

# A Study to find the Risk of Knee Injuries in Non-Professional Football Players

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## ABSTRACT

**Background :** Non-professional football players are those who play occasionally and mostly, do not possess the physical attributes and are untrained unlike professional players. The high intensity of football activities is related to the risk of injury in professional, non-professional, amateur and youth players.

**Aim and Objective:** To find the risk of knee injuries in non-professional football players.

**Materials and Methods:** The purposive sampling of 200 subjects (n=200) from the community and colleges in and around the Bangalore were assessed and screened. Non-professional Players between 18-27 years of age were included in this study. Demographic data was collected, and the bilateral Q-angle was recorded from the athletes. Knee outcome survey - activities of daily living (KOS-ADL) questionnaire was given to athletes.

**Result:** The current study could not predict the risk of knee injuries in non-professional football players.

**Conclusion:** Based on the results of this study, it is concluded that higher Q angles alone might not be responsible for knee injuries. Though the results of the study found the significant positive correlation between right and left Q angles, it showed moderate to poor correlation between right and left Q angles with KOS-ADL scale. Therefore, this study could not predict the risk of knee injuries in the non-professional football players.

**Keywords:** Amateur Football players, Q angles, KOS-ADL, knee injuries

## INTRODUCTION

Non-professional football players are those who play occasionally and mostly, do not possess the physical attributes and are untrained unlike professional players. Mostly, professional matches are scheduled, and players do prepare and are tactically trained for the gameplay whereas non-professional matches mostly are played randomly either as competitively or at recreational level. Professional players are well coped with physiological,

psychological, tactical and technical aspects of football than non-professional players. Non-professional players train more in self-organized ways than the professional players who train significantly more in systemic and organized settings.<sup>[1]</sup>

The non-professional players have significantly more playing time compared to professional players.<sup>[1]</sup> Football is a complex contact sport that can influence conditional capacities: running, sprinting, jumping and kicking, the

more playing time and the less systemic and organized training in non-professional players makes them more vulnerable to injury.

The Quadriceps-angle is the measurement of the angle between the quadriceps and patellar tendon and gives information about the alignment of knee joint and patellar tracking.<sup>[2,4-8]</sup> Normal range for Q-angle value varies from authors to authors. The normal Q-angle varies from 8 to 12 in males and 10 to 20 in females<sup>19</sup> and Q-angle of 10 to 15 measured with the knee in full extension is considered normal.<sup>[9]</sup>

Recent study has shown the significant relationship between Q-angle and the prevalence of knee injuries in elite volleyball players<sup>[11,12]</sup> as this sport also involves the fast movements, forceful jumping and landing. Due to the high intensity of football gameplay and also being the contact-collision sport, incidence of injuries are higher in football.<sup>[21,23]</sup>

Although we can find a lot of studies done on professional or elite players considering the incidence of injuries during the training sessions and the matches, no literatures are available that has been conducted on non-professional players who are equally prone to injuries. Hence, the study was intended to find the risk of knee injuries in non-professional football players.

The main objectives of the study was 1) To find the risk of knee injuries in non-professional football players. 2) To find the correlation between right and left Q angle in non-professional football players. 3) To find the correlation between right Q angle and KOS-ADL score in non-professional football players. 4) To find the correlation between left Q angle and KOS-ADL score in non-professional football players.

## MATERIALS AND METHODS

The current observational study design was conducted using purposive sampling of 200 subjects (n=200) from the community and colleges in and around the Bangalore were assessed and screened based on inclusion and exclusion criteria. Volunteers who were actively participating in football activities.

**Inclusion criteria:** Subjects aged between 18-27, only male football players, subjects playing football for more than six months, subjects having no history of previous knee pathologies.

**Exclusion criteria:** Professional football players, Previous history of lower limb fracture or surgery, Previous history of patellar dislocation, Players who recently started playing football or has been playing for less than 6 months. Demographic data was collected, and the

bilateral Q-angle was recorded from the athletes. Knee outcome survey-activities of daily living (KOS-ADL) questionnaire was given to athletes.

The present study was carried out by interacting with subjects living in and around Bangalore, Karnataka during the period of February 2019 and July 2019 (6 months).

**Materials used:** Marker pen, paper, goniometer, weighing machine, inch tape and stadiometer.

## Procedure

Brief explanation about the objective and the procedure of the study was explained, and then the consent was obtained from the subjects willing to participate in the study. Demographic information such as name, age, sex, height and weight were recorded. The Q-angle was measured and recorded in subjects lying in supine position. In order to collect the knee injuries, the Knee Outcome Survey Activities of Daily Living Scale was filled by participants.

## Q-angle measurement

The measurement of Q-angle<sup>[8,9]</sup> was performed with subject supine and the legs were extended at the knee joint with the quadriceps muscle relaxed. The feet were placed in a position of neutral rotation so that the toes were pointing directly upwards. Then the three bony landmarks: ASIS, CP and the centre of TT were marked with marker pen.<sup>[10]</sup>

The outline of the patella was drawn with marker pen after palpating the borders and a small dot was marked on the skin overlying the CP. Then the one line was drawn from the CP to centre of TT and was extended upwards from CP and other line was drawn from CP towards ASIS using the straight edge of measuring tape. Then the angle formed between two lines was defined as the Q angle and measured with the goniometer.

## KOS-ADL scale

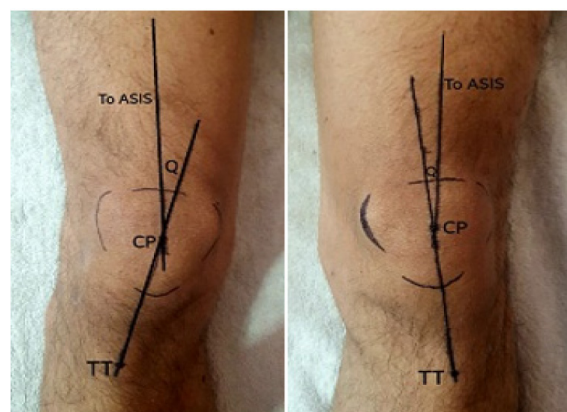
The Knee Outcome Survey (KOS) which is a patient-completed questionnaire was used to determine symptoms, functional limitations, and disability of the knee joint resulting from various knee injuries during activities of daily and sports.<sup>[13,15,16,20]</sup> Studies have also demonstrated good reliability, validity and responsiveness for KOS-ADL scale.<sup>[12,13,14]</sup>

## Scoring

KOS-ADL is a 14-item scale for activities of daily living. Six items assess the effects of knee symptoms and eight items assess the effects of knee condition on the ability to

perform specific functional tasks each item is rated on a 5-point scale with 5 indicating “no symptoms or no difficulty” and 0 representing “symptoms preventing activity or unable to perform”.

The highest possible score is 70. The scores of all items are summed, divided by 70, and then multiplied by 100 to give an overall ADLS percentage rating. Lower percentages reflect higher levels of disability.



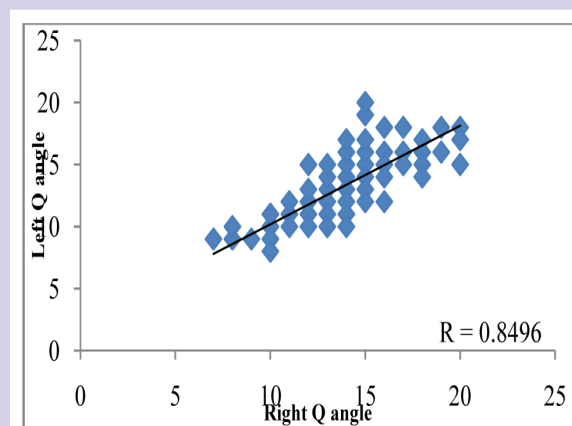
**Figure 1: Measurement of Q angle on right and left side.** ASIS-anterior superior iliac spine; CP-centre of patella; TT -tibial tuberosity; Q-quadriceps angle.

## RESULTS

The aim of the current study was to find the risk of knee injuries in non-professional football players. Statistical data analysis was done in Microsoft Excel 2010 and the descriptive statistics were calculated and summarized.

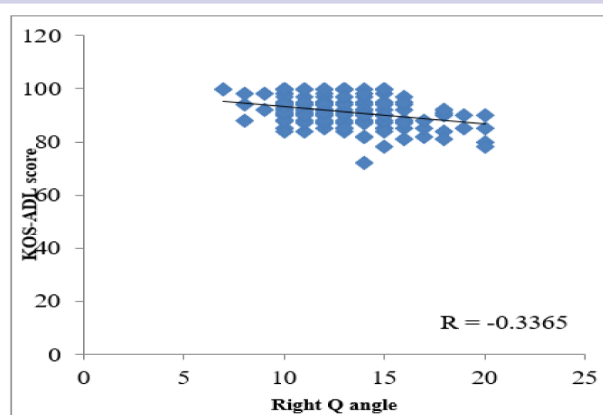
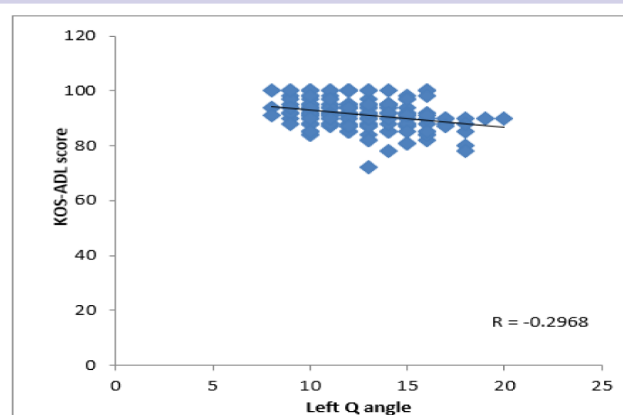
**Table 1: Descriptive statistics for age, height, weight, BMI, right and left Q angles and KOS-ADL score**

Variables	Mean	SD
Age	23.62	2.17
Height (cm)	168.72	6.6
Weight (KG)	62.36	7.61
BMI	21.9	2.32
Right Q angle	12.87	2.55
Left Q angle	12.46	2.39
KOS-ADL	91.41	4.93



**Graph 1: Pearson's correlation coefficient between right and left Q angles.**

There data included the average (mean and standard deviation) and Pearson's correlation coefficient. Pearson's correlation coefficient was calculated to find the



**Graph 2: Pearson's correlation coefficient between left Q angles and KOS-ADL score. Pearson's correlation coefficient between right Q angles and KOS-ADL score.**

correlation between right and left Q angles, right Q angle and KOS-ADL score, and left Q angle and KOS-ADL score.

Results showed the average Q angle value of all 400 limbs was 12.66°. The mean Q angle value on the right side was 12.86° as compared to 12.46° on the left. Correlation results showed the significant positive correlation ( $r=0.8495$ ) between right and left Q angles. Moderate negative correlation ( $r=-0.3365$ ) was observed between right Q angle with KOS-ADL score and poor negative correlation ( $r=-0.2968$ ) was observed between left Q angle with KOS-ADL score.

Hence, there is a significant correlation between the right and left Q angles, but the results showed no significant correlation between right and left Q angles with KOS-ADL score. The current study could not predict the risk of knee injuries in non-professional football players.

Table 2 provides the information about the bilateral

**Table 2: Individual differences between Q angle values on right and left sides**

Difference between right and left Q angle in degrees	Right = Left (n = 200)	Right > Left (n = 200)	Left > Right (n = 200)
0	52 (26%)	-	-
1	-	70 (35%)	38 (19%)
2	-	18 (9%)	6 (3%)
3	-	8 (4%)	2 (1%)
>3	-	4 (2%)	2 (1%)

differences between the right and left Q angle values. This tabulated data shows that 26% of the subjects showed no bilateral difference in right and left q angles and 74% of subjects showed bilateral differences in Q angles.

**Table 3: Effects of knee symptoms on the ability to perform ADL**

Variables	No Symptoms		No effect on activities		Slight effect on activities		Moderate effect on activities		Severe effects on activities		Prevent-ing activities	
	f	%	f	%	f	%	f	%	f	%	f	%
Pain	62	31	83	41.5	49	24.5	6	3	-	-	-	-
Stiffness	195	97.5	5	2.5	-	-	-	-	-	-	-	-
Swelling	141	70.5	58	29	1	0.5	-	-	-	-	-	-
Giving way, buckling, or shifting of the knee	170	85	29	14.5	1	0.5	-	-	-	-	-	-
Weakness	198	99	2	1	-	-	-	-	-	-	-	-
Liming	159	79.5	37	18.5	3	1.5	1	0.5	-	-	-	-

Table 3 provides the information of the effects of knee symptoms on the ability to perform ADLS. Data shows that 24.5% of subjects are having slight effect on their daily activities because of pain.

**Table 4: Functional limitations with ADL**

Variables	No difficult at all		Minimally difficult		Somewhat difficult		Fairly difficult		Very difficult		Unable to do	
	f	%	f	%	f	%	f	%	f	%	f	%
Walk	154	77	44	22	2	1	-	-	-	-	-	-
Go up stairs	139	69.5	58	29	3	1.5	-	-	-	-	-	-
Go downstairs	168	84	29	14.5	3	1.5	-	-	-	-	-	-
Stand	192	96	6	3	2	1	-	-	-	-	-	-
Kneel in front of the knee	75	37.5	97	48.5	28	14	-	-	-	-	-	-
Squat	41	20.5	69	34.5	75	37.5	15	7.5	-	-	-	-
Sit with your knees bent	65	32.5	90	45	37	18.5	8	4	-	-	-	-
Rise from a chair	178	89	22	11	-	-	-	-	-	-	-	-

Table 4 provides the information about the functional limitations on ADLS. Above tabulated data shows that 37.5% of the subjects find somewhat difficult to do the squat and 7.5% of the subjects are having fairly difficulty in doing squat. Sitting with knees bent is somewhat difficult for 18.5% of the subjects and 4% of the subjects are finding it fairly difficult.

## DISCUSSION

The aim of the present study was to find the risk of knee injuries in non-professional football players. An increase in the Q angle may also cause an increase in pressure between the patella and the underlying lateral femoral condyle during activation of the quadriceps. Though there are many studies documented on bilateral variability in Q angles.<sup>[3,4,10,12]</sup>

In this present study the mean Q angle on the right side was greater as compared to the left side and the results showed the positive correlation ( $r=0.8496$ ) of this difference between both the Q angles. The results of the study showed that 50% of subjects were having right Q angles greater than that of left and in 97% of subjects a difference of  $3^\circ$  was noted. Similarly, Veeramani R et al<sup>[10]</sup> found 52% of subjects having Q angle greater on right side than that on left and in 96% of subjects study showed difference of less than  $3^\circ$ .

The results from the Knee Outcome Survey and the score assigned by the players to their knee symptoms and knee functions in the ADLS are indicative of lower level of disability in their knee joint. The mean of total scores was  $91.41 \pm 4.93$ . In the KOS-ADL scale it was seen that pain affected slightly on the ability to perform activities in 24.55% of subjects. This effect may be because of high game loads causing muscle soreness which gives discomfort and pain while the muscle contracts. Muscle soreness is accompanied by a feeling of stiffness as a result of muscle oedema.<sup>[5,6,7,24]</sup>

KOS-ADL scale used in the present study also showed that most frequent complaint was about squat and sitting with their knees bent. 37.5% and 7.5% of the subjects found somewhat difficult and fairly difficult in doing squatting respectively.

18.5% and 4% of the subjects found somewhat difficult and fairly difficult while sitting with their knees bent respectively. This may be because squatting position places the line of body weight far posterior to the medial-lateral axis of the knee and to control squat, the quadriceps must be strongly activated which produces compression force that strongly presses the patella into the intercondylar groove of the femur.<sup>[17,18,19,22]</sup> This is the first time that the KOS-ADLS has been applied in non-professional football players. Thus, this study found no similar information to be compared with the obtained

## Limitations

Side differences in Q angle of the weight bearing knee could have been included with supine Q angle measurements. Study used KOS-ADL scale which is a self-reported scale that may have affected the results by recall bias.

Study did not use any objective assessment tool such as functional movement screening to see if they can predict the injury. Future studies standing Q angles along with supine Q angles should be analysed. Other functional assessment tests should be incorporated in addition to the self-reported questionnaires.

## CONCLUSION

Based on the results of this study, it is concluded that higher Q angles alone might not be responsible for knee injuries. Though the results of the study found the significant positive correlation between right and left Q angles, it showed moderate to poor correlation between right and left Q angles with KOS-ADL scale. Therefore, this study could not predict the risk of knee injuries in the non-professional football players.

## CONFLICT OF INTEREST:

The authors declared no conflict of interest.

## FUNDING: None

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