

Prevalence of Thoracic Outlet Syndrome in Wrestlers of Kolhapur

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Abstract— Background: Thoracic outlet syndrome (TOS) is characterized by upper limb difficulties produced by compression of the neurovascular tissues of the area of the neck over the first rib. High- performance athletes are at risk for neurovascular injuries, including TOS, because of the intense usage of upper extremities in overhead sports. Minor study has revealed NTOS in athletes including tennis, weightlifting, football, and wrestling.

Materials and Methods: 151 young adults (age 20-30 years; Male: 151) with more than 2 years of experience were included in this study. The disability for upper limb was measured using Quick DASH scale. The symptoms of TOS were assessed using clinical examination and special tests such as Elevated Stress Arm test, Adson's test and Upper limb nerve tension test. Statistical analysis was recorded and the results were obtained

Results: An observational study was done through simple random sampling from 151 male wrestlers between the age of 20 to 30 years from Kolhapur from October 2023 to February 2024. This study showed 34% (51 wrestlers) were affected by thoracic outlet syndrome. Along with this out of 51 participants with prevalence of thoracic outlet syndrome the no. of participants found to have positive Elevated Stress Arm test is 32 (63 % for n=51)

Conclusion: The present study concludes that 34% of Wrestlers (51 out of 151 players) were reported to have thoracic outlet syndrome in male wrestlers with more than 2 years of experience. Among those 32 (63%) of the wrestlers having thoracic outlet syndrome showed positive Elevated Stress Arm test.

Keywords: Thoracic outlet syndrome, Overhead athletes, Wrestlers, Quick DASH, Elevated Stress Arm test, Adson's test, ULNTT.

I. INTRODUCTION

Thoracic outlet syndrome (TOS) is characterized by upper limb difficulties produced by compression of the neurovascular tissues of the area of the neck over the first rib.¹ The thoracic outlet is a lower neck

anatomical region marked as three spaces between the clavicle and the first rib through which various essential neurovascular structures like subclavian vein and artery as well as the brachial plexus passes through.⁴ These structures pass through thoracic outlet from their central origin to the peripheral marking of the limb. The boundary of the thoracic outlet is formed anteriorly by the clavicle, posterior formed by the first thoracic rib, laterally their attachment of the pectoralis minor muscle on the coracoid process of scapula and medially it is bounded by sternum.¹⁷

The upper extremities receive their blood supply mainly through the subclavian arteries. The left subclavian artery arrives straight from the aorta, while the right subclavian artery emerges from the brachiocephalic artery. The subclavian artery travels superiorly towards the neck region, it extends laterally and move behind through the scalene triangle to the anterior scalene muscle. through the costoclavicular space it exits the thoracic outlet continuing as the axillary artery. The costoclavicular area, which includes the clavicle, first rib, and anterior and middle scalene muscles, is the most common location for arterial compression.¹⁷ The venous drainage in the upper extremities is carried out by the subclavian vein. Through the thoracic duct drainage, it absorbs the chyle. The vein moves upwards on each side into the neck alongside the subclavian artery. It then moves anterior to the anterior scalene muscle and then runs parallel to it, with the anterior scalene muscle separating the two components. It then emerges from the costoclavicular region continuing as the axillary vein. The subclavian vein is restricted by the anterior scalene muscle laterally; as well as the costoclavicular ligament medially, By the subclavius tendon from upwards and the first rib from downwards. The following course describes the compression of the subclavian vein against the subclavius tendon that's

seen among individuals with an unusually insertion of the anterior scalene muscle.¹⁷

The innervation the upper extremity is supplied by the brachial plexus which is formed from the C5 to T1 roots. When these roots leave the spinal cord through the foramen in the vertebrae they branch to form the trunk of plexus. They pass through the scalene triangle in the neck, with the subclavian artery in the back, middle scalene muscle in front. As it leaves through the costoclavicular space with the subclavian artery, it divides the trunks into anterior and posterior division. In the axilla region there is further formation of divisions to cords. This peripheral extension of the brachial plexus divides the scalene muscle into middle and anterior part. Due to this there is a significant relationship between the anterior scalene muscle and the brachial plexus.¹⁷

The action of the scalene muscle is to elevate the upper portion of the thoracic cage. The scalene muscle is further divided into parts, which is anterior, posterior and middle scalene muscle. These muscles extend from the cervical vertebrae to the first and second ribs. there is separation of the subclavian vein from the artery through anterior scalene. The middle scalene muscle is situated behind the brachial plexus, which is located laterally and posteriorly to the subclavian artery. There is no such role of the posterior part of the scalene, as it lies even behind the middle scalene muscle. There is interdigitation of these anterior and middle part of the scalene muscle through the brachial plexus in individuals having TOS. Henceforth, this creates a trap for the subclavian artery and the brachial plexus. the further division of the scalene muscle may result in formation of "scalene minimus" and when these muscles travel between the brachial plexus and the subclavian muscle, it may cause irritation the lower most trunk of the brachial plexus.¹⁷

This anatomical location has three possible compression points for the neurovascular bundle: The interscalene triangle - where there is compression of the brachial plexus or subclavian artery and it is formed by the anterior scalene muscle, the first rib at the bottom, and the middle scalene muscle. The costoclavicular area- where subclavian vessels and brachial plexus are located, which is bordered by the first rib on the posterior side and the subclavian

muscle and inferior portion of the clavicle on the anterior.⁶ It is found to be most common site for arterial compression.¹⁸

The sub-coracoid compartment- which includes the axillary vessels and brachial plexus, is marked out by the pectoralis minor tendon that attaches to the coracoid process in the front.⁶

At the interscalene triangle, the neurovascular bundle can become trapped between the anterior and middle scalene muscles, resulting in scalenus anticus syndrome, or between the anterior scalene muscle and the clavicle. At the costoclavicular level there may be compression of neurovascular structures which results in the costoclavicular syndrome caused by hyperabduction of the arm. Stretching the pectoralis minor muscle upwards might cause neurovascular compression in the subcoracoid area. Initially known as "hyperabduction syndrome," this condition occurs when the overlying pectoralis minor muscle occludes the neurovascular bundle.¹²

Previous studies shows prevalence ranges from 3 to 80 per 1,000 individuals, TOS can be quite catastrophic once it develops.² Although uncommon, this illness is becoming increasingly common in people who undertake repeated actions, such as those who play overhead sports like baseball, softball, volleyball, and swimming, wrestling etc.^{1,2} TOS manifestations appear among the ages of 20 and 50, with females being affected more than males.^{4,1} There are three classification of TOS according to the structure affected, that is Neurogenic TOS (NTOS), Venous TOS (VTOS) and Arterial TOS (ATOS).^{1,6} With highest incidence of NTOS of 90-95% cases of TOS, VTOS accounts for 3-5% and ATOS shows in 1-2% cases.⁶ Development of NTOS is much higher than development of vascular TOS.¹ The neurogenic form of TOS results from compression, irritation, and overuse of the roots of the brachial plexus, which leads to symptoms such as pain, tingling, paresthesia, and fatigue that begins in the neck and shoulder and radiate to the arms and hands, then to the back and chest in more severe cases.^{1,5,7}

Athletes frequently have intermittent symptoms, making early detection and diagnosis challenging. Symptoms in the thorax and shoulder might proceed to heaviness, numbness and fatigue in the affected arm

during physical activity.² Compression of subclavian vein results in venous thoracic outlet syndrome with symptoms such as arm swelling and oedema, weakness, pain and cyanosis.^{1,5,7} Lastly, if axillary or subclavian artery is compressed in thoracic outlet it causes Arterial TOS showing symptoms of reduce in pulse rate, delay capillary refill time, altered temperature, pain and numbness.^{1,5,6,7} Rarely, arterial TOS can result in a subclavian artery aneurysm, thrombus, and distant embolization.¹ Chronic damage and compression of the subclavian vein between the clavicle and first rib, as well as the surrounding subclavius tendon, contributes to the risk of effort thrombosis, or Paget-Schroetter syndrome (PSS). PSS is more prevalent among young competitive athletes, but it is seen less common than NTOS.¹

Thoracic outlet syndrome can be caused by a cervical rib, a rib or clavicle fracture, trauma or injuries such as whiplash, postural dysfunction, repeated stress injury, scalene muscle hypertrophy, and so on.^{1,3,4} Compression changes can cause certain symptoms, regardless of the cause. People who work with frequent lifting and abduction of upper limbs above shoulder level are more likely to have this condition. During this activity, the brachial plexus and blood arteries through the collarbone and upper ribs experience the most compression. However, pain sensations may not be present while the limbs are in neutral posture. These problems can be caused by a variety of factors, including job, sports, developmental abnormalities, and tumors.¹⁴

High-performance athletes are at risk for neurovascular injuries, including TOS, because to the intense usage of upper extremities in overhead sports.¹ Sports that include main arm motion, training, or hypertrophy of the trapezius, scalene muscles, or pectoralis.¹ Minor study has revealed NTOS in athletes including tennis, weightlifting, football, and wrestling.¹ Neurovascular compression occurring due to muscle hypertrophy especially in sports due to upper arm training.⁶ Wrestlers have complicated physiological demands that need high levels of strength, power, endurance, aerobic power, and anaerobic capabilities. Wrestlers aim to achieve physical dominance and control over their opponents. Wrestlers compete in a demanding setting that includes repetitive bouts of high-intensity activities

(e.g., attacks and counterattacks) followed by submaximal work of low-intensity activity or a rest.⁸

Athletes' repetitive overhead movements and training can cause shoulder girdle instability, hypertrophy, and imbalances in the anterior or middle scalene and pectoralis minor muscles, which leads to NTOS development.¹ Athletes with higher arm usage and scalene muscle hypertrophy may be more susceptible to TOS due to anatomical differences that might cause compression.¹³

Athletes may be at increased risk due to the amount of muscle produced during training.¹ In previous research it showed that strengthening exercises (which is essential for different athletic training) is a risk factor for TOS. Indeed, various strategies in the realm of strength training have been implicated as possible risk factors for TOS onset.⁶ Sports having upper limb strength and endurance and repeated overhead actions are more prone to develop TOS.¹ Injuries resulting from overuse in overhead sports are commonly caused by a variety of variables, including significant repetitive strain, repetitive overhead actions excessive physical performance requirements, higher work-to-rest ratios, and over time involvement in the sport.^{1,2} Individuals with TOS often have a flexed head posture, a depressed and anteriorly positioned shoulder, and a protracted scapula. This unusual shoulder posture, when combined with 90 degrees of abduction or flexion (as is common in those whose occupations require reaching, specifically overhead, and repeated lifting), may result in a decrease in the costoclavicular space, more friction of the neurovascular bundle in the subpectoral bundle, and shorter length of the sternocleidomastoid.³ The distance between the first rib and clavicle in the costoclavicular space reduced by over 50% when the arm was shifted from neutral to ABER position.¹²

The shortened sternocleidomastoid may cause the scalene and pectoralis muscle groups to contract as well, resulting in poor head and neck orientation and postural difficulties.³ Shoulder pain is frequently reported among athletes who use their arms extensively for sports. Previous studies have shown that classic neurogenic TOS in swimmers is caused by hypertrophy of the scalenus muscle, which is due to overdevelopment of the neck and shoulder muscles

due to years of training. ⁹ In high-performance athletes, NTOS symptoms may not be evident during rest.⁵

S r. N o.	TEST	PROCEDURE	POSITIVE SIGN
1.	Elevated arm stress test (EAST)	The shoulders are abducted in 90degree and externally rotated with 90-degree flexed elbow, ask the subject to open and close the hand for 3 minutes	Pain, weakness, paraesthesia
2.	ADSON test	When fully extended, the affected arm is abducted 30 degrees at the shoulder. The neck is extended and head is rotated toward same side, and subject inhales deeply, while therapist feels the radial pulse	Decrease in radial pulse rate on the same side.
3.	Upper limb nerve tension test	<ul style="list-style-type: none"> i. Median nerve ii. Radial nerve iii. Ulnar nerve 	Pain and tingling sensation radiating to upper extremity

TOS is diagnosed mostly by history, physical examination, and provoking tests. It should always be emphasized that TOS diagnosis is generally confirmed by excluding other diseases with identical clinical manifestations.⁸ Physical examination of the subject is based on observational and palpatory method. On observation, cyanosis, oedema, paleness and on palpation assessing the temperature change, shoulder pain through DASH outcome measure, tenderness in scalene and Trapezius muscle. ⁹ Provocative tests, to assess the aggravating symptoms with Elevated arm stress test, Adson test, upper limb nerve tension test, etc. ⁴

II. PROCEDURE

The study was conducted at D.Y Patil Medical college, hospital and research institute, Kolhapur for period of 6 months. It was a cross-sectional study. 90 patients were fulfilling the inclusion and exclusion criteria were included in the study.

Inclusion Criteria: Participants belonging to 18-25 years age group having Anterior knee pain for 3-6 months (Subacute), who were football players for more than 5 years and playing for more than 3 hours.

Exclusion Criteria: Participants having history of Patellar Fracture, knee ligament injury, recent knee and lower limb surgeries.

Methodology: Ethical Approval was obtained from Protocol committee of D. Y. Patil education society, Kolhapur and D.Y Patil college of Physiotherapy, Kolhapur.

Prevalence of thoracic outlet syndrome in wrestlers of Kolhapur is an observational study that was performed at Motibaug talim and Rashtrakul kusti Sankul, Kolhapur.

The participant was included in the study based on inclusion and exclusion criteria by simple random sampling method and the procedure was explained to them in their vernacular language. Written informed consent was taken from the participants willing to participate.

A brief demographic data including details like, name, age, gender, duration of practice, rest interval as per data collection sheet was recorded.

Further general physical examination was performed by assessing cyanosis, oedema pallor, temperature change and tenderness of scalene and trapezius muscle, with provocative tests like elevated stress arm test, Adson test and upper limb nerve tension test. The participants were assessed in standing position.

Quick Disability of Arm, Shoulder and Hand (DASH) outcome measure was used for evaluating upper limb pain. The questionnaire was in the vernacular language of the participant and was also explained to them.

The interpretation of the study was done based on physical examination results and Quick DASH outcome measure. The study was concluded by statistical analysis of the outcome measures and tests used.

III. STATISTICAL ANALYSIS

Prevalence is found by using the proportion of 51 participants having Thoracic Outlet Syndrome with total 151 participants and represented by using Pie Chart.

The various age, years of experience, duration of practice, rest interval, BMI, rating on Quick DASH scale are represented as in the form of Mean and SD.

The outcome measures Elevated stress arm test, Adson’s test and Upper limb nerve tension test are represented graphically by multiple bar diagram.

The statistical tests done using Z test.

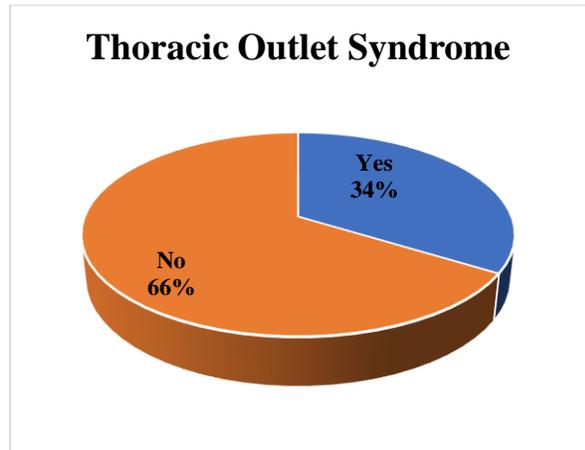
All the statistical analysis is done in Microsoft Excel 2016

IV. RESULT

An observational study was done through simple random sampling from 151 male wrestlers between the age of 20 to 30 years from Kolhapur from October 2023 to February 2024. This study showed 34% (51 wrestlers) were affected by thoracic outlet syndrome.

Thoracic Outlet Syndrome	No. of Participants	Percentage
Yes	51	34%
No	100	66%
Total	151	100%

Table no. 1 Represents the prevalence of Thoracic Outlet Syndrome in male wrestlers



Graph no. 1 Representation of prevalence of Thoracic Outlet Syndrome in male wrestlers

Ethical approval for the study was obtained from D.Y. Patil educational society and research institute kasba bawda, Kolhapur. Demographic details like age, years of experience, duration of practice, rest interval, BMI, rating on Quick DASH scale was obtained from the participants. It was seen that out of a total 151 participants the variable of age of the participants was 25.04 ± 2.57 .

The variable of the BMI was 28.00 ± 3.97 .

The variable of Quick DASH scale was 11.09 ± 17.12

The variable of Quick DASH optional module was 12.78 ± 19.61 .

The variable of average years of experience is represented as mean±SD; 5.56 ± 1.78

The variable of average duration of practice (hrs.) is represented as mean±SD; 4.01 ± 1.14

The variable of average rest interval (mins) is represented as mean±SD; 39.23 ± 15.08

Variables	Mean	SD
AGE	25.04	2.57
YEARS OF EXPERIENCE	5.56	1.78
DURATION OF PRACTICE (HRS)	4.01	1.14
REST INTERVAL (MINS)	39.23	15.08
BMI (KG/m2)	28.00	3.97
DISABILITY SCORE(/100)	11.09	17.12
OPTION MODULE (/100)	12.78	19.61

Table no. 2 Represents Variables in Mean and Standard deviation.

Special Tests used in the present study includes Elevated stress arm test, Adson’s test and Upper limb nerve tension test showing results as;

For Elevated Stress Arm test no. of participants with left side positive is 3, right side positive is 9, while bilateral positive is 20.

For Adson’s test no. of participants with left side positive is 1, right side positive is 3, while bilateral positive is 1.

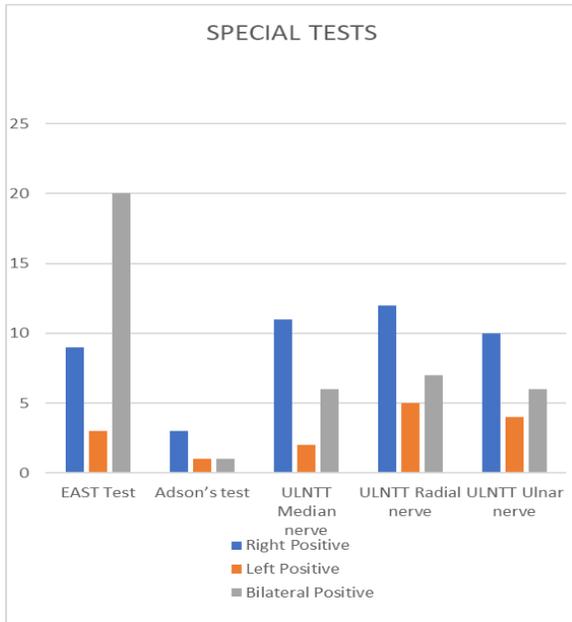
For Upper limb nerve tension test for median nerve no. of participants with left side positive is 2, right side positive is 11, while bilateral positive is 6.

For Upper limb nerve tension test for Radial nerve no. of participants with left side positive is 5, right side positive is 12, while bilateral positive is 7.

For Upper limb nerve tension test for Ulnar nerve no. of participants with left side positive is 4, right side positive is 10, while bilateral positive is 6.

Outcome Measure	Right Positive	Left Positive	Bilateral Positive
EAST Test	9	3	20
Adson’s test	3	1	1
ULNTT Median nerve	11	2	6
ULNTT Radial nerve	12	5	7
ULNTT Ulnar nerve	10	4	6

Table no. 3 Represents no. of participants showing positive signs on Special Tests.



Graph no. 2. Representation of no. of participants showing positive signs on Special Tests

Along with this out of 51 participants with prevalence of thoracic outlet syndrome the no. of participants found to have positive Elevated Stress Arm test is 32 (63 % for n=51)

Special Tests	Positive No. of Participants
Elevated Stress Arm test	63%

Table no. 4 Represents no. of participants showing positive EAST.

IV. DISCUSSION

The aim of this study is to find out the prevalence of thoracic outlet syndrome in wrestlers. 34% of Wrestlers were reported to have thoracic outlet syndrome (TOS).

Thoracic outlet syndrome (TOS) is characterized by upper limb difficulties produced by compression of the neurovascular tissues of the area of the neck over the first rib.¹ Although uncommon, this illness is becoming increasingly common in people who undertake repeated actions, such as those who play overhead sports like baseball, softball, volleyball, and swimming, wrestling etc.^{1,2}

Wrestlers have tremendous physiological demands that need great levels of power, strength, stamina, aerobic power, and anaerobic ability. Wrestlers aim to exert physical dominance and control over their

opponents. Wrestlers compete in a rigorous environment that comprises successive matches of high-intensity activities (for example, attacks and counterattacks), which is followed by submaximal work involving low-intensity activity or rest.⁸

This study was conducted on 151 male wrestlers. In the current study the prevalence was found out using. This study showed the prevalence of development of thoracic outlet syndrome in wrestlers. It was assessed on observation by checking the signs of cyanosis, pallor and oedema and on palpation by checking the temperature, and tenderness of scalene and trapezius muscles. The symptoms of thoracic outlet syndrome were assessed using tests like, EAST, Adson's, and ULNTT. The upper extremity pain was assessed using Quick DASH outcome measure.

As Hosokawa, et al. concluded with this study that Quick Disabilities of the Arm, Shoulder, and Hand has a high reliability and validity on assessing any upper limb impairments, and has the potential to assess treatment outcomes or report outcomes, it's very well used as a research tool or assessment tool for many practitioners.

Previous researches have concluded that sports involving repeated overhead action, repetitive strain and high level of training of the upper limb muscles, muscular swelling from trauma, training, or hypertrophy of the trapezius, scalene muscles, or pectoralis.^{1,2} Individuals with TOS often have a flexed head posture, a depressed and anteriorly positioned shoulder, and a protracted scapula. This unusual shoulder posture, when combined with 90 degrees of abduction or flexion (as is common in those whose occupations require reaching, specifically overhead, and repeated lifting), may result in a decrease in the costoclavicular space, more friction of the neurovascular bundle in the subpectoral bundle, and shorter length of the sternocleidomastoid.^{1,2,3}

Compression changes can cause certain symptoms, regardless of the cause. People who work with frequent lifting and abduction of upper limbs above shoulder level are more likely to have this condition. During this, the brachial plexus and blood arteries through the collarbone and upper ribs experience the most compression. However, pain sensations may not be present at rest. Due to such changes, there is

hemodynamic and neurological problems emerge, presenting clinically as sensations of paresthesia. Vascular TOS is a rare but potentially deadly kind of TOS that can induce transient loss of blood flow and occlusion of blood vessels, leading to limb ischemia. Brachial plexus compression is the leading cause of upper extremity discomfort. Because of this, vascular dysfunction near the base of the upper limb is frequently missed. As a result, numerous individuals cannot be diagnosed with arterial TOS, making documented cases uncommon.¹⁴

Previous researchers believed that neurovascular systems are particularly vulnerable to stretching or compression caused by throwing actions. Due to overhead throwing action the distance between the first rib and clavicle dropped by about 50% when the arm was shifted from neutral to an ABER position, with the subclavian artery located beneath the subclavius muscle. Throwing movement may bring about hypertrophy of scalene and pectoralis minor muscles, and not only that but also intramuscular hemorrhage and fibrosis, which may lead to increased compression of the neurovascular bundle in the interscalene triangle and subcoracoid space. Stretching of the brachial plexus might potentially contribute to the neural dysfunction. Additionally, the considerable traction force on the throwing arm can cause significant stress on the neurovascular bundle. Overhead-throwing athletes with abnormal shoulder girdle posture may experience tension on the brachial plexus against the first rib.¹²

According to Colbert, Lindsey, et al. TOS is a prevalent condition among some groups due to recurrent overhead strain. Overcompensation in specific areas may elevate the likelihood of injury in athletes, including posterior shoulder and scapular fatigue, which may lead to depression, protraction, and downward rotation of the dominant scapula, along with a downward inclination of the clavicle. This position increases the length of the upper trapezius, scalene, sternocleidomastoid, and rhomboid muscles, which might offer stability when scapular stabilizers are insufficient. The alteration in length-tension ratios among scapular stabilizers causes hyperactivity in the pectoralis major during pushing and elevating actions.²

According to J. Westley Ohman, et al. increased risk of developing TOS during sports, particularly those with repeated upper arm motions like swimming and throwing in baseball. High-performance athletes may not have these symptoms at rest.⁵

According to Warrick, et al. Athletes who are engaged in repetitive overhead exercises have a higher chance of getting NTOS as the repetitive tensile stress on a nerve can change its physiological function and structural integrity. Long-term external compressive stress can reduce blood flow, cause inflammatory processes, endoneural edema, and fibrotic alterations. Repetitive action can lead to the scarring of tissue and adhesions. Scar tissue can constrict the thoracic outlet, worsening the symptoms of NTOS.⁷

According to Otoshi, et al. almost one-third (32.8%) of high school baseball players have symptomatic TOS. This is the first data to show the prevalence of TOS in baseball players, which is approximately three times higher than in heavy industrial workers and 1.5 to three times higher than in elite volleyball players. The findings indicate that baseball players may have a higher risk of TOS than other overhead-throwing athletes. Furushima et al. found that people with severe TOS have certain structural anomalies of the origin and insertion of the scalene muscle, which may induce compression beneath the interscalene triangle. Strenuous exercise can cause bilateral hypertrophy of the scalene and pectoralis minor muscles, which may also be a contributing factor.¹²

According to Lindgren KA, et al. Shoulder discomfort has always been a prevalent complaint among sportsmen who use their arms substantially in sports. Classic neurogenic TOS in swimmers is caused by hypertrophy of the scalenus anticus muscle after years of training. A fibrous band within the scalenus anticus muscle could have caused the entrapment, as suggested by the study. Some of these individuals had a fibrous band compressing the lower part of the trunk of the brachial plexus, rather than hypertrophied scalenus muscle.⁹

The chronic overuse of upper extremity in athletes may lead to damage to subclavian vein, due to growth of fibrosis within and around the wall, repeated overuse may lead to formation of venous collateral

vein and constricting scar which will narrow the subclavian vein. This is more prevalent in competitive athlete and doesn't show symptoms until clot develops.¹

Most people who get TOSs may have an anatomical predisposition. Athletes may be more vulnerable to TOS due to higher usage of arms and scalene muscle hypertrophy, as well as smaller anatomical variances that might cause compression. Conservative management's prolonged periods of reduced activity and relaxation can be challenging for athletes, physicians, coaches, and employers alike. Surgery can have significant impacts on livelihood and quality of life for both professional and recreational players.¹

A. Abbreviations and Acronyms

TOS	Thoracic outlet syndrome
NTOS	Neurogenic Thoracic outlet syndrome
VTOS	Venous Thoracic outlet syndrome
ATOS	Arterial Thoracic outlet syndrome
PSS	Paget Schroetter Syndrome
DASH	Disabilities of Arm, Shoulder and Hand
ABER	Abduction External Rotation
MUCL	Medial Ulnar Collateral Ligament
EAST	Elevated Arm Stress Test
ULNTT	Upper Limb Nerve Tension Test
Rt	Right
Lt	Left
B/L	Bilateral
Fig	Figure

VII. CONCLUSION

The main goal of the study was to find out the prevalence of thoracic outlet syndrome in wrestlers of Kolhapur. The present study concludes that 34% of Wrestlers (51 out of 151 players) were reported to have thoracic outlet syndrome.

Among those 32 (63%) of the wrestlers having thoracic outlet syndrome showed positive Elevated Stress Arm test.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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