CORRELATION BETWEEN GLENOHUMERAL ROTATIONAL RANGES AND NONSPECIFIC NECK PAIN IN THROWING ATHLETES

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ABSTRACT

Background: In overhead throwing athletes, there are a few glenohumeral rotational changes observed in the throwing arm like reduced Internal Rotation and an increased External Rotation. There seems to be a prevalence of neck pain in these throwing athletes which correlate with these shoulder rotational range changes.

Materials and Methods: This is an observational study. 70 overhead throwing athletes were recruited for this study. Materials used were a standard goniometer and the Neck Disability Index (NDI) Questionnaire. The shoulder rotational ranges were measured by a goniometer in supine position. The dominant and non-dominant ranges were compared to determine the differences. Neck pain assessment by using the Neck Disability Index (NDI) was done. Shoulder rotational ranges and NDI were correlated using the Spearman's Correlation test.

Results: Significant differences were found in the rotational ranges of dominant and non-dominant shoulder. Out of 70, 42 athletes were found to demonstrate mild disability due to neck pain. The internal rotational deficit had a moderate positive correlation with NDI (r= 0.364, p= 0.01). Also, the Total Range of Motion (TROM) deficit had a moderate positive correlation with the NDI (r= 0.538, p=0.01). No correlation between External Rotation difference and NDI was found.

Conclusion: There is a prevalence of mild disability due to neck pain in throwing athletes. Internal Rotation deficit and a reduced Total Range of motion have a significant correlation with NDI in throwing athletes.

KEYWORDS: Throwing athletes; internal rotation deficit; neck pain

INTRODUCTION

Today, the field of sports has evolved to an extent where even an average athlete has to undergo rigorous training to excel in his choice of sport. The increase in competition puts greater demands on an athlete. These demands predispose an athlete to injuries due to various factors.

Athletes who require repeated overhead throwing activity in their field of sport have been shown to develop certain amount of deficit in the shoulder internal rotation of their dominant hand and it is often accompanied by a subsequent increase in external rotation[1-3]. These changes in the rotational ranges have been shown to predispose an athlete to various shoulder injuries[1-5].

While the relation between shoulder rotational range deficit and shoulder pain has been shown, its effect on the neck region has not been studied as much. In non-athletic population, neck disorders often affect the upper limb functions. Also upper limb activities have been shown to aggravate an existing neck pain[6]. Therefore, it is imperative to find if upper limb dysfunction can be a risk factor in developing neck pain. This study aims to determine whether the shoulder rotational disturbances developed in a throwing athlete have any contribution towards development of neck pain in this population. It might help to predict and prevent neck problems in athletes with rotational range disturbances.

Non-specific neck pain is defined as any form of acute, subacute or chronic neck pain, where no abnormal anatomic structure as cause of pain can be identified. Neck pain in any population can affect the ability to manage activities of daily living[6]. The severity of such a neck pain and disability can be measured using a questionnaire- Neck Disability Index. It is a 10 item questionnaire and each consists of 0-5 points. The total score of 50 can be obtained and is then converted to percentage. The NDI is very widely used scale and has a proven validity and reliability[7].

AIM

To determine the relation between Shoulder Rotation Range and non-specific neck pain using NDI in throwing athletes

OBJECTIVES

- To determine the prevalence of neck pain in throwing athletes using Neck Disability Index.
- To determine if correlation exists between shoulder rotational range and neck pain in throwing athletes.

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METHODOLOGY

This is an observational study. After the approval from ethical committee, 70 male overhead throwing athletes between 18 to 30 years of age were recruited. Athletes with previous history of shoulder or neck injuries, athletes suffering from any other illness were excluded from the study. All the athletes recruited were male. All athletes were informed about the need for study and procedure of the study and proper written consent was taken from all participants.

Shoulder rotational ranges (Internal rotation and External rotation) were taken with a standard goniometer in supine position for dominant and non-dominant sides. The Neck Disability Index Questionnaire (NDI) was filled by all the athletes. Shoulder rotational ranges for dominant and non-dominant sides were compared. Correlation between rotational range differences and NDI was then found by using Spearman's Correlation test.

RESULTS

For the 70 athletes participating in this study, a significant difference was found in the ER, IR and TROM for dominant and non-dominant sides ($p<0.005$) as shown in Table 1. Out of the 70 athletes, 42 were found to demonstrate mild disability (6.44%±5.87) on NDI due to neck pain. IR deficit and TROM deficit were found to have a moderate positive correlation with NDI as shown in Table 2.

TABLE 1: RANGE OF MOTIONS (IN DEGREES)

	Dominant	Non-dominant	Mean Difference*
IR	65.83±8.54	74.70±6.4	-8.87±5.86
ER	101.71±6.39	96.77±4.85	4.94±3.71
TROM	167.54±8.05	171.47±6.44	-3.93±5.09

P-value <0.05

*difference calculated as (dominant)-(non-dominant)

TABLE 2: CORRELATION OF ROTATIONAL DIFFERENCES WITH NDI

	Correlation Coefficient(r)	p-value	Correlation
IR Deficit	0.364	0.002	Moderate Positive Correlation
ER difference	0.094	0.437	No Correlation
TROM Deficit	0.538	0.001	Moderate Positive Correlation

DISCUSSION

A dominant shoulder has to perform a high velocity, repetitive action during the overhead throwing motion. This results in a few adaptive changes in the shoulder joint. Studies have shown that a loss of IR and subsequent increase in the ER of the dominant shoulder is observed in throwing athletes. That is similar to the result obtained in this study. Numerous theories have been proposed to explain these changes in the rotational ranges which include humeral retroversion, posterior capsular tightness and muscular adaptations in the dominant shoulder[8].

IR deficit in the shoulder joint has been associated with alterations in scapular positions in a few studies. A study by Thomas SJ, et al[9] showed the presence of a reduced external rotation and increased scapular protraction in athletes with IR deficit. Another study by Borich MR, et al[10] suggested an increased anterior tilting of scapula in shoulders with internal rotation deficit. These changes in scapular positions have been shown to be a risk factor for shoulder impingement and injuries in many studies[11].

Similarly, a study by Cools AMJ, et al suggested that alterations in scapular positioning might be associated with neck pain[8]. Thus altered scapular orientation in shoulder with IR deficit might be the source of mild neck disability. This might explain the correlation between IR deficit and NDI found in this study.

TROM is a concept where the amount of ER and IR are added up to determine the total rotational arc of motion of the shoulder joint. TROM should be equal in both dominant and non-dominant shoulder.

A difference in TROM has been associated as a risk factor for shoulder injuries[3]. In this study, TROM difference has been shown to moderately correlate positively with NDI. The reduced TROM of the dominant side might be due to soft tissue inflexibility developed in a throwing shoulder which includes pectoralis minor tightness and posterior capsule tightness. This tightness affects the scapular position thus causing excess anterior tilting[8].

Studies show that scapular dyskinesia threatens the function of cervical spine by inducing abnormal compression and shear forces in the cervical spine[8]. This might be a reason for the moderate correlation found between TROM and NDI.

CONCLUSION

This study concludes that, there is a prevalence of mild disability due to neck pain in throwing athletes. The Internal Rotation deficit and a reduced Total Range of motion have a significant correlation with NDI in throwing athletes.

CLINICAL APPLICATION

This study might help in predict and prevent neck pain in athletes with shoulder rotational disturbances. Also it demonstrates the need to consider the shoulder rotational component in evaluation and treatment of neck pain in throwing athletes.

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