RESEARCH PAPER

Common Musculoskeletal Problems in Weightlifters and Powerlifters

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Abstract

Background: Olympic weightlifting and powerlifting are strength sports that involve lifting maximal loads and place considerable stress on the musculoskeletal system, increasing the risk of injuries due to repetitive loading and technical er.**Aim**:To identify common musculoskeletal problems among weightlifters and powerlifters using an expert-validated self-designed questionnaire.

Methods: A cross-sectional study was conducted among 70 participants aged 18–50 years who were involved in weightlifting or powerlifting. Participants meeting the inclusion criteria completed a self-administered questionnaire assessing pain intensity, site of pain, aggravating factors, and the effect of pain on activities of daily living (ADLs), performance, and mental health.

Results: A total of 77% of participants reported musculoskeletal pain. Pain was more common during activity than at rest, with 37% reporting moderate pain intensity during activity.

The most common sites of pain were the shoulder (29%) and lower back (27%). Overhead activities (34%) and heavy lifting positions (18%) were the most common aggravating factors. Pain mildly affected ADLs and performance in most participants, while mental health remained largely unaffected. Rest (38%) and stretching (25%) were the most commonly reported relieving factors.

Conclusion: Musculoskeletal pain is prevalent among weightlifters and powerlifters, particularly affecting the shoulder and lower back. Proper technique, structured training, and early physiotherapy intervention may help reduce injury risk and improve performance.

Keywords: Powerlifters, weightlifters, musculoskeletal injuries

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Introduction

Olympic weightlifting and powerlifting are the two most commonly practiced strength sports where maximal strength in one repetition is the primary focus. In Olympic weightlifting, maximal strength with speed is generated during the lift to complete the lift as the primary focus. In weightlifting there are two events: Snatch, Clean & Jerk.(1)In powerlifting, there are three events:

Squat, Bench Press and Deadlift.(2)

The goal of both sports is to lift the maximum weight in each event.The risk of injury during heavy lifting work or during leisure time is very high and is a well-recognised problem.(3) In order to secure a balance between total training load and recovery, recommendations about training frequency, intensity and volume for resistance training practitioners should be focused upon.(4)

Other factors that have been suggested as risk factors for injuries are related to the lifting position and technical errors. For example, there is an increased risk of shoulder injury when the shoulder joint is abducted and externally rotated, which is a position weightlifters achieve during a snatch. It has also been suggested that squat movement could increase the risk of osteoarthritis.(5) The reason for this could be the fact that the knee joint is exposed to high forces when performing deep squats which increase the risk of osteoarthritis.(6),(7)

The deadlift exercise also exposes the spine to high compressive forces. Studies have shown that the compression forces average more than 17,000 N in elite powerlifters, and the distribution of forces have a large variation depending on the lifting technique.(8)

Musculoskeletal problems are commonly seen in weightlifters and powerlifters due to excessive stress and continuous trauma. These injuries may occur due to sudden damaging events such as strains and lacerations or due to repetitive stress.(9)

However, signs and symptoms of overuse syndromes such as pain and functional limitations appear gradually, and the athlete often continues training despite these symptoms.(10)

The different definitions used in earlier studies about weightlifters and powerlifters make it difficult to obtain a clear overview of the prevalence of injuries and the causes of injuries.

According to Van Mechelen's model of injuries, understanding the causes and mechanisms of injury is crucial in injury prevention.(11)

Hence, this study was planned to find out common musculoskeletal problems among weightlifters and powerlifters. Therefore, the purpose of this study is to identify the common sites of musculoskeletal pain in

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powerlifters and weightlifters and to find out its relation with training and different techniques that they use.

Aim

To study common musculoskeletal problems in weightlifters and powerlifters using an expert-validated self-made questionnaire.

Objectives

1. To identify common musculoskeletal problems in powerlifters and weightlifters.
2. To identify common sites of pain and aggravating factors.
3. To study how pain affects ADLs, mental health and performance.
4. To identify the relationship between techniques used and duration of practice with pain.

Methodology

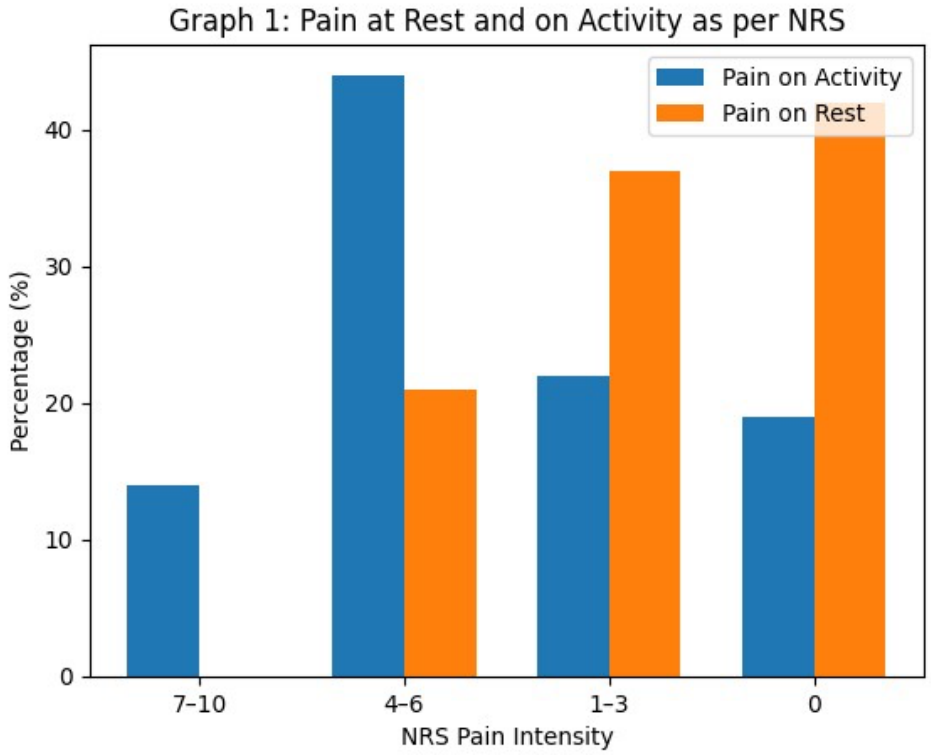
Study design: Cross-sectional study
Sample size: 70 participants
Participants: Weightlifters and powerlifters aged 18–50 years Inclusion Criteria:

- Individuals involved in powerlifting and weightlifting
- Age between 18–50 years
- Willing to participate Exclusion Criteria:
- Any comorbidities such as Diabetis, hypertension or underwent any surgery
- Not willing to participate
- Unable to understand questionnair

PLAN OF STUDY

The study was approved by the Institutional Ethics and Research Committee.
Subjects were selected based on the inclusion and exclusion criteria.
Participants were given a self-administered questionnaire in both soft and hard copy formats.
The collected data were analyzed to evaluate the objectives of the study.
Results and Graphical Representation

Graph 1 Represents pain at rest and at activity



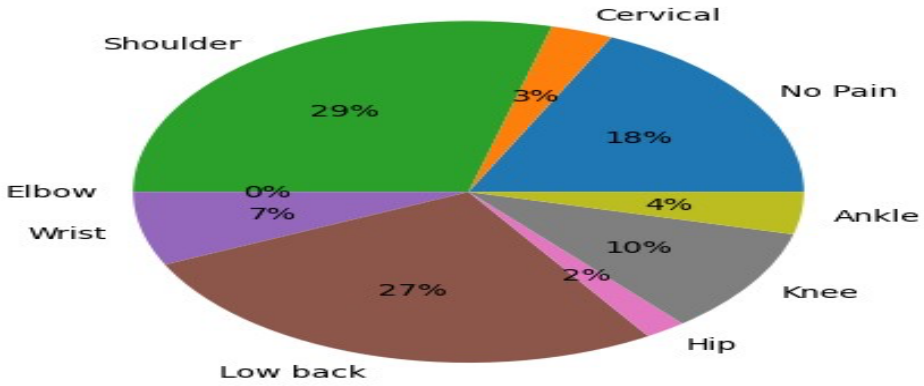
This graph shows pain intensity at rest and during activity based on the Numeric Rating Scale (NRS). Pain intensity at rest is mostly reported between 1–3 on the NRS. As the intensity of NRS increases, there is a decrease in the number of subjects reporting pain at rest. A total of 21% of subjects reported pain intensity of 4–6 at rest, while none reported severe pain intensity (7–10) at rest.

During activity, 19% of subjects reported no pain (0 intensity) and 17 subjects reported pain intensity ranging from 1–3. The majority of participants (37%) reported moderate pain intensity of 4–6 during activity, while 14% reported severe pain intensity of 7–10 during activity.

Site Of Pain illustrates the most common sites of pain among powerlifters and weightlifters.

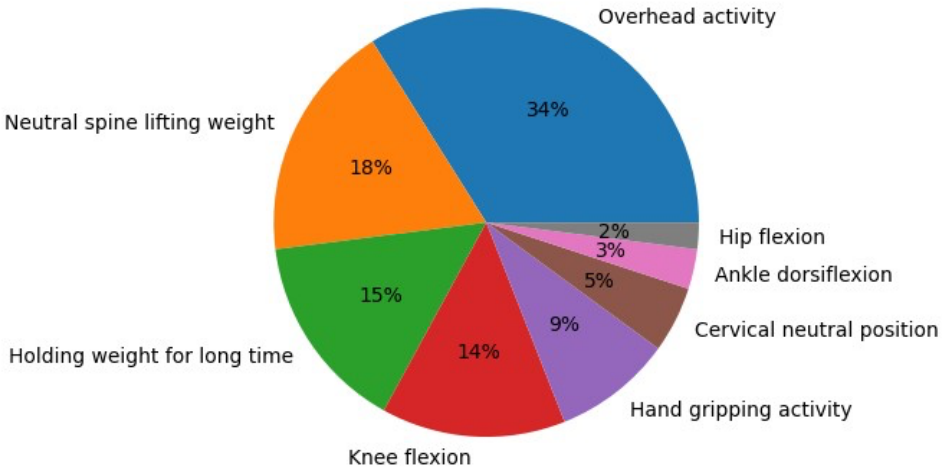
The most common site of affection is the shoulder, reported in 29% of the lifters, followed by low back pain reported in 27% of the participants.
Additionally, 18% of the lifters reported no pain.
Less common sites of pain include the knee (10%), wrist (7%), ankle (4%), cervical region (3%), and hip (2%).
The elbow region was not affected in any of the lifters included in this study.

Graph 2: Site of Pain

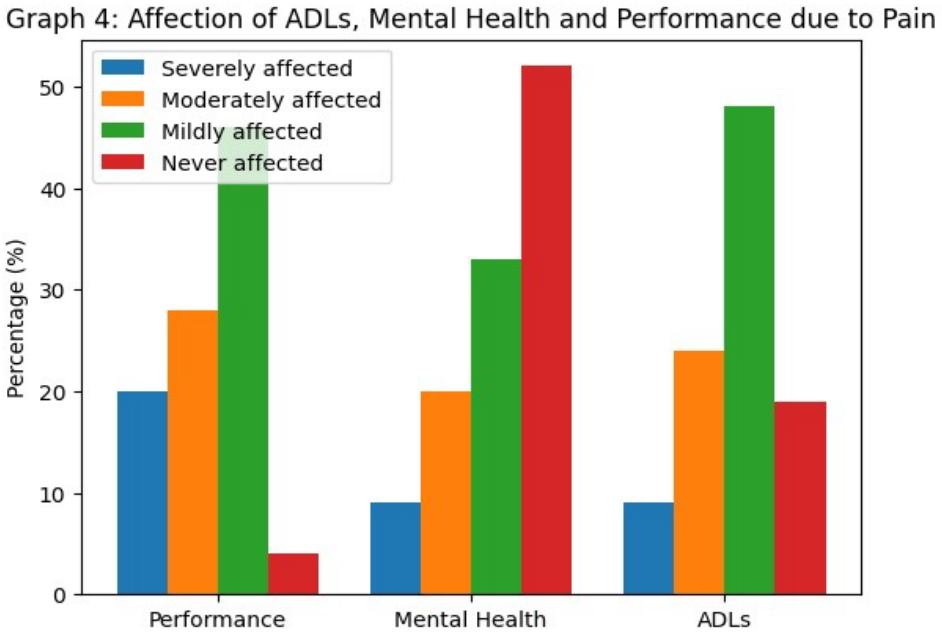


3: Aggrevating doctors for Pain
represents the aggravating factors responsible for pain in powerlifters and
weightlifters.
Overhead activity was identified as the most common aggravating factor, reported by 34% of the participants.
Pain during lifting with a neutral spine position was reported by 18% of lifters, while 15% experienced pain when holding weight for a prolonged duration.
Knee flexion was reported as a contributing factor in 14% of participants.
Other less common aggravating factors included hand gripping activities (9%), maintaining the cervical spine in a neutral position (5%), ankle dorsiflexion (3%), and hip flexion (2%).
These findings indicate that repetitive lifting techniques and sustained loading positions commonly contribute to musculoskeletal pain in weightlifters and powerlifters.

Graph 3: Aggravating Factors for Pain



4 is Effect of pain on prformance, ADLs and mental health
shows how pain affects Activities of Daily Living (ADLs), mental health, and
performance among the lifters.
The data are categorized based on severity levels, which include never affected, mildly affected, moderately affected, and severely affected.
Regarding the effect of pain on performance, 4% of participants reported that they were never affected, 46% were mildly affected, 28% were moderately affected, and 20% were severely affected.
In terms of mental health, the majority of participants (52%) reported that their mental health was never affected by pain. Additionally, 33% were mildly affected, 20% were moderately affected, and 9% were severely affected.



Graph 5: Practicing techniques for how much duration

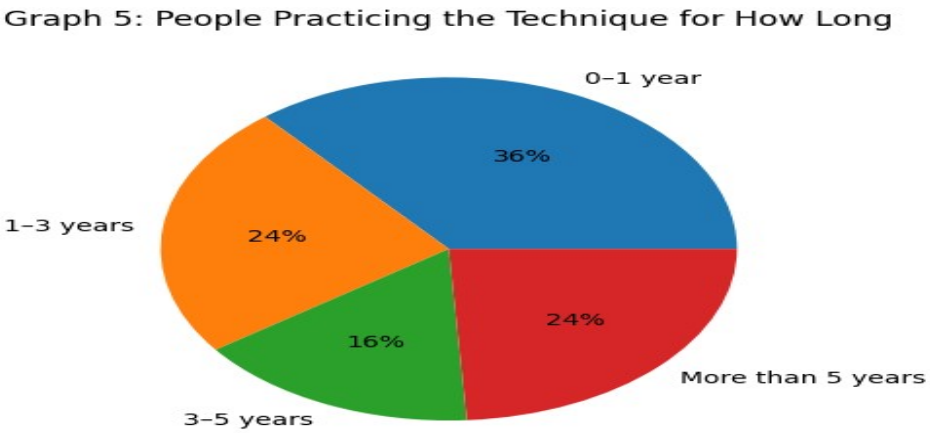
This graph represents the duration for which participants have been practicing weightlifting or powerlifting techniques.

The majority of participants (36%) have been practicing for 0–1 year.

Approximately 24% of participants have been practicing for 1–3 years, while another 24% have been practicing for more than 5 years.

A smaller proportion of participants (16%) reported practicing for 3–5 years.

These findings indicate that most lifters included in the study are relatively new to the sport, with a large proportion practicing for less than one year.



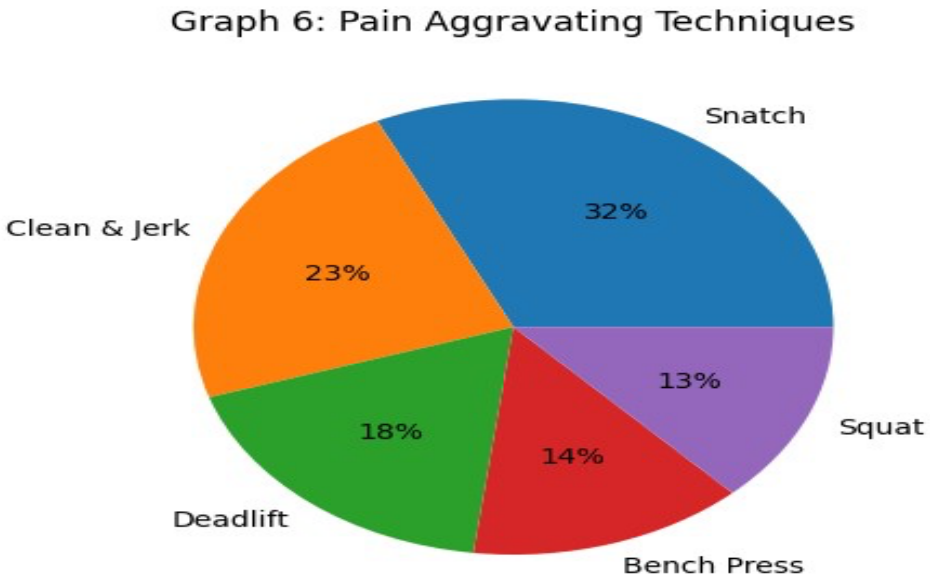
Graph 6: Pain Aggrevating Techniques

This graph represents the lifting techniques that aggravate pain among powerlifters and weightlifters.

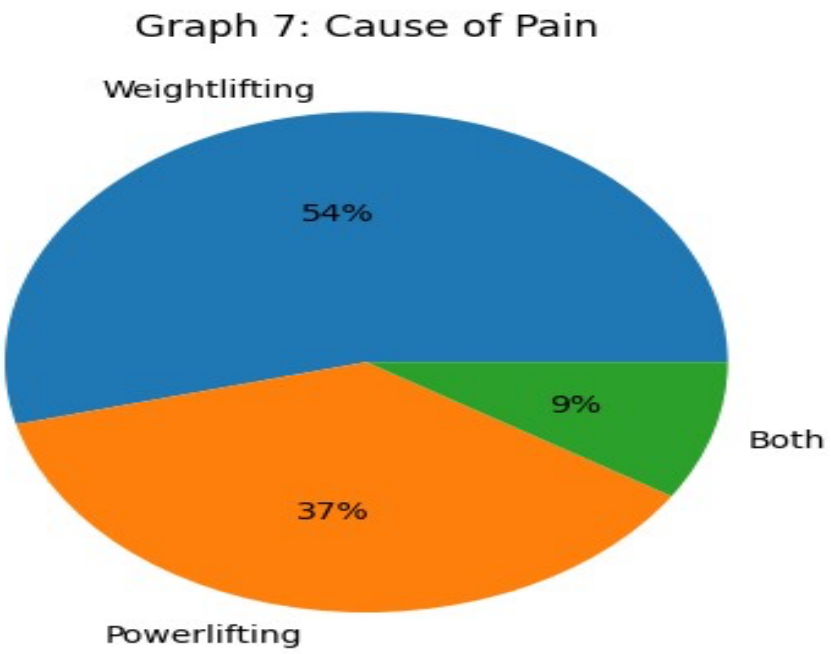
In powerlifters, the techniques most commonly associated with pain were the deadlift (18%), bench press (14%), and squats (13%).

In weightlifters, the most common pain-aggravating techniques were the snatch (32%) and clean and jerk (23%).

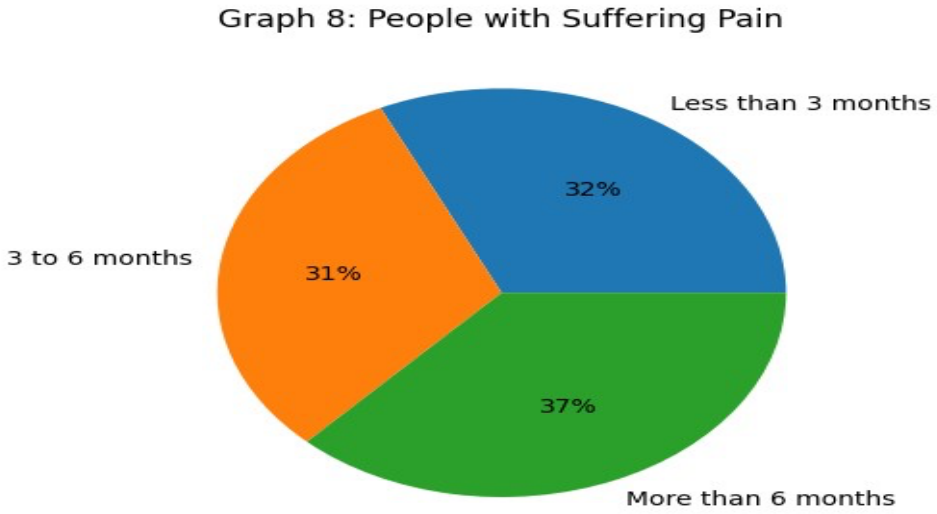
These findings suggest that high-load and technically demanding lifts contribute significantly to musculoskeletal pain among lifters.



Graph 7 Represents duration of the Practice
This graph shows the percentage of people practicing weightlifting and powerlifting for different durations.
The majority of participants (36%) have been practicing for 0–1 year.
About 24% of participants have been practicing for 1–3 years, and another 24% have been practicing for more than 5 years.
A smaller proportion of lifters (16%) have been practicing for 3–5 years.



Graph 8 Represents pain aggrevating techniques
In powerlifters and weightlifters, repetitive and overuse activities often lead to pain.
Among powerlifters, the pain-aggravating techniques include deadlift (18%), bench press (14%), and squats (13%).
Among weightlifters, the pain-aggravating techniques include snatch (32%) and clean and jerk (23%).



Graph 9: Pain Relieving Factors

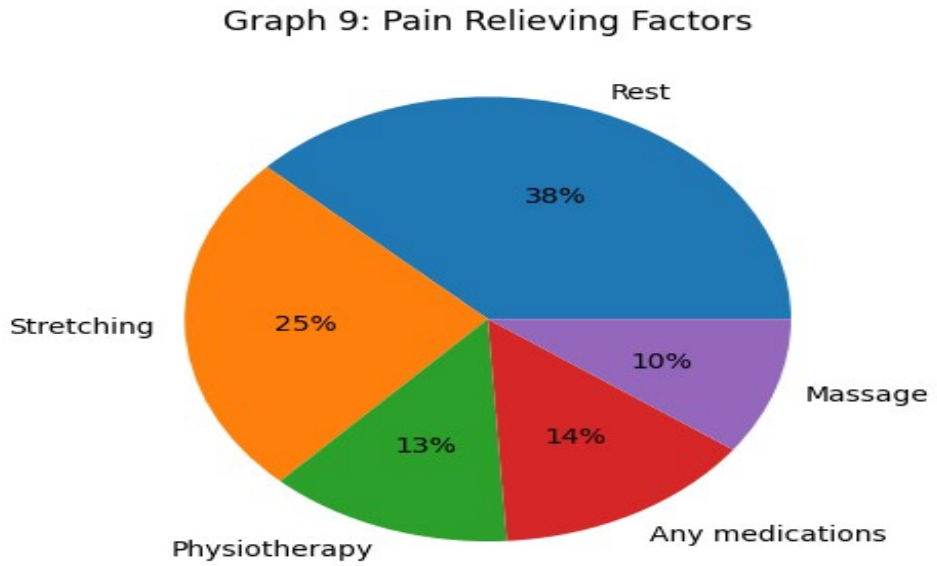
As powerlifting and weightlifting involve repetitive and strenuous activities, athletes often experience musculoskeletal pain due to overuse.

The following relieving factors were commonly reported by the lifters.

The most common relieving factor was rest, reported by 38% of participants, followed by stretching reported by 25% of the lifters.

Other less common relieving factors included medications reported by 14% of participants and physiotherapy reported by 13%.

Massage was reported by 10% of participants as a method for relieving pain.



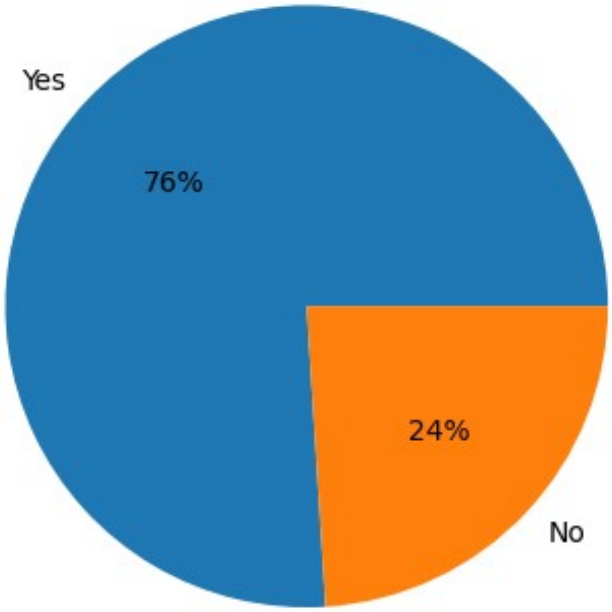
Graph 10: **Comments on Physiotherapy treating the injuries**

As physiotherapists play an important role in treating overuse injuries due to repetitive and strenuous activities, their contribution is significant in injury management.

76% of the participants felt that physiotherapy can help in treating injuries.

According to 24% of participants, physiotherapy cannot help in treating the injury.

Graph 10: Comments on Physiotherapy Treating Injury



REVIEW OF LITERATURE

Weightlifters and powerlifters' injuries are caused due to poor conditioning or technique, inadequate strength or endurance, and insufficient warm-up or stretching. Participation rates in powerlifting are generally rising among both men and women across all ages, levels of training, or competition. Powerlifting is a sport consisting of the squat, the bench press, and the deadlift exercises. The squat is one of the most frequently used resistance exercises for strength development in athletes.

The squat is a complex movement that requires coordinated actions of all major joints of the lower extremities. To perform the squat, there should be a decrease in the anterior displacement of the knee. Maintaining a near-vertical shin position during the squat reduces internal forces at the knee and emphasizes recruitment of the hip extensor muscles. The main muscles contributing during performance of the squat are the back and hip extensors, hip adductors, hip abductors, knee extensors, and ankle plantar flexors. Excessive shear forces can be injurious to the cruciate ligaments, while excessive compressive forces can be detrimental to the meniscus and articular cartilage.

The deadlift is an excellent total body exercise. Compared to the squat, the lower back muscles are involved to a greater extent. In the starting position, the lifter stands upright with knees and hips fully extended and shoulders pulled back. During the sumo deadlift, the muscles activated include the ankle dorsiflexors, knee extensors, and hip extensors, whereas in the conventional deadlift the muscles activated include the ankle plantar flexors, knee flexors and extensors, and hip extensors.

Strength and power athletes commonly perform the bench press to develop strength and size in the chest, shoulder, and triceps muscles. The bench press starts in a excessively heavy loads, a large range of motion during exercises, insufficient resting time between training sessions, and faulty lifting techniques can contribute to injuries.

Weightlifting exercises such as the snatch and clean and jerk are high-force, high-velocity movements that are routinely used in the training of athletes to increase strength and power. Weightlifting movements involve triple extension of the hip, knee, and ankle with high velocity and high force loads. These weightlifting variations are often used in strength and conditioning programs.

The snatch is executed by lifting a barbell from the floor to arm's length overhead in one continuous motion. The pulling motion used to lift the barbell from the floor and accelerate it upward is very similar in both the clean and jerk and the snatch. The main difference is that during the snatch a wider hand grip spacing is used, causing the athlete's hips to be lowered.

At the start or lift-off phase, the arms and back remain straight while considerable flexion and extension occur at the hip and knee joints. During the initial movement or first pull, the barbell is lifted from the floor to knee

height by hip and knee extension with slight plantar flexion while the back and arms remain straight.
A very high level of isometric tension is required in the spinal extensors during the first pull to maintain a straight posture in the inclined forward position.
The back (primarily the lower back), knees, and shoulders account for most injuries (64.8%), and the most prevalent types of injuries reported are strains and tendinitis (68.9%).
Good coaching and proper techniques are likely to minimize the number of musculoskeletal problems. The purpose of this study was to assess the common musculoskeletal injuries in powerlifters and weightlifters.

Edt. Strömbäck, Ulrica Aasa, "Prevalence and Consequences of Injury in Powerlifting"
70% of participants were currently injured and 87% had experienced injuries in the past 12 months. Injuries differed in men and women according to location. In both sexes, injuries commonly occurred in the lumbopelvic region, shoulder, and hip, while neck injuries in women and thoracic injuries in men were seen more frequently. This study describes the prevalence and localization of injuries among weightlifters of different sexes.

Svartholm I., Andersson F., "Injuries among Weightlifters and Powerlifters"
The risk of injuries is low in non-contact sports compared to contact sports. The most common locations of injuries in both sports are the spine, shoulder, and knee.

Kengo Shimozaki, "Incidence Rates and Characteristics of Abnormal Lumbar Findings and Low Back Pain in Child and Adolescent Weightlifters"
Abnormal lumbar findings were observed in 11 out of the 12 participants (91.7%), while 1 participant (8.3%) had no abnormal findings on MRI. Among those with abnormal lumbar findings, lumbar spondylolysis was found in 4 participants at the L3 vertebral level, lumbar disc protrusion in 2 participants at the L4/L5 vertebral level, and lumbar disc degeneration in 9 participants, which were nearly irreversible.

Gregory D. Myer, "The Back Squat: A Proposed Assessment of Functional Defects and Technical Factors that Limit the Performance"
By teaching and correcting the technique of basic functional movements, optimal gains in performance can be achieved and the risk of injury.
Kayvon Golshani, "Upper extremity weightlifting injuries: diagnosis and management"
Pectoralis major ruptures is most common injury during bench press due to forced abduction of the upper arm. Shoulder pain and capsulolabral injuries are due to chronic repetitive loading on the shoulder due to repetitive overhead weight training.

Discussion
The present study aimed to investigate the prevalence and characteristics of musculoskeletal problems among powerlifters and weightlifters aged 18–50 years. A total of 70 participants were included, of which 54 (77%) reported experiencing pain related to training, while 16 (23%) reported no injury. This high prevalence of pain highlights the physically demanding nature of strength sports and aligns with previous literature indicating a substantial burden of musculoskeletal injuries among resistance-trained athletes.

Pain at Rest and During Activity
The findings of this study demonstrated that pain was more prevalent during activity than at rest. Specifically, 44% of participants reported moderate pain intensity (NRS 4–6) during activity, whereas 42% reported no pain at rest. This suggests that pain in strength athletes is predominantly activity-induced rather than persistent at rest.
High spinal loads during lifting contribute to pain primarily during movement rather than in resting conditions. The intermittent nature of pain observed in this study may reflect mechanical overload rather than chronic pathological conditions. [12], [13]

Site of Pain
The most commonly reported sites of pain were the shoulder (29%) and lower back (27%). These findings are in agreement with existing literature, which consistently identifies the shoulder and lumbar spine as the most vulnerable regions in weightlifting and powerlifting.
It is reported a high incidence of shoulder injuries, particularly anterior instability, among weightlifters. The prevalence of lower back pain in strength athletes due to repetitive loading and improper biomechanics. [14],[15]
The involvement of other regions such as the knee, wrist, ankle, cervical spine, and hip, although less frequent, indicates that musculoskeletal stress in these sports is multi-regional and influenced by technique and training load.

Aggravating Factors for Pain
The study identified overhead activities (34%), heavy lifting with a neutral spine (18%), and prolonged holding of weight (15%) as the primary aggravating factors. These findings emphasize the biomechanical demands placed on the shoulder and lumbar spine during lifting.
The variations in lifting technique, particularly squat depth and load, significantly influence spinal and joint stress. Additionally, it is reported increased lumbar spine loading during heavy
lifts, contributing to injury risk.[12],[13]
Other contributing factors such as cervical positioning, ankle dorsiflexion, gripping activities, and knee flexion highlight the importance of kinetic chain involvement and technical precision in preventing injuries.

Effect on ADLs, Mental Health, and Performance

The results indicated that pain had a mild impact on Activities of Daily Living (ADLs) in 46% of participants and on performance in 48%. Interestingly, 52% of participants reported no significant effect on mental health.

These findings suggest that while musculoskeletal pain is common, it does not necessarily lead to severe functional or psychological impairment in most athletes. This may be attributed to adaptation, higher pain tolerance, and psychological resilience commonly observed in trained athletes.

However, previous studies, emphasize that even mild or recurrent pain can predispose athletes to long-term injury if not addressed appropriately. Therefore, early intervention remains crucial.[16]

Duration of Practice

The majority of participants (36%) had been practicing for 0–1 year, followed by 24% in both the 1–3 years and more than 5 years categories, and 16% in the 3–5 years category. The higher proportion of relatively novice lifters suggests that lack of experience and improper technique may contribute significantly to injury occurrence.

This is supported by literature indicating that beginners are at greater risk of injury due to inadequate neuromuscular control and improper lifting techniques. It is also highlighted that improper loading and poor technique are major risk factors for musculoskeletal disorders.[17]

Overall, this study demonstrates that musculoskeletal pain is highly prevalent among powerlifters and weightlifters, particularly affecting the shoulder and lower back. Pain is predominantly activity-related and influenced by training techniques and loading patterns. Although most athletes experience only mild functional limitations, the potential for long-term injury underscores the need for early intervention and preventive strategies.

CONCLUSION

According to the study, the shoulder and lower back are the most common sites of pain involved. Factors aggravating pain include overhead activities, while back pain is associated with maintaining a neutral spine during heavy lifting and holding weight in a fixed position.

In the majority of lifters, there is mild affection of performance and activities of daily living (ADLs). Pain affects mental health in some individuals; however, in most participants, mental health is not significantly affected by pain.

Most lifters who have been practicing for 0–1 year reported experiencing pain, indicating that the risk of injury is common in both sports. Since both powerlifting and weightlifting involve repetitive techniques, the likelihood of musculoskeletal pain and injury increases.

Clinical Implications

The findings of this study reinforce the importance of proper technique, structured training programs, and adequate recovery in preventing musculoskeletal injuries. Physiotherapists play a critical role in:

Identifying biomechanical faults

Designing individualized rehabilitation programs

Educating athletes on injury prevention strategies

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APPENDIX – QUESTIONNAIRE

Common Musculoskeletal Problems in Powerlifters and Weightlifters

Name: _____

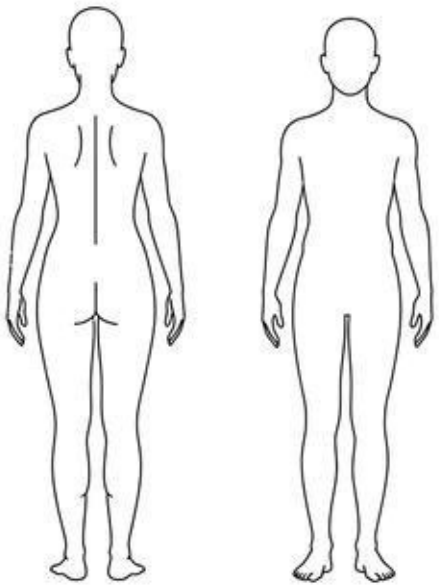
Age: _____

Sex: _____ Dominant hand: _____ 1) Do you have any pain?

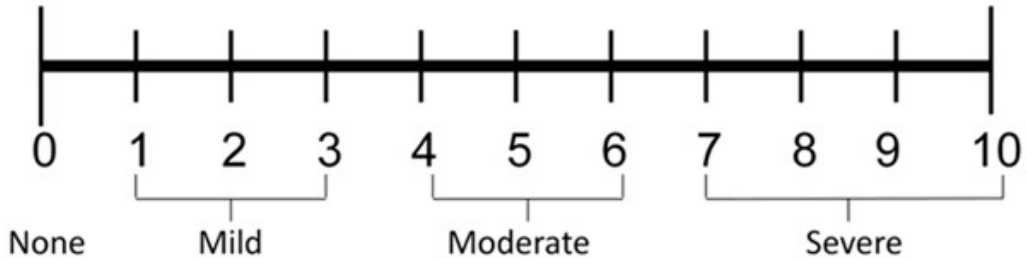
☐ Yes

☐ No

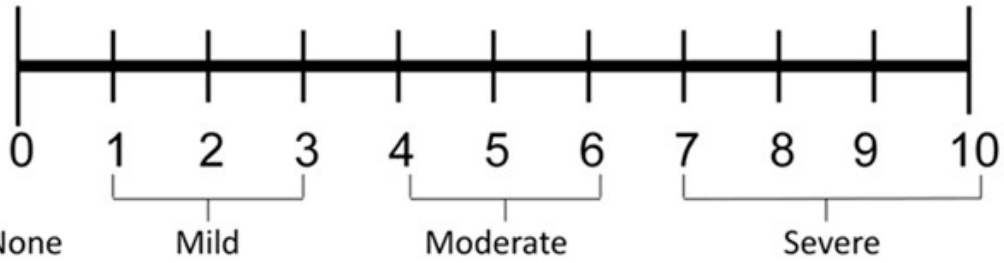
2) On the diagram shade in the area where you feel pain. Put an X on the area where it hurts most.



3) With respect to site marked do you have pain at rest?



4) With respect to site marked do you have pain oon activity?



5)
6) Since how many years you are practicing powerlifting or weightlifting?
○ 0–1 year
○ 2–3 years
○ 4–5 years
○ More than 5 years
6) Was there any injury during any of the training technique?
○ Powerlifting
○ Weightlifting
7) What is the time period you are suffering from pain?
○ Less than 3 months
○ 3–6 months
○ More than 6 months
8) Does this pain affect activities of daily living?
○ Never affected
○ Mild affected
○ Moderate affected
○ Severe affected
9) Does this pain affect your mental health?
○ Never
○ Occasionally
○ Sometimes
○ Often
10) Does this pain affect your performance?
○ Never
○ Occasionally
○ Sometimes
○ Often
11) While performing weightlifting or powerlifting, do any of the following activities aggravate pain?
Upper Body Activities:
○ Shoulder
○ Overhead activity
○ Wrist
○ Hand gripping activity
Spine Movements:
○ Spine
○ Forward bending
○ Backward bending
○ Twisting activity
Lower Limb Movements:
○ Hip – Flexion
○ Knee – Flexion
○ Knee – Extension
○ Ankle – Dorsiflexion
12) Do any of the following techniques aggravate pain?
☐ Weightlifting
☐ Clean and jerk
☐ Snatch
☐ Powerlifting
☐ Bench press
☐ Deadlift

☐ Squats

13) Which of the following is a relieving factor?

☐ Stretching

☐ Massage

☐ Any medications

☐ Rest

☐ Physiotherapy

14) Do you think that a physiotherapist can treat the injury?

☐ Yes

☐ No