Prevalence of Bicep Tendinitis in heavy lifting workers at construction site in Kolhapur region

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***Abstract*—Background Bicep tendinitis, also known as biceps tendinopathy or biceps tendinosis, is a common musculoskeletal disorder characterized by inflammation or degeneration of the bicep's tendon. It is often associated with repetitive overhead activities, heavy lifting, and tasks that require forceful use of the arms. Among occupational populations, heavy lifting workers at construction sites are particularly susceptible to this condition due to the nature of their work.**

Methods

Heavy lifting workers who lift bricks more than 5 kgs underwent numeric pain rating scale (NPRS) evaluation, Function independence measure (FIM), yergasons test and Quick DASH Scale Data on age, work experience, and lifting weight were recorded. Participants with any recent shoulder surgery and recent shoulder fracture were excluded.

Result

In a study involving 97 heavy lifting workers who lift bricks more than 5 kgs, 8.25% (8 participants) exhibited positive bicep tendinitis, while 91.75% (89 participants) had normal scores on the FIMS Scale,Quick DASH Score, NPRS Scale and Negative yergasons test. Participants with bicep tendinitis. Most participants (89) were aged between 30-40 years, with a mean age of 22.63 (±3.36) years. Interestingly, a higher prevalence of Bicep Tendinitis was observed in participants have work experience of more than 5 years. Paticipants shown positive bicep tendinitis have mean of 6.50±(1.60=2.15E-24) in NPRS Scale, 16.2593.45=7.55E-68) In Quick DASH Score, and 122.63(2.88=4.78E-16) In FIMS Score.

Conclusion

This study underscores the susceptibility of Bicep tendinitis Heavy lifting workers who has repetative overhead activities, indicating a heightened risk of tendon rupture. Shoulder pain, with or without Bicep tendinitis, adversely affects individuals' quality of life and work performance. It stresses the necessity for spine surgeons, physiotherapists, and physical trainers to promote awareness regarding biomechanical principles, proper weightlifting techniques, and execution to prevent future physical injuries.

Write abstract/summary of your article here.

***Index Terms*—Heavy weight lifting, FIMS, Bicep Tendinitis, Pain, musculoskeletal Disorder**

I. INTRODUCTION

Bicep tendinitis, a prevalent musculoskeletal disorder, is characterized by inflammation or degeneration of the biceps tendon. This condition is often linked to repetitive overhead activities, heavy lifting, and tasks requiring forceful arm movements. Construction workers, particularly those engaged in heavy lifting, are susceptible to bicep tendinitis due to the nature of their work.

The biceps tendon, a strong fibrous band, connects the biceps muscle to the shoulder and elbow joints. Comprising two main parts – the long head and short head – this tendon facilitates movement and stability in the shoulder and elbow. The long head originates from the scapula's supraglenoid tubercle, while the short head originates from the coracoid process. These two heads merge to form the biceps muscle belly, inserting into the forearm's radial tuberosity.

In construction workers, repetitive overhead movements, heavy lifting, and forceful arm use can cause microtrauma, inflammation, and degeneration of the biceps tendon. Poor lifting techniques, awkward postures, and inadequate ergonomics exacerbate this risk. Factors contributing to bicep tendinitis in construction workers include:

- Repetitive overhead activities, such as frequent lifting, reaching, and carrying heavy objects
- Heavy lifting, which places significant stress on the biceps tendon

- Awkward postures, such as reaching overhead or working with extended arms
- Inadequate workstation design, improper tool selection, and lack of ergonomic controls

Understanding the anatomy of the biceps tendon is crucial in grasping the pathophysiology of bicep tendinitis. Excessive stress, repetitive movements, and poor ergonomic practices predispose construction workers to bicep tendinitis, highlighting the importance of preventive measures and ergonomic interventions.

Bicep tendinitis involves inflammation, degeneration, and microtears within the biceps tendon. The condition's pathophysiology encompasses a complex interplay of mechanical, structural, and biological factors, including:

- Mechanical stress: Repetitive overhead activities and heavy lifting cause microtrauma and tissue damage
- Structural factors: Poor posture, inadequate ergonomics, and pre-existing musculoskeletal conditions contribute to bicep tendinitis
- Biological factors: Inflammation, degeneration, and microtears within the biceps tendon perpetuate the condition

Structural Changes and Inflammatory Response in Bicep Tendinitis

Chronic overuse and repetitive stress can lead to structural changes within the tendon, including collagen degeneration, fiber disorganization, and neovascularization. Conversely, tissue injury triggers an inflammatory response, characterized by the release of pro-inflammatory cytokines, chemokines, and growth factors. This inflammatory cascade contributes to pain, swelling, and impaired tendon healing.

Tendon Healing Process

The healing process of the tendon involves a series of overlapping phases, including inflammation, proliferation, and remodeling. However, in chronic cases of bicep tendinitis, the balance between tissue repair and tissue degeneration may be disrupted, leading to persistent symptoms and impaired function.

Risk Factors for Bicep Tendinitis

Several intrinsic and extrinsic factors increase the susceptibility of heavy lifting workers to bicep tendinitis:

- Age: Older individuals are more prone to bicep tendinitis due to age-related changes in tendon structure and decreased tendon elasticity.
- Gender: Males are at a higher risk of bicep tendinitis compared to females, possibly due to differences in muscle mass, strength, and biomechanics.
- Biomechanical factors: Poor lifting techniques, improper body mechanics, and repetitive motions can contribute to bicep tendinitis.
- Occupational hazards: Construction workers are exposed to heavy lifting, awkward postures, vibration, and mechanical trauma, all of which can predispose them to bicep tendinitis.
- Pre-existing medical conditions: Obesity, diabetes, and metabolic disorders can impair tendon healing and increase the risk of bicep tendinitis.

The Impact of Musculoskeletal Injuries on Construction Workers

The construction industry is a vital component of modern society, but it poses significant challenges to the health and safety of its workers. Musculoskeletal injuries (MSIs), including bicep tendinitis, are a prevalent and debilitating issue in the construction industry.

Addressing the Challenge of MSIs in Construction Work

Addressing the issue of MSIs in construction work requires a comprehensive understanding of the risk factors involved, as well as proactive measures aimed at prevention and intervention. By exploring the epidemiology, etiology, and impact of MSIs in the construction sector, we can shed light on the complexities of this issue and propose strategies for mitigating its adverse effects.

Biceps tendinitis is a significant occupational health concern for construction workers. Understanding the causes, effects, and prevention strategies for this condition is essential for promoting the health, safety, and productivity of workers in the construction industry.

The Prevalence of Biceps Tendinitis in Construction Workers

Construction workers are disproportionately affected by biceps tendinitis due to the physically demanding nature of their job. The repetitive strain of lifting heavy materials, operating power tools, and performing overhead motions places excessive stress on the upper extremities, including the biceps tendon.

Understanding the Anatomy and Mechanisms of Biceps Tendinitis

A comprehensive understanding of the biceps tendon's anatomy and biomechanics is essential. The tendon

originates from the shoulder joint and attaches to the radius bone in the forearm, facilitating arm movement and stability. Construction work-related activities, such as overhead reaching and forceful lifting, can strain the biceps tendon, leading to microtrauma and inflammation.

Impact on Work Performance and Quality of Life

The repercussions of biceps tendinitis extend beyond physical discomfort, affecting both work performance and overall quality of life. Pain and limited range of motion in the affected shoulder can hinder task completion, compromise job site safety, and contribute to absenteeism and decreased productivity.

Identifying Risk Factors and Contributing Factors

Several factors contribute to the development of biceps tendinitis in construction workers, including repetitive movements, poor ergonomic practices, improper lifting techniques, and inadequate rest periods. Additionally, age, pre-existing musculoskeletal conditions, and genetic predisposition can exacerbate the likelihood of developing biceps tendinitis.

Biceps tendinitis poses a significant occupational health challenge for construction workers, with far-reaching implications for individual well-being and industry productivity. By understanding the underlying mechanisms, risk factors, and consequences of this condition, stakeholders can implement targeted interventions to prevent and mitigate the impact of biceps tendinitis on worker health and safety.

Through collaborative efforts encompassing ergonomic design, job rotation, training initiatives, and early intervention programs, we can strive towards creating safer and healthier work environments that promote the long-term sustainability of the construction workforce. This comprehensive approach will facilitate the development of effective prevention and management strategies for biceps tendinitis in construction workers.

II. MATERIALS & METHODS

Study design: Observational Study
Sample size: 97
Study Population: 30-45 years
Source of data: Construction sites in Kolhapur region
Study Duration: 6 Months

Selection Criteria

Inclusion criteria:

1. Age (30-45)
2. Gender-Male
3. Work experience of 3 or more than 3 years
4. Heavy lifting workers who lift bricks more than 5 kgs

Exclusion criteria:

1. Recent history of fracture at shoulder joint
2. Any recent shoulder surgery

III. PROCEDURE

This study was an observational study with selection of weight lifters who lift bricks more than 5kgs, Inclusion and exclusion criteria were considered.

The study protocol was presented for approval in front of institutional ethical committee and protocol committee of D. Y. Patil Education Society, deemed to be university Kolhapur and D.Y. Patil College of Physiotherapy, Kolhapur and Ethical approval was granted by the committee. Written consent is taken from Subjects willing to participate.

Incidence of Bicep tendonitis is a prevalent study which is performed in heavy lifting workers in and around construction sites in Kolhapur city.

The observational study titled " Prevalence Bicep tendinitis in heavy lifting workers at construction site in Kolhapur region" was conducted in the Kolhapur region. Potential subjects were approached and provided with an explanation of the study's purpose. Written consent was obtained from those willing to participate.

Participants for the study were recruited from several construction sites across the Kolhapur region. They underwent assessments using FIMS Scale, Yergasons test, Quick DASH Scale and numeric pain rating scale. The study focused workers who lift bricks more than 5kgs, including only male individuals aged between 30 and 45 years, who had been actively engaged in weightlifting for a minimum of 3 years. These participants reported experiencing Shoulder pain that began after their initiation of weightlifting activities. Eligible subjects meeting these criteria were invited to participate in the study.

The study excluded weightlifters who had recently shoulder surgery or recent fracture, this exclusion criteria aimed to focus specifically on recreational weightlifters without prior significant Shoulder-related conditions.

The nature of the study was explained to interested subjects, and written consent was obtained from all participants. Demographic data including name, age, and gender were collected using a standardized data collection sheet.

The Numeric Pain Rating Scale (NPRS) , Quick DASH scale, Yergasons test and Functional Independence measure (FIMS) scores were recorded on a data collection sheet for all 97 participants. Subsequently, a master chart was prepared, containing participant numbers past medical history, past surgical history, age, NPRS Score, Quick DASH score, Fims Scale, Yergasons test result.

The statistical analysis utilized appropriate biostatistical tools and was conducted using the master chart data. This analysis aimed to calculate the prevalence of Bicep tendinitis in heavy lifting workers at construction site in Kolhapur region.

The results were presented graphically for clarity. The study also calculated the average no. of participants affected by bicep tendinitis.

Statistical Analysis

Descriptive statistics such as mean , SD and the percentage was used to present the data .Mean and standard deviation is calculated for the variables of demographic profile and outcome measures; NPRS Quick DASH , FIMS Scale.

They are presented through Pie chart as well as through table.

In our study we have calculated prevalence pf bicep tendinitis in heavy lifting workers at construction site Kolhapur region

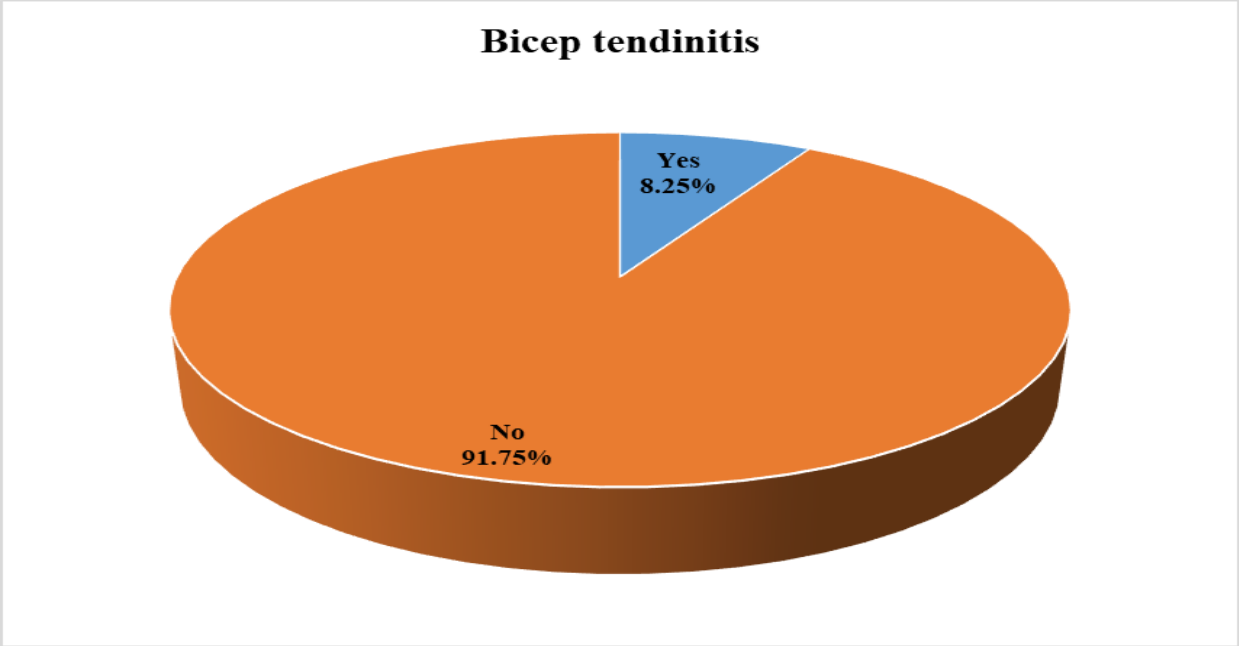
The age, Pain intensity and years of weight lifting practice were calculated through MS Excel 2016

IV. RESULT

Bicep tendinitis, a condition characterized by inflammation or irritation of the bicep tendon, was examined within a cohort of 97 participants. Among these individuals, 8 reported experiencing symptoms indicative of bicep tendinitis, representing 8.25% of the total sample size. This minority prevalence suggests that while bicep tendinitis is present within the studied population, it is not a widespread affliction. Further analysis reveals that the vast majority of participants, comprising 89 individuals or 91.75% of the sample, did not report any symptoms associated with bicep tendinitis. This finding underscores the relative rarity of the condition within this specific group. It prompts consideration of factors such as age, activity level, and medical history that may influence susceptibility to bicep tendinitis, as well as potential preventive measures to mitigate its occurrence.

Understanding the prevalence of bicep tendinitis within this cohort provides valuable insight for healthcare practitioners and researchers alike. By identifying the proportion of individuals affected by the condition, professionals can better allocate resources for diagnosis, treatment, and prevention strategies. Additionally, it highlights the importance of continued research to elucidate the underlying causes and risk factors associated with bicep tendinitis, ultimately aiding in the development of targeted interventions to improve patient outcomes and quality of life.

Bicep tendinitis	No. of participants	Percentage
Yes	8	8.25%
No	89	91.75%
Total	**97**	**100.00%**



Numerical Pain Rating Scale: An observational was done through random sampling from 97 heavy lifting workers between the age of 30 to 45 years from in and around Kolhapur from October 2023 to
April 2024.
Numeric pain rating scale containing score was used to asses the intensity of pain and
severity of pain while performing Activities of daily living was used with the confidentiality and
privacy ensured to be maintained with the written consent taken from them.
Ethical approval for the study was obtained from D.Y. Patil educational society and research institute
Kasaba bavada, Kolhapur. Demographic details like age group, work exp, past medical and surgical history was obtained from the participants.
The table provides data on various variables comparing individuals with and without bicep tendinitis. Each variable is presented with its mean and standard deviation (SD) for both groups, along with the associated p-value indicating the significance of the differences observed.

1. NPRS Score: Individuals with bicep tendinitis exhibited a significantly higher mean NPRS score (6.50 ± 1.60) compared to those without bicep tendinitis (1.11 ± 1.02), with a p-value of 2.15E-24. This suggests that individuals with bicep tendinitis reported significantly greater levels of pain compared to their counterparts.

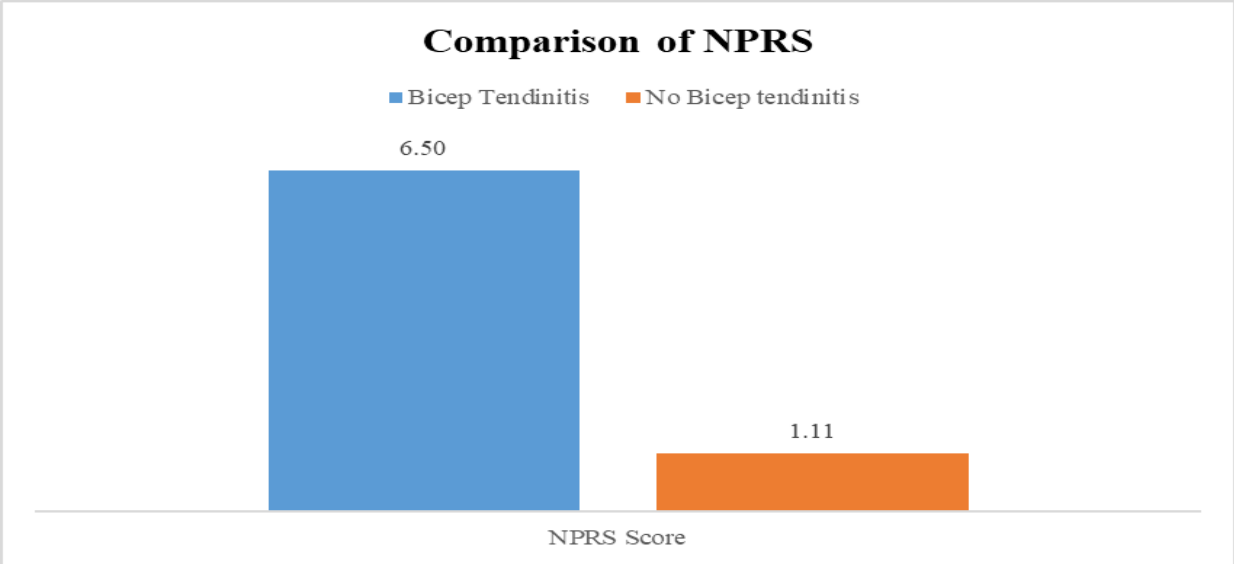
2. Quick DASH Score: The mean Quick DASH score was notably elevated among individuals with bicep tendinitis (16.25 ± 3.45) in contrast to those without the condition (0.00 ± 0.00), with a p-value of 7.55E-68. This indicates a substantial impairment in upper extremity function and disability associated with bicep tendinitis.

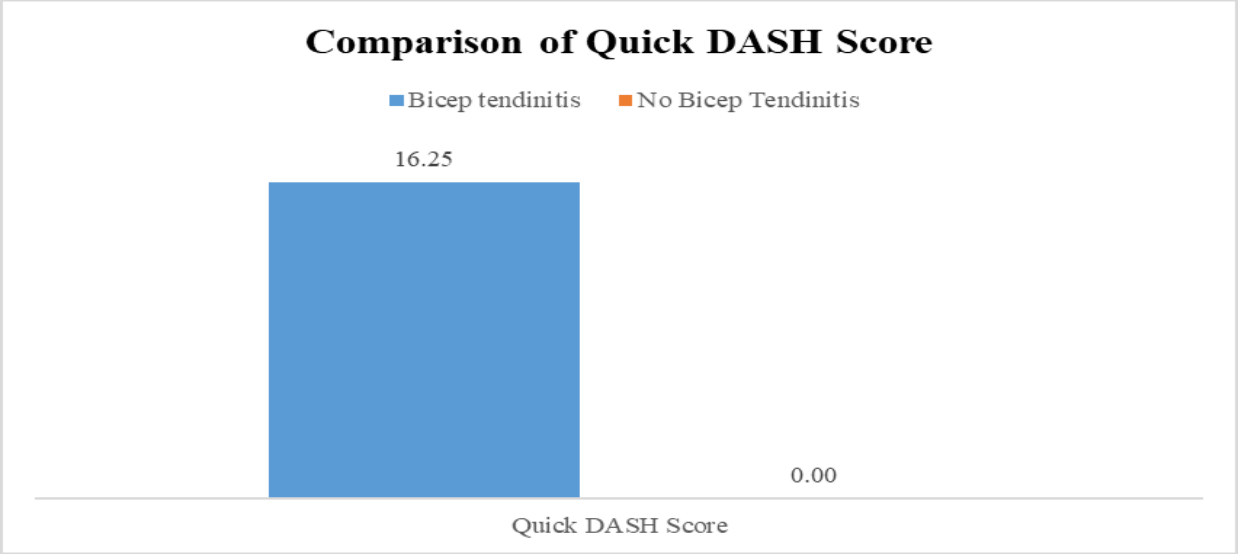
3. FIMS Score: While individuals with bicep tendinitis had a slightly lower mean FIMS score (122.63 ± 2.88) compared to those without the condition (125.94 ± 0.53), the difference was still statistically significant (p-value: 4.78E-16). This suggests that bicep tendinitis may have a modest impact on functional independence among affected individuals.

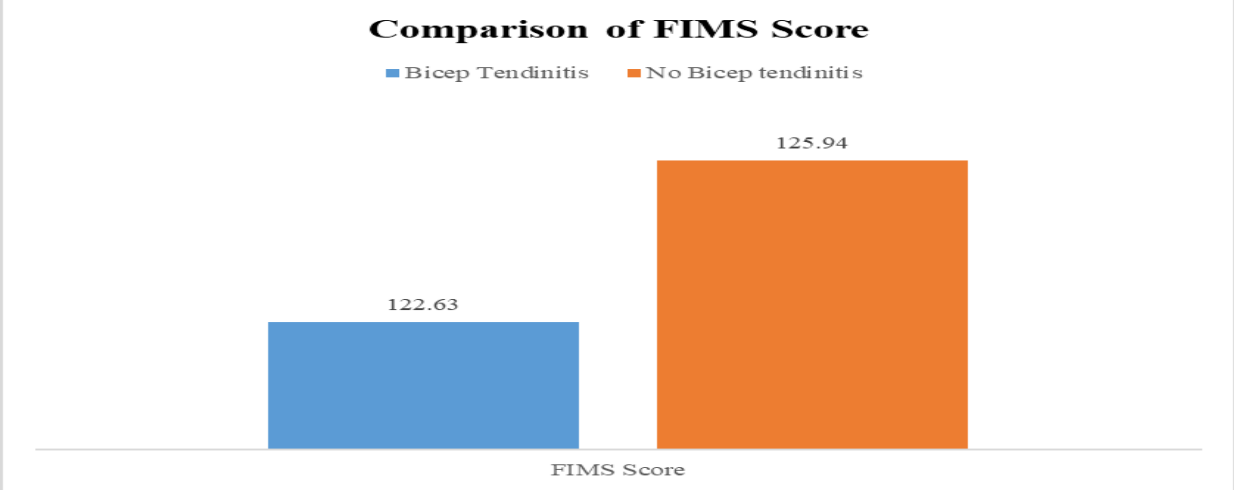
4. Work Experience (work exp.): Individuals with bicep tendinitis had a significantly higher mean work experience (8.50 ± 4.07 years) compared to those without the condition (3.96 ± 1.18 years), with a p-value of 4.31E-12. This indicates a potential association between longer work experience and the development of bicep tendinitis.

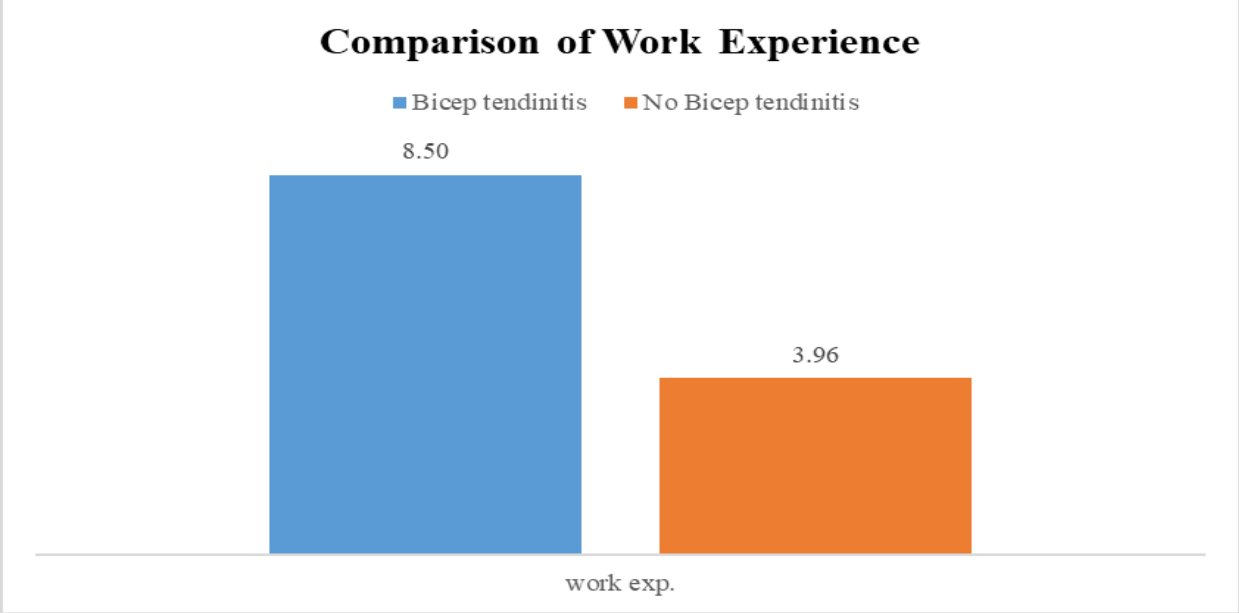
Variable	Bicep Tendinitis		No Bicep Tendinitis		P Value
	Mean	SD	Mean	SD	
NPRS Score	6.50	1.60	1.11	1.02	2.15E-24
Quick DASH Score	16.25	3.45	0.00	0.00	7.55E-68
FIMS Score	122.63	2.88	125.94	0.53	4.78E-16
work exp.	8.50	4.07	3.96	1.18	4.31E-12

P Value <0.00001




Comparison of Quick DASH Score
Bicep tendinitis
No Bicep Tendinitis
16.25
0.00
Quick DASH Score


Comparison of FIMS Score
Bicep Tendinitis
No Bicep tendinitis
125.94
122.63
FIMS Score


Comparison of Work Experience
Bicep tendinitis
No Bicep tendinitis
8.50
3.96
work exp.

V. DISCUSSION

Bicep Tendinitis in Heavy Lifting Workers: A Regional Perspective

The construction industry's physically demanding nature puts heavy lifting workers at risk of musculoskeletal injuries, including bicep tendinitis. This condition, characterized by bicep tendon inflammation, leads to pain, swelling, and limited mobility. This study aims to investigate the prevalence of bicep tendinitis among heavy lifting workers in the Kolhapur region.

Occupational Health Challenges

Bicep tendinitis is a common occupational injury among heavy lifting workers. Repetitive strain from lifting tasks, awkward postures, and prolonged exposure to strenuous activities contribute to its development. Individual factors, such as age and fitness level, may also exacerbate the risk.

Regional Prevalence and Prevention

Limited local studies exist, but data from similar populations suggest a notable incidence of bicep tendinitis. Region-specific research is necessary to better understand its prevalence in Kolhapur's construction workforce. Effective prevention and management strategies include ergonomic interventions, worker education on proper lifting techniques, and early detection through regular health assessments.

Implementing Prevention Strategies

Education plays a crucial role in preventing bicep tendinitis among brick lifting workers. Comprehensive training on proper lifting techniques, ergonomic principles, and body awareness can empower workers to minimize strain on their muscles and tendons. Regular stretching and strengthening exercises, as well as ergonomic modifications and equipment upgrades, are also essential for preventing bicep tendinitis.

Addressing the prevalence of bicep tendinitis among heavy lifting workers in Kolhapur's construction sites is crucial for safeguarding occupational health and productivity. Further research and proactive interventions are necessary to mitigate its impact and ensure a safer working environment.

VI. CONCLUSION

This study was conducted among Construction workers who lift bricks including participants aging from 30 - 45 years in and around Kolhapur region reveals, Construction workers with Shoulder pain are prone to Musculoskeletal disorder which suggests high risk of injury. Research on prevalence of bicep tendinitis in brick lifting workers inform the development of ergonomic guidelines, training programs, and workplace interventions aimed at reducing the risk of injury and promoting worker health and safety. This study also identified co-relation of bicep tendinitis according to age and years since work experience of more than 3 years. As Shoulder pain with or without Bicep tendinitis impact individual's quality of life along with their sports performance, creating awareness by surgeons, physiotherapist and physical trainers about biomechanical property, proper techniques and execution of weightlifting is necessary to prevent any physical injuries in future.

Declaration by Authors

Ethical Approval: Approved
Acknowledgement: None
Source of Funding: None
Conflict of Interest: The authors declare no conflict of interest.

REFERENCES

[1] Julitta S Boschman, Henk F van der Molen, Judith K Sluiter and Monique HW Frings-Dresen. Musculoskeletal disorders among construction workers. BMC Musculoskeletal Disorders 2012, 13:156

[2] Berndt Stenlund, lan Goldie, Mats Hagberg, Christer Hogstedt. Shoulder tendinitis and its relation to heavy manual work and exposure to vibration. Scond Work Environ Heath 1993:19:43-9

[3] . Khushboo Gulzar, Syed Ali Abdullah, Dr Farooq Islam, Asim Raza Huraira Tuqeer, Alveena Shakoor. Prevalance of biceps tendinitis among body builders. Xi an Shiyou University, Natural science 2022: 1673-064X

[4] Frank RM, Cotter EJ, Strauss EJ, Jazrawi LM, Romeo AA. Management of Biceps Tendon

Pathology: From the Glenoid to the Radial Tuberosity. J Am Acad Orthop Surg. 2018 Feb 15:26(4):e77-e89.

[5] Nho SJ, Strauss EJ, Lenart BA, Provencher MT, Mazzocca AD, Verma NN, Romeo AA.Long head of the biceps tendinopathy: diagnosis and management. JAm Acad Orthop Surg.2010 Nov; 18(11):645-56.

[6] Neer CS. Anterior acromioplasty for the chronic impingement syndrome in the shoulder: a preliminary report. J Bone Joint Surg Am. 1972 Jan;54(1):41-50.

[7] Jobe FW, Moynes DR, Tibone JE, Perry J. An EMG analysis of the shoulder in pitching. A second report. Am J Sports Med. 1984 May-Jun; 12(3):218-20.

[8] Pagnani MJ, Deng XH, Warren RF, Torzilli PA, O'Brien SJ. Role of the long head of the biceps brachii in glenohumeral stability: a biomechanical study in cadavera. J Shoulder Elbow Surg. 1996 Jul-Aug;5(4):255-62.

[9] Itoi E, Kuechle DK, Newman SR, Morrey BF, An KN. Stabilising function of the biceps in stable and unstable shoulders. J Bone Joint Surg Br. 1993 Jul; 75(4):546-50.

[10] Wilk KE, Hooks TR. The Painful Long Head of the Biceps Brachi: Nonoperative Treatment Approaches. Clin Sports Med. 2016 Jan;35(1):75-92.

[11] Borms D, Ackerman I, Smets P, Van den Berge G, Cools AM. Biceps Disorder Rehabilitation for the Athlete: A Continuum of Moderate- to High-Load Exercises. Am J Sports Med. 2017 Mar: 45(3):642-650.

[12] Eakin CL, Faber KJ, Hawkins RJ, Hovis WD. Biceps tendon disorders in athletes. JAm Acad Orthop Surg. 1999 Sep-Oct;7 (5):300-10.

[13] Griffin JW, Leroux TS, Romeo AA. Management of Proximal Biceps Pathology in Overhead Athletes: What Is the Role of Biceps Tenodesis? Am J Orthop (Belle Mead NJ).2017 Jan/Feb;46(1):E71-E78.

[14] Murthi AM, Vosburgh CL, Neviaser TJ. The incidence of pathologic changes of the long head of the biceps tendon. J Shoulder Elbow Surg. 2000 Sep-Oct;9(5):382-5.

[15] Beall DP, Williamson EE, Ly JQ, Adkins MC, Emery RL, Jones TP, Rowland CM.Association of biceps tendon tears with rotator cuff abnormalities: degree of correlation with tears of the anterior and superior portions of the rotator cuff. AJR Am J Roentgenol.2003 Mar: 180(3):633-9. [PubMed?

[16] Nuelle CW, Stokes DC, Kuroki K, Crim JR, Sherman SL. Radiologic and Histologic Evaluation of Proximal Bicep Pathology in Patients with Chronic Biceps Tendinopathy Undergoing Open Subpectoral Biceps Tenodesis. Arthroscopy. 2018 Jun;34(6): 1790-1796.

[17] Wu PT, Jou IM, Yang CC, Lin CJ, Yang CY, Su FC, Su WR. The severity of the long head biceps tendinopathy in patients with chronic rotator cuff tears: macroscopic versus microscopic results. J Shoulder Elbow Surg. 2014 Aug;23(8): 1099-106.

[18] Cook JL, Feller JA, Bonar SF, Khan KM. Abnormal tenocyte morphology is more prevalent than collagen disruption in asymptomatic athletes' patellar tendons. J Orthop Res 2004 Mar; 22(2):334-8.

[19] Linaker CH, Walker-Bone K. Shoulder disorders and occupation. Best Pract Res Clin Rheumatol. 2015 Jun;29(3):405-23.

[20] Harrison AK, Flatow EL. Subacromial impingement syndrome. J Am Acad Orthop Surg.2011 Nov; 19(11):701-8.

[21] Sambandam SN, Khanna V, Gul A, Mounasamy V. Rotator cuff tears: An evidence-based approach. World J Orthop. 2015 Dec 18;6(11):902-18.

[22] Doxey R, Thiese MS, Hegmann KT. Reliability of Common Provocative Tests for Shoulder Tendinitis. J Occup Environ Med. 2018 Dec;60(12): 1063-1066.

[23] Bakhsh W, Nicandri G. Anatomy and Physical Examination of the Shoulder. Sports Med Arthrosc Rev. 2018 Sep;26(3): e10-e22.