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Shoulder Pain among the Bangladeshi Handball Players: The Prevalence and Associated Factors

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We the undersigned certify that we have carefully read and recommended to the Faculty of Medicine, University of Dhaka, for the acceptance of this dissertation entitled

"**Shoulder Pain among the Bangladeshi Handball Players: The Prevalence and Associated Factors"**

Submitted by **Sabuj Sutradhar** for the partial fulfillment of the requirement for the degree of Bachelor of Science in Physiotherapy.

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DECLARATION

This work has never before been approved in full for a degree, nor is it presently being presented as a candidate for one. A portion of the criteria for the B.Sc. in Physiotherapy degree are being met by submitting this dissertation.

I confirm that I will receive an inadequate rating and be subject to disciplinary action from the appropriate authorities if it is found in my work that I have plagiarized or otherwise cheated. I guarantee that the bound copy of the thesis and the electronic version are the same.

If the results of this project are published in the future, the research supervisor will be very concerned. The physiotherapy department of SAIC College of Medical Science and Technology (SCMST) will provide consent, and the project will be properly recognized as a graduate thesis.

Signature: Date: August, 2024

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LIST OF ACRONYMS

ADLs - Activities of Daily Living

BMI - Body Mass Index

DOMS - Delayed Onset Muscle Soreness

EHF - European Handball Federation

FES - Functional Electrical Stimulation

ICD - International Classification of Diseases

ICS - International Classification of Shoulder Injuries

IHF - International Handball Federation

IOC - International Olympic Committee

IRB - Institutional Review Board

NCAA - National Collegiate Athletic Association

PSI - Pain Severity Index

QuickDASH- Disabilities of the Arm, Shoulder, and Hand

ROM - Range of Motion

SPSS - Statistical Package for Social Sciences

TENS - Transcutaneous Electrical Nerve Stimulation

TSI - Tissue Strain Index

VAS - Visual Analog Scale

WHO - World Health Organization

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ABSTRACT

Introduction: Handball, an Olympic sport that is fast-paced and dynamic, which include overhead throwing motions, frequent body contact, and rapid direction changes. Because of the repetitive overhead motions and body collisions resulting from this physically demanding activity, handball frequently causes musculoskeletal ailments, especially shoulder discomfort. There is a dearth of information on the prevalence and associated factors for shoulder pain among handball players in Bangladesh. **Objectives:** The objective was to determine the prevalence and associated factors of shoulder pain among Bangladeshi handball players. **Methodology:** A descriptive type of cross-sectional, descriptive research was conducted with 106 current handball players from clubs in Dhaka and the Bangladesh Handball Federation. Semi-structured questionnaires, such as QuickDASH disability evaluation and the Visual Analog Scale (VAS) for pain, were utilized to gather data. The data were analyzed using SPSS version 25 using descriptive and inferential statistical tests such as Kruskal-Wallis and Chi-square, Ordinal Logistic Regression and convenience sampling was used. **Result:** The study found that Shoulder pain prevalence was 35.8%, with 48.1% reporting a history of shoulder pain. Male prevalence (58.5%) was higher than females (41.5%). Pain intensity varied: mild (22.6%), moderate (17.9%), and severe (4.7%). Risk factors included prolonged training sessions, inadequate warm-ups, and previous injuries. QuickDASH indicated significant functional impairment among affected players. **Conclusion:** Shoulder pain is a widespread problem among Bangladeshi handball players, impacting performance and daily activities. Addressing modifiable factors such as training practices and warm-up routines can mitigate this issue. The findings emphasize the need for targeted preventive measures and physiotherapy interventions.

Key words: *Shoulder pain, Handball player, Risk factors, Sports physiotherapy*

CHAPTER-I: INTRODUCTION

1.1 Background:

Handball, an Olympic sport since 1972, and after basketball and soccer, It is among the most popular team sports in Europe (Asai et al. 2020, pp. 677-681). There are over 800,000 teams and 19 million participants in handball, which is played in 199 countries (International Handball Federation 2010). The sport has changed with time, and athletes are now stronger, quicker, and more proficient (Laver and Myklebust. 2015, pp. 1-27). Handball is defined by one-on-one play, sporadic running, intense body contact, and difficult skills including dribbling, passing, throwing, and catching (Laver et al. 2018, pp. 141-153).

Every season, the European Handball Federation (EHF) hosts more than 900 matches. The EHF is made up of two associate member federations and fifty members. Each team in these federations has at least 16 registered players every match, and there are four to eighteen male and female teams. Accordingly, 3,328-14,976 players compete in Europe's premier division (Hadjisavvas et al. 2022, p. 204).

The game was first played outdoors with 11 players per team in Scandinavia and Germany in the late 19th century. In 1910, indoor handball was first played in Sweden. Field handball had its Olympic debut in 1936, but indoor handball and women's handball followed in 1972 and 1976, respectively (History of Handball. 2021, p. 1).

A team in handball has seven players, including the goalie. At least five players must be on the court for the game to begin. Additionally, depending on federation regulations, there may be seven to nine replacements on the bench. A central line separates the 40 × 20 m rectangular playing court. A goal-area line, goal areas, and goal lines are all included. They are 3 m wide and 2 m high, and they have a net connected. The restraining line, the 7-meter line for penalties, and other lines and regions are designated for the goalie. Play begins in the center with a throw-off area. Two 30-minute halves make up a 60-minute handball match. Two 5-minute halves of overtime is played if the score is tied. They utilize a 7-meter throwing tie-breaker if they are still tied. Five individuals from each squad are chosen to take turns throwing. If the score is still tied, the winner is decided by sudden death (Parkar. 2023, p. 1).

The majority of common injuries type that occur during exercise or sports is called "sports injuries," albeit they do not just affect athletes. Gardeners suffer tendinitis, painters have shoulder issues, and manufacturing workers get tennis elbow while not participating in sports. However, "sports injuries" are ultimately those that impact those who participate in physical exercise. The largest common type of sports injuries is musculoskeletal injuries, which are the focus of this health topic. The musculoskeletal system is the network of muscles, ligaments, tendons, bones, and other tissues that make up the body and allow for movement. The two primary categories of sports injuries are acute and chronic. Acute injuries happen rapidly; such when someone falls, gets hit, or twists joint, but chronic injuries usually result from overusing one region of the body and worsen over time. Acute injuries include sprains and dislocations, while common chronic conditions include shin splints and stress fractures (Branch. 2017, pp. 1-2).

A complicated interaction between external (environmental) and internal (athlete-related) risk factors leads to sports injuries. Strength and balance are two examples of variables that may be changed by training or behavioral techniques, while other aspects, like gender and age, cannot be changed (Bahr and Holme. 2003, pp. 384-392). Sportsmen can sustain injuries to their musculoskeletal systems. Lower limbs, the trunk, and the head (bone injuries and soft tissue) are the most affected. Along with football, basketball, volleyball, hockey, and soccer, handball is another sport in which they play (Salzer et al. 2020, pp. 328-338).

The fast-paced team sport among handball is one of the top five sports for injury. Both top athletes and club finances are impacted by musculoskeletal ailments caused by frequent collisions. Knee injuries are common, particularly ACL tears. More injuries occur to backcourt players than to wing players (El Adl et al. 2022, pp. 5639-5646). Previous studies in the literature of handball have found that contact accounts for 40-84% of all injuries (Laver and Myklebust. 2014, pp. 1-27). Because handball players must frequently come into physical touch with one another, there is a higher chance of musculoskeletal injuries (Giroto et al. 2017, pp. 195-202).

The injury rate for young handball players ranges from 9.9 to 41.0 per 1000 hours of play. Accordingly, it has one of the highest injury rates among Olympic sports, according to the International Olympic Committee's (IOC) surveillance system. For

this reason, researchers are particularly concerned about preventing injuries among young handball players (Vila et al. 2022, p. 10688).

Shoulder injuries are common, particularly among young people and adolescents who participate in sports. Current research frequently concentrates on certain shoulder illnesses, but there aren't enough thorough studies that include all shoulder trauma kinds and age ranges in the general population (Enger et al. 2019, p. e000551). Anterior instability of the shoulder joint is a common cause of rotator cuff impingement and shoulder discomfort in athletes who execute overhead motion. Research on painful shoulder problems has been conducted in the sports of swimming, baseball, and tennis (Fahlstrom et al. 2006, pp. 168-173).

However, a prevalent problem that poses difficulties for family doctors is shoulder discomfort. At five percent of all visits, it ranks third among musculoskeletal problems in the general population. The incidence peaks in the fourth or sixth decades of life and varies between 6.6 and 25 instances per 1000 people. Shoulder discomfort is the most common orthopedic referral, followed by knee pain. Furthermore, up to 3.9% of new ER visits are related to shoulder injuries, which are common in sports (Stevenson and Trojian. 2002, pp. 605-611).

Numerous structures around the shoulder, including bursae, motion planes, and joints (such as the glenohumeral, acromioclavicular, and sternoclavicular joints), can cause shoulder discomfort. Pain is the main reason individuals seek medical care, regardless of the exact problem. Adhesive capsulitis, or frozen shoulder, is one condition that significantly restricts mobility and causes discomfort. Shoulder discomfort may also be caused by rotator cuff conditions such as calcific tendinitis, tears, or subacromial impingement. Although cervical spine-related pain and post-stroke shoulder pain are not addressed here, a simple diagnostic method entails recognizing warning signs, obtaining pertinent medical history, and carrying out simple shoulder tests to identify the cause of the pain (Murphy and Carr. 2010, pp. 1-2).

Young athletes as well as adults and professional athletes have shoulder pain. It's important to understand that discomfort frequently indicates injury, even if the majority of research concentrate on shoulder injuries that have been diagnosed. There has been little study on the prevalence of shoulder discomfort in teenage sports; statistics show that between 18.6% and 39.6% of swimmers and 5.5% and 12.5% of

volleyball players suffer from shoulder pain. Athletes may experience discomfort for a variety of reasons, including personal traits and upper limb performance (Oliveira et al. 2017, pp. 107-113).

Shoulder pain's prevalence and causes have been investigated in recent research. The main cause of the 12% incidence among weekly patients observed by chiropractors is overuse. In a survey conducted in the UK, 26% of respondents reported having shoulder pain, with 70% of those cases affecting the rotator cuff. In all, 46% of the general population had shoulder discomfort at least once in the previous 12 months. Athletes frequently have shoulder discomfort as a result of repeated actions, high pressures, and strain (Mohseni-Bandpei et al. 2012, pp. 541-548).

According to recent research, 10% of male athletes (divers, weightlifters, wrestlers, orienteers, and ice hockey players) who participated in a small sample reported having shoulder discomfort in the previous week, and 21% reported having it in the previous year (Jonasson et al. 2011, pp. 1540-1546). Of the various sports groups, 29% reported having shoulder pain at the moment, and 43.8% reported having shoulder issues. The frequency of shoulder discomfort was highest among volleyball players, followed by swimmers, but it was equally prevalent among badminton, basketball, and tennis players (Lo, Hsu and Chan. 1990, pp. 173-177).

Overhead players in collegiate sports including baseball, softball, swimming, tennis, and volleyball suffered 30% of shoulder injuries throughout their playing careers (Laudner and Sipes. 2009, pp. 260-268). One of the main activities of team handball, which is performed by both men and women, is overarm tossing. To score against the goalie and distribute the ball to teammates is the aim. Enhancing throwing velocity with optimal technique is the main focus of training (Van Den Tillaar and Cabri. 2012, pp. 807-813).

In the Olympic team sport of handball, players must frequently toss above and make physical contact, which puts strain on the shoulder. Male and female athletes of all ages frequently have shoulder problems. Scapula dyskinesia, weakness, and reduced shoulder mobility are some of the factors that lead to these injuries. But there is still conflicting scientific data about the majority of proposed risk factors, and the value of standard clinical screening techniques is up for debate (Asker et al. 2017, p. 485).

In the contact sport of handball, players must move quickly, leap, and throw a lot. These put strain on the lower limbs and increase the risk of acute and chronic shoulder injuries. Although research has concentrated on acute injuries, little is known about handball injuries to the upper extremities. Athlete performance is impacted by overuse issues such as scapular dysfunction, shoulder instability, and discomfort. The throwing motion of a handball exposes the shoulder to repetitive stress and possible injury, just like baseball pitching does (Myklebust et al. 2013, pp. 288-294).

Shoulder overuse problems are common among handball players. According to studies, between 30% and 45% of these athletes experience either acute or persistent shoulder discomfort. Because overhead throwing is repeated and may reach speeds of up to 130 km/h, the throwing arm adapts by becoming more externally rotated and less internally rotated. These alterations might be the consequence of bone adaptations or posterior capsule contraction. These adaptations may result in anterior instability, SLAP lesions, and internal impingement, among other shoulder issues. Shoulder injuries are largely caused by the glenohumeral internal rotation deficit (GIRD), which occurs when the throwing shoulder has less internal rotation than the non-throwing shoulder (Almeida et al. 2013, pp. 602-607).

There are several widely utilized treatments for shoulder issues, such as injections of glucocorticosteroid, oral glucocorticoids, anesthesia-assisted manipulation, hydrodilatation (distension arthrography), physical therapy, and surgery (Green et al. 2013, p. 1). Two of the best handball players in Germany, Holger Glandorf and Oliver Roggisch, have acknowledged in a number of interviews that players are often forced to practice and play despite their complaints, and in the worst cases, with the anguish that follows. To make up for this, they turn to NSAIDs. Nicola Karabatic claims that because handball involves such intensive bodily contact, it is difficult to play and survive without feeling pain. It is challenging to completely prohibit the use of opioids in professional sports, despite the known risks (Salzer et al. 2020, pp. 328-338).

In a recent study, general practitioners (GPs) and physiotherapists rated the following treatments as effective: corticosteroids, non-steroidal anti-inflammatory drugs (NSAIDs), transcutaneous electric nerve stimulation, acupuncture, ultrasound therapy,

strengthening exercises, stretching, movement exercises, superficial heat or ice therapy, and workplace accessibility modifications (Brox. 2003, pp. 33-56).

A review assesses the effectiveness and safety of physical therapy for adult shoulder pain. Physiotherapy, which provides a variety of choices, is typically the first line of treatment for shoulder discomfort. Pain alleviation, healing promotion, muscle strengthening, joint range enhancement, and muscle spasm reduction are among the objectives. Various electrotherapeutic methods, manual treatment, and supervised exercises are all part of the interventions. Bipolar interferential current, laser therapy, ultrasound, transcutaneous electromagnetic stimulation (TENS), and pulsed electromagnetic field therapy are examples of electrotherapies. Laser treatment increases circulation and decreases inflammation. Tissue extensibility, capillary permeability, and blood flow are all improved by ultrasound. In certain parts of the central nervous system, TENS may cause the release of endogenous opiates. Enhancing vascularization for healing is the goal of pulsed electromagnetic field therapy (Green, Buchbinder and Hetrick. 2003, p. 1).

Research shows that a large percentage of handball players experience shoulder pain, which is a prevalent problem among the sport's participants. Many subsequent issues are frequently caused by patients' ignorance after shoulder discomfort first appears. Effective mitigation of these problems requires the use of methods targeted at minimizing shoulder discomfort. Interventions to avert future problems would be less necessary if handball players were well informed about shoulder discomfort. The primary objective of this study is to determine the prevalence of shoulder pain among Handball players. The investigation's conclusion will provide a clearer picture of how common shoulder pain is in this demographic, which will aid in the creation of focused preventative measures. This is essential for handball players to prevent shoulder discomfort episodes and improve their quality of life. Additionally, participants and practitioners will learn from the study's findings, which will enhance the Handball community's comprehension of the problem.

1.2 Justification:

Handball, a globally popular team sport, boasts approximately 19 million players and 795,000 teams across six confederations and 209 countries, according to Clinton and Dwight (1996) and the International Handball Federation (IHF) (Ferrari, Sarmento and Vaz. 2019, pp.63-76). Handball is a physically demanding sport that involves accelerations, rapid direction changes, throws, jumps, and frequent player contact. These dynamics contribute to high injury rates, ranging from 9.9 to 41.0 injuries per 1,000 match hours for young players, with higher rates observed in elite seniors due to overuse and recurring injuries. Shoulder injuries, in particular, are prevalent in handball due to repetitive overhead throwing motions and physical contact. These injuries result from a combination of acute trauma and progressive damage caused by overuse, requiring a balance between shoulder stability and mobility, often referred to as the “thrower’s paradox”.

In sports like handball, where players must repeatedly raise their shoulders upward, shoulder soreness is a major problem for sportsmen. On the other hand, there is a limitation of particular study about the incidence of shoulder discomfort among handball players in Bangladesh. Several factors make it necessary to justify a study on this subject like a handball player's performance and quality of life are negatively impacted by shoulder pain, which has serious health consequences. This study will also assist physiotherapists understand the issue of shoulder discomfort among handball players. For the Bangladeshi handball player experiencing shoulder discomfort, it will help to make the existing physiotherapy treatment more comprehensive and successful. This research may provide a precise picture of the frequency of shoulder discomfort among patients who play handball. Therefore, it will be advantageous for physiotherapists to engage in this field to provide therapy services. Many organizations operating in this field may find this research useful in incorporating physiotherapy services into their programs to provide full treatment services. Patients would thereby profit more from it.

1.3 Research question:

What was the prevalence and risk factors of shoulder pain among Bangladeshi handball players?

1.4 Aim of the study:

The aim of the study is to determine the prevalence and associated risk factors for shoulder pain among the Bangladeshi handball players.

1.5 Study objective:

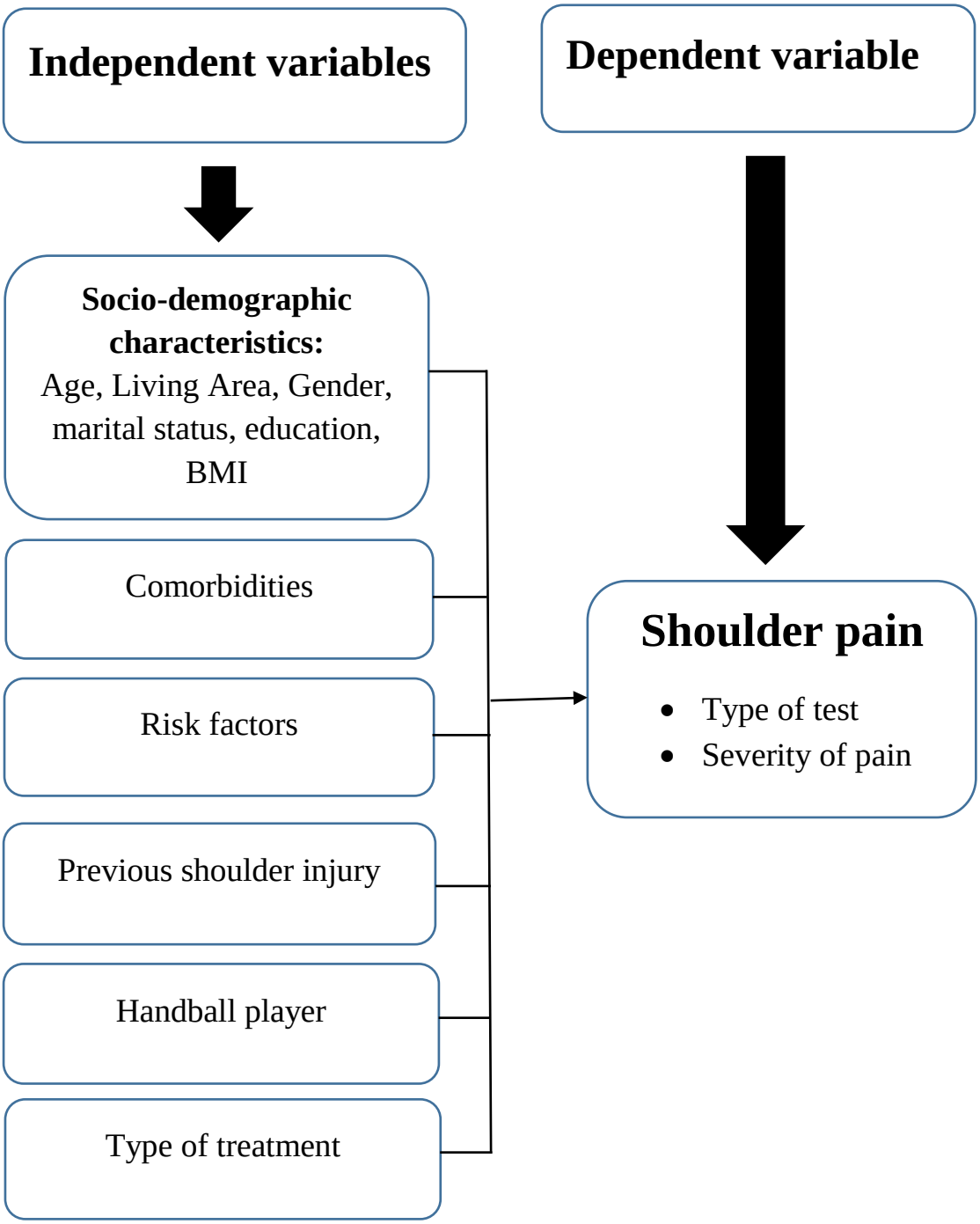
1.5.1 General objective:

To determine the prevalence and associated factors for shoulder pain among the Bangladeshi handball players.

1.5.2 Specific objectives:

- To calculate the prevalence of shoulder pain among the Bangladeshi handball players.
- To investigate the associated factors with shoulder pain among Bangladeshi handball players.
- To assess the severity of shoulder pain by VAS scale among the Bangladeshi handball players.
- To evaluate impact of shoulder pain problem in training, competition habit & activities of daily living by Quick DASH scale among the Bangladeshi handball players.
- To find out socio-demographic characteristics of Bangladeshi handball players.

1.6 Conceptual framework:



1.7 Operational definition:

Handball:

Handball, in the team sport known as team handball, European handball, or Olympic handball, two teams of seven players each pass the ball to a goalie and six out court players in an effort to throw it into the opponent's goal. A typical match includes of two halves of 30 minutes each, with the team with the most goals winning.

Shoulder Pain

Shoulder pain is defined as discomfort in or around the shoulder. Shoulder pain might be caused by the joint itself, any of the many surrounding muscles, ligaments, or tendons, or both. As you move your arm or shoulder, shoulder pain usually grows worse.

Risk factors:

A complicated interaction between external (environmental) and internal (athlete-related) risk factors leads to sports injuries. Strength and balance are two examples of variables that may be changed by training or behavioral techniques, while other aspects, like gender and age, cannot be changed.

Numerous factors, such as scapular dyskinesis, glenohumeral range of motion (ROM) imbalances, strength imbalances, improper training load dosage, previous injuries, sex, player position, school grade, playing level, and altered shoulder joint position sense, have been linked to handball shoulder injuries.

CHAPTER-II: LITERATURE REVIEW

(Host and Mankie. 2018, p. 388) discuss that in many cultures, Participating in sports is often regarded as necessary and valuable. Whether a person participates in sports for social, professional, or leisure reasons, sports may have a big influence on their life. More than 30 million kids and teenagers play sports in the US. Every year, about 3.5 million of these 30 million people are injured. Not all injuries are severe, but many do need to be rehabilitated. There is typically just a sports trainer on staff for high school sports, and many youth sports teams lack access to urgent care doctors, leaving parents to fend for their children's medical needs.

(International Olympic Committee. 2017, p. 1) reported that in 1936, handball was included to the Olympic Games during the XI Olympiad Games in Berlin. The goal and the goal-area line were 11 meters apart at the beginning, and each team had 11 players. At the moment, each team has merely seven players (Department of Physical Education, 2017)(Volossovitch. 2013, pp. 380-392). In the physically taxing sport of handball, players frequently collide with one another (Myklebust et al. 2013, pp. 288-294). Handball is a team activity that involves occasional high-intensity bodily contact that involves running, leaping, throwing, hitting, blocking, and pushing (Matthys et al. 2011, pp. 355-363).

Exercise or sports activity may cause sports-specific injuries. Overtraining, inadequate fitness, and abnormal form or technique can all lead to sports-related injuries. Without a warm-up, sports injuries are more likely to occur. Bruising, strains, sprains, rips, and fractures are all possible outcomes of sports-related injuries. Soft tissues including bursae, tendons, ligaments, muscles, and fascia may sustain injury (Sports Injuries: Types, Treatments, Prevention, and More. 2018, p. 1).

According to one study (Stoppler. 2018. pp. 1-2), In general, "sports injury" refers to the kind of injuries that most commonly occur during physical activity or sports. The term "musculoskeletal system injury" often refers to damage to the muscles, bones, and associated tissues like cartilage, however sports or exercise can cause harm to practically any part of the body. (Babarinde, Ismail and Schellack. 2017, pp. 11-19) argues that Sports including running, cycling, volleyball, swimming, and heavy lifting are the most common ones that have been linked to these conditions. Not warming up

before a sporting event, overtraining, or spending too much time on particular physical activity can all raise the chance of injury.

(Tooth et al. 2020, pp. 478-487) conduct a systemic review on Risk Factors of Overhead Athletes on Overuse Shoulder Injuries. They found that, Range of motion (deficient or excess), past injury, intrinsic factors, and rotator cuff weakness (isometric and isokinetic) all greatly enhance the risk of future injuries. Athlete skill level, age, sex, BMI, and years of practice also seem to have no effect. Even though there is typically a correlation, it is still unclear how scapular dysfunction affects shoulder injuries. Season, training load, field position, external factors, and training/match circumstances can all contribute to shoulder injury.

Edmonds found that in his research on overhead athletesAbduction, external rotation, and rapid shoulder elevation make the overhead athlete more prone to injury. A humeral head angle against the posterosuperior glenoid may result in labral impingement, rotator cuff tendon damage, or both. Throwing or striking action can cause scapular dyskinesis, partial articular-sided supraspinatus avulsions, and posterosuperior labral tears in sports including baseball, softball, water polo, tennis, racquetball, and volleyball. The symptoms of SICK scapula syndrome include scapular malposition, inferior medial border prominence, coracoid discomfort and malposition, and dyskinesis of scapular movement. It is believed that athletes who perform above average are more likely to sustain an injury (Edmonds and Dengerink. 2014, pp. 537-541).

(Vila et al. 2022, p. 10688) studies a systemic review on most common injuries in handball. At first they are studies about location of injuries, they found Among Olympic sports, handball is one of the most harmful games. Although they cannot agree on which has the highest prevalence, the majority of research revealed that lower extremity injuries, particularly in the knee, ankle, and thigh, are more common. On the other hand, the shoulder is the most injured part of the upper extremities. According to a 2015 World Men's Handball Championship (MWBC) research conducted in Qatar, lower limb injuries are more common than upper extremity injuries. The head, ankle, knee, and hand are the most often damaged body parts among 13 to 14-year-olds, according to another study. Conversely, they examined some research on the occurrence of upper extremity injuries and found that scapular

dyskinesia, external rotation, internal rotation, and shoulder strength are all associated with shoulder injuries. The study discovered no correlation between ROM and the likelihood of injury, overuse shoulder injuries, or overt scapular dyskinesia. But in handball players, scapular dyskinesia during shoulder abduction has been associated with shoulder injuries; players in the front row are more likely to have shoulder issues than those playing closer to the 6m line. According to some retrospective research, handball had the highest incidence of tendinopathy, particularly in the upper extremities, compared to other sports. The injury rate also fluctuated between increases and decreases in handball load. They also explain the process of damage and calculate that contact injuries, along with traumatic and overuse injuries, are the most prevalent causes of injury. They also learn that there is a connection between the current ailment and the prior one. According to some research, the most frequently injured areas by direct contact were the head, hand, shoulder, and ankle; on the other hand, the most frequently injured areas via non-contact touch were the knee, shoulder, and thigh. When it comes to the frequency of injuries per position, goalkeepers have the fewest incidents while pivot positions are the most at danger. Studies have shown that overuse is the most prevalent cause of injury among goalkeepers and acute injuries among front-line players, while overuse and acute injuries are the most common causes of injury among wingers.

(Laver et al. 2018, pp. 141-153) state that one of the primary team sports, handball, is most impacted by injury. It is among the top five sports in terms of both the number and severity of injuries. Concussions and acute joint injuries mostly to the knee and ankle are frequent. Degenerative injuries are very frequent, and recent studies have shown how important they are, especially to the knee, hip, and shoulder.

In the cohort study on handball load and shoulder injury rate by Moller et al. (2017, pp. 231-237) state that the first large-scale cohort research examining the association between risk factors for shoulder injuries in sports that are linked to participation and those that are not. They found that those with a handball load over 60% had a greater injury rate than those with a lower load. The incidence and rate of shoulder injuries both rise in tandem with an increase in handball load. Additionally, they determine if scapular dykinesis and external rotational strength might cause shoulder injuries since they increase handball load in comparison to a typical player. Accordingly, they said that handball load is either directly or indirectly linked to shoulder injuries in handball

players, and that handball load is also linked to scapular dyskinesis and external rotation strength. Finally, we found that the prevalence of shoulder injuries among 14-18-year-old handball players was 2.5 times higher than previous findings.

A cohort study by (Giroto et al. 2017, pp. 195-202) state that, there are several risk factors present in handball like overuse injury and traumatic injury. According to the study, Overuse injuries are caused by the upper extremities, such as the shoulder and elbow, whereas traumatic injuries are caused by the lower extremities, such as the ankle and knee. On the one hand, overuse injuries are tendinopathy, whereas traumatic injuries include muscular injuries, sprains, and contusions. Additionally, we discovered that the chance of overuse injuries rose with each additional weekly match. Research has indicated that female athletes and those who trained for an additional hour per week were more likely to get trauma injuries. During training, there were 3.7 injuries for every 1000 hours of instruction. Unfortunately, a history of injuries is also a common risk factor for future ones. They discovered that players with prior injuries had a 2.5% greater chance of becoming injured again. According to the study, training hours are another risk factor that might raise the likelihood of a severe injury by 9%. Additionally, they stated that while sprains are the second most common injury in the upper extremities, the majority of severe injuries occur in the knee, ankle, and thigh. Among all of these injuries, the majority happen during the last stretch of a training session or in the second half of a game.

There also a another systemic review by Raya-Gonzalez et al. (2020, p. 3925) noted that The frequency of handball injuries ranges from 1.7 to 7.8 per 1000 hours of exposure. Whereas among young male and female handball players, males are more common than females, and senior male players are more common than senior females. Thus, when all categories were included, a comprehensive analysis of the studies included in this systematic review revealed that handball players' lower limbs particularly their ankle and knee were most frequently injured. As a result of the sport's reliance on repetitive throwing action, several authors have recorded a high prevalence of overuse injuries in the shoulders. In a similar vein, low back overuse injuries were seen to be rather common, possibly as a result of the forceful motions required during collisions and landings. Contusions and sprains are the most frequent injury types among senior handball players, with male players experiencing strains more frequently than female players. The majority of systemic reviews on the

duration of persistent injuries found that they lasted less than 1-7 days, though this is weak evidence because different criteria were used. The most common injuries among male handball players, both junior and senior, required one to 7 days off from play. In addition, the study reviewed the playing position and discovered that, across all categories analyzed, outfield players reported more injuries than goalkeepers.

A 6 year survey study by (Asai et al. 2020, pp. 677-681) state that In major international tournaments, the injury rate is higher (26.5 per 1000 PH), with males suffering more injuries than females from contact play resulting from calf contusions. According to (Laver et al. 2018, pp. 141-153) argued that on their study, research on handball epidemiology is hard, and it's hard to find patterns in injury and risk variables. However, they stated that among Olympic sports, handball is one of the biggest risk factors for injuries, with an incidence rate of 108 injuries per 1000 match hours.

Acute and overuse injuries are common in the shoulder area due to the large volume of throws and passes as well as hard body tackles that frequently go straight to the shoulder (Myklebust et al. 2013, pp. 288-294). Shoulder injuries are common among leisure athletes and athletes who participate in overhead sports. High-velocity overhead throwing's demands and repetition might change this stability-mobility relationship, which could result in injury discuss by (Bedi. 2011, pp. 85-92). (Myklebust et al. 2013, pp. 288-294) also argued that Overuse problems often impact an athlete's performance, causing pain, shoulder instability, and scapular dysfunction. (Walker-Bone and Van Der Windt. 2021, pp. 285-306) found that with an estimated 0.9 to 2.5% yearly incidence and 18 to 26% point prevalence, shoulder discomfort is very common. The third most frequent musculoskeletal condition to be treated by a doctor in the UK, it is estimated to account for 4% of yearly adult primary care visits (Greenberg. 2014, pp. 487-504) found that SIS is the most frequent cause of shoulder discomfort and is indicative of a subacromial bursa or rotator cuff issue. A clinical diagnosis is often made after a thorough history and physical examination to identify the source of the patient's distress. Neer (1972, 1983) proposed that the mechanism behind 95% of all RC disorders was irritation of the subacromial bursa and rotator cuff tendons from the bottom of the front part of the acromion (Lewis. 2016, pp. 57-68).

In the study of mechanisms and treatments for shoulder Injuries in overhead throwing athletes by Zaremski, Wasser and Vincent. (2017, pp. 179-188) they found that at the current NCAA level, nearly 140,000 men and women participate in division I, II, and III overhead throwing sports, such as baseball, softball, and volleyball. In a 16-year study, 1623 shoulder injuries in collegiate baseball were identified, with 73% of them being connected to pitching and 59.5% to throwing. Handball and cricket have a high injury rate there. In one session of play, cricket players have greater shoulder discomfort than handball players; in contrast, handball players experience shoulder pain and injuries at a rate of 7% to 28%.

(Almeida et al. 2013, pp. 602-607) conduct a research on with and without throwing-related shoulder pain glenohumeral range of motion in handball players; he found that There were no notable differences between the groups in terms of age, gender, height, weight, previous athletic experience, or weekly practice hours. The glenohumeral internal rotation deficit and external rotation gain were significantly larger in handball players with throwing-related shoulder pain than in athletes without such pain, and the throwing arm's internal rotation was lower. He also found that when comparing the two groups' limbs, there was a discernible variation in internal and external rotation, although the discomfort group showed larger discrepancies. The two groups' overall rotation motion did not differ from one another, nevertheless.

A researcher Hodgetts et al. (2021, p. 24) perform a systemic review on shoulder pain, they review 20 studies where participants are more than 40 thousand and assessed whether shoulder pain ratings were "increasing," "staying stable," or "decreasing" at the age of fifty. Out of the total 21 studies that were included, 16 showed higher estimates/odds factors in older adults, indicating that shoulder pain tended to rise beyond age 50. In contrast to merely two of the 4 instances of sedentary labor, estimations revealed that 14 of those with the most physically active professions for individuals over 50 were growing within the 18 samples.

There has another studies of system review include meta-analysis on athletes shoulder pain, they review 5 studies total of 419 athletes, they found that Of the athletes who experienced shoulder discomfort during the follow-up, 35% exhibited scapular dyskinesis, whereas 25% had shoulder pain symptoms but no scapular dyskinesis. Additionally, they found that over a 9–24 month follow-up period, shoulder

discomfort was 43% more likely to occur in those with scapular dyskinesis. Shoulder discomfort is 43% more common in athletes with scapular dyskinesis than in those without it (Hickey et al. 2018, pp. 102-110).

According to Pribicevic. (2012, p. 1) he was studies narrative review on epidemiology of shoulder pain. He descried that the wide ranges in prevalence (from 1-67%) point to probable differences in how shoulder discomfort is defined among the groups under investigation. Middle-aged people (45–64 years old, or 21–55%) frequently have shoulder pain, which can be brought on by the rotator cuff and other shoulder components aging. This is most often the result of degeneration, acute injury, or disease. He said that 12-57% of the population, or teens aged 12-18; also frequently suffer from shoulder discomfort. Increased technology use and extended sitting periods may cause postural alterations associated with this disorder. Sports like baseball, tennis, swimming, and overhead athletics all include repetitive overhead shoulder motion. Shoulder pain is therefore a regular occurrence in these activities. Overhead sports put the shoulder through stress, fatigue, micro damage, static stabilizer laxity, and dynamic stabilizer muscle imbalances. The shoulder's mechanical characteristics may alter as a result of these conditions, increasing its susceptibility to harm.

A study on Japanese university handball player they review that Female gamers and those who play online suffer more than male players, with 46.1% of players having at least one injury in the previous year. In contrast to lower back, knee, and shoulder injuries brought on by overuse, they claim that traumatic mechanisms induce injuries to the ankle, knee, and shoulder (Mashimo et al. 2021, pp. 475-485).

In terms of injury incidence, there are no statistically significant differences between training vs matches, maturity levels (immature/mature), or categories (youth versus adult). Adult participants had more head, ankle, and muscle injuries than younger competitors, most likely due to their higher level of competition intensity. Biologically immature athletes were shown to have a greater incidence of apophysitis injuries than other athletes. Additionally, athletes who were in the second line of play had more damage to their knees and cartilage. Individual differences in training materials and even play style, as well as larger samples that may need multi-center

techniques, should be taken into consideration in future research study which is discuss by Monaco et al. (2019, pp. 67-74).

According to Myklebust et al. (2013, pp. 288-294) he discuss about current shoulder pain. In his study he found that in accordance by the western ontario shoulder instability index, which measures the frequency of current shoulder pain on test day, 36% of players reported experiencing shoulder pain, and 22% reported having shoulder trouble in the past. According to the majority of injured sportsmen, their discomfort started off slowly. Players who had pain in the past or present reported missing games in 36% and 36% of cases, respectively, and changing their training regimens in 68% and 76% of cases.

On the other studies by Kulkarni et al. (2015, pp. 135-143) describe that, Only 1% to 2% of people in the UK contact their doctor each year for new-onset shoulder pain, despite the fact that shoulder issues are estimated to impact 14% of the population. As much as 70% of all new origin shoulder pain cases have been shown to be caused by subacromial shoulder discomfort from rotator cuff pathological conditions, which involve tendon inflammation, calcific inflammation of the tendons and rotator cuff tears.

(Bron et al. 2011, p. 139) reported that myofacial trigger points are common in patients who have shoulder discomfort. According to their findings, the anterior deltoid (38%) and teres major (49%) muscles had the highest prevalence of latent myofacial trigger points, while the infaspinatus (77%) and upper trapezius muscles (58%) had the highest incidence of active myofacial trigger points. According to (Robinson et al. 2014, pp. 272-279) doing a study on US school athletes shoulder pain. They organized there study during the 2005-2006 through 2011-2012 academic year. They found that the nationwide estimate of shoulder injuries over this time period was 820691, with a prevalence rate of 2.15 per 10,000 athletes. Sprains, strains, and dislocations or separations are the most prevalent injuries that occur during competition, which has a greater injury rate than practice. Additionally, they find that guys sustain greater injuries than girls when they come into contact with the field or another individual.

The aim of the study is to determine the prevalence and associated risk factors that intervene for shoulder pain among the Bangladeshi handball player. This study will

also assist physiotherapists understand the issue of shoulder pain among handball players. For the Bangladeshi handball player experiencing shoulder discomfort, it will help to make the existing physiotherapy treatment more comprehensive and successful. This research may provide a precise picture of the frequency of shoulder discomfort among patients who play handball.

CHAPTER-III: METHODOLOGY

3.1 Study design:

The study design was the descriptive type of cross sectional carried out with objective of determining the prevalence and associated factors for shoulder pain among the Bangladeshi handball players.

3.2 Study area:

Data for the present study were collected from the handball player attending Bangladesh Handball Federation in Dhaka, Bangladesh.

3.3 Study place:

The researcher is a student of 4th year B.Sc. in Physiotherapy of SAIC college of Medical Science and Technology, Mirpur, Dhaka. Therefore, the study was carried out at the researcher's college.

3.4 Study period:

The study period was one year from September 2023 to the August 2024.

3.5 Study population:

Handball players who actively participate in handball games in Bangladesh Handball Federation.

3.6 Sample size:

The sample for the present study was calculated by the following statistical formula.

We know that -

$$n = \frac{Z^2\, p\, q}{d^2}$$

Here,

n = required sample size

Z = confidence level at 95% (standard value of 1.96)

p = p is the prevalence taken as 48.7% (Oliveira et al., 2017)

d = margin of error at 5% (standard value of 0.05)

So, sample size is 383.

Accordingly, the researcher's initial goal is to concentrate his investigation on 383 samples using the estimate above.

Based on calculations, the study's actual sample size is 383 people. Because of time constraints and the fact that this study is part of an academic research effort, it is challenging to get a larger number of samples. 106 handball players were thus selected as the study's sample.

3.7 Sampling technique:

Convenience sampling was used for the study because it was the quickest, least expensive and most straightforward way to choose a sample. It will be simple to find people who meet the requirements related to the study's goal using the convenience sampling technique.

3.8 Eligibility criteria:

3.8.3 Inclusion criteria:

- Handball players actively participating in handball clubs in Dhaka city.
- Players aged 15 years or older. (Monaco et al., 2019)
- Players who have been playing handball for 1.5 years (Monaco et al., 2019).

3.8.4 Exclusion Criteria:

- Players with a previous history of shoulder surgery or significant shoulder injury unrelated to handball.
- Players with any medical condition affecting shoulder function unrelated to handball activity.
- Players unwilling or unable to provide informed consent.
- Handball players with shoulder pain caused by non-sport-related injuries or conditions.

3.9 Method of data collection:

3.9.4 Technique of data collection:

The required data for the research were collected from the participants by face to face formal interview.

3.9.5 Instrument and tools of data collection:

- A pre-tested semi-structured questionnaire and demographic information chart used as a data collection instrument.
- VAS scale for rating the intensity of shoulder pain (e.g., 0-10 scale).
- QuickDASH scale for measuring the disability of arm and shoulder due to shoulder pain related to Handball.
- The English questionnaires were converted into Bengali to ask the participants during interviews.
- Height measuring tape and Weight machine.

3.9.6 Procedure of data collection:

The researcher requested permission to conduct the study from the SAIC College of Medical Science and Technology's Ethical Review Board by submitting his research plan. In due time, the Ethical Review Board gave permission. After that, the researcher decided to carry out the study at the Bangladesh Handball Federation. The federation authority granted permission for the research to be conducted. The researcher then went to the Bangladesh Handball Federation to speak with handball players. The study's goals and objectives were thoroughly described to the participants, and it was made clear that they might decline to answer any questions on the questionnaire. It was also made clear to participants that they might leave the research at any moment. The study consisted of those who consented to take part. The researcher started the interviews after gaining the subjects' signed informed permission. The interviews were conducted in a friendly atmosphere, and the comments were noted as such. The researcher expressed gratitude to the respondents for their participation once the data was gathered.

3.10 Management of data:

3.10.1 Data editing:

It characterized by reviewing and cleaning the collected data to identify and correct errors, inconsistencies, or missing information. The primary goal of data editing is to ensure the accuracy, reliability, and completeness of the data before proceeding with data analysis. Proper data editing helps to produce valid and meaningful research results.

3.10.2 Data entry:

Data entry is the process of converting raw data from various sources into a digital format or a data management system, such as a spreadsheet, database, or data entry software. It is a fundamental step in research, business, and other domains where data needs to be organized, analyzed, and utilized efficiently. Data entry involves carefully inputting information from paper documents, questionnaires, surveys, or other sources into a computer or electronic system.

3.10.3 Data analysis:

Data were analyzed with the Statistical Package for Social Sciences (SPSS) Version 25 software. We performed descriptive statistics, including frequency range, distribution, range, and percentage. Utilizing inferential statistics, the link between both dependent and independent variables was examined.

3.11 Result:

The findings of the study have been presented with the tabulations, charts, graphs and description in the result section of the thesis.

3.12 Ethical consideration:

To perform the study, the researcher received approval from the SAIC College of Medical Science and Technology's Ethical Review Board. Handball players that participated in the Bangladesh Handball Federation provided the researcher with data, and the federation authority granted permission for the study to be conducted. Prior to the interview, the handball players received a thorough explanation of the study's goals and objectives. Consent forms for interested participants were distributed, and verbal explanations in Bengali were given on the form's significance and contents.

It was explained to the participants that their involvement in the study would be entirely voluntary and that they might leave at any moment without fear or consequence. They were also given the assurance that privacy would be protected. Despite the possibility of presenting or publishing the research findings, personal identifiers like names and addresses would remain confidential. It was explained to the participants that printed questionnaires would be used to gather data. The permission form and the questionnaire were also examined by the supervisor.

Each participant gave their consent by signing a consent form before to the interview. The participants were informed of their part in the study. Information about the research would not be shared with anybody else; it would only be discussed with the supervisor. Upon completion, all study-related materials would be disposed away. Even though the study's conclusions might not directly affect the participants, they might have future implications for the physiotherapy industry. Additionally, participants received assurances that their participation in the study would not result in any negative consequences.

CHAPTER-IV: RESULTS

The purpose of this study was to find out how common shoulder pain is among handball players and what risk factors are associated with it. A total of 106 people who play handball actively are involved in this study. After gathering the descriptive data, the researcher computed the percentage. The data was numerically coded and analyzed using the SPSS 25.0 version software.

4.1: Socio-demographic information

Figure no. 1: Age group of the participants

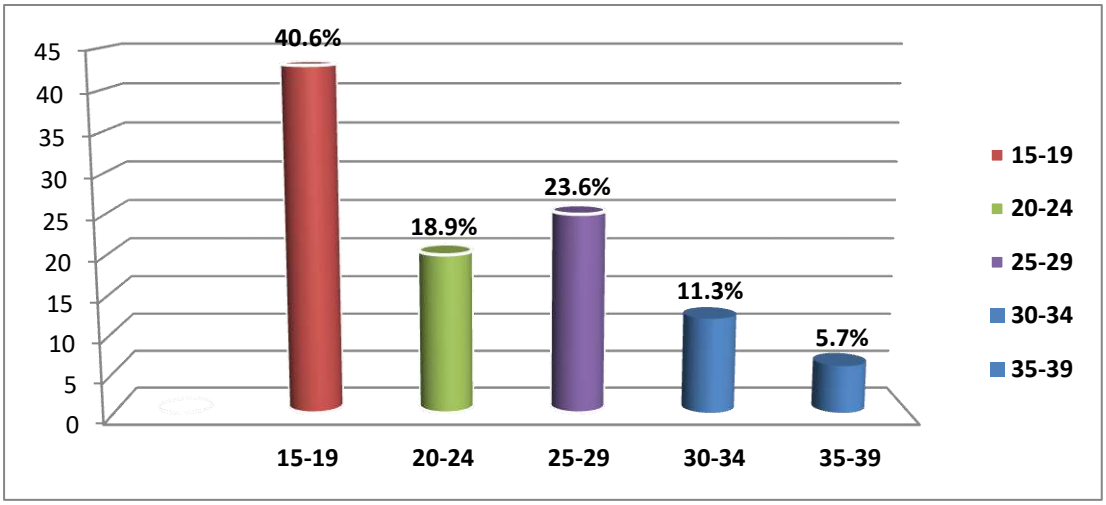


Figure no. 1: Frequency distribution of the respondents by Age Group

The age distribution of the handball players in this study is shown in the column. The biggest percentage of participants (40.6%) were between the ages of 15 and 19, followed by those between the ages of 25 and 29 (23.6%) and 20 and 24 (18.9%). Participation rates were lower among the 30-34 and 35-39 age groups (11.3%) and 5.7%, respectively. Participants in the research included 106 players in total, evenly split throughout the age categories. (Figure no. 1)

Figure no. 2: Sex of the participants

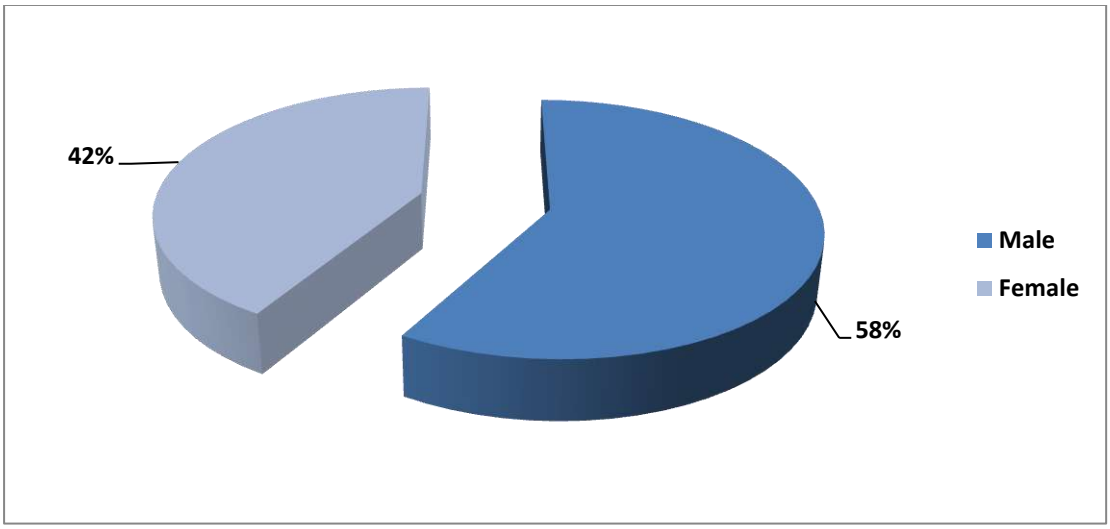


Figure no. 2: Frequency distribution of the respondents by Sex

The distribution of participants by sex is shown in the pie chart. Among the 106 handball players in the study, 58.5% were men (N = 62), and 41.5% were women (N = 44). Male gamers outnumber female gamers, according to the distribution. (Figure no. 2)

Figure no. 3: Living area of the participants

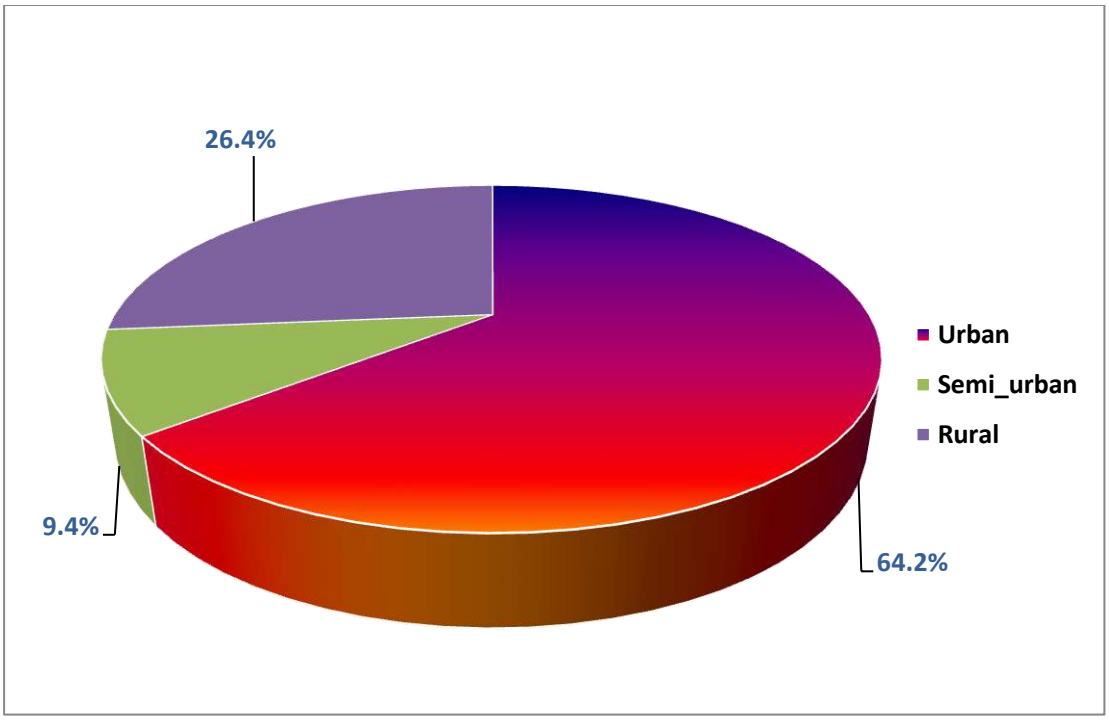


Figure no. 3: Frequency distribution of the respondents by Living area

The distribution of the participants by residential area is shown in the pie chart. The majority of handball players (64.2%) resided in cities, with semi-urban regions (9.4%) and rural areas (26.4%) following closely behind. (Figure no. 3)

Figure no. 4: Marital status of the participants

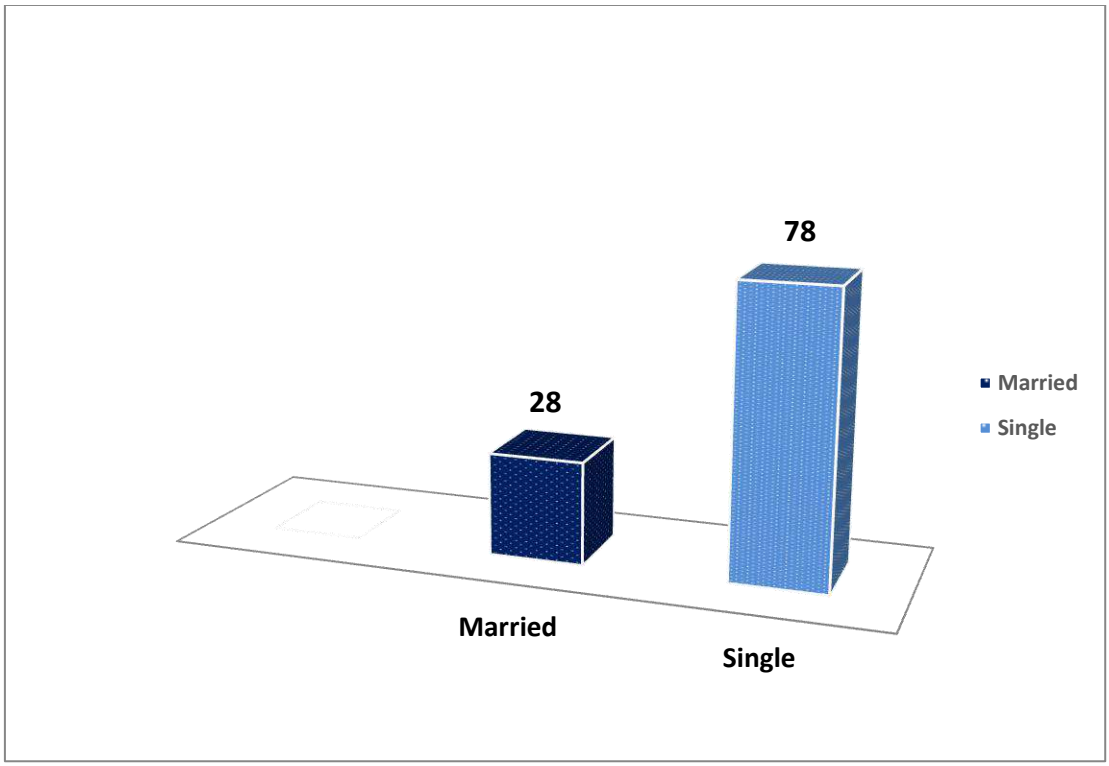


Figure no. 4: Frequency distribution of the respondents by marital status

The persons' marital status is shown in the column. Women made up the bulk of the handball players in the sample, accounting for 73.6% (N = 78). As seen by the 26.4% of married individuals (N = 28), the majority of the study group was unmarried. (Figure no. 4)

Figure no. 5: Educational status of participants

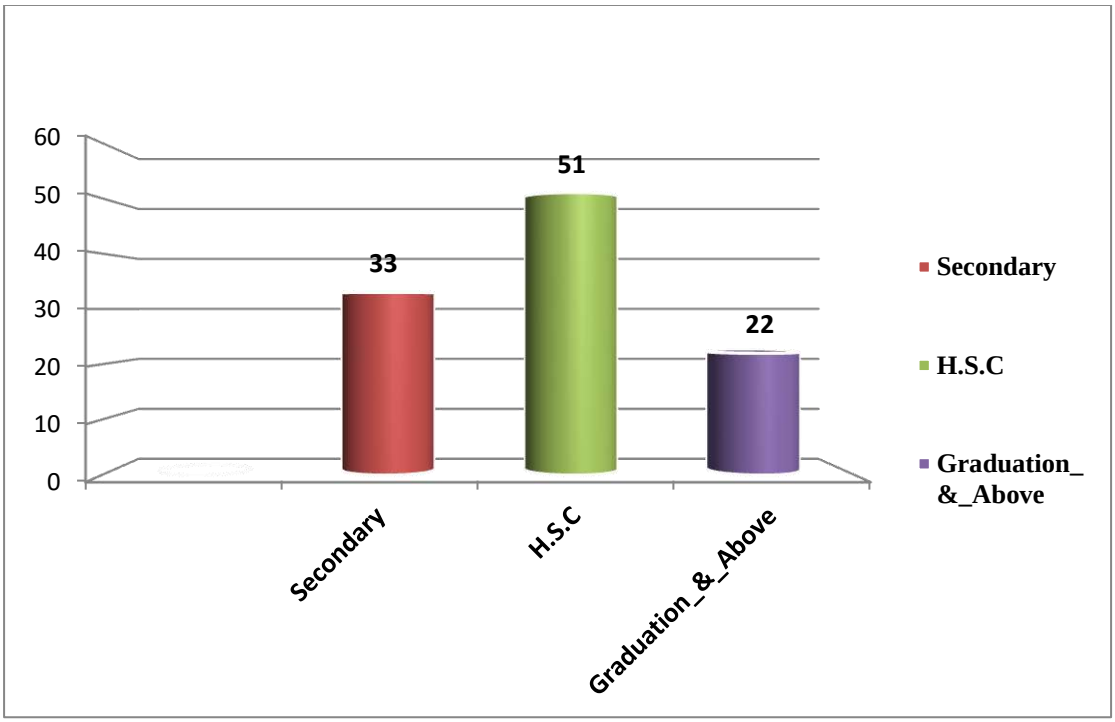


Figure no. 5: Frequency distribution of the respondents by Educational Status

Individuals' educational backgrounds are shown in a column. The Higher Secondary Certificate (H.S.C.) was obtained by 51 (48.1%) of the handball players. Twenty-two (20.8%) of the participants had graduated or obtained a higher degree, while 33 (31.1%) had finished secondary school. (Figure no. 5)

Figure no. 6: Monthly family income of participants

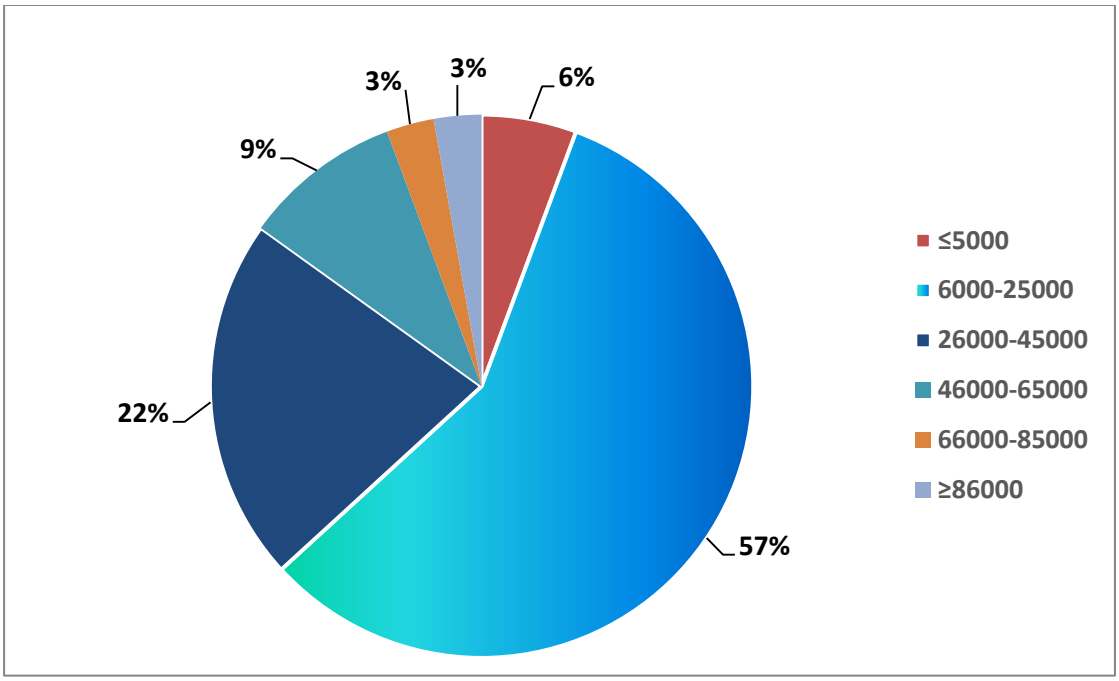


Figure no. 6: Frequency distribution of the respondents by Monthly income

A pie chart shows the members' monthly household income distribution. 21.7% (N = 23) claimed earning between 26,000 and 45,000, while the majority (57.5%, N = 61) reported earning between 6,000 and 25,000. 2.8% (N = 3) reported incomes between 66,000 and 85,000 and ≥86,000. In contrast, a smaller number, 9.4% (N = 10), reported wages between 46,000 and 65,000. Additionally, 5.7% of participants (N = 6) made less than $5,000. This distribution highlights that the bulk of participants were concentrated in the medium income range, with fewer individuals in both the upper and lower income ranges. (Figure no. 6)

Table no. 1: Frequency distribution of the respondents by socio-demographic characteristics and sex

Variable		Total (N%)	Sex (N%)	
			Male	Female
Age Group	**15-19**	**43(40.6%)**	**26(24.5%)**	**17(16%)**
	20-24	20(18.9%)	11(10.4%)	9(8.5%)
	25-29	25(23.6%)	13(12.3%)	12(11.3%)
	30-34	12(11.3%)	9(8.5%)	3(2.8%)
	35-39	6(5.7%)	3(2.8%)	3(2.8%)
	Mean ± SD: 22.98 ± 6.335			
Living Area	**Urban**	68(64.2%)	42(39.6%)	26(24.5%)
	Semi-urban	10(9.4%)	6(5.7%)	4(3.8%)
	Rural	28(26.4%)	14(13.2%)	14(13.2%)
Marital Status	**Married**	28(26.4%)	16(15.1%)	12(11.3%)
	Single	78(73.6%)	46(43.4%)	32(30.2%)
Educational status	**Secondary**	33(31.1%)	18(17%)	15(14.2%)
	H.S.C	51(48.1%)	31(29.2%)	20(18.9%)
	Graduation & Above	22(20.8%)	13(12.3%)	9(8.5%)
Family income/ Month	**≤5000**	6(5.7%)	0(0%)	6(5.7%)
	6000-25000	61(57.5%)	32(30.2%)	29(27.4%)
	26000-45000	23(21.3%)	19(17.9%)	4(3.8%)
	46000-65000	10(9.4%)	8(7.5%)	2(1.9%)

	66000-85000	3(2.8%)	1(0.9%)	2(1.9%)
	≥86000	3(2.8%)	2(1.9%)	1(0.9%)
BMI	**Under weight**	12(11.3%)	5(4.7%)	7(6.6%)
	Normal weight	83(78.3%)	50(47.2%)	33(31.1%)
	Pre-obesity	10(9.4%)	6(5.7%)	4(3.8%)
	Obesity type-I	1(0.9%)	1(0.9%)	0(0%)
	Obesity type-II & III	0(0%)	0(0%)	0(0%)
Comorbidities	**Hypertension**	1(0.9%)	1(0.9%)	0(0%)
	DM	0(0%)	0(0%)	0(0%)
	Asthma	0(0%)	0(0%)	0(0%)
	I don't know	105(99.1%)	61(57.5%)	44(41.5%)

In this Table, the individuals' health and demographic data are grouped by sex. Men (24.5%, N = 26) somewhat outnumbered women (16%, N = 17), and most participants (40.6%, N = 43) were between the ages of 15 and 19. With 39.6% (N = 42) men and 24.5% (N = 26) women, the majority of participants (64.2%, N = 68) resided in urban areas, while 26.4% (N = 28) lived in rural areas, with an equal distribution of males and females (13.2%, N = 14 each). With 43.4% (N = 46) men and 30.2% (N = 32) women, the bulk of participants (73.6%, N = 78) were unmarried; married people made up 26.4% (N = 28), with 15.1% (N = 16) men and 11.3% (N = 12) women (N = 78).

In every category, men were more likely than women to have earned their Higher Secondary Certificate (H.S.C.) (48.1%; N = 51), followed by secondary education (31.1%) and graduation or higher degrees (20.8%; N = 22). The monthly family income was about equal for men (30.2%, N = 32) and women (27.4%, N = 29), with the majority falling between 6,000 and 25,000 (57.5%, N = 61). While all participants

of whom 5.7% were female made at least ≤5,000, men were more prevalent in higher income brackets. BMIs were within the normal range for the great majority of people (78.3%, N = 83), including 47.2% (N = 50) males and 31.1% (N = 33) women. Pre-obesity was seen in 9.4% (N = 10), somewhat higher in men (5.7%, N = 6), whereas underweight was found in 11.3% (N = 12), more common in women (6.6%, N = 7). Type I obesity was seen in only one individual (0.9%). Only one male participant reported having hypertension, and there were no occurrences of diabetes mellitus or asthma. These were the only comorbidities identified (0.9%, N = 1). 99.1% of people (N = 105), including 57.5% of men (N = 61) and 41.5% of women (N = 44), reported not knowing of any comorbid conditions. (Table no. 1)

4.2: Medical information

Figure no. 7: Playing position of the participants

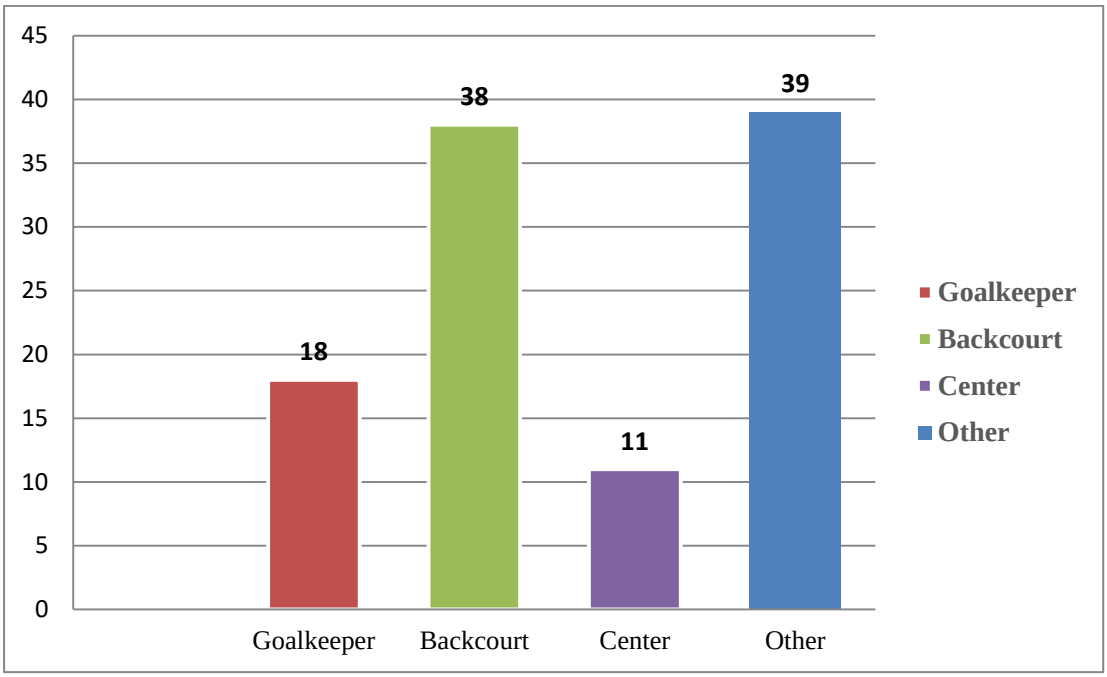


Figure no. 7: Frequency distribution of the respondents of playing position

The bar chart provides a summary of the handball players' playing positions. The position that participants reported the most frequently was 'Other,' as stated by 36.8% (N = 39). Second place went to backcourt positions, which were reported by 35.8% (N = 38) of players. 10.4% (N = 11) of the players were center players, while 17.0% (N = 18) were goalkeepers. With somewhat higher percentages in the backcourt and other positions, this distribution demonstrates that all playing positions are well represented. (Figure no. 7)

Figure no. 8: Prevalence of shoulder pain

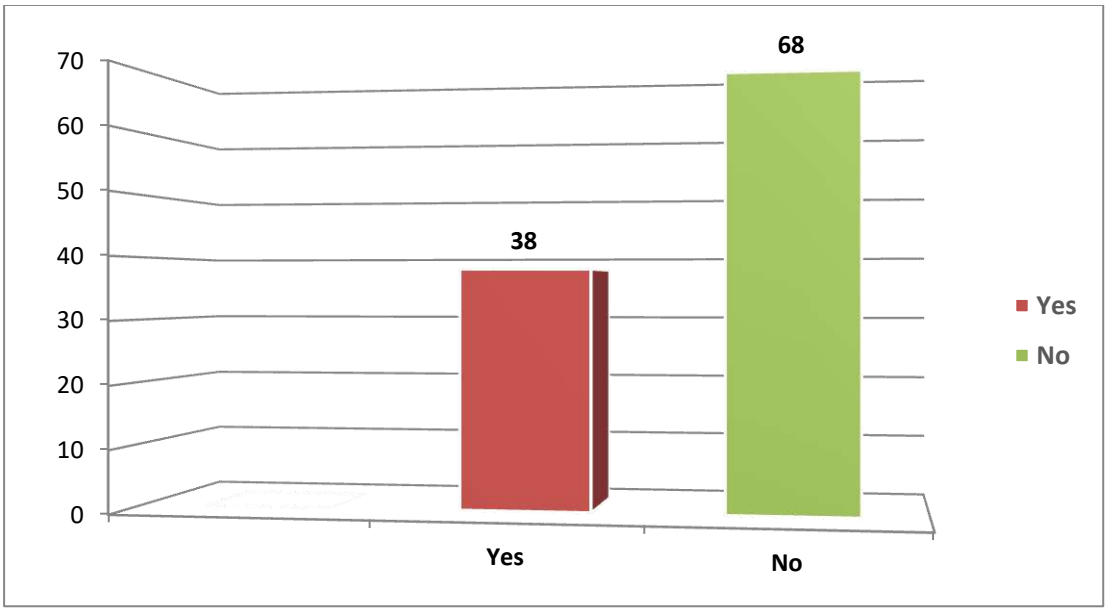


Figure no. 8: Frequency distribution of the respondents by shoulder pain

The prevalence of shoulder pain among the participants is shown in the bar graph. Of the handball players, 64.2% (N = 68) reported having no shoulder pain, whereas 35.8% (N = 38) reported having shoulder discomfort. This data suggests that shoulder soreness is a serious issue, as over one-third of the research participants experienced it. (Figure no. 8)

Figure no. 9: Ever experience shoulder pain

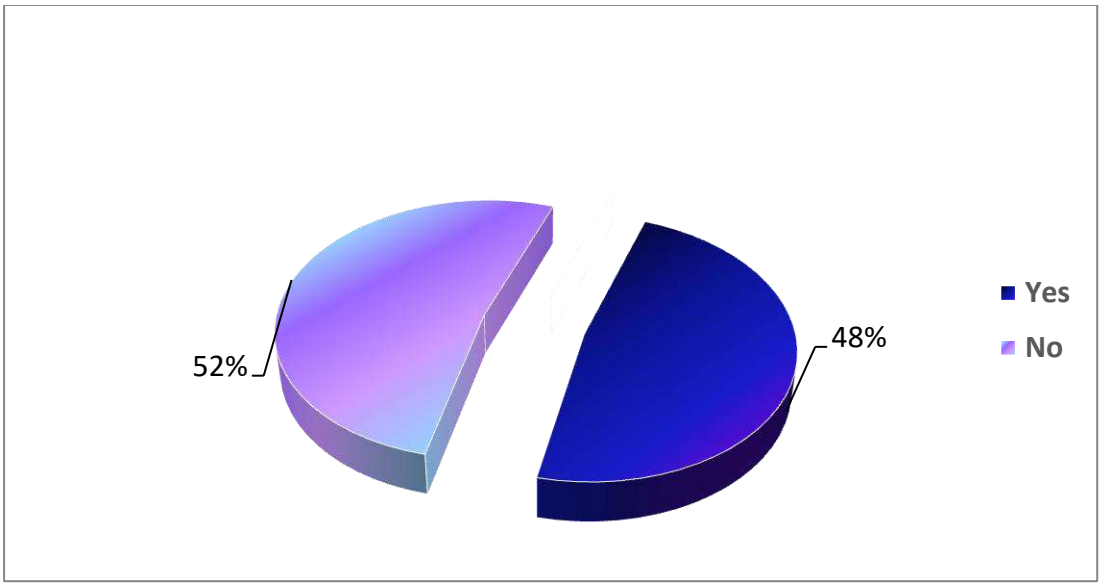


Figure no. 9: Frequency distribution of the respondents by History of previous shoulder pain

The pie chart shows the participants' experiences with shoulder pain that is specifically related to playing handball. Of the participants, over half (48.1%, N = 51) reported having shoulder pain from handball, whereas 51.9% (N = 55) indicated they had never had it. The significant prevalence of shoulder pain as a potential problem for handball players is highlighted by these data. (Figure no. 9)

4.2.1 Relationships between shoulder pain and related factors:

Table no. 2: Frequency distribution of the respondents by between has shoulder pain and related factor:

Variables		Total (N%)	Have shoulder pain (N%)	
			Yes	No
BMI	Under weight	12(11.3%)	5(4.7%)	7(6.6%)
	Normal Weight	83(78.3%)	28(26.4%)	55(51.9%)
	Pre-Obesity	10(9.4%)	5(4.7%)	5(4.7%)
	Obesity type-I	1(0.9%)	0(0.0%)	1(0.9%)
	Obesity type-II & III	0(0.0%)	0(0.0%)	0(0.0%)
Age Group	15-19	43(40.6%)	26(24.5%)	17(16%)
	20-24	20(18.9%)	11(10.4%)	9(8.5%)
	25-29	25(23.6%)	13(12.3%)	12(11.3%)
	30-34	12(11.3%)	9(8.5%)	3(2.8%)
	35-39	6(5.7%)	3(2.8)	3(2.8%)
Sex	Male	62(58.5%)	25(23.6%)	37(34.9%)
	Female	44(41.5%)	13(12.3%)	31(29.2%)
Comorbidities	Hypertension	1(0.9%)	1(0.9%)	0(0.0%)
	DM	0(0.0%)	0(0.0%)	0(0.0%)
	Asthma	0(0.0%)	0(0.0%)	0(0.0%)
	Don't know	105(99.1%)	37(34.9%)	68(64.2%)

	Goalkeeper	18(17%)	9(8.5%)	9(8.5%)
Playing position	**Backcourt**	38(35.8%)	15(14.2%)	23(21.7%)
	Center	11(10.4%)	3(2.8%)	8(7.5%)
	Other	39(36.8%)	11(10.4%)	28(26.4%)

Age, sex, BMI, playing position, comorbidities, and other factors all significantly correlate with the frequency distribution of respondents who reported shoulder discomfort. Most respondents (78.0%) were within the normal weight range, while 26.4% said they had shoulder pain. 11.3% of those surveyed were underweight, and 4.7% said they experienced shoulder pain. Respondents in the Type I, Type II, and Type III obesity groups did not have shoulder pain, while the pre-obesity group had a 9.4% prevalence, with respondents with and without shoulder pain split equally. Therefore, shoulder pain is more common in those with a normal body mass index.

According to the age distribution, the majority of respondents (40.6%) were between the ages of 15 and 19, and 24.5% of them reported having shoulder pain. Other age groups, such as 20-24 (18.9%) and 25-29 (23.6%), also exhibited shoulder discomfort, but to a lesser extent, whereas the 30-34 and 35-39 age groups had lower rates of both total respondents and shoulder pain prevalence. This pattern suggests that younger people, particularly teens, are more likely to have shoulder pain.

The number of respondents who reported shoulder discomfort was greater among males (58.5%) than among women (41.5%), with 23.6% of male feeling shoulder pain. This implies that male could be more likely than women to have shoulder discomfort. Very few responses (0.9%) cited identified comorbidities, such as hypertension, in which shoulder soreness was present in every case. But the majority of participants (99.1%) claimed they were unaware of their comorbidities, and 34.9% of them reported feeling shoulder pain. There was substantial variance in the degree of relationship between shoulder soreness and the playing position. Shoulder soreness was most common among backcourt players (35.8% total; 14.2%), goalkeepers (17%; 8.5%), and players in other positions (36.8%; 10.4%). Center players had shoulder discomfort the most (2.8%).

In general, shoulder discomfort appears to be more common in backcourt players, younger respondents (particularly those aged 15 to 19), men, and those with a normal body mass index. Although comorbid conditions were not fully understood, reported incidences of hypertension were linked to shoulder pain. These findings might guide targeted therapies and more research into the causes and alleviation of shoulder pain in this population. (Table no. 2)

Table no. 3: Frequency distribution of the respondents by between has shoulder pain and related factor:

Variables		Total (N%)	Have shoulder pain (N%)	
			Yes	No
Since practicing handball	Less than 1year	11(10.4%)	9(8.5%)	2(1.9%)
	1year to 2year	19(17.9%)	6(5.7%)	13(12.3%)
	More than 2year	76(71.7%)	23(21.7%)	53(50%)
Frequency of training time/week	Up to 3times/ week	13(12.3%)	8(7.5%)	5(4.7%)
	More than 3times/ week	93(87.7%)	30(28.3%)	63(59.4%)
Duration of training session/ day	Up to 1hour/ day	13(12.3%)	9(8.5%)	4(3.8%)
	More than 1hour/ day	93(87.7%)	29(27\.4%)	64(60.4%)
Strength training specifically for shoulder	never	19(17.9%)	4(3.8%)	15(14.2%)
	Occasionally	54(50.9%)	18(17%)	36(34%)
	Regularly	30(28.3%)	13(12.3%)	17(16%)
	Always	3(2.8%)	3(2.8%)	0(0.0%)
Ever experience shoulder pain	Yes	51(48.1%)	35(33%)	16(15.1%)
	No	55(51.9%)	3(2.8%)	52(49.1%)
Shoulder pain	Yes	41(38.7%)	31(29.2%)	10(9.4%)

due to playing handball	**No**	29(27.4%)	6(5.7%)	23(21.7%)
	N/A	36(34%)	1(0.9%)	35(33%)

The respondents' distribution based on their handball practice and other factors shows a strong link with shoulder pain. Among those who have played handball for more than two years, the majority (71.7%) report experiencing shoulder pain during that period. Of the athletes, 8.5% report shoulder pain, and 10.4% have less than a year of experience. While just 5.7% of players report having shoulder pain, 17.9% of players have one to two years of experience. In other words, playing handball for a long time may increase the likelihood of shoulder pain.

Additionally, a high correlation with training frequency is seen. The majority of respondents (87.7%) work out more than three times a week, whereas just 7.5% of those who train up to three times a week (12.3% of the total) experienced shoulder pain, with 28.3% expressing shoulder discomfort. Additionally, 27.4% of responders experienced shoulder soreness, and 87.7% reported exercising for more than an hour per session, suggesting that the duration of training sessions mattered. Longer training sessions may increase the risk, as individuals who exercised for up to an hour a day reported shoulder soreness at a lower rate (8.5%) compared to those who trained for up to 12 hours a day (12.3%). Another important component appears to be shoulder strength training. Half of the respondents (50.9%) occasionally engage in strength training, and 17% reported experiencing shoulder pain. Shoulder pain was less common among regular strength training participants (12.3%) than among non-participants (28.3%). Even still, 3.8% of those who never do shoulder-specific strength training (17.9%) reported having shoulder pain. Curiously, all respondents who consistently incorporated shoulder-specific strength exercises reported experiencing shoulder pain (2.8%), suggesting that inadequate or irregular training may exacerbate the issue.

Regarding the overall number of respondents who reported having shoulder pain, 48.1% reported having it, and 33% attributed it directly to handball. However, 51.9% of respondents claimed they had never suffered shoulder discomfort, and just 2.8% did so in relation to sports. Furthermore, 38.7% of those surveyed claimed that handball was directly responsible for their shoulder pain, and 29.2% reported that they

were still experiencing it. On the other side, 34% of respondents claimed that handball had nothing to do with their shoulder discomfort, and 27.4% disassociated the sport from it. (Table no. 3)

Table no. 4: Frequency distribution of the respondents by between has shoulder pain and related factor:

Variables		Total (N%)	Have shoulder pain (N%)	
			Yes	No
History of previous shoulder injury	Yes	24(22.6%)	16(15.1%)	8(7.5%)
	No	82(77.4%)	22(20.8%)	60(56.6%)
Performing worm up	Never	10(9.4%)	6(5.7%)	4(3.8%)
	Occasionally	13(12.3%)	4(3.8%)	9(8.5%)
	Regularly	66(62.3%)	19(17.9%)	47(44.3%)
	Always	17(16%)	9(8.5%)	8(7.5%)
Performing cool down	Never	9(8.5%)	5(4.7%)	4(3.8%)
	Occasionally	14(13.2%)	6(5.7%)	8(7.5%)
	Regularly	75(70.8%)	24(22.6%)	51(48.1%)
	Always	8(7.5%)	3(2.8%)	5(4.7%)
Performing stretching exercise for shoulder muscle	Never	27(25.5%)	12(11.3%)	15(14.2%)
	Occasionally	48(45.3%)	15(14.2%)	33(31.1%)
	Regularly	28(26.4%)	10(9.4%)	18(17%)
	Always	3(2.8%)	1(0.9%)	2(1.9%)
Received any training or education for prevention shoulder injury	Yes	46(43.4%)	27(25.5%)	19(17.9%)
	No	60(56.6%)	11(10.4%)	49(46.2%)

Pain or discomfort in other body part that affect shoulder	**Yes**	26(24.5%)	17(16%)	9(8.5%)
	No	80(75.5%)	21(19.8%)	59(55.7%)

By examining the respondents' history of shoulder injuries, warm-up and cool-down procedures, stretching exercises, injury prevention training, and discomfort in other body parts, one might learn more about the causes associated with that pain. However, a significant majority (77.4%) stated they had no history of shoulder injuries, even though 20.8% of respondents claimed they now felt shoulder pain. But among the 22.6% who reported having shoulder pain in the past, 15.1% said that the pain persisted, indicating a strong correlation between the prevalence of shoulder pain and prior injuries.

Exercises for warming up have a preventive effect against shoulder pain. Most respondents (62.3%) said they regularly warmed up, with 44.3% saying they were not uncomfortable and 17.9% saying they had shoulder ache. Those who warmed up frequently (16%) reported reduced pain (8.5%), whereas those who warmed up seldom (9.4%) reported higher shoulder pain (5.7%). Techniques for cooling down also had shown a protective trend. Even while 22.6% of respondents felt pain and 70.8% of respondents reported regular cool-downs, those who always performed cool-downs (7.5%) reported even lower rates of discomfort (2.8%). The absence or irregularity of cool-down protocols, however, was linked to a somewhat higher frequency of pain.

The activities used by respondents to strengthen their shoulder muscles were different. Out of 45.3%, 14.2% reported shoulder pain, and 26.4% stretched often, 9.4% reported shoulder pain. Those who had never stretched reported somewhat higher rates of shoulder discomfort (25.5%) than those who had. Only 2.8% of respondents reported that they constantly extended their shoulders, and 0.9% reported that their pain was little. In light of these findings, everyday stretching may help reduce the likelihood of shoulder pain.

Additionally, injury prevention education and training appear to have an impact on shoulder soreness. 25.5% of respondents who received such training (43.4%) reported experiencing shoulder discomfort, compared to 10.4% of respondents who did not get such training (56.6%). This illustrates how information about prevention can help reduce shoulder pain.

Apart from shoulder pain, 16% of those surveyed reported pain in other shoulder-related body parts. However, 75.5% of respondents indicated they did not have shoulder pain, and just 19.8% reported experiencing it. So, pain or discomfort elsewhere may be the source of shoulder issues or exacerbate them.

In general, a history of shoulder injuries, a lack of knowledge about injury prevention, discomfort in other body parts, and inconsistent warm-up, cool-down, or stretching practices are associated with a greater prevalence of shoulder pain. Consistent warm-up and cool-down routines, injury prevention training, and periodic stretching exercises may be necessary to reduce shoulder pain in this population. (Table no. 4)

Table no. 5: Frequency distribution on respondents between has shoulder pain and characteristics, persistence, and impact:

Variables		Total (N%)	Have shoulder pain (N%)	
			Yes	No
Shoulder that feel pain	Right	30(28.3%)	19(17.9%)	11(10.4%)
	Left	9(8.5%)	7(6.6%)	2(1.9%)
	Both	13(12.3%)	12(11.3%)	1(0.9%)
	N/A	54(50.9%)	0(0.0%)	54(50.9%)
Pain persistence	Less than 1day	16(15.1%)	14(13.2%)	2(1.9%)
	1day to 2day	15(14.2%)	10(9.4%)	5(4.7%)
	More than 2days	22(20.8%)	12(11.3%)	10(9.4%)
	N/A	53(50%)	2(1.9%)	51(48.1%)
Type of pain	Constant	10(9.4%)	10(9.4%)	0(0.0%)
	Intermittent	46(43.4%)	28(26.4%)	18(17%)
	N/A	50(47.2%)	0(0.0%)	50(47.2%)
Time of experience more	Training/ Competition	33(31.1%)	24(22.6%)	9(8.5%)
	Other situation	22(20.8%)	13(12.3%)	9(8.5%)
	N/A	51(48.1%)	1(0.9%)	50(47.2%)
Pain impact in training	Yes	43(40.6%)	30(28.3%)	13(12.3%)
	No	63(59.4%)	8(7.5%)	55(51.9%)

Impact in competition level	**Yes**	38(35.8%)	26(24.5%)	12(11.3%)
	No	68(64.2%)	12(11.3%)	56(52.8%)
Impact in ADL	**Yes**	25(%)	19(17.9%)	6(5.7%)
	No	81(%)	19(17.9%)	62(58.5%)
Take any management	**Yes**	20(18.9%)	14(13.2%)	6(5.7%)
	No	86(81.1%)	24(22.6%)	62(58.5%)

The research provides a detailed explanation of the shoulder pain characteristics, persistence, and impact experienced by handball players. Nineteen individuals (17.9%) stated they were now experiencing right shoulder pain, whereas thirty participants (28.3%) reported having it. Seven (6.6%) and nine (8.5%) of the individuals said they were now experiencing pain in their left shoulder. Thirteen (12.3%) of the individuals said they were uncomfortable in both shoulders, twelve (11.3%) said they were in pain, and fifty-four (50.9%) said they had no shoulder pain.

The information fully explains the characteristics of shoulder soreness, persistence, and impact experienced by handball players. Thirty individuals (28.3%) reported experiencing right shoulder pain, and nineteen (17.9%) claimed they were experiencing it at the moment. Nine (8.5%) and seven (6.6%) of the participants said they were experiencing pain in their left shoulder at the present. Of those who took part, 13 (12.3%) said they were uncomfortable in both shoulders, 12 (11.3%) said they were in pain, and 54 (50.9%) said they had no shoulder pain.

In terms of pain persistence, 16 individuals (15.1%) experienced discomfort that lasted less than a day; while 14 participants (13.2%) were still in pain. 15 participants (14.2%) had discomfort that lasted one to two days, while 10 people (9.4%) are now in pain. Out of the twenty-two people, twelve (11.3%) said that their discomfort persisted for longer than two days. 53 people, or 50% of the population, did not have chronic pain.

Regarding this kind of pain, 10 individuals (9.4%) reported that it was ongoing, and all ten were now experiencing it. 28 individuals (26.4%) reported experiencing

occasional discomfort, while 46 participants (43.4%) reported experiencing it currently. Fifty individuals (47.2%) lacked any pertinent pain history. Twenty-four (22.6%) of the participants said they were now in pain, and thirty-three (31.1%) said that they were more uncomfortable during practice or competition. Of the participants, 51 (48.1%) did not have a meaningful response, while 22 (20.8%) reported having discomfort in different circumstances, with 13 (12.3%) reporting it currently.

The impact of pain was evaluated as well. Forty-three individuals (40.6%) were affected by the training, while thirty participants (28.3%) are still feeling the effects. In this group, 63 participants (59.4%) said that training had no impact on them, despite the fact that just 8 individuals (7.5%) reported experiencing discomfort. Among the 38 individuals (35.8%) who reported pain, 26 (24.5%) had their competitive performance jeopardized. Only 12 individuals (11.3%) reported feeling uncomfortable at the present, compared to 68 (64.2%) who claimed that competition had no effect on them. ADLs were impacted in 25 individuals (23.6%), 19 of whom (17.9%) reported pain at the time, whereas 81 participants (76.4%) had no impact, 19 of whom (17.9%) were still experiencing discomfort.

Finally, the pain management data reveals that 20 participants (18.9%) sought therapy, and 14 individuals (13.2%) were still in pain, while the bulk of participants (81.1%), 86, did not seek any management, and 24 individuals (22.6%) were still in pain. These findings demonstrate the intricacy of handball players' shoulder pain and the ways it impacts several aspects of their life. (Table no. 5)

Table no. 6: Frequency distribution of the respondents by between has shoulder pain severity on VAS scale:

Variables		Total (N%)	Have shoulder pain (N%)	
			Yes	No
Category of VAS Scale	Mild to no pain	82(77.4%)	18(17%)	64(60.4%)
	Moderate pain	19(17.9%)	15(14.2%)	4(3.8%)
	Severe pain	5(4.7%)	5(4.7%)	0(0.0%)

According to the Visual Analog Scale (VAS) for pain severity, the data shows the distribution of people with shoulder discomfort. Eighty-two people (77.4% of the sample) fell into the "Mild to No Pain" group, of whom eighteen (17%) reported shoulder discomfort and sixty-four (60.4%) did not. 19 people (17.9% of the sample) were evaluated in the "Moderate Pain" group; 15 (14.2%) reported shoulder discomfort, while 4 (3.8%) reported no pain at all. Finally, 5 people (4.7% of the sample) fell into the "Severe Pain" group, and all of them (100%) said they had shoulder discomfort. Shoulder pain was not experienced by a substantial proportion of the sample, with the majority falling into the "Mild to No Pain" group. Nonetheless, the majority of respondents in the "Moderate Pain" and "Severe Pain" groups reported shoulder discomfort, while none in the severe pain category reported no pain at all. (Table no. 6)

Figure no. 10: Frequency distribution of the respondents by between disability level associations with has shoulder pain:

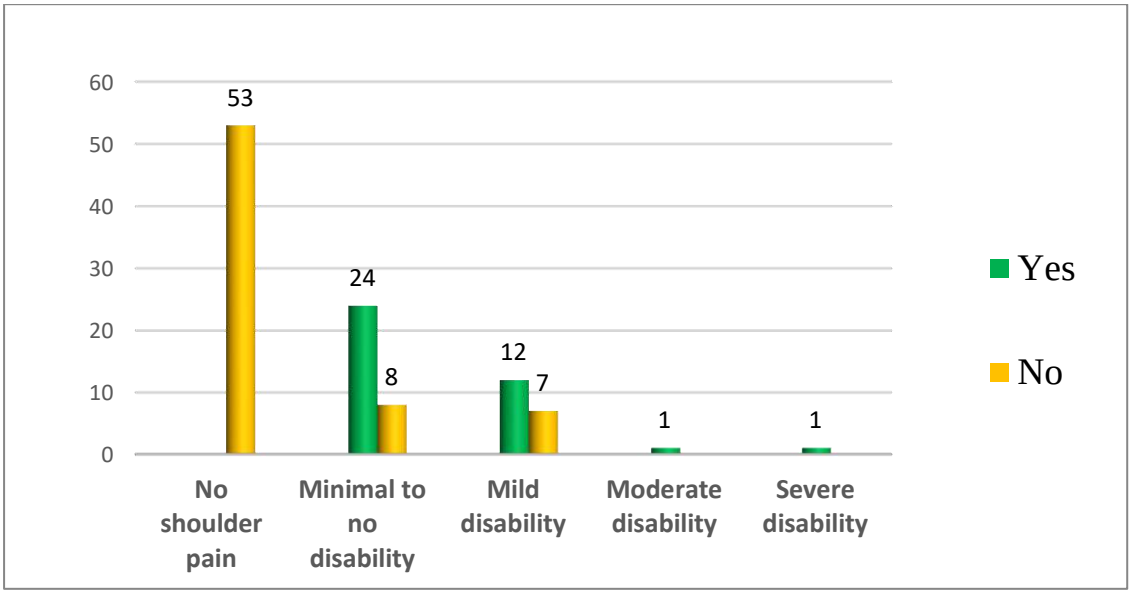


Figure no. 10: Frequency distribution between QuickDASH associations with shoulder pain

The QuickDASH results demonstrate the functional impairment of participants with respect to shoulder pain. Fifty-three individuals (50%) reported having no shoulder pain at all, and none of them were experiencing any pain at the present. Of those with shoulder pain, 32 (30.2%) reported having little to no handicap, 24 (22.6%) reported feeling pain at the time, and 8 (7.5%) did not. Twelve (11.3%) of the 19 people (17.9%) who had modest impairment reported ongoing shoulder pain, whereas seven (6.6%) did not report any pain at all. All of them were experiencing discomfort at the moment, and just one individual (0.9%) claimed to have a moderate disability. In a similar vein, one participant (0.9%) experienced considerable disability and ongoing shoulder pain. These findings demonstrate that the majority of individuals reported little to no functional limitations, even among those who experienced shoulder pain. (Figure no. 10)

Table no. 7: Frequency distribution of the respondents by between functional disability levels by QuickDASH with Severity of pain by VAS scale:

Variables		Total (N%)	Quick DASH				
			No shoulder pain	Minimal to no disability	Mild disability	Moderate disability	Severe disability
Category of VAS Scale	Mild to no pain	82(77.4%)	53(50%)	23(21.7%)	6(5.7%)	0(0.0%)	0(0.0%)
	Moderate pain	19(17.9%)	0(0.0%)	9(8.5%)	10(9.4%)	0(0.0%)	0(0.0%)
	Severe pain	5(4.7%)	0(0.0%)	0(0.0%)	3(2.8%)	1(0.9%)	1(0.9%)

The table illustrates the relationship between pain severity as measured by the VAS scale and functional capacity as measured by the QuickDASH scale. It categorizes people not only based on their functional ability, which goes from "No shoulder pain" to "Minimal to no disability," "Mild disability," "Moderate disability," and "Severe disability," but also on the intensity of the pain they report, which goes from "Mild to no pain" to "Severe pain."

According to the QuickDASH scale, 77.4% of those with moderate to no pain are categorized as having "No shoulder pain," and the majority of those with "Minimal to no disability" fall into these categories. This suggests that those who are less in pain tend to be more functional. On the other hand, individuals with moderate pain are more likely to be categorized as mildly or moderately impaired according to the QuickDASH scale; 9.4% of those with moderate pain reported having "Moderate disability." Finally, those with severe pain are more likely to have significant functional impairments; 2.8% of them are categorized as having a "Moderate disability," and 0.9% are categorized as having a "Severe disability." This trend indicates a clear relationship between increased pain levels and increased impairment

in shoulder-related tasks, showing that functional ability tends to decline as pain intensity increases. (Table no. 7)

Figure no. 11: Frequency distribution of the respondents by Severity of pain on sex:

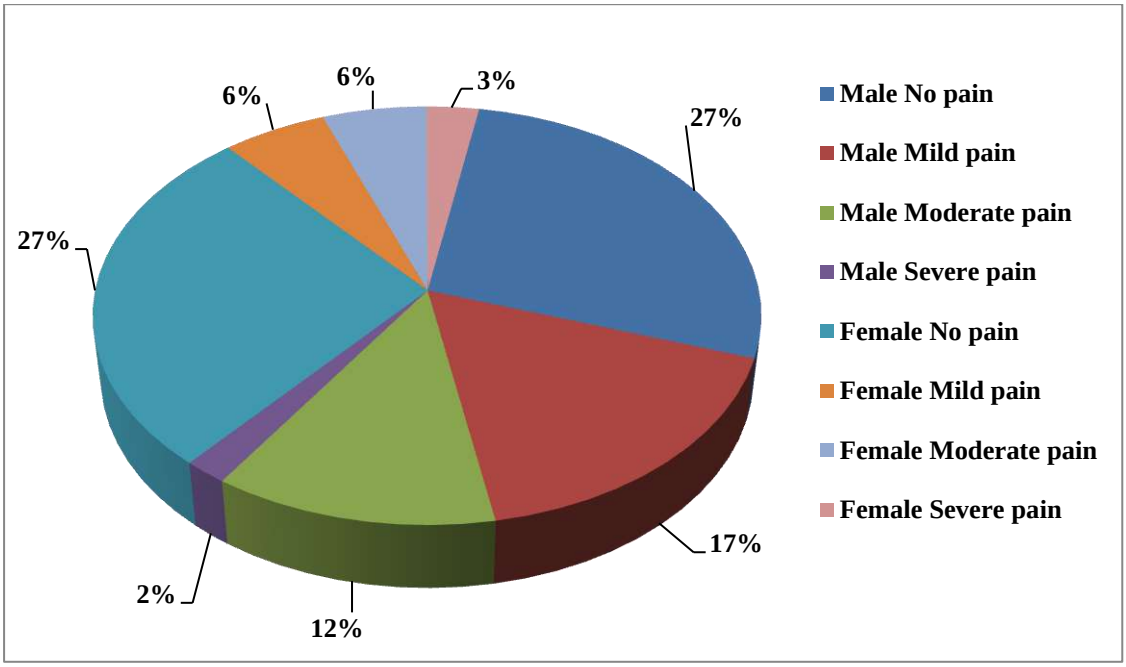


Figure no. 11: Frequency distribution Severity of pain based on Sex by VAS scale

By examining the Visual Analog Scale (VAS) categories by sex, the distribution of pain intensity between male and female participants is displayed. Of the 58 participants who reported no discomfort (54.7%), the proportion of males (29 participants, or 27.4%) and women (29 participants, or 27.4%) was equal. Six participants (5.7%) experienced moderate pain, whereas the majority of the 24 participants (22.6%) who did so were male (18 participants, or 17%). Six (5.7%) and thirteen (12.3%) of the 19 people (17.9%) who reported considerable pain were female. Two men (1.9%) and three women (2.8%) were among the five people (4.7%) who reported experiencing extreme pain.

These findings imply that mild and moderate pain were reported more frequently by men, although severe pain was somewhat more prevalent among women. Nonetheless, the number of people who said they were not uncomfortable was split evenly between the sexes. (Figure no. 11)

Figure no. 12: Frequency distribution of the respondents by disability level depends on sex:

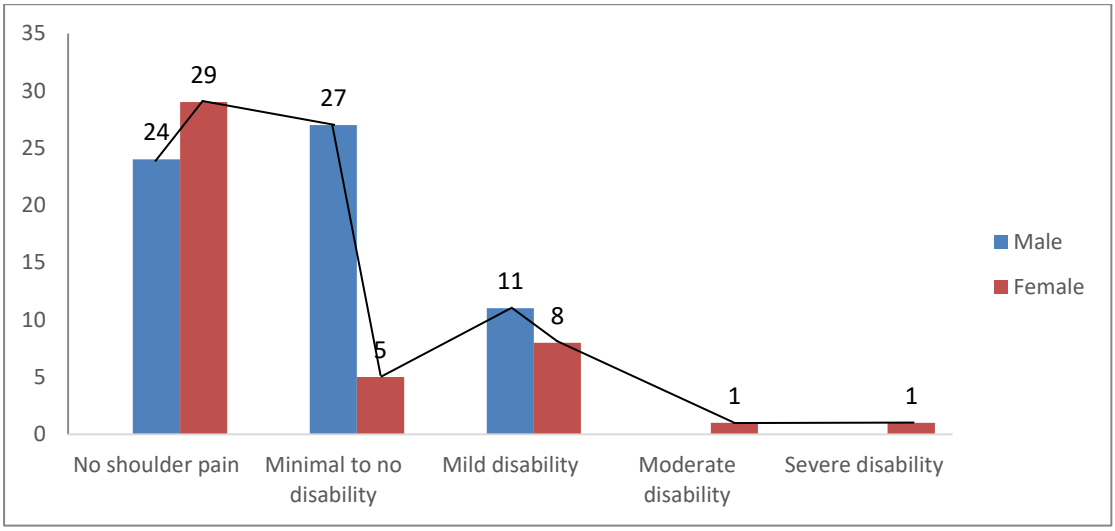


Figure no. 12: Frequency distribution of the respondents by disability level depends on sex

By separating the Quick DASH scores by sex and impairment categories, the functional impact of shoulder problems on participants is highlighted. Of the 53 participants (50%) who reported no shoulder discomfort, 24 (22.6%) were male individuals and 29 (27.2%) were female. 32 people (30.2%) were judged to have little to no disability; 27 (25.5%) of these people were men, while just 5 (4.7%) were women. The slight disability group consisted of 19 people (17.9%), with 8 (7.5%) and 11 (10.4%) being female. Only one person (0.9%) fell into either the moderate impairment or the severe impairment categories. Two female participants were identified: one with a moderate handicap (0.9%) and another with a severe handicap (0.9%).

Generally speaking, more women fell into the mild, moderate, and severe disability groups, whereas more males fell into the minimum to no impairment group. This suggests that the ways that shoulder issues affect functionality may change depending on a person's sex. (Figure no. 12)

Table no. 8: Association between Disability level and Have shoulder pain and ever experience shoulder pain:

Ordinal logistic regression test on Quick DASH Scale and Have shoulder pain		df	Sig.	95% Confidence Interval	
				Lower Bound	Upper Bound
Threshold	DASH cat = 0	1	.001***	1.450	3.277
	DASH cat = 1	1	.001***	3.818	6.536
	DASH cat = 2	1	.001***	6.066	9.879
	DASH cat = 3	1	.001***	6.354	11.034
Location	Have shoulder pain	1	.008**	.410	2.672
	Ever experience shoulder pain	1	.001***	2.264	4.871

Ordinal logistic regression test

(*= < 0.05, ** = < 0.01, *= < 0.001)**

The parameter estimates for the ordinal logistic regression model may contribute to our understanding of the relationship between shoulder pain variables and the Quick DASH scale. The criteria for each of the Quick DASH scale's several stages vary noticeably. The estimate for the transition from no impairment to minimum disability (DASH category = 0]) is 2.364 ($p < 0.001$), for instance, and the 95% CI range is 1.450-3.277.

Similarly, the change from minimal to mild handicap (DASH category = 1]) is indicated by an estimate of 5.177 ($p < 0.001$) with a 95% CI of 3.818-6.536. The criteria for moderate to severe disability (DASH category = 3]) and mild to moderate disability (DASH category = 2]) also show statistical significance, with estimates of 8.694 (95% CI: 6.354-11.034) and 7.973 (95% CI: 6.066-9.879), respectively. These results demonstrate that the Quick DASH scale effectively classifies various levels of functional impairment.

According to the predictors, having current shoulder pain significantly increases the likelihood of having higher Quick DASH scores, as indicated by the estimate of 1.541 ($p = 0.008$) with a 95% CI of 0.410-2.672. Similarly, a history of shoulder pain is associated with a greater likelihood of impairment levels, with an estimate of 3.568 and a 95% CI of 2.264-4.871 ($p < 0.001$). The logit link function in the model accounts for the nonlinear relationship between predictors and the response variable, and reference categories are used as the baseline for comparisons.

Overall, the findings indicate that higher Quick DASH scores, which reflect more functional impairment, are significantly correlated with both past and current shoulder pain. The scale's statistically significant threshold estimations support the possibility that it might differentiate between various impairment levels, emphasizing the need of treating shoulder pain to reduce functional limitations and improve outcomes. (Table no. 8)

Table no. 9: Association between BMI and socio-demographic and medical information:

Variables	Test Statistic	df	Sig.
Between BMI (Score) and Age group	25.177	4	.001***
Between BMI (Score) and marital status	8.362	1	.004**
Between BMI (Score) and Living Area	7.080	2	.029*
Between BMI (Score) and Educational status	6.088	2	.048*
Between BMI (Score) and monthly family income	9.190	5	.102
Between BMI (Score) and Co-morbidities	.002	1	.961
Between BMI (Score) and Playing position in Handball	4.273	3	.233
Between BMI (Score) and Since practicing Handball	2.262	2	.323
Between BMI (Score) and engaging strength training for shoulder	1.709	3	.635
Between BMI (Score) and Shoulder that feel pain	3.053	3	.384
Between BMI (Score) and Pain persistance	4.711	3	.194
Between BMI (Score) and type of pain	.685	2	.710
Between BMI (Score) and shoulder pain responsible for handball	2.057	2	.358
Between BMI (Score) and time of experience more	.849	2	.654
Between BMI (Score) and proper worm up	3.520	3	.318
Between BMI (Score) and cool down	3.807	3	.238
Between BMI (Score) and performing stretching exercise for shoulder muscle	2.999	3	.392

Kruskal-wallis Test

(*= < 0.05, ** = < 0.01, *= < 0.001)**

To examine the distribution of BMI values among various training, pain, and demographic groups, the Kruskal-Wallis test was employed. The results indicated that age group, marital status, domicile, and educational attainment all had a substantial impact on the BMI distribution. The null hypothesis was rejected, for instance, for the following variables: age groups (Test Statistic = 25.177, df = 4, Sig. < 0.001), marital status (Test Statistic = 8.362, df = 1, Sig. = 0.004), living areas (Test Statistic = 7.080, df = 2, Sig. = 0.029), and educational status (Test Statistic = 6.088, df = 2, Sig. = 0.048). On the other hand, there were no appreciable differences in BMI scores for several other attributes. These included monthly family income (Test Statistic = 9.190, df = 5, Sig. = 0.102), co-morbidities (Test Statistic = 0.002, df = 1, Sig. = 0.961), and playing position in handball (Test Statistic = 4.273, df = 3, Sig. = 0.233). Strength training for the shoulders (Test Statistic = 1.709, df = 3, Sig. = 0.635) and handball practice (Test Statistic = 2.262, df = 2, Sig. = 0.323) did not substantially alter the BMI distribution.

Additionally, pain-related characteristics, including the type of pain (Test Statistic = 0.685, df = 2, Sig. = 0.710), intensity of pain (Test Statistic = 4.711, df = 3, Sig. = 0.194), and the affected shoulder (Test Statistic = 3.053, df = 3, Sig. = 0.384), did not significantly affect BMI ratings. Whether shoulder pain was related to playing handball (Test Statistic = 2.057, df = 2, Sig. = 0.358), when the pain occurred (Test Statistic = 0.849, df = 2, Sig. = 0.654), and the use of exercises such as shoulder stretching (Test Statistic = 2.999, df = 3, Sig. = 0.392), proper warm-up (Test Statistic = 3.520, df = 3, Sig. = 0.318), and cool-down (Test Statistic = 3.807, df = 3, Sig. = 0.238) had no significant correlation with BMI scores.

Other variables, including co-morbidities, exercise habits, pain-related issues, and income, did not, however, show any significant associations. In conclusion, the test found a number of demographic characteristics, such as age, marital status, dwelling location, and education, to have significant correlations with the distribution of BMI. (Table no. 9)

Table no. 10: Association between pain severity and socio-demographic and medical information:

Variable		VAS Scale			Chi-square test		
		Mild to no pain	Moderate pain	Severe pain	χ^2	df	P-value
Sex	Male	47(44.3%)	13(12.3%)	2(1.9%)	1.522	2	0.467
	Female	35(33%)	6(5.7%)	3(2.8%)			
Frequency of training time/ week	Up to 3times/ week	9(8.5%)	4(3.8%)	0(0%)	2.189	2	0.335
	More than 3times/ week	73(68.9%)	15(14.2%)	5(4.7%)			
Duration of training session/ day	Up to 1hour/ day	9(8.5%)	4(3.8%)	0(0%)	2.189	2	0.335
	More than 1hour/ day	73(68.9%)	15(14.2%)	5(4.7%)			
Have shoulder pain	Yes	18(17%)	15(14.2%)	5(4.7%)	31.180	2	0.001***
	No	64(60.4%)	4(3.8%)	0(0%)			
Ever experience shoulder pain	Yes	29(27.4%)	17(16%)	5(4.7%)	23.749	2	0.001***
	No	53(50%)	1.9(19%)	0(0%)			

History of shoulder injury	**Yes**	10(9.4%)	12(11.3%)	2(1.9%)	23.777	2	0.001***
	No	72(67.9%)	7(6.6%)	3(2.8%)			
Any training or education to preventing shoulder injury	**Yes**	32(30.2%)	10(9.4%)	4(3.8%)	4.025	2	0.134
	No	50(47.2%)	9(8.5%)	1(0.9%)			
Pain or discomfort in other body part that affect shoulder	**Yes**	10(9.4%)	11(10.4%)	5(4.7%)	33.549	2	0.001***
	No	72(67.9%)	8(7.5%)	0(0%)			
Impact on training	**Yes**	21(19.8%)	17(16%)	5(4.7%)	33.783	2	0.001***
	No	61(57.5%)	2(1.9%)	0(0%)			
Impact on competition level	**Yes**	18(17%)	15(14.2%)	5(4.7%)	31.180	0	0.001***
	No	64(60.4%)	4(3.8%)	0(0%)			
Impact on ADL	**Yes**	11(10.4%)	9(8.5%)	5(4.7%)	26.870	2	0.001***
	No	71(67%)	10(9.4%)	0(0%)			
Take any management	**Yes**	8(7.5%)	9(8.5%)	3(2.8%)	20.055	2	0.001***
	No	74(69.8%)	10(9.4%)	2(1.9%)			

Chi-Square test

(*= < 0.05, ** = < 0.01, *= < 0.001)**

The table, which examines the relationship between various factors and pain severity, is classified using the Visual Analog Scale (VAS). The chi-square test, which uses

statistical analysis to report the p-value, degrees of freedom (df), and chi-square value (χ^2) for each variable, can be used to understand these relationships.

Sex and pain intensity do not appear to be significantly correlated, as indicated by the p-value of 0.467 and the χ^2 value of 1.522. The frequency of training (up to three times vs. more than three times per week) and the duration of training sessions (up to one hour vs. more than one hour per day) do not substantially correlate with the degree of pain, as evidenced by χ^2 values of 2.189 and p-values of 0.335.

However, there is a substantial association between the severity of the pain and characteristics related to shoulder pain and damage. Those with a history of shoulder pain ($\chi^2 = 23.749$, $p = 0.001$), current shoulder discomfort ($\chi^2 = 31.180$, $p = 0.001$), or a history of shoulder injury ($\chi^2 = 23.777$, $p = 0.001$) are more likely to report higher pain intensity. The degree of shoulder pain also significantly correlates with pain or discomfort in other parts of the body ($\chi^2 = 33.549$, $p = 0.001$), indicating that musculoskeletal issues have a broader impact on shoulder pain.

The severity of pain has a significant influence on training, competitive levels, and activities of daily living (ADL). The chance of reporting interference in ADL ($\chi^2 = 26.870$, $p = 0.001$), competition ($\chi^2 = 31.180$, $p = 0.001$), and training ($\chi^2 = 33.783$, $p = 0.001$) is positively correlated with the level of discomfort. Furthermore, the degree of pain and the usage of management measures are strongly correlated, with those in agonizing pain being more likely to seek care ($\chi^2 = 20.055$, $p < 0.001$).

The study concludes that the degree of shoulder pain is strongly correlated with injury history, shoulder discomfort, and functional repercussions. On the other hand, there are no appreciable relationships between the intensity of pain and training duration, frequency, or sex. These findings emphasize the significance of pain management and its broader effects on functioning and performance. (Table no. 10)

CHAPTER-V: DISCUSSION & LIMITATION

The purpose of this study is to determine the prevalence of shoulder discomfort and the risk variables that are linked to it among Dhaka city's handball players. In this study population 106 and researcher found that, the prevalence of present shoulder pain was 35.8% (38) and rest of the population has no shoulder pain related to handball. But when it associates with previous shoulder pain history, there is a significant difference on it. Close to the half of the handball player 51 (48.1%) had previous shoulder pain between that 35 (33%) population has present shoulder pain. One study conducted on Norwegian female handball players, they found that of the 179 players, 65 (36%) said they now had shoulder discomfort, 40 (22%) said they had previously experienced shoulder pain when playing handball, and 74 (41%) said they had never experienced shoulder pain. All of these responses were in line with my findings. Athletes who had previously had shoulder discomfort were much older than those who did not (Myklebust et al. 2013, pp. 288-294). According to a different comprehensive evaluation of 33 cohort studies, 44% of them reported having shoulder pain (Raya-Gonzalez et al. 2020, p. 3925). Another study conducted in the national second league of team handball in Germany revealed that 498 (9.8%) out of 1194 players experienced shoulder pain (Luig et al. 2018, pp. 1884-1891).

Based on the sex in the study between 106 participants, there more participants are male 58% and rests of the participants 42% are female. Between the male participants 25 (23.6%) has prevalence of shoulder pain on the other hand between female 13 (12.3%) has prevalence of shoulder pain. That means male are more experiences shoulder pain than female. A study on Danish they found that, According to age groups, handball players under the age of (16) and seniors report greater shoulder pain than men, while those under the age of (18) report more shoulder pain than women (Moller et al. 2012, pp. 531-537). On the other hand another study shows that there were thirty female participants and thirty male athletes, however there were eleven and seventeen injuries, respectively. That suggests that shoulder discomfort is more common in males than in women, which is in line with the results of my study (Hatzimanouil et al. 2015, p. 1).

The study's participant group showed that 43 (40.65%) of the participants were in the 15-19 age group, followed by 25-29 and then, progressively, 20-24, 30-34, and 35-39.

Compared to higher age groups, the lower age group (15-19) had more incidences of shoulder discomfort (26, 24.55%). A study by Monaco M found that, Compared to immature athletes, who only suffered 39 injuries, mature players had 103. Players in the first line suffered the most injuries (63), followed by goalkeepers (17) and the second line (62). The impact of age on injury risk was highlighted by the significant difference in injury frequency between immature players (10 injuries) and mature players (52 injuries) in the 2nd Line position, that's seems to same result close to my study (Monaco et al. 2019, pp. 67-74). There was a another 6 years cohort study on the incidents of injuries on handball player, the main finding of this study for injury rate based on gender, they also found that boys are more injured rather than girl (Asai et al. 2020, pp. 677-681).

Of the total participants in this study, 39 (36.8%) play handball in different positions, followed by 38 (35.8%), 18 (17%), and 11 (10.4%) in the backcourt, goalkeeper, and center. Shoulder pain is more common in backcourt players than in players in other positions. A study by Forthomme P. on handball player, According to one study, There is a strong correlation between shoulder injuries and playing position. Compared to players at other positions, backcourt players had a 3.5-fold higher risk of suffering a shoulder injury this season. The likelihood of a shoulder injury the next season was eight times lower for defensive players than for offensive ones. These result shows similar result close to my study (Jaksic et al. 2024, pp. 19-30) (Forthomme et al. 2018, pp. 174-180). In a different study, backcourt players were far greater chances than wing and line players to have any of the shoulder issue categories. This result might not be shocking because backcourt players are known to have a greater overall demand on their shoulders because they throw at a much higher rate and are more likely to be stopped by an opponent when making a break or blocking a shot, which puts the shoulder in a vulnerable position (Asker et al. 2018, pp. 1892-1900).

Of the participants in my study, the majority (71.7%) had been playing handball for more than two years. Of them, 23 (21.7%) had shoulder pain, the highest incidence of shoulder pain based on handball practice. This indicates that the prevalence of shoulder discomfort will also rise if the amount of time spent playing handball increases concurrently. Based on the increase in handball practice a study found that

according to the rough analysis, More people who increased their handball exposure by more than 60% experienced shoulder injuries than people who increased it by less than 20% (Moller et al. 2017, pp. 231-237).

In this study, the majority of participants (87.7%) reported shoulder discomfort, and they trained more than three times a week. Likewise, 87.7% of participants trained for over an hour every day, and 27.4% reported soreness. 17% of individuals reported discomfort, while 50.9% of participants occasionally engaged in shoulder-specific strength exercise. Notably, all participants reported shoulder discomfort, and 2.8% of them consistently engaged in shoulder-specific strength exercise. According to these data, shoulder discomfort may be linked to longer training sessions, more frequent training, and sporadic shoulder-specific strength training. According to the variables a study found that the impact of shoulder-specific strength training on participants' shoulder discomfort was investigated in this study. The results showed that 3.8% of participants reported having shoulder discomfort, and 17.9% had never engaged in shoulder-specific strength exercise. Pain was experienced by 17% of individuals who occasionally performed shoulder-specific strength training (50.9%). 12.3% of subjects experienced discomfort, whereas 28.3% reported regular strength exercise. It's interesting to note that all participants (100%) experienced shoulder discomfort, and 2.8% routinely engaged in shoulder-specific strength exercise. These results imply a possible association between a higher frequency of shoulder discomfort and irregular or nonexistent strength exercise. Strength training's ability to prevent shoulder injuries may be impacted by a number of variables, including poor technique, overtraining, or insufficient recuperation, as evidenced by the fact that all subjects who consistently engaged in this type of training reported experiencing discomfort (Hadjisavvas et al. 2022, p. 1.).

The study found that frequent warm-up and cool-down exercises were associated with a lower prevalence of shoulder discomfort. In contrast to 17.9% of those who warmed up frequently (62.3%), 8.5% of those who warmed up always experienced shoulder discomfort. Even though 22.6% of respondents said they were uncomfortable, 70.8% of them regularly engaged in cool-down exercises. In a similar vein, 45.3% of those who occasionally conducted stretching exercises experienced pain (14.2%), whereas 26.4% of persons who regularly practiced them felt discomfort. Despite these trends,

some individuals who regularly participated in these activities continued to have shoulder pain, suggesting that other factors may raise the risk of harm. In the Oslo Sports Trauma Research Center shoulder injury prevention program, Fredriksen et al. (2020, pp. 1423-1433) assessed the impact of an organized warm-up program on the shoulder injury risk variables of young handball players. For eighteen weeks, the intervention group warmed up three times a week with the program. External rotation (ER) ability increased by 6% in the control group and decreased by 10% in the treatment group, according to the data. The groups did not, however, vary in any statistically significant ways. Additionally, neither group's internal rotation (IR) and range of motion (ROM) changed significantly. These results imply that, although the warm-up program might have improved ER strength, the program's ability to prevent shoulder injuries may have been more significantly impacted by other elements, such as improved neuromuscular regulation, exercise regulation, or other biomechanical enhancements that went above ER strength and IR ROM (Fredriksen et al. 2020, pp. 1423-1433). On the other hand the study on cool down, it is still unclear exactly how cool-down activities affect handball players' shoulder pain. In another study on shoulder strengthening program, in their 2017 study, Sommervold and Osteras discovered that junior female handball players' a shoulder-strengthening program significantly reduced shoulder discomfort. Pain prevalence increased from 23% to 36% in the control group, whereas it dropped from 34% to 11% in the exercise group. For six months, resistance training was conducted three times a week to strengthen the rotator cuff and scapular stabilizers. These results show how effective targeted shoulder strength training is at preventing shoulder discomfort in handball players (Sommervold and Osteras. 2017, pp. 61-70).

The study found that athletes who received shoulder injury prevention training reported experiencing shoulder pain at a rate of 43.4%, compared to 56.6% of players who did not get training. Compared to 46.2% of those who did not get training, 17.9% of those who did reported no shoulder pain. This suggests that exercise may reduce the likelihood of shoulder pain, even if other factors may also play a role in injury incidence. Related to this a study by Andersson et al. (2017), The prevalence of overuse shoulder injuries was much lower among athletes who participated in a shoulder damage prevention training program. The exercises included in the intervention were designed to increase shoulder strength, stability, and flexibility. The

intervention group's shoulder injury rate was 34% lower than that of the control group's athletes, who did not get the specific preventative training (Andersson et al. 2017, pp. 1073–1080).

According to the research, 24.5% of athletes reported experiencing pain or discomfort in other parts of their bodies as a result of their shoulders. 8.5% of them did not experience shoulder pain, whereas 16% did. Nonetheless, 55.7% of respondents reported no pain at all, 19.8% reported shoulder pain, and 75.5% reported no such discomfort. This raises the possibility that shoulder discomfort and pain in other bodily areas are related. According to the study by Ogasawara et al. (2024), the incidence and intensity of shoulder pain among male national handball players from Japan were shown to be significantly impacted by pain and discomfort in other body parts. The study found that athletes with neck, upper back, or thoracic pain were more likely to report experiencing more shoulder discomfort. These interconnected discomforts were associated with altered biomechanics and compensatory adjustments during handball throwing or defensive activities. The results show that addressing pain in related body parts through careful monitoring, targeted rehabilitation, and preventative programs may reduce shoulder discomfort and enhance performance. This highlights the need of treating injuries holistically, that is, by focusing on both the affected area and other body regions (Ogasawara et al. 2024, p. 65).

In this study the data indicates that, shoulder pain significantly affects players' training, competition, and activities of daily living (ADLs). 40.6% of players said that pain interfered with their training, with 28.3% citing shoulder discomfort, while 59.4% of players claimed that pain had no influence on their training, including 7.5% who were still in pain. In reference to competition, 34.8% of players cited discomfort-related performance issues, with 24.5% citing shoulder pain, while 64.2% said there was no influence from competition, with 11.3% citing pain. In contrast to 25% of players who reported pain influencing their ADLs, including 17.9% with shoulder pain, 81% of players reported no ADL impact, including 17.9% with discomfort. According to the study by Ogasawara et al., (2024), elite Japanese handball players' Shoulder pain has a significant influence on training, competitive performance, and activities of daily living (ADLs). Athletes who had shoulder pain reported finding it difficult to maintain their peak training intensity and performance during

competitions, and throwing velocity and accuracy were greatly affected. Furthermore, shoulder pain highlighted the injury's functional limitations by making it challenging to do daily ADLs like lifting or overhead tasks. These findings demonstrate the need for targeted therapies to lessen the detrimental impact of shoulder discomfort on daily activities and athletic performance (Ogasawara et al. 2024, p. 65).

Out of the individuals in this research, only 18.9% received therapy for shoulder issues, with 5.7% expressing no discomfort and 13.2% experiencing pain. Even still, 81.1% of people including 22.6% who had shoulder pain and 58.5% who did not did not seek medical attention. Despite the prevalence of shoulder pain, this indicates a low level of therapeutic adherence. Proper treatment of shoulder injuries has been demonstrated to dramatically increase the rehabilitation and performance of handball players in the Landreau et al. (2018) study. In most cases, shoulder function and pain were effectively restored using non-surgical techniques including physical therapy and structured rehabilitation. For patients with severe injuries that needed surgery, adhering to post-operative rehabilitation protocols allowed them to recover and return to sports in a safe way. In addition to reducing the effects of shoulder injuries, the study shows that proper treatment prevents long-term problems and recurrence, underscoring the necessity of timely and tailored intervention strategies (Landreau et al. 2018, pp.177-195).

According to the VAS scale data, 17% of participants in this research experienced shoulder pain, 22.6% reported mild discomfort, and 54.7% reported no pain at all. Of the individuals, 17.9% reported significant pain and 14.2% reported shoulder discomfort. It was less usual for athletes to report experiencing significant shoulder discomfort, at 4.7%. These findings show the range of pain levels experienced by athletes and the prevalence of moderate to severe shoulder discomfort. According to this Myklebust et al. (2013) evaluated the Visual Analogue Scale (VAS) to measure the level of shoulder pain experienced by elite Norwegian women's handball players. Athletes with shoulder pain reported moderate to severe discomfort, and their average VAS scores showed that this significantly impacted their ability to practice and compete effectively. Repetitive throwing motions and overuse injuries were strongly associated with higher VAS ratings, underscoring the need for targeted interventions to reduce pain and prevent more damage (Myklebust et al. 2013, pp. 288–294).

The study shows that shoulder function varies significantly depending on the degree of impairment, as indicated by the Disabilities of the Arm, Shoulder, and Hand (DASH) score. As DASH scores increased, threshold estimates for several DASH categories showed a distinct and significant loss in shoulder function, indicating a worsening of impairment. The findings were all statistically significant, highlighting the robust correlation between declining shoulder function and increasing DASH scores. These results highlight how significantly increased impairment levels affect shoulder function. According to this study, athletes who experience pain and those who do not have it have very distinct shoulder functioning based on the Quick-DASH score results. Players without pain had superior shoulder function, with a mean Quick-DASH score of 4.50 (SD = 6.80); players with pain had worse shoulder function, with a mean score of 11.40 (SD = 11.40). The statistically significant difference ($p = 0.001$, U test) showed how functional outcomes are impacted by shoulder pain (Oliveira et al. 2017, pp. 107–113).

5.1 Limitations:

In any investigation, including this one, total precision is unachievable. Interpreting the results requires taking into account a number of restrictions and obstacles:

- The small sample size of the study is its first weakness. 106 patient records of shoulder-painting handball players who met the inclusion and exclusion criteria were used to collect data over the course of a year. The number of handball players is not sufficiently represented by the sample size.
- The frequency and contributing variables of shoulder pain among handball players in Bangladesh are also not well documented in the literature. Comparing the study's conclusions to those of other research projects carried out in other settings is difficult as a result.
- The scope of this study was limited to Bangladeshi handball players' prevalence of shoulder pain. Other facets of shoulder pain in handball players, including risk factors, injury causes, preventative techniques, and rehabilitation methods, should be investigated in more detail.
- By expanding the study to include a wider range of groups, larger sample sizes, and more thorough objectives, the validity and applicability of any follow-up findings will be enhanced.

CHAPTER-VI: CONCLUSION & RECOMMENDATION

6.1 Conclusion:

The significant prevalence of shoulder pain among Dhaka handball players is highlighted by this study, which also reveals several risk factors and their wide-ranging effects. According to the findings, a significant number of athletes suffer from shoulder discomfort, particularly those who are younger, have had prior injuries, and train for longer amounts of time. Male players had shoulder soreness more frequently than female players, which is consistent with findings from previous international studies. The study also highlights how backcourt players' defensive challenges and frequent high-velocity throwing make them vulnerable to shoulder ailments.

The study found that factors including longer, more frequent training sessions, inadequate warm-up and cool-down techniques, and irregular or insufficient strength training are all substantially linked to shoulder soreness. Athletes who consistently engaged in shoulder-specific strength training and injury prevention programs reported lower rates of shoulder discomfort, underscoring the importance of targeted therapies. However, the low percentage of treatment uptake highlights the need for athletes to have greater access to medical and rehabilitation services, even if shoulder injuries are widespread.

The study additionally points out the functional limitations caused by shoulder pain, which negatively affect players' training, competition performance, and daily activities. The findings highlight the importance of early identification, prompt treatment, and comprehensive prevention measures, including biomechanical assessments, rehabilitation programs, and targeted strength training, in reducing the impact of shoulder pain.

Future research should look at the biomechanical, psychological, and nutritional factors that lead to shoulder injuries in order to provide more effective therapies. In addition to emphasizing the pressing need for tactical methods to enhance athlete performance and well-being, this study offers a foundation for comprehending the epidemiology of shoulder pain in handball players.

6.2: Recommendation

To reduce the incidence of shoulder discomfort and related risk factors among handball players, the following suggestions are put forth in light of the study's findings:

- Include mobility exercises, dynamic stretches, and sport-specific drills into your warm-up and cool-down routines.
- To increase stability and avoid overuse, do strength training targeted at the rotator cuff and scapular stabilizers.
- Training methods should be created that restrict high-intensity throwing, minimize repeated motions, and track effort.
- Teach athletes, coaches, and trainers about injury prevention, biomechanics, and how to spot shoulder problems early.
- For treatment and recovery, promote prompt medical examinations and make sports medicine professionals available.
- Put injury monitoring systems in place to keep eye on patterns and modify preventative measures.
- Create programs that adjust to a player's age and gender, emphasizing younger players and backcourt positions.
- To identify athletes who are at risk and modify training, evaluate shoulder function and discomfort on a regular basis using measures such as DASH and VAS.
- Encourage studies on the biomechanical, psychological, and environmental aspects of handball shoulder injuries.

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APPENDICES

Verbal Consent Form

Assalamuaalaikum/ Namashkar,

I am Sabuj Sutradhar, a student of B.Sc. in Physiotherapy, SAIC College of Medical Science and Technology (SCMST), affiliated with Faculty of Medicine, University of Dhaka. For the partial fulfillment of my bachelor degree, I have to conduct a research project and it is a part of my study. My Research title is "Shoulder pain among the Bangladeshi Handball players: The prevalence and associate factors"

I do expect that the interview will take 20-30 minutes. I also offer you to ask any sort of questions when you fell it is necessary to get insight.

I would like to inform you that this is a purely academic study and will not be used for any other purposes. I assure you that all the data will be kept confidential. Your participation will be voluntary. You may have the rights to withdraw your consent and discontinue from the study at any point of time. You also have the right not to answer any other question that you don't like of this questionnaire.

If you have any query about the study, you may contact with me (01688226914) or my supervisor Shahid Afridi, lecturer (Physiotherapy) of SCMST

So, may I have your consent to proceed with the interview? Yes……., No……

Signature of the participant & Date…….

Signature of the researcher & Date……..

Signature of the witness & Date……..

Shoulder pain among the Bangladeshi Handball players: The prevalence & associate factors.

Questionnaire

Part 1: Personal information

1.1 Patients name	
1.2 Address	PS: Dist:
1.3 Mobile number	

Part 2: Socio-demographic information

Question	Answer
2.1 Age	…… (In years)
2.2 Sex	0 = Male 1 = Female
2.3 What is your Living Area?	0 = Urban 1 = Semi urban 2 = Rural
2.4 What is your marital status?	0 = Married 1 = Single 2 = Others
2.5 What about your education level?	0 = Illiterate 1 = Secondary 2 = H.S.C 3 = Graduation & above
2.6 How about your family income?	…….In BDT/ Month

Part 3: Medical information

3.1 What is your Height?	…….cm

3.2 What is your Weight?	……kg
3.3 BMI	0 = Underweight 1 = Normal weight 2 = Over weight 3 = Obesity
3.4 Comorbidities	0 = Hypertension 1 = Diabetes mellitus 2 = Asthma 3 = Don't know
3.5 How long you playing handball?	……(In Year)
3.6 What is your playing position in handball?	0 = Goalkeeper 1 = Backcourt 2 = Center 3 = Other
3.7 How long you practicing handball?	0 = less than 1year 1 = 1year to 2 year 2 = more than 2 year
3.8 What is the frequency of training times per week?	0 = up to 3 times/week 1 = more than 3times/week
3.9 What is the duration of training session per day?	0 = up to 1hour/day 1 = more than 1hour/day
3.10 How often do you engage in strength training specifically for shoulder muscle?	0 = Never 1 = Occasionally 2 = regularly 3 = Always
3.11 Have you any shoulder pain?	0 = Yes 1 = No
3.12 Have you ever experience shoulder pain related to playing handball?	0 = Yes 1 = No
3.13 In which shoulder do you feel pain?	0 = Right 1 = Left

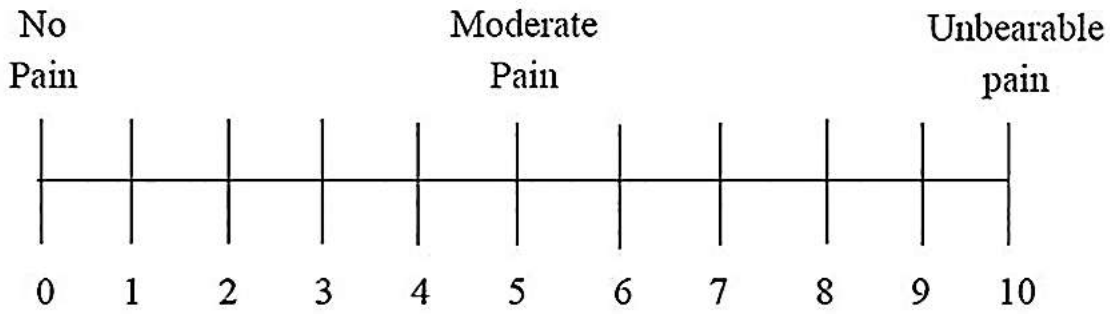
	2 = Both 3 = N/A
3.14 Do you think your shoulder pain is responsible for playing Handball?	0 = Yes 1 = No 2 = N/A
3.15 How long the pains persist?	0 = less than 1day 1 = 1day to 2 day 2 = More than 2 day 3 = N/A
3.16 What is the type of pain?	0 = Constant 1 = Intermittent 2 = N/A
3.17 If pain intermittent when you experience more?	0 = Training/competition 1 = Other situation 2 = N/A
3.18 Do you have history of previous shoulder injury?	0 = Yes 1 = No
3.19 How often do you perform a proper warm-up before playing or training?	0 = Never 1 = Occasionally 2 = Regularly 3 = Always
3.20 How often do you perform a cool-down after playing or training?	0 = Never 1 = Occasionally 2 = Regularly 3 = Always
3.21 Do you perform stretching exercises for your shoulder muscles?	0 = Never 1 = Occasionally 2 = Regularly 3 = Always
3.22 Have you received any training or education on preventing shoulder injuries?	0 = Yes 1 = No

3.23 Do you experience pain or discomfort in other parts of your body that might affect your shoulder?	0 = Yes 1 = No
3.24 Is the pain impact in your training?	0 = Yes 1 = No
3.25 Is the pain impact in your competition level?	0 = Yes 1 = No
3.26 Is the pain impact in your activity of daily living?	0 = Yes 1 = No
3.27 Do you take any management for shoulder pain (medication, physiotherapy or both)?	0 = Yes 1 = No

3.28 Visual Analogue Scale (VAS)

How severe is your pain on VAS Scale?

0-10 Vas Numeric Pain Distress Scale



3.29 Quick DASH Scale

	No difficulty	**Mild difficulty**	**Moderate difficulty**	**Severe difficulty**	**Unable**
3.29.1 Open a tight or new jar.	1	2	3	4	5
3.29.2 Do heavy household chores (e.g., wash walls, floors).	1	2	3	4	5
3.29.3 Carry a shopping bag or briefcase.	1	2	3	4	5

3.29.4 Wash your back.	1	2	3	4	5
3.29.5 Use a knife to cut food.	1	2	3	4	5
3.29.6 Recreational activities in which you take some force or impact through your arm, shoulder or hand (e.g., golf, hammering, tennis, etc.).	1	2	3	4	5

	Not at all	**Slightly**	**Moderately**	**Quite a bit**	**Extremely**
3.29.7 During the past week, to what extent has your arm, shoulder or hand problem interfered with your normal social activities with family, friends, neighbours or groups?	1	2	3	4	5

	Not limited at all	**Slight limited**	**Moderately limited**	**Very limited**	**Unable**
3.29.8 During the past week, were you limited in your work or other regular daily activities as a result of your arm, shoulder or hand problem?	1	2	3	4	5

Please rate the severity of the following symptoms in the last week. (circle number)	**None**	**Mild**	**Moderate**	**Severe**	**Extreme**
3.29.9 Arm, shoulder or	1	2	3	4	5

hand pain.					
3.29.10 Tingling (pins and needles) in your arm, shoulder or hand.	1	2	3	4	5

	No difficulty	**Mild difficulty**	**Moderate difficulty**	**Severe difficulty**	**So much Difficulty that i Can't sleep**
3.29.11 During the past week, how much difficulty have you had sleeping because of the pain in your arm, shoulder or hand? (circle number)	1	2	3	4	5

SPORTS/PERFORMING ARTS MODULE (OPTIONAL)

Did you have any difficulty:	**No difficulty**	**Mild difficulty**	**Moderate difficulty**	**Severe difficulty**	**Unable**
3.29.12 Using your usual technique for playing your instrument or sport?	1	2	3	4	5
3.29.13 Playing your musical instrument or sport because of arm, shoulder or hand pain?	1	2	3	4	5
3.29.14 Playing your musical instrument or sport as well as you would like?	1	2	3	4	5
3.29.15 Spending your usual amount of time practicing or playing your instrument or sport?	1	2	3	4	5

সম্মতি পত্র

আসসালামুয়ালাইকুম/নমস্কার,

আমি সবুজ সুত্রধর , সাইক কলেজ অভ মেডিকেল সায়েন্স অ্যান্ড টেকনোলজি (এসসিএমএসটি) এর বি.এস সি. ইন ফিজিওথেরাপিতে এর শিক্ষার্থী। যা, ঢাকা বিশ্ববিদ্যালয়ের মেডিসিন অনুষদের অধিভুক্ত একটি ইনস্টিটিউট। আমার ব্যাচেল ডিগ্রী সম্পূর্ণ করার জন্য একটি গবেষণা প্রকল্প পরিচালনা করতে হবে, এবং এটি আমার পড়াশুনার একটি অংশ। গবেষণার শিরোনামঃ "হ্যান্ডবল খেলোয়াড়দের মধ্যে কাঁধের ব্যাথাঃ ব্যাপকতা এবং সহযোগী কারণ"।

আমি আশা করি সাক্ষাৎকারটি ২০-৩০ মিনিট সময় নেবে। আপনার মনে কোন কিছু জানা দরকার মনে হলে, যেকোন প্রশ্ন করতে পারেন।

আপনার অবগতির জানাচ্ছি যে, এটি সম্পূর্ণ একাডেমিক গবেষণা এবং অন্য কোন উদ্দেশ্যে ব্যবহার করা হবে না। আমি আপনাকে আশ্বাস দিচ্ছি যে, সকল তথ্য গোপনীয় রাখা হবে। এটি একটি স্বেচ্ছাসেবী অংশগ্রহণ । আপনি যেকোন সময় আপনার সম্মতি প্রত্যাহার করে গবেষণা থেকে চলে যেতে পারেন। এছাড়াও, এই প্রশ্নাবলীতে যেকোন প্রশ্নের উত্তর না দেওয়ার অধিকার আপনার আছে।

গবেষণা সম্পর্কে কোন প্রশ্ন থাকলে, আমার সাথে (০১৬৮৮২২৬৯১৪) অথবা আমার সুপারভাইজার শহিদ আফ্রিদি (০১৭৮০০০৬৪৪১), লেকচারার অভ ফিজিওথেরাপি, (এসসিএমএসটি) সাথে যোগাযোগ করতে পারেন।

সাক্ষাৎকার এগিয়ে নেওয়ার জন্য কি আমি আপনার সম্মতি পেতে পারি?

হ্যাঁ....., না.....

অংশগ্রহণকারীর স্বাক্ষর ও তারিখ.....

গবেষকের স্বাক্ষর ও তারিখ.....

সাক্ষীর স্বাক্ষর ও তারিখ.....

হ্যান্ডবল খেলোয়াড়দের মধ্যে কাঁধের ব্যাথাঃ ব্যাপকতা এবং সহযোগী কারণ

প্রশ্নাবলী

পর্ব ১: ব্যক্তিগত তথ্য

১.১ নাম	
১.২ ঠিকানা	থানা: জেলা:
১.৩ মোবাইল নাম্বার	

পর্ব ২: সামাজিক-জনসংখ্যা সংক্রান্ত তথ্য

প্রশ্ন	উত্তর
২.১ বয়স	…… (বছর)
২.২ লিঙ্গ	০ = পুরুষ ১ = মহিলা
২.৩ আপনার বসবাসের এলাকা কি ধরনের?	০ = শহর ১ = আধা শহর ২ = গ্রাম
২.৪ আপনার বৈবাহিক অবস্থা কি?	০ = বিবাহিত ১ = অবিবাহিত ২ = অন্যান্য
২.৫ আপনার শিক্ষাগত যোগ্যতা কি?	০ = অশিক্ষিত ১ = মাধ্যমিক ২ = উচ্চমাধ্যমিক ৩ = স্নাতক এবং তার উপরে
২.৬ আপনার পারিবারিক আয় কত?	.....টাকা/ মাস

পর্ব 3: চিকিৎসা বিষয়ক তথ্য

৩.১ আপনার উচ্চতা কত?	……..……সেমি
৩.২ আপনার ওজন কত?	…….…… কেজি
৩.৩ বিএমআই	০ = কম ওজন ১ = স্বাভাবিক ওজন ২ =অতিরিক্ত ওজন ৩ = স্থুলতা
৩.৪ কো-মরবিডিটিস	০ = উচ্চ রক্তচাপ ১ = ডায়াবেটিস মেলাইটাস ২ = হাঁপানি ৩ = জানা নেই
২.৫ আপনি কতবছর হ্যান্ডবল খেলছেন?	…….…… (বছর)
২.৬ হ্যান্ডবলে আপনার খেলার অবস্থান কি?	০ = গোলরক্ষক ১ = ব্যাককোর্ট ২ = কেন্দ্র ৩ = অন্যান্য
৩.৭ আপনি কতক্ষণ হ্যান্ডবল অনুশীলন করেছেন ?	০ = এক বছরের কম ১ = এক থেকে দুই বছর ২ = দুই বছরের বেশি
৩.৮ প্রতি সপ্তাহে কত দিন প্রশিক্ষণ করেন?	০ = প্রতি সপ্তাহে ৩ দিন পর্যন্ত ১ = প্রতি সপ্তাহে ৩ দিনের বেশি
৩.৯ প্রতিদিন কত সময় প্রশিক্ষণ করেন?	০ = প্রতি দিনে ১ ঘন্টা পর্যন্ত ১ = প্রতিদিনে ১ ঘণ্টার বেশি
৩.১০ কাঁধের পেশীগুলির জন্য আপনি কত ঘন ঘন শক্তি প্রশিক্ষণে নিযুক্ত হন?	০ = কখনই না ১= মাঝে মাঝে ২ = নিয়মিত

	৩ = সর্বদা
৩.১১ আপনার কাঁধে কোন ব্যথা আছে?	০ = হ্যাঁ ১ = না
৩.১২ আপনি কি কখনো হ্যান্ডবল খেলার সাথে সম্পর্কিত কাঁধে ব্যথা অনুভব করেছেন?	০ = হ্যাঁ ১ = না
৩.১৩ কোন কাঁধে আপনি ব্যথা অনুভব করেন?	০ =ডান ১ =বাম ২ =উভয় ৩ = প্রযোজ্য নয়
৩.১৪ আপনি কি মনে করেন আপনার কাঁধের ব্যথা হ্যান্ডবল খেলার জন্য দায়ী?	০ = হ্যাঁ ১ = না ২ = প্রযোজ্য নয়
৩.১৫ কতক্ষণ ব্যথা অব্যাহত থাকে?	০ = এক দিনের কম ১ = এক থেকে দুইদিন ২ = দুই দিনের বেশী ৩ = প্রযোজ্য নয়
৩.১৬ ব্যথার ধরন কি?	০ = সবসময় হয় ১ = মাঝে মাঝে হয় ২ = প্রযোজ্য নয়
৩.১৭ যদি ব্যথা মাঝে মাঝে হয় তাহলে কখন অনুভূত হয়?	০ = প্রশিক্ষণ/প্রতিযোগিতা ১ = অন্য পরিস্থিতি ২ = প্রযোজ্য নয়
৩.১৮ আপনি কি আগে কাঁধে কখনো আগাত পেয়েছিলেন?	০ = হ্যাঁ ১ = না

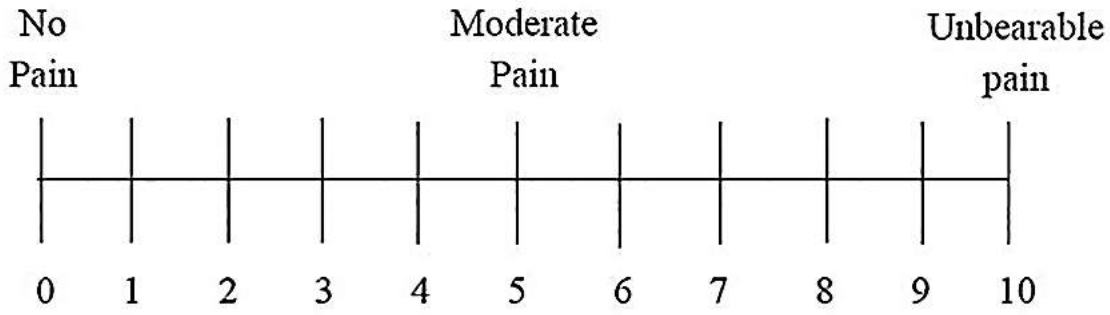
৩.১৯ খেলা বা প্রশিক্ষণের আগে আপনি কত ঘন ঘন একটি সঠিক ওয়ার্ম-আপ করেন?	০ = কখনই না ১ = মাঝে মাঝে ২ = নিয়মিত ৩ = সর্বদা
৩.২০ খেলা বা প্রশিক্ষণের পরে আপনি কত ঘন ঘন কুল-ডাউন করেন?	০ = কখনই না ১ = মাঝে মাঝে ২ = নিয়মিত ৩ = সর্বদা
৩.২১ আপনি আপনার কাঁধের পেশী জন্য প্রসারিত ব্যায়াম সঞ্চালন করেন?	০ = কখনই না ১ = মাঝে মাঝে ২ = নিয়মিত ৩ = সর্বদা
৩.২২ আপনি কি কাঁধের আঘাত প্রতিরোধে কোন প্রশিক্ষণ বা শিক্ষা পেয়েছেন?	০ = হ্যাঁ ১ = না
৩.২৩ আপনি কি আপনার শরীরের অন্যান্য অংশে ব্যথা বা অস্বস্তি অনুভব করেন যা আপনার কাঁধকে প্রভাবিত করতে পারে?	০ = হ্যাঁ ১ = না
৩.২৪ আপনার প্রশিক্ষণে ব্যথা কোনো প্রভাব ফেলে ?	০ = হ্যাঁ ১ = না
৩.২৫ আপনার প্রতিযোগিতার স্তরে ব্যথা কোনো প্রভাব ফেলে?	০ = হ্যাঁ ১ = না
৩.২৬ আপনার দৈনন্দিন জীবনযাত্রার কার্যকলাপে ব্যথা কি প্রভাব ফেলে?	০ = হ্যাঁ ১ = না
৩.২৭ আপনি কি কাঁধের ব্যথার জন্য কোন ব্যবস্থাপনা গ্রহণ করেন (ঔষধ,	০ = হ্যাঁ ১ = না

ফিজিওথেরাপি বা উভয়ই)?	

৩.২৮ **Visual Analogue Scale (VAS)**

VAS স্কেলে আপনার ব্যথা কতটা গুরুতর ?

0-10 Vas Numeric Pain Distress Scale



৩.২৯ **Quick DASH Scale**

	কোন অসুবিধা নেই	হালকা অসুবিধা	মাঝারি অসুবিধা	গুরুতর অসুবিধা	অক্ষম
৩.২৯.১ একটি টাইট বা নতুন জার খুলুন।	০	১	২	৩	৪
৩.২৯.২ ভারী গৃহস্থালির কাজ করুন (যেমন, দেয়াল, মেঝে ধোয়া)।	০	১	২	৩	৪
৩.২৯.৩ একটি শপিং ব্যাগ বা ব্রিফকেস বহন করুন।	০	১	২	৩	৪
৩.২৯.৪ আপনার পিঠ ধুয়ে নিন।	০	১	২	৩	৪
৩.২৯.৫ খাবার কাটার জন্য একটি ছুরি ব্যবহার করুন।	০	১	২	৩	৪
৩.২৯.৬ বিনোদনমূলক ক্রিয়াকলাপ যেখানে আপনি	০	১	২	৩	৪

আপনার বাহু, কাঁধ বা হাত দিয়ে কিছু শক্তি বা প্রভাব নেন (যেমন, গল্ফ, হাতুড়ি, টেনিস, ইত্যাদি)।					

	একেবারেই না	সামান্য	পরিমিত ভাবে	খুব সামান্য	অনেক বেশি
৩.২৯.৭ গত সপ্তাহে, আপনার বাহু, কাঁধ বা হাতের সমস্যা কতটা পরিবার, বন্ধুবান্ধব, প্রতিবেশী বা গোষ্ঠীর সাথে আপনার স্বাভাবিক সামাজিক কার্যকলাপে হস্তক্ষেপ করেছে?	০	১	২	৩	৪

	মোটেও সীমাবদ্ধ নয়	সামান্য সিমিত	মাঝারি সিমিত	খুব সিমিত	অক্ষম
৩.২৯.৮ গত সপ্তাহে, আপনার বাহু, কাঁধ বা হাতের সমস্যার ফলে আপনি কি আপনার কাজ বা অন্যান্য নিয়মিত দৈনন্দিন কার্যকলাপে সীমাবদ্ধ ছিলেন?	০	১	২	৩	৪

গত সপ্তাহে নিম্নলিখিত লক্ষণগুলির তীব্রতা অনুগ্রহ করে রেট করুন। (বৃত্ত নম্বর)	না	হালকা	পরিমিত	গুরুতর	অত্যন্ত বেশি
৩.২৯.৯ বাহু, কাঁধ বা হাতে ব্যথা।	০	১	২	৩	৪
৩.২৯.১০ আপনার বাহু, কাঁধ বা হাতে টিংলিং (পিন এবং সূঁচ) অনুভূত হওয়া।	০	১	২	৩	৪

	কোন অসুবিধা নেই	হালকা অসুবিধা	মাঝারি অসুবিধা	গুরুতর অসুবিধা	এত কষ্ট যে আমি ঘুমাতে পারি না
৩.২৯.১১ গত সপ্তাহে, আপনার বাহু, কাঁধ বা হাতে ব্যথার কারণে আপনার ঘুমাতে কতটা অসুবিধা হয়েছে? (বৃত্ত নম্বর)	০	১	২	৩	৪

খেলাধূলা/শিল্পকলা প্রদর্শন করা মডিউল (ঐচ্ছিক)

আপনার কি কোন অসুবিধা ছিল:	কোন অসুবিধা নেই	হালকা অসুবিধা	মাঝারি অসুবিধা	গুরুতর অসুবিধা	অক্ষম
৩.২৯.১২ আপনার বাদ্যযন্ত্র বা খেলার জন্য আপনার স্বাভাবিক কৌশল ব্যবহার করছেন?	০	১	২	৩	৪
৩.২৯.১৩ বাহু, কাঁধ বা হাতে ব্যথার কারণে আপনার বাদ্যযন্ত্র বা খেলাধুলা করছেন?	০	১	২	৩	৪
৩.২৯.১৪ আপনার পছন্দ মতো আপনার বাদ্যযন্ত্র বাজাচ্ছেন বা খেলাধুলা করছেন ?	০	১	২	৩	৪
৩.২৯.১৫ অনুশীলন বা যন্ত্র বাজানো বা খেলায় আপনার স্বাভাবিক পরিমাণ সময় ব্যয় করছেন?	০	১	২	৩	৪

Data collection permission letter

Date: 04/06/2024

To

The General Secretary

Bangladesh Handball Federation.

Dhaka-1000, Bangladesh

Subject: **Prayer for permission to collect data from Bangladesh Handball Federation, Dhaka, Bangladesh to conduct a research project.**

Sir,

With due respect and humble submission to state that I am a student of B.Sc. in Physiotherapy at SAIC College of medical science and technology (SCMST). As a part of our course curriculum, we have to conduct a research project for the partial fulfillment of the requirement for the degree of B.Sc. in Physiotherapy. My research title is "Shoulder Pain Among the Bangladeshi Handball Player: The Prevalence And Associated Factors" and the aim of the study is to determine the prevalence of and risk factors for shoulder pain among the Bangladeshi handball player. This is a cross-sectional study under the supervisor Mr Shahid Afridi, Lecturer (Physiotherapy) of SCMST. I have chosen the Bangladesh Handball Federation, Dhaka, Bangladesh to collect data from the shoulder pain patients who play Handball.

So, I, therefore, pray and hope that you would be kind enough to give permission for data collection that will help me to complete my study.

Yours Faithfully

Sabuj Sutradhar

B.Sc. in Physiotherapy (4th Year)

Session: 2018-2019

SCMST, Mirpur-14, Dhaka-1216, Bangladesh.

Forwarded

04.06.24

Zahid Bin Sultan Nahid
Assistant Professror & Head
Physiotherapy Department
SAIC College of Medical Science & Technology (SCMST)
Mirpur-14, Dhaka-1216

BANGLADESH HANDBALL FEDERATION
DATE 05/07/2024
DHAKA

Shahid Afridi
B.Sc. PT (CRP-DU)
Lecturer, Department of Physiotherapy
SAIC College of Medical Science & Technology (SCMST)
Mirpur-14, Dhaka-1216

IRB Permission letter

SCMST-BPT/IRB/.05-23/039

To
Sabuj Sutradhar
4th Year Student of B.Sc. in Physiotherapy
Session: 2018-19, Reg No: 10441
SAIC College of Medical Science & Technology (SCMST)
Mirpur-14, Dhaka-1216, Bangladesh

Subject: Approval of the thesis proposal **"Shoulder pain among Bangladeshi handball player: The prevalence and associated factor"** by ethics committee.

Dear Sabuj Sutradhar
Congratulations.
The Institutional Review Board (IRB) of SCMST 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	Research proposal.
2	Structured Questionnaire (English & Bangla version)
3	Information sheet & consent form.

The purpose of the study is to determine the prevalence of and associated factors for shoulder pain among the Bangladeshi handball player. The study involves face to face interview by using structured questionnaire to determine the prevalence of and associated factors for shoulder pain among the Bangladeshi handball player that may take 30 to 40 minutes to fill in the questionnaire and there is no likelihood of any harm to the participants. The members of the Ethics committee have approved the study to be conducted in the presented form at the meeting held at 09.00 AM on 28th September 2023 at SCMST.

The institutional Ethics committee expects to be informed about the progress of the study, any changes occurring during 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,
04.06.24

Dr. Abul Kasem Mohammad Enamul Haque
Principal, SCMST &Chairman, Institutional Review Board (IRB)
SAIC College of Medical Science & Technology (SCMST)
Mirpur-14, Dhaka-1216, Bangladesh