigned, certify that we have carefully read and recommend to the Faculty of Medicine, University of Dhaka, for the acceptance of this dissertation entitled **"Effectiveness of Joint Play Technique among the Patients with Frozen Shoulder: A randomized controlled trial"**

Submitted by **Jannatul Ferdousi** for the partial fulfillment of the requirement for the degree of Bachelor of Science in Physiotherapy.

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CHAPTER - I INTRODUCTION

1.1 Background

Frozen shoulder, also called adhesive capsulitis, is an inflammatory condition that occurs due to progressive fibrosis as well as contractures of the glenoid capsule thus, causing in pain and decreased active and passive glenohumeral joint range of motion (Aboelnour et al. 2023, p. 215). A frozen shoulder occurs in about 2 to 5% of the general population across the world and up to 30 percent of diabetic patients (Zreik et al. 2016, p. 12). This condition often affects middle-aged individuals between the ages of 40 and 60, and the condition affects 8 % of men and 10 % of female (Sarasua et al. 2021, p. 205).

Women are being nearly four times greater than men to suffer from this. It may appear as sudden acute shoulder pain or as a gradually pain sensation with limited mobility in the shoulder joint (Xiao et al. 2017, p. 193). In China, a significant proportion of the labor force is between the ages of 40 and 59, with more than 30% aged 40-49 and over 20% aged 50-59 (Kobayash et al. 2019, p. 631). A study conducted on Pakistan among diabetic patients found 33% of patients had developed frozen shoulder, and more frequent in females. (Ahmed et al. 2020, p. 83).

A national survey conduct in Bangladesh where 1.4 % adults were affected by frozen shoulder (Zahid et al. 2020, p. 3). It first involves the shoulder external rotation, followed by abduction. It can also limit the range of motion of shoulder of the patients, especially when the shoulder passes across the mid point of the opposite side (such as putting on a seatbelt) or when the patient is hanging clothes or doing overhead activities. This condition makes harder for patients to move their shoulder, particularly when the shoulder passes across the mid point of the opposite side when the patient is hanging clothes or doing overhead activities. Moreover, frozen shoulder influences the quality of patients; people may not be able to put on clothes by themselves, comb their hair, and shower (Tang et al. 2024, p. 239).

Even though frozen shoulder usually resolves on its own in about 2 to 3 years, but some patients may persist to have symptoms such as shoulder pain, stiffness and limited range

of motion that impair quality of life (Kim et al. 2020, p. 224). Recovery outcomes differ between individuals, with some continuing to experience pain and restricted mobility.

A large case series reported that about 35% of patients had mild to moderate symptoms, while 6% still had severe symptoms after an average of 4.4 years. Recurrence is rare, but the opposite shoulder may be affected in 6–17% of cases within the first five years (Lyne et al. 2022, p. 318).

Anyway, most individuals with this condition seek medical treatment as a result of a lengthy healing process, along with irritating symptoms (Lin et al. 2022, p. 367). The pathophysiology of frozen shoulder starts with inflammation and later develops into fibrosis and stiffness of the shoulder capsule. This entire process is termed the inflammatory fibrotic cycle (Sarasua et al. 2021, p. 828).

The American Productivity Audit (APA) even revealed that MS pain conditions severely affect the capability to work and productivity. Besides, MS pain is also convincingly linked to the psychological risk factors (Kaliniene et al., 2016). This condition has prolonged negative impacts on patients, which may persist for months or years, leading to major psychoeconomic stresses on society. Various evidence shows early detection and treatment can alleviate both burden and duration of the disease (Vita et al. 2024, p. 579).

Frozen shoulder can be treated conservatively or surgically. The conservative treatment consist of oral medications, intra-articular injections, and physical therapy (Georgiannos et al. 2017, p. 65). Conservative treatments are the first choice for the treatment of frozen shoulder After nonsurgical treatment fails, surgical management such as arthroscopic capsular release or capsular incision may be considered (Zhong et al. 2021, p. 166).

Physiotherapy is generally considered the first-line treatment for frozen shoulder (Rayudu et al., 2018). Manual therapy is often applied to help patients achieve faster recovery (Hwang et al. 2021, p. 323). The aim of physiotherapy involves alleviating pain, increasing the range of motion and functional restoration. A combination of physiotherapy interventions, which include stretching, strengthening, electrotherapy and mobilization can be applied (Almureef et al. 2020, p. 22).

Keltenborn mobilization is a sustained passive stretch maneuver that enhances joint mobility without causing articular surface compression. Forces are categorized into Grades I, II, and III. Grade I causes slight distraction to help relieve pain, Grade II applies stress to the surrounding tissues, and Grade III creates enough distraction to stretch the joint capsule and improve range of motion (Do Moon et al. 2015, p. 1391). The Keltenborn mobilization involves two key passive movements, traction or separation, and linear gliding, which is called joint play. These motion recovery accessory glides and pain-free physiological movement, following the concave-convex rule (Rathod et al. 2019, p. 320).

Small and accessory motion within joints is called joint play, such as gliding, rolling, and spining. Various conditions are responsible for loss of normal joint play motion, frozen shoulder among them. To achieve normal joint play motion, Keltonborn mobilization is helpful because it involves traction and linear gliding called joint play and according to the concave convex rule. there are few studies conduct related to joint play technique.

The frozen shoulder is a severe musculoskeletal issue with severe clinical and economic implications, especially when the risk groups of their occurrence are considered, such as diabetics. Detection of dysfunctional biomechanics, as well as effective methods of physiotherapeutic treatment, including joint play technique methods, or commonly called Kaltenborn mobilization, could make a promising contribution in terms of reducing pain, improving quality of movement, and functional recovery (Rezwan et al. 2021 p. 50).

1.2 Justification

Frozen shoulder or adhesive capsulitis is a common musculoskeletal condition that causes pain, stiffness, and limited movement in the shoulder joint. It often involves difficult activities, such as dressing, reaching overhead, or doing household tasks, which negatively impact quality of life. Although many treatment approaches are available, including medication, exercise, and physical therapy, yet there is no clear agreement on which method works best for improving movement and function. This lack of clarity shows the importance of more evidence-based studies to support clinical practice. In managing frozen shoulder, physiotherapy has a major role, with manual therapy often used as the main approach. Among manual techniques, the Kaltenborn concept of joint mobilization, particularly joint play techniques, is designed to restore normal joint mechanics by addressing the capsular tightness and joint restrictions that contribute to frozen shoulder. While some studies suggest positive outcomes from joint mobilization, there is limited high-quality evidence specifically focusing on the Kaltenborn joint play technique in frozen shoulder management. Most existing research on frozen shoulder either evaluates general exercise programs or compares various mobilization methods without isolating the effect of joint play. Moreover, there are limited research on joint play technique. This inconsistency creates a gap in knowledge, especially in understanding whether targeted joint play mobilization can provide superior or additional benefits. This study aims to fill the gap by evaluating the effectiveness of the joint play technique in patients with frozen shoulder. It is important to establish its clinical value, as frozen shoulder is a condition that can last for months or even years if not treated well. If joint play techniques are shown to be effective, they could become a recommended part of rehabilitation programs, helping patients recover faster, regain independence, and reduce the need for invasive procedures such as manipulation under anesthesia or surgical intervention.

1.3 Research question

Is joint play technique effective among the patients with frozen shoulder?

1.4 Aim of the study

The aim of this study is to compare the effectiveness of the joint play technique among patients with frozen shoulder.

1.5 Objectives of the study

1.6.1 General objective

- To compare the effectiveness of joint play technique with conventional therapy before and after intervention among patients with frozen shoulder.

1.6.2 Specific objectives

- To compare the baseline characteristics of the participants between the experimental and control groups.
- To assess the pain by using the NPRS and disability by using the SPADI questionnaire of the experimental and control groups before and after intervention.
- To estimate the improvement in ROM by using the goniometer of the experimental and control groups before and after intervention.
- To identify the association between the sociodemographic factors and the shoulder pain disability index.

1.6 Hypothesis:

1.4.1 Alternative Hypothesis

Joint play technique with conventional physiotherapy is effective for frozen shoulder patients.

Alternative hypothesis $H_a = \mu_1 - \mu_2 \neq 0$ or $\mu_1 \neq \mu_2$.

1.4.2 Null Hypothesis

Joint play technique with conventional physiotherapy is not effective for frozen shoulder patients.

Null hypothesis $H_0 = \mu_1 - \mu_2 = 0$ or $\mu_1 = \mu_2$

Here,

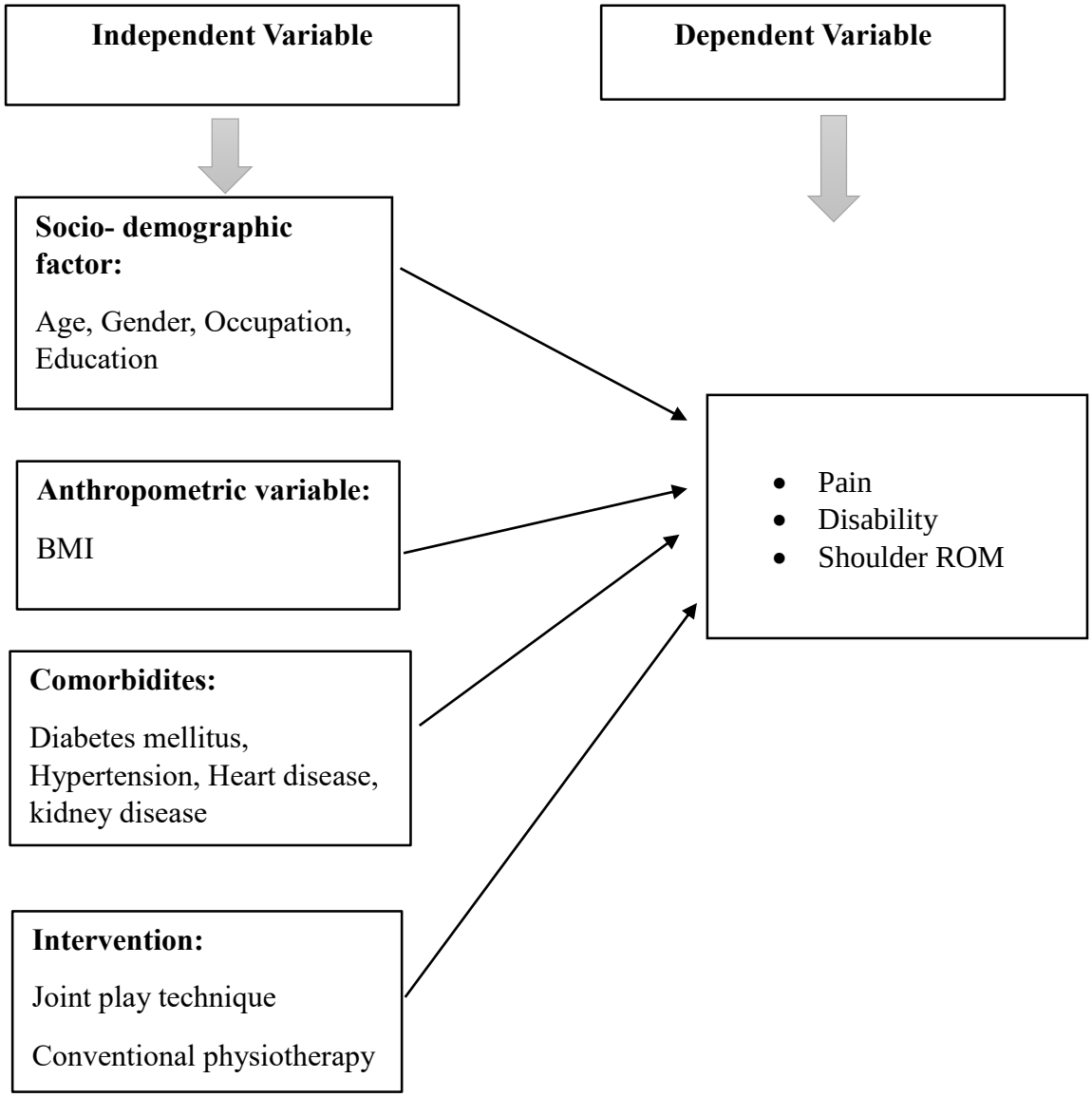
Ho = Null hypothesis

Ha = Alternative hypothesis

μ_1 = Mean of population 1

μ_2 = Mean of population 2

1.7 Conceptual framework



1.8 Operational definitions

Frozen shoulder:

Frozen shoulder is a condition in the shoulder joint that is characterized by pain, stiffness, and reduced range of motion both actively and passively. It usually develops gradually and lasts several months to years, and this condition limits daily activities like reaching, dressing, etc.

Joint play technique:

A manual therapy technique where small, passive, accessory movements such as gliding, rolling and distraction are applied by a physiotherapist to reduce pain, stiffness, and improve joint range of motion.

Conventional Physiotherapy:

Conventional physiotherapy refers to the routine physiotherapy treatment for frozen shoulder, which includes hot pack application, ultrasound therapy, stretching exercises, pendular exercises, active and passive range of motion exercises, and strengthening exercises for the shoulder joint to reduce pain and stiffness and to improve mobility.

CHAPTER-II LITERATURE REVIEW

Frozen shoulder also known as adhesive capsulitis (AC) is a musculoskeletal condition that leads to pain and limits the movement of the upper limb, including restrictions in passive motion (Patel et al. 2020, p. 91). Frozen shoulder can occur either primary or idiopathic or secondary, resulting from predisposing factors. Various conditions have been linked to its development, including hyperthyroidism, Dupuytren contracture, breast cancer treatments, cerebral vascular disease, myocardial infarction, hyperlipidemia, and autoimmune disease (Yang et al. 2017, p. 1317).

The prevalence of frozen shoulder is between 2-5% in the general population, with a higher occurrence in females, particularly among individuals aged 40-70 years (Redler et al. 2019, p. 544). The prevalence of frozen shoulder among people with diabetes is reported to be 10.3% in type 1 diabetes and 22.4% in type 2 diabetes, which is about five times higher than the 13.4% seen in the general population. In China, a significant proportion of the labor force is between the ages of 40 and 59, with more than 30% aged 40-49 and over 20% aged 50-59 (Kobayash et al. 2019, p. 631).

Frozen shoulder occurs most commonly in people in their 50s and 60s, with the highest incidence around the mid-50s. Study reported that up to 17% individuals with frozen shoulder may develop the condition in the opposite shoulder within five years (Alben et al. 2023, p. 579). Some commonly related systemic comorbidities related to frozen shoulder include diabetes, cardiovascular disease, Parkinson's disease, stroke, and hyperthyroidism, etc. which occur in about 60 percent of patients with frozen shoulder (Alhashimi et al., 2018).

In the early stages of frozen shoulder, pain and stiffness are the most common symptoms. These are usually felt on the front and side of the shoulder, the upper arm’s anterior and central regions, and the forearm’s flexor surface. Pain often becomes more noticeable at night (Stella et al. 2022, p. 481).

Frozen shoulder is often considered a self-limiting condition that may last two to three years. However, some studies report that up to 40% of patients continue to experience pain and stiffness beyond three years, as pain and inflammation may resolve on their own, but the muscle atrophy and joint pathology persist if not treated (Balci et al. 2016, p. 121).

The shoulder, or glenohumeral joint, is a ball-and-socket joint that allows the greatest range of motion of any joint in the human body. This extensive mobility enables a wide variety of movements, but it also makes the shoulder more prone to instability and a broader range of injuries compared with other joints (Kang et al. 2024, p. 744).
The glenohumeral joint connects the humerus to the scapula, while the scapula itself interacts with the thoracic cavity through the scapulothoracic articulation. The scapula is held to the clavicle by the coracoclavicular ligament. While the acromioclavicular joint lies at the outer end of the clavicle, it provides limited structural stability to the shoulder. Additional support comes from the coracoid and acromion processes, the coracoacromial ligament, and the surrounding shoulder muscles. Together, these muscles and peripheral structures help maintain the strength and stability of the shoulder joint (Eovaldi et al., 2018).

The upper limb connects to the central skeleton through the sternoclavicular joint. The pectoral girdle includes three joints: the sternoclavicular, coracoclavicular, and acromioclavicular. It is made up of three bones: the clavicle, scapula, and humerus. The clavicle sits just above the first rib, and its outer end joins the acromion and coracoid processes of the scapula, forming the acromioclavicular and coracoclavicular joints. The main ligaments providing shoulder stability are the glenohumeral ligaments and the coracoacromial ligament (Cowan et al., 2023).

The muscles around the shoulder are essential for keeping the joint stable. The rotator cuff muscles are the main group providing this support and include the supraspinatus, infraspinatus, teres minor, and subscapularis. These muscles form a cuff of muscle and tendon as they attach to the upper part of the humerus. Other important muscles of the shoulder girdle include the pectoralis major and minor, deltoid, trapezius, and serratus anterior (Cowan et al., 2023). Movements of the shoulder, including abduction, adduction, flexion, extension, and internal and external rotation, are controlled by its muscles (Bakhsh et al. 2018, p. 10). The glenoid cavity, which forms the articular surface of the glenohumeral joint, is situated on the outer side of the scapula. It is reinforced by the glenoid labrum, the joint capsule, supporting ligaments, and the rotator cuff muscles tendon attachments. The scapula, a flat bone, serves as an attachment site for several muscles. At its lateral angle, the glenoid fossa connects with the head of the humerus. The shoulder is the body's most frequent site for

hydroxyapatite crystal deposition. Frozen shoulder often occurs when these crystals build up in the muscle-tendon units, with the supraspinatus tendon being the most common location for such deposits (Suh et al. 2019, p. 566).

The subscapularis muscle is supplied by the upper and lower branches of the subscapular nerve. The supraspinatus and infraspinatus muscles receive signals from the suprascapular nerve. The teres minor is controlled by the posterior branch of the axillary nerve, which also supplies the deltoid muscle. The trapezius is innervated by the spinal accessory nerve (11th cranial nerve) along with direct branches from the cervical plexus. The levator scapulae gets its nerve supply from C3 to C5, while the serratus anterior is supplied by the long thoracic nerve (Okwumabua et al., 2023).

Duplay had first mentioned stiff shoulder in 1872, referring to it as “scapulohumeral periarthritis”. Later, Codeman used the term frozen shoulder to describe muscle spasm and stiffness in the shoulder joint. Frozen shoulder impairs both active and passive range of motion, leading to in severe limitation in function.

The condition undergoes three stages: the initial "freezing" stage, which lasts 2-9 months and is marked by pain increase and mobility decrease and the "frozen" stage, which lasts 4-12 months and is marked by pain decrease but continued stiffness and the "thawing" stage, which lasts 12-24 months and is marked at the onset by gradual range of motion improvement (Stella et al. 2022, p. 481). There are physical signs associated with frozen shoulder, such as decreased muscle strength and mobility of the deltoid and supraspinatus muscles, and a reduced angle between the humerus and scapula (Pandey et al. 2021, p. 299).

Frozen shoulder has been associated to a variety of comorbidities, including cardiovascular illness, Parkinson's disease, stroke, hyperthyroidism, and diabetes mellitus, with an incidence of about 60% (De la Serna et al. 2021, p. 663). More than 80% of individuals with frozen shoulder have associated comorbidities, and over 35% have three or more related conditions. Additional risk factors include smoking, obesity, and low levels of physical activity (Pietrzak et al. 2016, p. 12).

The main feature of frozen shoulder is shoulder pain combined with a significant loss of movement. The pain is often a dull, that can spread down into the biceps. Activities such as reaching overhead or behind the back can worsen the pain and stiffness. If

symptoms like fever, night sweats, fatigue, or unexplained weight loss are present, other conditions such as tumors or autoimmune diseases should be considered (Ramirez et al. 2019, p. 297). The symptoms associated with frozen shoulder have the potential to cause disability in patients and contribute to increased public healthcare expenditures.

The shoulder joint capsule is a loose fibrous covering that encloses the joint. The healthy capsule is made of dense bundles of type I collagen and elastic fibers with minimal blood vessels and nerve fibers. Fibroblasts are the main cell type within the capsule membrane, generating ECM proteins that create a flexible but supporting structure. In FS, the connective tissue membrane progressively fibroses, and the surrounding synovial membrane thickens, changing the collagen structure. In along with fibrotic alterations, there is inflammation, neoangiogenesis, and neoinnervation. As a result, the joint volume decreases and the capsule stiffens, leading to limited mobility and discomfort (Ryan et al. 2016, p. 340).

A study from Switzerland showed that people who develop frozen shoulder after a shoulder injury leads to significantly longer work absences up to 7.5 times more and higher treatment costs (CHF 34,000 per case) compared to other shoulder injuries. It contributes to an estimated CHF 78 million in annual healthcare costs, highlighting its major socioeconomic burden (Bouaicha et al. 2020 p.188). Frozen shoulder patients also exhibit higher levels of pro-inflammatory cytokines such as TNF, IL-6, and IL-1B that are consistently high in diabetic patients. AGEs (Advanced Glycation End-products) also show higher immunoreactivity in diabetic and non-diabetic FS patients (Cho et al. 2018, p. 72).

AGEs causes an increase collagen cross- linking, resulting in less elasticity and more mechanical stiffness (Zreik et al. 2016, p. 26). In recent years, researchers have focused on understanding the causes of inflammation and fibrosis in frozen shoulder (FS). Although no single cause has been identified, persistent and unresolved inflammation appears to play an important role in its development Current study has led to better understanding of risk factors and disease development, as well as insights into the basic mechanisms. This offers the possibility of helping identify new therapy strategies. Although FS affects 5% of the world's population, research on it is not as advanced as that of other musculoskeletal conditions (Millar et al. 2022, p. 8).

In addition, some Investigations demonstrate of tissue biopsies from frozen shoulder patients show a chronic immune cell (mast cells, macrophages, T and B lymphocytes) infiltration, and inflammatory mediators like cytokines, i.e., interleukins (IL)-1β, IL-6, IL-8, and tumor necrosis factor-alpha (TNF-α), and matrix metallo proteinases (MMPs) in the affected shoulder (De la Serna et al. 2021, p. 66).

Diagnosing frozen shoulder is done through a combination of clinical examination and imaging examination. Diagnosing frozen shoulder (FS) can be confusing and unclear for many clinicians. Some patients may show common signs like pain and limited shoulder movement in all directions, but they might not have any actual damage to the joint capsule (Hollmann et al. 2018, p. 63).

According to the American Physical Therapy Association, frozen shoulder can be identified when there is a loss of more than 25% of range of motion (ROM) in at least two planes, along with a loss of passive external rotation greater than 50% compared with the unaffected side, or when external rotation is less than 30° (Li et al. 2021, p. 27). Commonly reported clinical signs also include painful shoulder stiffness lasting at least four weeks, severe pain that limits daily activities or work, night pain, and restricted active and passive range of motion, particularly in elevation, while imaging shows a normal radiographic appearance (de Sire et al. 2022, p. 2449).

X-rays are not usually helpful except to exclude bone pathologies, but magnetic resonance imaging (MRI) is considered the most reliable method, but ultrasound is also widely used because it is affordable, accessible, and helpful for distinguishing frozen shoulder from other conditions (Shrestha et al. 2024, p. 587). Characteristic ultrasound findings include thickening of the inferior glenohumeral capsule, thickening of the coracohumeral ligament and rotator cuff interval soft tissues, hypervascularity in the subacromial deltoid bursa, and fluid around the biceps tendon sheath (Al Khayyat et al. 2023, p. 369).

Imaging, however, does not yield superior diagnostic information to that of a physical exam and history and therefore is not recommended in the routine workup even though MRI may be beneficial if on clinical suspicion there's another grave pathology with similar symptomology to fs (Lewis et al. 2015, p. 2). According to Al Dajah, the development of musculoskeletal problems in frozen shoulder is closely linked to

biomechanical abnormalities of the scapulohumeral rhythm and impaired muscle control of the shoulder's prime movers, particularly the deltoid and rotator cuff (Al Dajah et al. 2014, p. 1803). Pain during movement often leads to kinesiophobia, which gradually reduces shoulder muscle flexibility and disrupts the normal scapulohumeral coordination (Alito et al. 2024, p. 209).

The management of frozen shoulder can either be conservative or surgical. Conservative treatment includes oral medications, intra-articular injections, and physical therapy. Studies have shown that most of the health professionals prefer conservative treatment with physiotherapy and analgesics (Georgiannos et al. 2017, p. 65). Rehabilitation programs have been shown to be effective in reducing pain, improving range of motion (ROM), and restoring function, often supported by physical modalities. Various physiotherapy methods include cryotherapy, heat packs, transcutaneous electrical nerve stimulation (TENS), active and passive ROM exercises, joint mobilization, proprioceptive neuromuscular facilitation (PNF), home exercise programs, and Kinesio taping (Alptekin et al. 2016, p. 207).

An NHS cost-utility analysis determined that Manipulation Under Anaesthesia (MUA) was the cheapest treatment for frozen shoulder and had more Quality-Adjusted Life Years (QALYs) than Early Structured Physiotherapy (ESP) but was less costly than Arthroscopic Capsular Release (ACR) (Corbacho et al. 2021, p. 685). Codman's pendulum exercises, while commonly prescribed for passive mobilization, were not found to produce significant improvements in pain or ROM compared with other mobilization strategies (Zavala-Gonzalez et al. 2018).

A systematic review in 2015 highlighted that manual mobilization combined with exercise improved both ROM and function in frozen shoulder patients (Jason et al. 2015, p. 1318). Patients with frozen shoulder may benefit from resistance-based exercises, though there is still not much information on this topic. Some studies show that adding strengthening exercises to a multimodal treatment program including mobilization and electrostimulation can improve pain, range of motion, function, and muscle strength (Rawat et al. 2017, p. 235). when scapulothoracic exercises and electromagnetic therapy were substituted, however, no comparable advantages were observed (Junaid et al. 2016, p. 316).

The results of the present study indicated that Kaltenborn mobilization showed significant improvements in pain, disability, and all of the measured ROM, abduction, internal rotation, and external rotation (Umar et al., 2023). Another study shows a randomized clinical trial of Kaltenborn mobilization and muscle energy technique compared with patients with adhesive capsulitis. Both groups improved, but Kaltenborn mobilization resulted in higher response rates in reducing pain, increasing range of motion, and functional mobility. The authors concluded that Kaltenborn was the more effective intervention. These results justify the application of joint mobilisation in the treatment of frozen shoulder (Zohiab et al. 2025, p. 219).

Educating patients about frozen shoulder (FS) is a key part of early management. Understanding its natural history such as how long it typically lasts, can reduce fear and anxiety. When patients know what to expect, their symptoms often feel more manageable. Consistent and accurate information across all healthcare providers is essential to prevent confusion. Effective education should also include strategies that empower patients to self-manage their condition. These include simple modifications to occupational or recreational activities, tailored to the stage of frozen shoulder (Vermeulen et al., 2017).

In addition to shoulder exercises, regular physical activity is advised to support health, improve mood and sleep, and lower the risk of depression. It also helps reduce the negative effects of a sedentary lifestyle, which generally involves higher levels of chronic low-grade inflammation and the development of insulin resistance (Leon Latre et al. 2014, p. 449).

Frozen shoulder often lasts a long time and can seriously disrupt sleep and daily activities, which has a major impact on a patient's physical, mental, and social well-being. Many people with FS experience anxiety or depression, and those with other health conditions tend to have more disability and a lower quality of life (Toprak et al. 2019, p. 287). Mental health issues can also influence how much pain and disability a person feels, as well as how they experience and report their symptoms (Ebrahimzadeh et al. 2019, p. 38).

CHAPTER-III METHODOLOGY

3.1 Study design:

It was a randomized controlled trial (RCT), carried out with the objective of comparing the effectiveness of Join play technique and conventional physiotherapy among the patient with frozen shoulder.

3.2 Study Area:

Data were collected from Academy of Physiotherapy Pain and Rehabilitation center, Unique Pain and Paralysis Centre and Elite Physiotherapy & Health Care, Mirpur , Dhaka.

3.3 Study place:

The study was conducted at SAIC College of Medical Science and Technology (SCMST), Mirpur in Dhaka.

3.4 Study period:

The study period was one year (June 2024 to July 2025).

3.5 Study population:

Participant with frozen shoulder (Adhesive capsulitis) received treatment from Academy of Physiotherapy Pain and Rehabilitation center, Unique Pain and Paralysis Centre and Elite Physiotherapy & Health Care.

3.6 Sample size

$$n = \frac{2\,SD^2\,(Z\,{}^{\alpha}/_{2} + Z\beta)^2}{d^2}$$

$$= 2 \times (9.26)^2 \frac{(1.96+0.84)^2}{(8.59)^2}$$

$$= 2 \times 85.74 \frac{7.84}{73.78}$$

$$= 171.49 \times 0.10$$

$$= 18.22$$

Here,

Standard deviation = 9.26 (Pattnaik et al. 2023, p. 149)

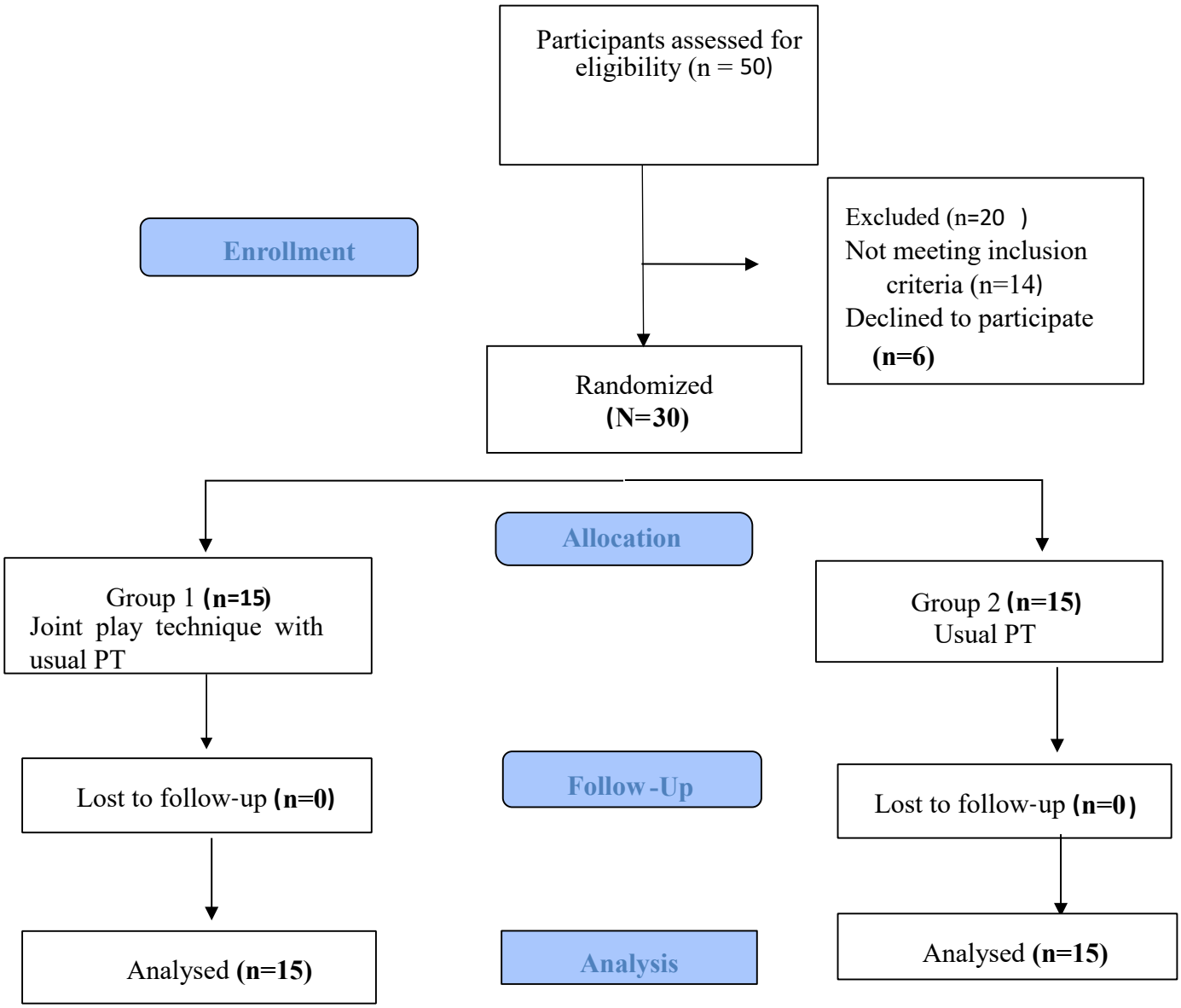
From Z table type 1 error of 5% $Z\alpha$= 1.96

From Z table 80% power $Z\beta$ = 0.84

Effect size difference between mean values = 73.78 (Pattnaik et al. 2023, p. 149)

n = number of sample size

3.7 CONSORT (Consolidated Standards of Reporting Trails) flow chart:



3.8 Sampling technique:

A simple random sampling technique was applied to allocate into control and experimental group. The sample was selected randomly among participants who meet the inclusion criteria. Out of them, 15 participants were allocated to experimental group, receiving conventional physiotherapy with joint play technique and 15 participants to the control group receiving only conventional physiotherapy. To, maintain systemic identification, the control group participants were labeled as C1, C2, C3 etc. while experimental group participants were refer to as E1, E2, E3 etc. Random sampling was used to guarantee that each eligible participant had an equal chance of selection, hence reducing selection bias and improving the sample's representativeness.

3.9 Eligibility criteria

3.9.1 Inclusion criteria:

- Patient diagnosis with frozen shoulder for at least one month (Alam et al. 2024, p. 35).
- Age range 40 to 70 years (Agarwal et al. 2016, p. 334).
- Patient having a history of pain and restriction of shoulder range of motion for 3 to 9 months (Rathod et al. 2019, p. 320).

3.9.2 Exclusion criteria:

- Patient with any history of fracture and dislocation of the shoulder (Rathod et al. 2019, p. 320).
- Patient with surgery to the damaged shoulder (Do Moon et al., 2015).
- Participants who were unwilling to participate.
- Any other neurological deficits as stroke, Parkinson’s disease etc. (Do Moon et al. 2015, p. 1391).
- Patient who had history of taking intra-articular injection of steroids previous (Alam et al. 2024, p. 35).

3.10 Method of data collection:

3.10.1 Technique of data collection:

Data were collected through a face-to-face interview using an internationally accepted questionnaire.

3.10.2 Instruments of data collection:

Instrument:

Questionnaire

A questionnaire was prepared according to the objectives and variables of the present study. The questionnaire had six sections. The questionnaire contained closed ended questions. First section contained questions on socio-demographic information. The second section included questions on anthropometric measurements. The third part included questions on comorbidity information. The fourth section included diseases related information. The fifth section included Range of motion of all movement of shoulder was obtained using universal goniometer, and the sixth section included SPADI (Shoulder pain and disability index) Scale for assessing pain and disability.

Tools

The shoulder pain and disability index (SPADI) is a self-report questionnaire developed by (Roach et al., 1991) to assess the pain and disability associated with shoulder pathology. The SPADI consists of 13 items in two subscales, a 5-item subscale that measures pain and an 8-item subscale that measures disability. Each item is rated on a 0 to 10, where 0 means no pain or no difficulty and 10 means worst pain or complete inability. The Shoulder Pain and Disability Index (SPADI) is scored out of 130 raw points (Pain = 50, Disability = 80), which is then converted into a percentage. To find the total percentage score, add the pain and disability scores, divide by 130, and then multiply by 100 and higher scores indicating greater pain and functional disability in the shoulder. The points of the shoulder pain and disability index (SPADI) SPADI scale are

Pain scale

1. How severe is your pain at its worst?
2. How severe is your pain when lying on the involved side?
3. How severe is your pain when reaching for something on a high shelf?
4. How severe is your pain when touching the back of your neck?
5. How severe is your pain when pushing with the involved arm?

Disability scale

1. How much difficulty do you have washing your hair?
2. How much difficulty do you have washing your back?
3. How much difficulty do you have putting on an undershirt or pullover sweater?
4. How much difficulty do you have putting on a shirt that buttons down the front?
5. How much difficulty do you have putting on your pants?
6. How much difficulty do you have placing an object on a high shelf?
7. How much difficulty do you have carrying a heavy object of 10 pounds?
8. How much difficulty do you have removing something from your back pocket?

Goniometer

The Goniometer is a standard clinical instrument used to measure joint range of motion (ROM) in degrees. This tool has been widely validated and recommended by the American Academy of Orthopaedic Surgeons (AAOS) and other clinical guidelines (Norkin et al., 2016). In this study, the shoulder joint range of motion is assessed by using a universal goniometer, which is reliable and easy to use in clinical and research settings. Measurements were taken both before (pre) and after (post) the intervention to evaluate changes in joint mobility. Each motion was measured actively, and three readings were taken, with the average value recorded for analysis.

The normal ROM values for shoulder (as per AAOS standards) are:

- Shoulder Flexion: 0-180 degree.
- Shoulder Extension: 0-60 degree.
- Shoulder Abduction: 0-180 degree.

- Shoulder Adduction: 0-60 degree.
- Shoulder Internal Rotation: 0-70 degree.
- Shoulder External Rotation: 0-90 degree.

Height measurement tape.

Weight machine.

3.11 Procedure of data collection:

The researcher obtained permission from the Ethical Review Board of SAIC College of Medical Science and Technology to carry out the study. A written permission was also taken from the concerned authority from Academy of Physiotherapy Pain and Rehabilitation center, Unique Pain and Paralysis Centre and Elite Physiotherapy & Health Care, Mirpur, Dhaka for data collection. After that the researcher approached the Frozen shoulder patients and the aim and objectives of the study was explained in details to them. Interested participants were included in the study. A total of 30 individuals who meet the inclusion criteria were recruited and split into two groups of 15 participants each. Participants were asked to fill up written consent form with their signature to ensure volunteer participation. They were informed about the privacy and confidentiality of the information. Then the researcher started interview with the participants by using the pretested questionnaire. Then pre-test data was collected before treatment and post-test was collected after 12 sessions of the treatment.

Physical examination was conducted among the both group of participants to assess the pain and disability and range of motion by using SPADI and Goniometer. The findings of physical examination were recorded in the questionnaire. The interview and examination were in a cordial environment. At the end of the interview and examination, the researcher thanked the participants.

3.12 Intervention:

Dosage: The total duration of the trial regimen was four weeks, three sessions per week, total 12 session and the duration of each session of treatment was 30-45 minutes. The experimental group participants received Joint play technique along with usual physiotherapy treatment. And control group receive usual physiotherapy. Both groups received treatment for 12 session. Treatment has been given by qualified physiotherapists who were trained in Joint play technique for the experimental group.

3.12. 1Treatment protocol

<table>
<tr><th>Experimental group (30-45 minutes)</th><th>Control group (30-45 minutes)</th></tr>
<tr><td>• Joint play technique, performed 4 to 6 glides and each sustained stretch hold 10-30 seconds then 20 repetitions per glide with a gap of 10 seconds, for 3 times per weeks, over 4 weeks.</td><td rowspan="2">(Usual physiotherapy intervention)
• Soft tissue release 5-7 minutes per session, 3 times per weeks, over 4 weeks.
• Capsular stretching 10 rep × 1 set 3 times per session, 3 times, over 4 weeks.
• Superficial heating modalities 5-7 minutes per session, 3 times per weeks, over 4 weeks.
• Ultrasound therapy 5-7 minutes per session, 3 times per weeks, over 4 weeks.
• Strengthening exercise programs 5-7 minutes per session, 3 times per weeks, over 4 weeks.
• Education about posture, disease condition and home advice 5 min.</td></tr>
<tr><td>• With usual physiotherapy intervention.</td></tr>
</table>

Figure1: Intervention (joint play technique)

3.13 Data analysis:

The data analysis was conducted using SPSS 22 version software, Microsoft word, Microsoft Excel 2019 was used to create bar diagram, table, charts.

3.14 Statistical test

- Data was analysis by SPSS version 22 using for descriptive analysis for sociodemographic variable.
- Mann-Whitney-U test was used to compare the baseline variability among the categorical data.
- Mann-Whitney-U test used to calculate between group comparison.
- Used Wilcoxon-test measure within group mean difference and Mann-Whitney U test to calculate between group mean differences.
- Chi-square test was used to determine the association among different variables.

3.15 Ethical consideration:

The researcher submitted a research proposal to the institutional review board (IRB). The IRB of SCMST approved the proposal. The permission was obtained from the authority of Academy of physiotherapy pain and rehabilitation center and Unique Pain and Paralysis center and Elite Physiotherapy & Health Care to collect data from the patients. The investigator followed the World Health Organization (WHO) & Bangladesh Medical Research Council (BMRC) guidelines.

The researcher approached the patients attending those hospitals. The aims and objectives of this study was explained to them for taking informed consent from every participant. They were also informed about the rights to withdraw anytime and also ensured about safety of the procedure who agreed were included into this study and written informed consent was obtained from each of the participants. Personal and relevant information were kept confidential and privacy were maintained strictly for every individual participant.

CHAPTER-IV RESULTS

Table 1: Comparison of baseline characteristics of the participants

Variable	Control group (n=15)	Experimental group (n=15)	P-value
Age Mean age ± SD	56.33 ± 10.34	54.60 ± 9.51	.693
Gender Male Female	8 (53.3%) 7 (46.7%)	6 (40.0%) 9 (60.90%)	.472
BMI	24.97 ± 3.2	25.79 ± 3.1	.348
Comorbidites Diabetes mellitus Hypertension Heart disease	12(80.0%) 6 (40.0%) 1 (6.7%)	6 (40.0%) 9 (60.0%) 1 (6.7%)	.369
ROM of flexion Pre	89.33 ± 8.63	86.66 ± 12.77	.794
ROM of abduction pre	83.67 ± 7.66	88.33 ± 14.84	.168
ROM of external rotation pre	20.00 ± 6.81	24.00 ± 7.36	.117
ROM of internal rotation pre	28.33 ± 6.17	30.20 ± 6.85	.312
SPADI pre score	64.51 ± 12.48	62.15 ± 16.94	.618

The above-mentioned table presents the baseline characteristics of participants in both the control group (n = 15) and the experimental group (n = 15), along with their corresponding p-values to indicate statistical significance between the two groups. The mean age of participants in the control group is 56.33 ± 10.34 years, compared to 54.60 ± 9.51 years in the experimental group. The difference is not statistically significant (p = 0.693). Gender of participants in the experimental group (53.3%) are male and female 6 (40.0%) are female, whereas the experimental group, 7 (46.7%) are male and 9 (60.0%) are female, along their corresponding p values to indicate no statistically significant. In the case of comorbidities, p value indicates no statistically significant. The mean Body Mass Index (BMI) in the control group is 25.79 ± 3.1, while in the experimental group it is 24.79 ± 3.2. This difference is not statistically significant (p = 0.515). Regarding the pre-intervention range of motion (ROM) of shoulder flexion, the control group shows a mean of 89.33 ± 8.63 degrees, and the experimental group shows 86.66 ± 12.77 degrees, with no significant difference (p = 0.794). The ROM of shoulder abduction is 83.67 ± 7.66 degrees in the control group and 88.33 ± 14.84 degrees in the experimental group, with no statistically significant difference (p = 0.168). Similarly, the ROM of external rotation is 20.00 ± 6.81 degrees in the control group and 24.00 ± 7.36 degrees in the experimental group (p = 0.117), and the ROM of internal rotation is 28.33 ± 6.17 degrees and 30.20 ± 6.85 degrees, respectively (p = 0.312). Both differences are not statistically significant. The pre-intervention Shoulder Pain and Disability Index (SPADI) scores were 64.51 ± 12.48 in the control group and 62.15 ± 16.94 in the experimental group, with no significant difference between groups (p = 0.618). Overall, except for the ROM of extension, there were no statistically significant differences in baseline characteristics between the control and experimental groups (p > 0.05 for all variables), indicating that the groups were comparable before the intervention.

4.1 Socio-demographic variable of the participants:

4.1.1 Age of the participants

Age group in years	**Experimental group**		**Control group**	
	Frequency		Frequency	
	N	**%**	N	%
40-47 years	4	26.7	3	20.0
48-55 years	2	13.3	3	20.0
56-63 years	4	26.7	4	26.7
64-70 years	5	33.3	5	33.3
Total	15	100	15	100
Mean ± SD	54.60 ± 9.51		56.33 ± 10.34	

Table 2 regarding the frequency distribution of participants by age, in the experimental group, 4 (26.7%) participants were in the 40-47 years age group, 2 (13.3%) were in the 48-55 years group, 4 (26.7%) belonged to the 56-63 years group, and 5 (33.3%) were in the 64-70 years age group. Similarly, in the control group, 3 (20.0%) participants were in the 40-47 years group, 3 (20.0%) were in the 48-55 years group, 4 (26.7%) were in the 56-63 years group, and 5 (33.3%) were in the 64-70 years age group. The mean age in the experimental group was 54.60 years with a standard deviation of 9.51, while the control group had a mean age of 56.33 years and a standard deviation of 10.34.

4.1.2 Education qualification of the participants

Education qualification	Experimental Group N (%)	Control Group N (%)	Total N (%)
Primary	1 (3.3%)	1 (3.3%)	2 (6.7%)
SSC	4 (13.3%)	0 (0.0%)	4 (13.3%)
HSC	3(10.0%)	5(16.7%)	8 (26.7%)
Graduation	4(13.3%)	6(20.0%)	10 (33.3%)
Masters	3(10.0%)	3(10.0%)	6 (20.0%)

Table 3 presents the distribution of participants based on educational qualification in both the experimental and control groups. In the experimental group, 1 participant (3.3%) had a primary level education, 4 (13.3%) had completed SSC, 3 (10.0%) had completed HSC, 4 (13.3%) were graduates, and 3 (10.0%) had a master's degree. In comparison, the control group had 1 participant (3.3%) with a primary education, none with SSC, 5 participants (16.7%) with HSC, 6 (20.0%) were graduates, and 3 (10.0%) had completed a master's degree.

4.1.3 Living area of the participants

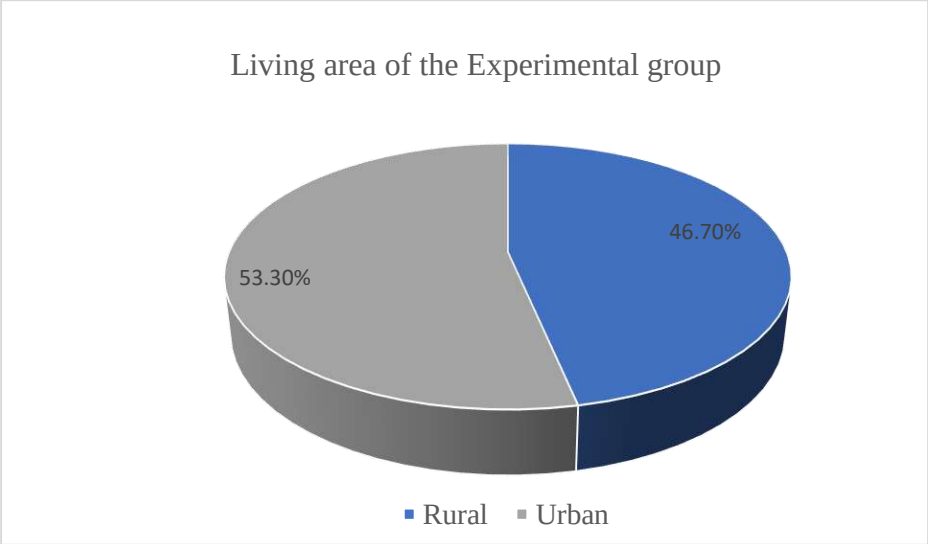


Figure No 3: Living area of the Experimental group

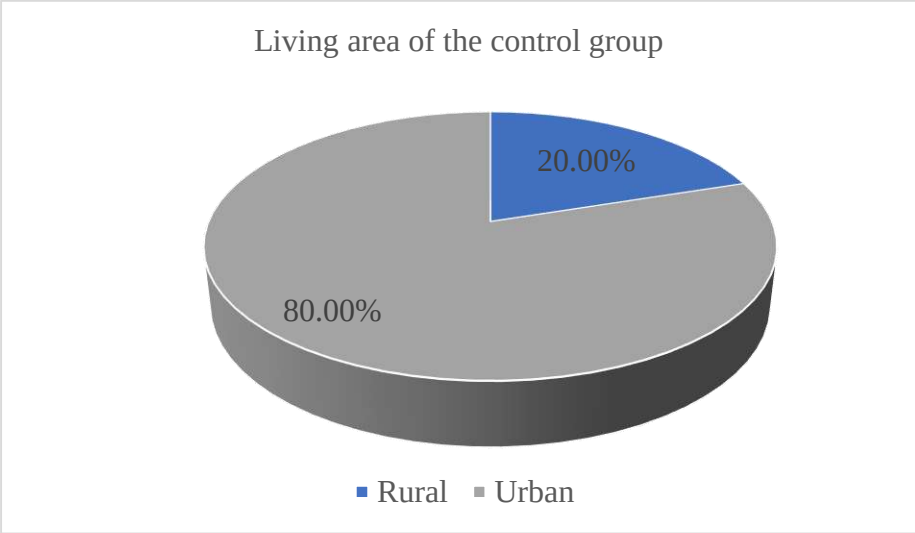


Figure No 3: Living area of the control group

These figure shows the distribution of participants based on their living area. In the experimental group, 7 participants (46.7%) were from rural areas, while 8 (53.3%) were from urban areas. In the control group, 3 participants (20.0%) resided in rural areas, and the majority, 9 participants (80.0%), lived in urban areas.

4.1.4 Occupation of the participants

Occupation	Experimental Group N (%)	Control Group N (%)	Total N (%)
Office worker	4 (13.3%)	2 (6.7%)	6 (20.0%)
Businessman	2 (6.7%)	2 (6.7%)	4 (13.3%)
Housewife	5 (16.7%)	7 (23.3%)	12 (40.0%)
Teacher	1 (3.3%)	2 (6.7%%)	3 (10%)
Farmer	1(3.3%)	0(0.0%)	1 (3.3%)
Others	2(6.7%)	2(6.7%)	4 (13.3%)

Table 4 presents the distribution of participants by occupation in both the experimental and control groups. In the experimental group, 4 participants (13.3%) were office workers, 2 (6.7%) were businessmen, 5 (16.7%) were housewives, 1 (3.3%) was a teacher, 1 (3.3%) was a farmer, and 2 (6.7%) belonged to other occupations. In the control group, 2 participants (6.7%) were office workers, 2 (6.7%) were businessmen, 7 (23.3%) were housewives, 2 (6.7%) were teachers, none were farmers, and 2 (6.7%) belonged to other occupations.

4.1.5 BMI of the participants

BMI of the participants	Experimental Group N (%)	Control Group N (%)	Total N (%)
Underweight	0 (0.0%)	0 (0.0%)	0 (0.0%)
Normal	8 (26.7%)	6 (20.0%)	14 (46.7%)
Overweight	6 (20.0%)	8 (26.7%)	14 (46.7%)
Moderately obese	1 (3.3%)	1 (3.3%)	2 (6.7%)
Severely obese	0 (0.0%)	0 (0.0%)	0 (0.0%)

Table 5 illustrates the distribution of participants based on their Body Mass Index (BMI) classification in both the experimental and control groups. In the experimental group, 8 participants (26.7%) had a normal BMI, 6 participants (20.0%) were classified as overweight, and 1 participant (3.3%) was moderately obese. In the control group, 6 participants (20.0%) had a normal BMI, 8 participants (26.7%) were overweight, and 1 participant (3.3%) was moderately obese.

4.2.1 Affected side of the participants

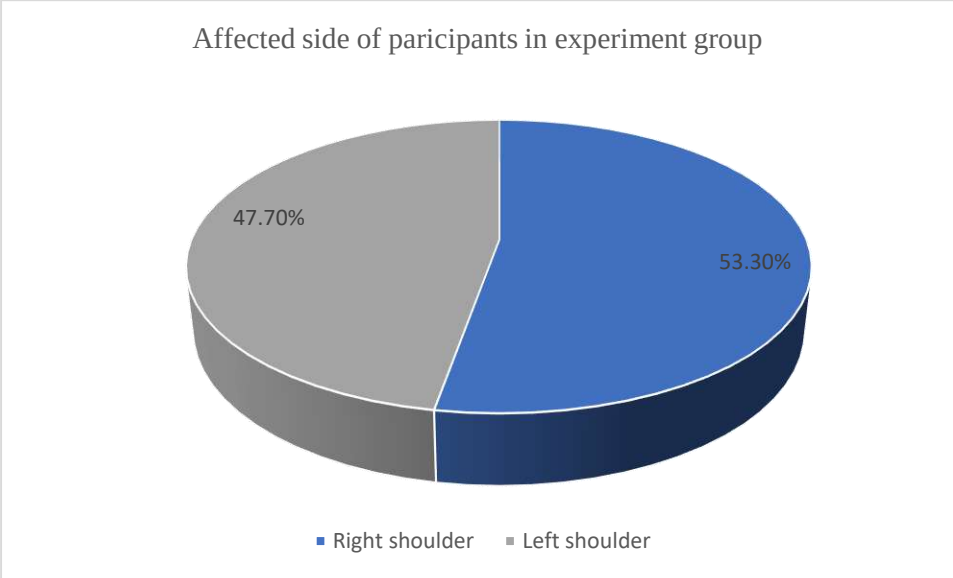


Figure No 4: Affected side of participants in Experimental Group

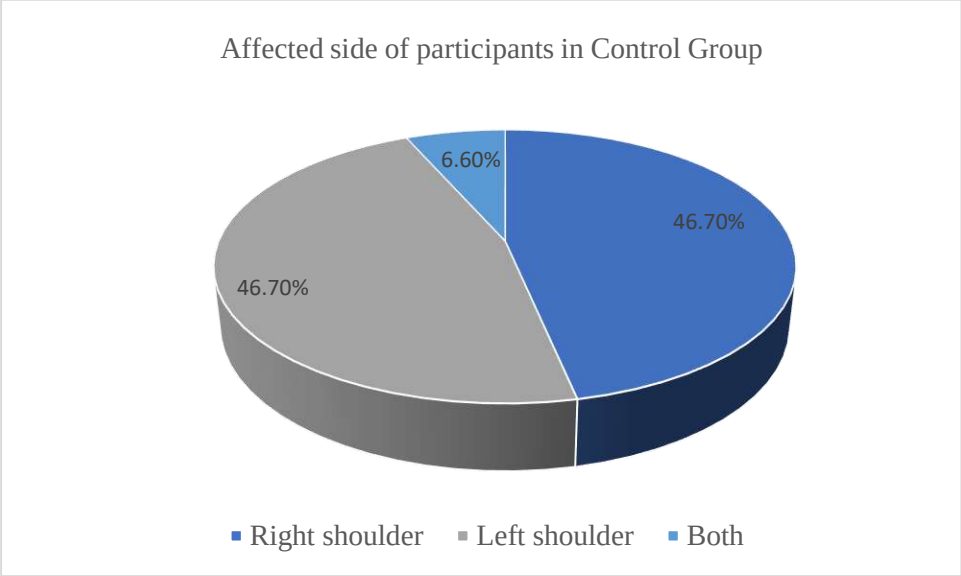


Figure No 5: Affected side of participants in Control Group

This figure shows the distribution of the affected shoulder side among participants in the experimental and control groups. In the experimental group, 8 participants (53.3%) had their right shoulder affected, while 7 participants (46.7%) had the left shoulder affected. No participants had both shoulders affected. In the control group, 7 participants (46.7%) had the right shoulder affected, 7 participants (46.7%) had the left shoulder affected, and 1 participant (6.6%) had both shoulders affected.

4.2.2 Duration of pain of the participants

Duration of pain	Experimental Group N (%)	Control Group N (%)	Total N (%)
Less than 6 weeks	2 (6.7%)	4 (13.3%)	6 (20%)
6 weeks to 12 weeks	6 (20.0%)	8 (26.7%)	14 (46.7%)
12 weeks to 24 weeks	4 (13.3%)	1 (3.3%)	5 (16.7%)
More than 24 weeks	3 (10.0%)	2 (6.7%)	5 (16.7%)

Table 6 illustrates the distribution of pain duration among participants in the experimental and control groups. In the experimental group, 2 (6.7%) participants experienced pain for less than 6 weeks, 6 (20.0%)participants for 6 weeks to 12 weeks, 4 (13.3%) participants for 12 weeks to 24 weeks, and 3 (10.0%) participants for more than 14 weeks. In the control group, 4 (13.3%) participants had pain lasting less than 6 weeks, 8 (26.7%) participants between 6 weeks to 12 weeks, 1(3.3%) participant between 12 weeks to 24 weeks, and 2 (6.7%) participants for more than 12 weeks.

4.2.3 Duration of symptoms of the participants

Duration of symptoms	Experimental Group N (%)	Control Group N (%)	Total N (%)
Intermittent	10 (33.3%)	14 (46.7%)	24 (80.0%)
Constant	5 (16.7%)	1 (3.3%)	6 (20.0%)

Table 7 presents the distribution of symptom duration types among participants in the experimental and control groups. In the experimental group, 10 participants (33.3%) experienced intermittent symptoms, while 5 participants (16.7%) had constant symptoms. In the control group, 14 participants (46.7%) reported intermittent symptoms, and only 1 participant (3.3%) had constant symptoms.

4.2.4 Difference between pre and post level of pain between and experimental and control group:

Difference between pain level	Category of participants	N	Mean Rank	Mann-Whitney U score	P value
	Experimental group	15	21.37	24.50	.001
	Control group	15	9.63		
	Total	30			

Table 8 The Mann-Whitney U test showed a significant difference in pain levels between the experimental and control groups. The experimental group (Mean Rank = 21.37, N = 15) had higher improvement in pain compared to the control group (Mean Rank = 9.63, N = 15). The Mann-Whitney U value was 24.50 with a p-value of .001, indicating that the reduction in pain in the experimental group was statistically significant compared to the control group.

4.2.5 Difference between pre and post level of disability between and experimental and control group:

Difference between disability level	Category of participants	N	Mean Rank	Mann-Whitney U score	P value
	Experimental group	15	20.63	35.50	.001
	Control group	15	10.37		
	Total	30			

Table 9 The Mann-Whitney U test revealed a significant difference in disability levels between the groups. The experimental group (Mean Rank = 20.63, N = 15) showed greater improvement in reducing disability compared to the control group (Mean Rank = 10.37, N = 15). The U value was 35.50 with a p-value of .001, which is highly significant. The results indicate that the experimental intervention was significantly more effective in reducing disability level than the control intervention.

4.3.1 Difference between pre and post total pain and functional disability between and experimental and control group:

Table no 10: Mann-Whitney test for between-group analysis for total SPADI

	Category of participants	N	Mean Rank	Mann-Whitney U score	P value
Difference between SPADI scale	Experimental group	15	10.13	32.00	.001
	Control group	15	20.87		
	Total	30			

The efficacy of the intervention was assessed using the Mann-Whitney U test on posttest SPADI scores. Results showed a significant difference between groups (U = 32.00, p = 0.001). The experimental group (n = 15) had a lower mean rank of 10.13, indicating less pain and disability, while the control group (n = 15) had a higher mean rank of 20.87, showing greater pain and disability. Individuals in the experimental group showed significantly greater improvements in shoulder function and pain relief on the Shoulder Pain and Disability Index (SPADI) compared to the control group.

4.3.2 Difference between range of motion of flexion between and experimental and control group:

Table 11: Mann Whitney U test for between group analysis for range of motion of flexion

Difference between ROM of Flexion	Categori of participants	N	Mean Rank	Mann Whitney U score	P value
	Experimental group	15	20.03	44.50	.003
	Control group	15	10.97		
	Total	30			

The intervention effectiveness was tested using the Mann-Whitney U test to compare posttest shoulder flexion ROM between groups. Results showed a significant difference ($U = 44.50$, $p = 0.003$). The experimental group ($n = 15$) had a higher mean rank of 20.03, while the control group ($n = 15$) had a lower mean rank of 10.97. This indicates that the experimental group experienced significantly greater improvements in shoulder flexion ROM than the control group.

4.3.3 Difference between range of motion of abduction between and experimental and control group:

Table: 12 Mann Whitney test for between group analysis for ROM of Abduction

Difference between ROM of Abduction	Categori of participants	N	Mean Rank	Mann Whitney U score	P value
	Experimental group	15	20.43	38.50	.002
	Control group	15	10.57		
	Total	30			

The effectiveness of the intervention was assessed using the Mann-Whitney U test to compare posttest shoulder abduction ROM between the groups. A significant difference was found (U = 38.50, p = 0.002). The experimental group (n = 15) had a higher mean rank of 20.43, while the control group (n = 15) had a lower mean rank of 10.57. This shows that the experimental group achieved greater improvements in shoulder abduction ROM than the control group.

4.3.4 Difference between range of motion of external rotation between and experimental and control group:

Table: 13 Mann Whitney test for between group analysis for ROM of External rotation

Difference between ROM of External rotation	Categori of participants	N	Mean Rank	Mann Whitney U score	P value
	Experimental group	15	21.70	19.50	.001
	Control group	15	9.30		
	Total	30			

The intervention effectiveness was assessed by using the Mann-Whitney U test to compare posttest shoulder external rotation ROM between the groups. The results showed a highly significant difference (U = 19.50, p = 0.001). The experimental group (n = 15) had a higher mean rank of 21.70, while the control group (n = 15) had a lower mean rank of 9.30. This indicates that the experimental group showed much greater improvement in external rotation ROM than the control group.

4.3.5 Difference between range of motion of internal rotation between and experimental and control group:

Table: 14 Mann Whitney test for between-group analysis for ROM of Internal rotation

Difference between ROM of Internal rotation	Category of participants	N	Mean Rank	Mann Whitney U score	P value
	Experimental group	15	21.30	25.50	.001
	Control group	15	9.70		
	Total	30			

The effectiveness of the intervention was evaluated using the Mann-Whitney U test to compare posttest shoulder internal rotation ROM between groups. The results showed a highly significant difference ($U = 25.50$, $p = 0.001$). The experimental group ($n = 15$) had a higher mean rank of 21.30, while the control group ($n = 15$) had a lower mean rank of 9.70. This shows that the experimental group achieved significantly greater improvements in internal rotation ROM than the control group.

4.4.1 Wilcoxon signed rank test

Table: 15 Within group analysis by Wilcoxon signed rank test for SPADI score after and before (Experimental group)

Post total spadi percentage - Pre total spadi percentage	N	Mean Rank	Sum of Ranks	Wilcoxon signed rank test based on Z rank	P value
Negative Ranks	15b	8.00	120.00	-3.416c	.001
Positive Ranks	0c	0.00	.00		
Ties	0d				
Total	15				

The Wilcoxon Signed Rank Test was used to compare pretest and posttest SPADI scores. No participants showed an increase in scores (N = 0), while all 15 participants showed a decrease (Mean Rank = 8.00, Sum of Ranks = 120.00). There were no ties. The test showed a Z-value of -3.416 with a p-value of 0.001, indicating a statistically significant reduction in shoulder pain and disability after the intervention. This demonstrates that the treatment was effective.

4.4.2 Wilcoxon signed rank test

Table: 16 Within group analysis by Wilcoxon signed rank test for SPADI score after and before (Control group)

Post total spadi percentage - Pre total spadi percentage	N	Mean Rank	Sum of Ranks	Wilcoxon signed rank test based on Z rank	P value
Negative Ranks	15b	8.00	120.00	-3.433c	.001
Positive Ranks	0c	0.00	.00		
Ties	0d				
Total	15				

A Wilcoxon signed-rank test was used to compare pretest and posttest SPADI scores within the group. Results showed a significant reduction in scores after the intervention ($Z = -3.433$, $p = 0.001$). All 15 participants showed decreased scores (Mean Rank = 8.00, Sum of Ranks = 120), with no increases or ties. This indicates that the intervention notably improved shoulder pain and function in the group.

4.4.3 Wilcoxon signed rank test

Table: 17 Within group analysis by Wilcoxon signed rank test for ROM of Flexion after and before (Experimental group)

Post test Pretest ROM of flexion	N	Mean Rank	Sum of Ranks	Wilcoxon signed rank test based on Z rank	P value
Negative Ranks	0b	0.00	0.00	-3.372c	.001
Positive Ranks	14c	7.50	105.00		
Ties	1d				
Total	15				

The Wilcoxon Signed Rank Test was used to compare pretest and posttest shoulder flexion ROM. No participants had negative ranks, meaning none experienced a decrease in ROM. Fourteen participants had positive ranks (Mean Rank = 7.50, Sum of Ranks = 105), showing an increase, and one participant had a tie. The test gave a Z-value of -3.372 with a p-value of 0.001, indicating a significant improvement in shoulder flexion ROM after the intervention.

Table: 18 Within group analysis by Wilcoxon signed rank test for ROM of Flexion after and before (Control group)

Post test Pretest ROM of flexion	N	Mean Rank	Sum of Ranks	Wilcoxon signed rank test based on Z rank	P value
Negative Ranks	0b	.00	.00	-2.716c	.007
Positive Ranks	9c	5.00	45.00		
Ties	6d				
Total	15				

A Wilcoxon signed-rank test was used to compare pretest and posttest shoulder flexion ROM within the group. Results showed a significant improvement after the intervention ($Z = -2.716$, $p = 0.007$). Nine participants had positive ranks (Mean Rank = 5, Sum of Ranks = 45), none had negative ranks, and six were ties. This indicates the intervention significantly increased shoulder flexion ROM.

4.4.4 Wilcoxon signed rank test

Table: 19 Within group analysis by Wilcoxon signed rank test for ROM of Abduction after and before (Experimental group)

Post test Pretest ROM of Abduction	N	Mean Rank	Sum of Ranks	Wilcoxon signed rank test based on Z rank	P value
Negative Ranks	1e	4.00	4.00	-3.019c	.002
Positive Ranks	13f	7.77	101.00		
Ties	1g				
Total	15				

A Wilcoxon signed-rank test was conducted to compare pretest and posttest shoulder abduction ROM. Thirteen participants showed positive ranks (Mean Rank = 7.77, Sum of Ranks = 101), indicating improvement, one participant had a negative rank (Mean Rank = 4.00, Sum of Ranks = 4), and one participant had a tie. The test showed a Z-value of -3.019 with a p-value of 0.002, demonstrating a significant increase in shoulder abduction ROM ($p < 0.05$). This indicates that the intervention was effective for most participants.

Table: 20 Within group analysis by Wilcoxon signed rank test for ROM of Abduction after and before (Control group)

Post test Pretest ROM of Abduction	N	Mean Rank	Sum of Ranks	Wilcoxon signed rank test based on Z rank	P value
Negative Ranks	0e	0.00	0.00	-2.555c	.011
Positive Ranks	8f	4.50	36.00		
Ties	7g				
Total	15				

A Wilcoxon signed-rank test was used to compare pretest and posttest shoulder abduction ROM. 8 participants showed positive ranks (Mean Rank = 4.50, Sum of Ranks = 36), none had negative ranks, and 7 were ties. The test gave a Z-value of -2.555 with a p-value of 0.011, showing a significant improvement in abduction ROM. This indicates the intervention was effective for several participants.

4.4.5 Wilcoxon signed rank test

Table: 21 Within group analysis by Wilcoxon signed rank test for ROM of External rotation after and before (Experimental group)

Post test Pretest ROM of External rotation	N	Mean Rank	Sum of Ranks	Wilcoxon signed rank test based on Z rank	P value
Negative Ranks	0b	0.00	0.00	-3.448c	.001
Positive Ranks	15c	8.00	120.00		
Ties	0d				
Total	15				

A Wilcoxon signed-rank test was used to compare pretest and posttest shoulder external rotation ROM. All 15 participants showed positive ranks (Mean Rank = 8.00, Sum of Ranks = 120), with no negative ranks or ties. The test gave a Z-value of -3.448 and a p-value of 0.001, showing a significant improvement. This finding indicates the intervention was highly effective in improving external rotation for all participants.

Table: 22 Within group analysis by Wilcoxon signed rank test for ROM of External rotation after and before (Control group)

Post test Pretest ROM of External rotation	N	Mean Rank	Sum of Ranks	Wilcoxon signed rank test based on Z rank	P value
Negative Ranks	0b	0.00	0.00	-3.088c	.002
Positive Ranks	12c	6.50	78.00		
Ties	3d				
Total	15				

A Wilcoxon signed-rank test was used to compare pretest and posttest shoulder external rotation ROM. Twelve participants showed positive ranks (Mean Rank = 6.50, Sum of Ranks = 78), with no negative ranks, and three participants had no change (ties). The test gave a Z-value of -3.088 and a p-value of 0.002, showing a significant improvement. This indicates that the intervention effectively increased external rotation ROM for most participants.

4.5.1 Wilcoxon signed rank test

Table: 23 Within group analysis by Wilcoxon signed rank test for ROM of Internal rotation after and before (Experimental group)

Post test Pretest ROM of Internal rotation	N	Mean Rank	Sum of Ranks	Wilcoxon signed rank test based on Z rank	P value
Negative Ranks	0b	0.00	0.00	-3.346c	.001
Positive Ranks	14f	7.50	105.00		
Ties	1g				
Total	15				

A Wilcoxon signed-rank test was used to assess the difference in shoulder internal rotation range of motion (ROM) between pretest and posttest. The analysis showed that 14 participants had improved internal rotation ROM after the intervention, with a mean rank of 7.50 and a total rank sum of 105.00. No participants showed a decrease in ROM, and one participant showed no change, as indicated by a tie. The test produced a Z-value of -3.346 and a p-value of 0.001, which indicates a statistically significant improvement in internal rotation ROM following the intervention. These findings suggest that the treatment was effective in improving shoulder internal rotation in most of the participants.

Table 24: Within group analysis by Wilcoxon signed rank test for ROM of Internal rotation after and before (Control group)

Post test Pretest ROM of Internal rotation	N	Mean Rank	Sum of Ranks	Wilcoxon signed rank test based on Z rank	P value
Negative Ranks	0b	0.00	0.00	-2.539c	.011
Positive Ranks	8f	4.50	36.00		
Ties	7g				
Total	15				

A Wilcoxon signed-rank test was conducted to compare shoulder internal rotation range of motion (ROM) between pretest and posttest measurements. The results showed that 8 participants experienced improvement in internal rotation ROM after the intervention, with a mean rank of 4.50 and a total rank sum of 36.00. No participants showed a decrease in ROM, and 7 participants had no change, as indicated by ties. The test yielded a Z-value of -2.539 and a p-value of 0.011, indicating a statistically significant improvement in shoulder internal rotation ROM after the intervention. These findings suggest that the intervention was effective in improving internal rotation ROM in several participants.

4.5.2 Association between age and Spadi outcome:

Variable	Minimal	Mild	Moderate	Sever	Extreme	Total N (%)	*p*-value
Age category							
40-47	0(0%)	1(14.3%)	4(57.1%)	2(28.6%)	0(0%)	7 (23.3%)	.992
48-55	0(0%)	1(20.0%)	1(60.0%)	1(20.0%)	0(0%)	5(16.7%)	
56-63	0(0%)	1(12.5%)	4(50.0%)	3(37.5%)	0(0%)	8(26.7%)	
64-70	0(0%)	1(10.0%)	5(50.0%)	4(40.0%)	0(0%)	10(33.3%)	

Table 25 The association between the post spadi score and age category was analyzed using the Chi- square test. The result demonstrated a statistically no significant association between the age and spadi score, where is (p = .992). In the age sub group 40-47 years olds, majority (57.1%), experience moderate symptoms with 28.6% having severe symptoms. In the 48-55 years age group moderate disability reporting (60%) with smaller proportion reporting mild (20%) and severe (20%). In the 56-63 years age group, half (50%) reported moderated disability and (37.5%) experiencing severe symptoms. and in 64-70 age group, moderate symptoms 50%, severe 40% and mild symptoms (10%).

CHAPTER- V DISCUSSION AND LIMITATION

This research was conducted to assess how effective the joint play technique is in enhancing shoulder function and reducing disability in individuals diagnosed with frozen shoulder. The findings are discussed concerning baseline characteristics, socio-demographic variables, and statistical analyses, including the Mann-Whitney U and Wilcoxon signed-rank tests. The baseline characteristics of the participants were analyzed to ensure comparability between the control and experimental groups. The mean age for experimental group participants was 54.60 ± 9.51 years, while the control group had a mean age of 56.33 ± 10.34 years. This slight age difference aligns with studies like Agarwal et al. (2016, p. 3342), which found a similar age group. Age is an important variable in research on frozen shoulder, as it predominantly affects middle-aged and older adults.

The gender distributions showed in the experimental group, 53.3% participants were male and 46.7% were female, and control group male 40.0% and female 60.0%. Previous research, such as Butt et al. (2024), also reported that women have a higher chance of frozen shoulder than men. The shoulder ROM for flexion p value 0.794, abduction p value 0.168, the control and external rotation p value 0.117, and internal rotation p value 0.312. This result is consistent with the observations of Umar et al. (2023), who highlighted that ensuring comparable baseline characteristics is essential to minimize bias in clinical research.

Socio-demographic variables, including education level, occupation and BMI, were assessed. Educational level assessed, with a higher percentage of graduates in the experimental group (26.7%) compared to the control group (40.0%). Participants with HSC were more common in the control group (33.3%) than the experimental group (20.0%), Master's holders were equally distributed (20.0%) in both groups, while SSC level education was seen in only the experimental group (26.7%). These results indicate that frozen shoulder occurs across all educational backgrounds. This reflects findings by Challoumas et al. (2020), who highlighted the role of educational background in rehabilitation success.

In occupation, the largest group within the experimental (33.3%) and control (46.7%) groups was that of housewives, then those who work in offices and businessmen. These results are in agreement with Zerik et al. (2016, p. 26), who noted a higher risk in occupations that involve repetitive arm activity or maintaining fixed postures for long periods, especially among women performing household work.

The BMI distribution showed in the experimental group 40.0% overweight and 53.3% normal weight, and the control group 40.0% normal weight and 53.3% overweight, an 6.7% in both groups being moderately obese. This distribution aligns with findings by Kim et al. (2025, p. 26), who reported that higher BMI increases the risk of frozen shoulder.

The Mann-Whitney U test was conducted to compare post-test scores of the SPADI scale and Range of motion through a universal goniometer between groups. In the experimental group, Mann-Whitney U = 32.00, p = 0.001, and the mean rank 10.13 in the Spadi score and the control group mean rank 20.28 which indicates higher level of pain and disability. This result indicates the experimental group had greater improvement than the control group. This aligns with Rezwan et al. (2021 p. 50), who demonstrated that joint play technique significantly enhances pain and functional disability in frozen shoulder.

These findings contrast, Do Moon et al. (2015, pp. 1391), who reported that no significant difference between groups receiving Mulligan mobilization and Keltornborn mobilization due to differences in intervention intensity and duration.

Mann-Whitney U test to compare the posttest range of motion (ROM) of shoulder flexion between the experimental and control groups. The analysis revealed a statistically significant difference between the groups (Mann-Whitney U = 44.50, p = 0.003), The experimental group achieved a higher mean rank of 20.03, while the control group showed a lower mean rank of 10.97, range of motion of shoulder abduction statistically significant difference between the groups (Mann-Whitney U = 38.50, p = 0.002), experimental group demonstrated a higher mean rank of 20.43, whereas the control group had a lower mean rank of 10.57. range of motion of external rotation a statistically highly significant difference between the groups (Mann-Whitney U = 19.50, p = 0.001), demonstrating the strong effectiveness of the intervention and range

of motion of shoulder internal rotation between the experimental and control groups statistically highly significant difference between the groups (Mann-Whitney U = 25.50, p = 0.001), demonstrating the strong effectiveness of the intervention.

This results aligns with Rezwan et al. (2021 p. 50) who indicates effectiveness of range of motion after this technique. In contrast, Pattnaik et al. (2023, p. 149), focusing on muscle energy technique and kaltenborm mobilization techniques show both groups have similar improvement in the range of motion of the shoulder joint.

Kaltenborn mobilization consists of passive movements including traction, and sliding movements, refered to as point play gliding, which are guided by the concave and concave rules. Moreover, the result of this study aligns with Fernandes et al. (2020), which reported more effectiveness in enhancing range of motion and decreasing pain and disability.

In the contrast, Rathod et al. (2019), focousing Kaltenborn techniques less effective in decreasing pain and improving range of motion compared to Mulligan mobilization, likely because patients in the Mulligan group performed active movements, which may have caused reflex inhibition around the joint, unlike the passive techniques used in Kaltenborn mobilization.

Limitations

However, there are a few limitations that have to be declared, such as-

- The relatively small size of the sample: The sample is small (n=30) and this limit the ability to generalize the findings into a larger population.
- Short intervention Duration: The four-week intervention may not cover the long-term outcomes of joint play technique.
- Functional disability of the shoulder is only measured by the researcher. Data was collected from three sites; it might influence the result.
- All the clinical physiotherapists who provided treatment were not experts in joint play technique.
- Researcher only assess functional disability of the shoulder.

CHAPTER VI CONCLUSION AND RECOMMENDATION

Frozen shoulder is a prevalent musculoskeletal condition that significantly impacts patients' quality of life, with physiotherapy being an essential part of its management. The results of this study suggest that adding joint play technique to conventional physiotherapy yields better results than conventional therapy by itself, leading to greater pain relief, improved functional performance, and increased shoulder range of motion. There was a more significant improvement in the SPADI score of the experimental group than those of the control group, establish the capacity of joint play technique in improving shoulder function and reducing disability. The significant improvements in SPADI scores show that joint play mobilization helps reduce stiffness, ease capsular tightness, and improve movement limitation.

Unlike conventional therapy, which mainly focuses on pain relief, joint play restores normal joint glides and supports better control of movement. Statistically significant improvement in shoulder joint range of motion in abduction, internal rotation and external rotation. This finding indicates that the joint play technique improves shoulder mobility. A key finding was that the joint play technique helps to improve joint arthokinetic motion within the joint also reduces functional disability in patients with frozen shoulder. In conclusion, this study results indicate the effectiveness of the joint play technique in improving pain and functional disability among frozen shoulder patients. This study highlights the important role of physiotherapy in musculoskeletal rehabilitation and supports using joint play mobilization as part of treatment. By reducing stiffness and improving movement control, it offers a practical approach to rehabilitation.

Recommendation:

The investigator recommended some steps for future research, which includes: including a large sample size should include in future research to make the findings more generalizable. Long term follow up are recommended to these lasting effects of joint play technique. This would help to determine whether the benefits of this technique persist over time. Also recommended for future research, conducting research in multiple clinic or setting can provide broader data and strengthen the applicability of the finding and should explore multimodal treatment approaches with these technique like joint play technique with proprioceptive neuromuscular facilitation (PNF) technique, strengthening program etc. In future research should use a broader range of outcome measurement tools like quality of life scales, psychological well-being measures scale etc.

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Appendix

CONSENT STATEMENT (English)

Please Read It Carefully

Assalamualaikum!

I am Jannatul Ferdousi, a student of B.Sc. in physiotherapy, 4th year 2018-19 session, at Saic College of Medical Science & Technology, affiliated with the University of Dhaka under the Faculty of Medicine. I am conducting a research program entitled "Effectiveness of Joint Play Technique among the Patients with Frozen Shoulder**."** In this study, I would like to find out the effect of effectiveness of joint play technique among the patients with frozen Shoulder.

I would like to request some information regarding your sociodemographic, pain and frozen shoulder related questions. Please note that this academic research project will take approximately 20-30 minutes to complete. Participating in this study will not affect your current or future treatment in any way. It is important to mention that the information collected will only be used for academic research purposes, and all your provided data will be kept confidential. In the case of any report or publication, we will ensure that your identity remains anonymous.

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

If you have any questions regarding the study or your rights as a participant, please feel free to contact the investigator Jannatul Ferdousi or the research supervisor Zahid Bin Sultan Nahid Asst. professor & Head of Physiotherapy department, Saic College of Medical Science and Technology, Mirpur-14, Dhaka-1216.

Do you have any questions before I start?	Yes	No

So may I have your consent to Proceed with the interview?

Signature of the Participant _____

Date……

	Yes	No

Signature of the Interviewer _____

Date……

Title: Effectiveness of Joint Play Technique among the Patients with Frozen Shoulder.

Personal information

Patient ID:	
Date of test:	
Name of participants:	
Code:	
Address:	
Phone:	

Part-1: Socio-Demographic Information

Please give a tick (√) mark at the left side box of the best correct answer

Question No	**Questions/ Information on**	**Responses of the participants**
1.1	Age	……Year
1.2	Gender	1= Male 2= Female 3=Others
1.3	Marital status	1= Unmarried 2= Married
1.4	Educational Qualification	1= Illiterate 2= Primary 3= SSC 4= HSC 5= Graduation 6= Masters or higher

1.5	Occupation	1=Office worker 2= Businessman 3= Housewife 4= Teacher 5= Labor 6= Farmer 7= Other.....
1.6	Living area	1= Rural 2= Urban
1.7	Family type	1= Nuclear family 2= Extended family

Part-2: Anthropometric Information

Question No	Questions	Response
2.1	Height	
2.2	Weight	
2.3	BMI	

Part-3: Comorbidity Information

Please give a tick mark at the left side box of the best correct answer

QN	Question	Response
3.1	Any co-morbidities	1=Diabetes(DM) 2=Hypertension 3=Heart disease 4=Respiratory disease 5=Kidney disease 7=Others

Part-4: Disease related information

Please give a tick □ mark at the left side box of the best correct answer

QN	Question	Response
4.1	Affected limb	1=Right shoulder 2=Left shoulder 3=Both
4.2	Duration of pain	1=Less than 6 weeks 2=6 weeks to 3 months 3=3 to 6 months 4=more than 6 months
4.3	Nature of pain	1=Sharp 2=Dull 3=Burning 4=Stiffness 5=Throbbing 6=Others
4.5	Select the pain area	1=Up to shoulder 2= Above elbow 3= Below elbow
4.6	Duration of symptoms	1=Intermittent 2=Constant
4.7	Aggravating factor	1=At rest 2=At activity
4.8	Relieving factors	1=At rest 2=At activity
4.9	Muscle wasting	1=Present 2=Absent
4.10	Pick the time with no pain	1=AM 2=Pm 3=As the day progress 4=When still 5=On the move

Part-5: Assessment of Shoulder Range of Motion by Goniometer

5.1	Shoulder ROM (in degree)	Flexion:…….. Extension:…… Adduction:…… Abduction:……..... External rotation:….. Internal rotation:……

Part-6: Shoulder pain and disability index (SPADI)

Pain Scale

Circle the number that best describe your pain 0 = no pain and 10 = worst pain

How severe is your pain at its worst?	0	1	2	3	4	5	6	7	8	9	10
How severe is your pain when lying on the involved side?	0	1	2	3	4	5	6	7	8	9	10
How severe is your pain when reaching for something on a high shelf?	0	1	2	3	4	5	6	7	8	9	10
How severe is your pain when touching the back of your neck?	0	1	2	3	4	5	6	7	8	9	10
How severe is your pain when pushing with the involved arm?	0	1	2	3	4	5	6	7	8	9	10

Disability Scale

Circle the number that best describe your experience where 0 = no difficulty and 10 = worst difficulty.

How much difficulty do you have washing your hair?	0	1	2	3	4	5	6	7	8	9	10
How much difficulty do you have washing your back?	0	1	2	3	4	5	6	7	8	9	10
How much difficulty do you have putting on an undershirt or pullover sweater?	0	1	2	3	4	5	6	7	8	9	10
How much difficulty do you have putting on a shirt that buttons down the front?	0	1	2	3	4	5	6	7	8	9	10
How much difficulty do you have putting on your pants?	0	1	2	3	4	5	6	7	8	9	10
How much difficulty do you have placing an object on a high shelf?	0	1	2	3	4	5	6	7	8	9	10
How much difficulty do you have carrying a heavy object of 10 pounds?	0	1	2	3	4	5	6	7	8	9	10
How much difficulty do you have removing something from your back pocket?	0	1	2	3	4	5	6	7	8	9	10

আসসালামুআলাইকুম!

আমি জান্নাতুল ফেরদৌসি, বিএসসি ফিজিওথেরাপিতে চতুর্থ বর্ষের ছাত্রী, ২০১৮-১৯ সেশনের, সাঈক কলেজ অফ মেডিকেল সায়েন্স অ্যান্ড টেকনোলজিতে, ঢাকা বিশ্ববিদ্যালয়ের মেডিসিন ফ্যাকাল্টির অধীনে। আমি "ফ্রোজেন শোল্ডার রোগীদের মধ্যে জয়েন্ট প্লে টেকনিকের কার্যকারিতা" শীর্ষক একটি গবেষণা পরিচালনা করছি।

এই গবেষণায়, আমি জানতে চাই ফ্রোজেন শোল্ডার রোগীদের উপর জয়েন্ট প্লে টেকনিক কতটা কার্যকর। এজন্য আমি আপনার কিছু সামাজিক, জনসংখ্যাতাত্ত্বিক, ব্যথা এবং ফ্রোজেন শোল্ডার সম্পর্কিত তথ্য সংগ্রহ করতে চাই।

দয়া করে মনে রাখবেন, এই একাডেমিক গবেষণায় অংশগ্রহণের জন্য প্রায় ২০–৩০ মিনিট সময় লাগবে। এই গবেষণায় অংশগ্রহণ আপনার বর্তমান বা ভবিষ্যতের চিকিৎসায় কোনো প্রভাব ফেলবে না। এছাড়াও, আপনার দেওয়া তথ্য শুধুমাত্র একাডেমিক গবেষণার উদ্দেশ্যে ব্যবহার করা হবে এবং গোপন রাখা হবে। কোনো প্রতিবেদন বা প্রকাশনার ক্ষেত্রে আপনার পরিচয় গোপন রাখা হবে।

গবেষণায় অংশগ্রহণ সম্পূর্ণ স্বেচ্ছাসেবী, এবং আপনি যে কোনো সময় অংশগ্রহণ বন্ধ করতে পারেন কোনো নেতিবাচক প্রভাব ছাড়াই। আপনি কোনো প্রশ্ন উত্তর দিতে না চাইলেও তা দিতে বাধ্য নন।

গবেষণা বা আপনার অধিকার সম্পর্কে কোনো প্রশ্ন থাকলে, আপনি গবেষক জান্নাতুল ফেরদৌসি বা গবেষণা সুপারভাইজার জাহিদ বিন সুলতান নাহিদ (সহকারী অধ্যাপক ও ফিজিওথেরাপি বিভাগের প্রধান, সাঈক কলেজ অফ মেডিকেল সায়েন্স অ্যান্ড টেকনোলজি, মিরপুর-১৪, ঢাকা-১২১৬) এর সঙ্গে যোগাযোগ করতে পারেন।

আপনি কি গবেষণায় অংশগ্রহণের জন্য সম্মতি দিচ্ছেন?

হ্যাঁ	না

আপনার কাছে গবেষণার আগে কোনো প্রশ্ন আছে কি?

হ্যাঁ	না

অংশগ্রহণকারীর স্বাক্ষর: _____ তারিখ:

সাক্ষাৎকারকারীর স্বাক্ষর: _____ তারিখ: _____

ফ্রোজেন শোল্ডার রোগীদের মধ্যে জয়েন্ট প্লে টেকনিকের কার্যকারিতা

ব্যক্তিগত তথ্য

রোগীর আইডি:	
পরীক্ষার তারিখ:	
অংশগ্রহণকারীর নাম:	
কোড:	
ঠিকানা:	
ফোন:	

পার্ট–১: সামাজিক–জনসংখ্যাতাত্ত্বিক তথ্য
দয়া করে সঠিক উত্তরের বাম পাশে (√) চিহ্ন দিন

প্রশ্ন নং	প্রশ্ন / তথ্য	উত্তর
১.১	বয়স	..... বছর
১.২	বয়স	১ = পুরুষ ২ = মহিলা ৩ = অন্যান্য
১.৩	লিঙ্গ	১ = অবিবাহিত ২ = বিবাহিত
১.৪	বৈবাহিক অবস্থা	১ = নিরক্ষর ২ = প্রাথমিক ৩ = এসএসসি ৪ = এইচএসসি ৫ = স্নাতক ৬ = মাস্টার্স

১.৫	পেশা	১ = অফিস কর্মী ২ = ব্যবসায়ী ৩ = গৃহিণী ৪ = শিক্ষক ৫ = শ্রমিক ৬ = কৃষক ৭ = অন্যান্য.....
১.৬	বসবাসের এলাকা	১ = গ্রাম ২ = শহর
১.৭	পরিবারের ধরণ	১ = একক পরিবার ২ = যৌথ পরিবার

পার্ট–২: শারীরিক তথ্য

প্রশ্ন নং	**Questions**	উত্তর
২.১	উচ্চতা	
২.২	ওজন	
২.৩	বিএমআই	

পার্ট–৩: সহ–রোগ সম্পর্কিত তথ্য

দয়া করে সঠিক উত্তরের বাম পাশে (√) চিহ্ন দিন

প্রশ্ন নং	প্রশ্ন	উত্তর
৩.১	কোনো সহ–রোগ আছে কি?	১ = ডায়াবেটিস ২ = উচ্চ রক্তচাপ

		৩ = হৃদরোগ ৪ = শ্বাসতন্ত্রের রোগ ৫ = কিডনি রোগ ৬ = অন্যান্য.....

পার্ট–৪: রোগ সম্পর্কিত তথ্য

দয়া করে সঠিক উত্তরের বাম পাশে (√) চিহ্ন দিন

প্রশ্ন নং	প্রশ্ন	উত্তর
৪.১	আক্রান্ত অঙ্গ	১ = ডান কাঁধ ২ = বাম কাঁধ ৩ = উভয়
৪. ২	ব্যথার স্থায়িত্ব	১ = ৬ সপ্তাহের কম ২ = ৬ সপ্তাহ–৩ মাস ৩ = ৩–৬ মাস ৪ = ৬ মাসের বেশি
৪. ৩	ব্যথার ধরন	১ = তীক্ষ্ণ ২ = মৃদু ৩ = জ্বালাপোড়া ৪ = শক্তভাব ৫ = অন্যান্য……....
৪. ৪	ব্যথার স্থান	১ = কাঁধ পর্যন্ত ২ = কনুইয়ের উপরে ৩ = কনুইয়ের নিচে
৪. ৫	উপসর্গের ধরণ	১ = মাঝেমধ্যে ২ = সবসময়
৪. ৬	ব্যথা বাড়ার কারণ	১ = বিশ্রামের সময় ২ = কাজ করার সময়
৪.৮	ব্যথা কমার কারণ	১ = বিশ্রামের সময় ২ = কাজ করার সময়

৪.৯	মাংসপেশীর ক্ষয়	১ = আছে ২ = নেই
৪.১০	ব্যথাহীন সময়	১ = সকাল ২ = বিকেল ৩ = দিনের অগ্রগতির সাথে ৪ = স্থির অবস্থায় ৫ = নড়াচড়ার সময়

পার্ট–৫: গনিওমিটারের মাধ্যমে কাঁধের গতিসীমা (Shoulder ROM in degree)

৫. ১	কাঁধের গতিসীমা	ফ্লেক্সন (Flexion) এক্সটেনশন (Extension) অ্যাডাকশন (Adduction) অ্যাবডাকশন (Abduction) ইন্টার্নাল রোটেশন (Internal Rotation) এক্সটার্নাল রোটেশন (External Rotation)

পার্ট–৬: কাঁধের ব্যথা ও অক্ষমতা সূচক (SPADI)

ব্যথার স্কেল

০ = কোনো ব্যথা নেই ১০ = সবচেয়ে তীব্র ব্যথা

সবচেয়ে বেশি ব্যথা কেমন ছিল?	০	১	২	৩	৪	৫	৬	৭	৮	৯	১০
আক্রান্ত কাঁধে শোয়ার সময় ব্যথা?	০	১	২	৩	৪	৫	৬	৭	৮	৯	১০
উঁচু তাক থেকে কিছু নেওয়ার সময় ব্যথা?	০	১	২	৩	৪	৫	৬	৭	৮	৯	১০
ঘাড়ের পেছনে হাত দেওয়ার সময় ব্যথা?	০	১	২	৩	৪	৫	৬	৭	৮	৯	১০
আক্রান্ত হাতে চাপ দেওয়ার সময় ব্যথা?	০	১	২	৩	৪	৫	৬	৭	৮	৯	১০

অক্ষমতার স্কেল ০ = কোনো অসুবিধা নেই ১০ = সবচেয়ে বেশি অসুবিধা

চুল ধোওয়ার সময়	০	১	২	৩	৪	৫	৬	৭	৮	৯	১০
পিঠ ধোওয়ার সময়	০	১	২	৩	৪	৫	৬	৭	৮	৯	১০
আন্ডারশার্ট বা পুলওভার জামা পরার সময়	০	১	২	৩	৪	৫	৬	৭	৮	৯	১০
সামনের বোতামওয়ালা শার্ট পরার সময়	০	১	২	৩	৪	৫	৬	৭	৮	৯	১০
প্যান্ট পরার সময়	০	১	২	৩	৪	৫	৬	৭	৮	৯	১০
উঁচু তাকেতে কিছু রাখার সময়	০	১	২	৩	৪	৫	৬	৭	৮	৯	১০
১০ পাউন্ড ওজন বহন করার সময়	০	১	২	৩	৪	৫	৬	৭	৮	৯	১০
পিছনের পকেট থেকে কিছু বের করার সময়	০	১	২	৩	৪	৫	৬	৭	৮	৯	১০