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Original Article

Risk of Injury Based on Fundamental Movement Pattern among Non-Professional Adolescent Soccer Players

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ABSTRACT

Soccer is a competitive sport and necessitates the adept performance of fundamental movement patterns to prevent injuries during game. Increasing trends of soccer in Pakistan makes the players most prone to risk of injury which is why the fall risks should be explored and awareness about each should be raised. **Objective:** To assess the risk of injury based on fundamental movement patterns among non-professional adolescent soccer players. **Methods:** A descriptive cross-sectional study was conducted on 50 non-professional adolescent Soccer players aged between 10 to 19 years. Players were selected using non-probability convenient sampling from two different clubs. Risk of injury was assessed by using Functional Movement Screen (FMS). Data were analyzed by using Statistical Package for the Social Sciences (SPSS) version 21.0. Variables were correlated by using Pearson Correlation. **Results:** Among the participants, 7 out of 24 (29.2%) athletes had the greater risk of injury in while 17 out of 24 (70.8%) athletes had less risk of injury in one club. Among the participants, 14 out of 26 (53.8%) athletes showed the greater risk of injury while 12 out of 26 (46.2%.) athletes had less risk of injury. **Conclusions:** The study concluded that non-professional Soccer players had greater risk of injury due to flawed Fundamental Movement Pattern (FMP).

INTRODUCTION

Soccer is considered as a high intensity and intermittent activity [1-3]. There are two sessions each of forty-five minutes with 15 minutes interval at half time in this sport game. This holds the repute of being the most popular and most played sports and is approximately being played in 211 countries. Fundamental movement patterns are series of consecutive, interconnected movements of particular body parts in space [4, 5]. Fundamental movement pattern includes Deep Squats, Hurdle Steps, In-line Lunge, Shoulder Mobility, Active straight leg raises, Trunk Stability Push-up and Rotary Stability [6, 7]. The transfer of energy and connection of movement between upper and lower extremities have important impact during trunk movement [8, 9]. It is believed that trunk function is a predictor of athletic performance. Some researches demonstrate an important relationship of trunk function with athletic performance i.e., soccer players [10]. From the available literature, we have come to learn that there are multiple factors which affecting basic motor skills in soccer athletes [11]. These include age and relevant experiences. Amongst known risk factors for any sports injury, literature lists a difference in nervous system structure,

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musculoskeletal systems i.e. high porous bones and plasticity, laxity of ligaments, inadequate bone growth, hormonal differences etc [12, 13]. Mental features i.e., low attention span, inappropriate coordination of hand and eye, low awareness and motivation for sports related training are also considered as few of the major risk factors [14, 15].

The current study assessed the functional outcomes of male soccer athletes who have attained various skill levels in reference to analyzing their potential risk of injury to the motor system. The aim of the current study was to determine the differences in the status and risk of injury among soccer player and indicate any deficits among them if any. This would help us provide deeper insight to the severity of training the soccer players need. Through this study a prediction of chances of injury in soccer players can also be made.

METHODS

This study was a cross-sectional descriptive study and was conducted at Model Town Soccer Club (MTFC) and Fame Soccer Club (FFC) in a duration of about six months i.e., from May 2019 to November 2019. Sample size (n=45) was calculated through WHO Sample size Calculator using values from a previously published research paper because no known population of soccer players in Pakistan was reported till date. The values were as follows: Confidence Level – 95%, Margin of error: 5% and Population proportion: 50%. 50 non-professional soccer players were enrolled in the study from MTFC and FFC was included. Non probability convenient sampling was used as sampling technique. Athletes with any other medical disease which affected the athlete's performance and the FMS movements: Autoimmune Disease, Asthma and Anxiety etc. were excluded. The study was approved by LCPT Ethical Review Committee under the reference Number - LCPT/DPT/1245 on 22-05-2019. Each research participant was interviewed before assessment for inclusion and exclusion criteria. Assessment of the fundamental movement pattern was done utilizing Functional Movement Screen (FMS). Functional Movement Screen (FMS) measures the risk of injury by performing the 7 fundamental movement patterns by athletes including Deep Squat, Hurdle Step, Inline Lunge, Shoulder Mobility, Active Straight Leg Raise, Trunk Stability, Pushup and Rotary Stability. Reliability of FMS is 0.81. Analyses was done using software SPSS version 21.0. Data were presented in the form of frequency and percentages.

RESULTS

Participants of the current study had mean age of 21.56 ± 1.41 years, height; 168.09 ± 5.64 cm and weight; 53.86 ± 9.76 kg. Among non-professional soccer players, players with dominance of right were reported to be n= 45 (90%) and left were n=5 (10%) as shown in table 1.

Table 1: Demographical characteristics of respondents

Variables	Characteristics
Age	21.56 ± 1.41 years
Height	168.09 ± 5.64 cm
Weight	53.86 ± 9.76 kg
Right side Dominance	45 (90.00%)
Left side Dominance	5 (10.00%)

As shown in table 2, on assessment of Deep squats, n=5 were unable to complete movement, n=20 were able to complete their movement but with compensation and n=25 performed movement perfectly without any compensation. Amongst all respondents, n=2 were unable to complete and perform right hurdle steps, n=28 were found to be able to complete movement but compensated in some way, whereas n=20 reported that they performed their movement without any compensation. N=33 were found to be able to complete movement in left side hurdle steps but compensated in some way, n=1 were found to be unable to complete movement pattern and n=16 performed movement perfectly. N=24 were found to be able to complete their right side in line lunge with any compensation, n=20 performed their movement perfectly without any compensation and n=6 were unable to complete their movement. N=30 were found to be able to complete their left side in line lunge with any compensation, n=25 performed their movement perfectly without any compensation and n=5 were unable to complete their movement. N=35 were found to be able to complete their right shoulder mobility perfectly and n=4 completed their movements but compensated. N=37 were found to be able to complete movement in left shoulder mobility but compensated in some way, n=3 were found to be unable to complete movement pattern and n=10 performed movement perfectly. N=48 were found to be able to complete movement in right side active straight leg raise but compensated in some way. N=5 respondents were found to be able to complete movement. N=45 respondents performed left side active straight leg raise accurately.

Table 2: Movement patterns screening of soccer players

Movement patterns	Frequency (%)
Deep squats	
Unable to complete movement	5 (10.00%)
Able to complete movement with compensation	20 (40.00%)
Able to perform movement without compensation	25 (50.00%)
Hurdle steps	
Right hurdle steps	
Unable to complete movement	2 (4.00%)
Able to complete movement with compensation	28 (56.00%)
Able to perform movement without compensation	20 (40.00%)

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Movement patterns	Frequency (%)
Left hurdle steps	
Unable to complete movement	1 (2.00%)
Able to complete movement with compensation	33 (66.00%)
Able to perform movement without compensation	16 (32.00%)
In Line Lunge	
Right side In Line Lunge	
Unable to complete movement	6 (12.00%)
Able to complete movement with compensation	24 (48.00%)
Able to perform movement without compensation	20 (40.00%)
Left hurdle steps	
Unable to complete movement	5 (10.00%)
Able to complete movement with compensation	30 (60.00%)
Able to perform movement without compensation	15 (30.00%)
Shoulder Mobility	
Right Shoulder Mobility	
Unable to complete movement	4 (8.00%)
Able to complete movement with compensation	35 (70.00%)
Able to perform movement without compensation	11 (22.00%)
Left Shoulder Mobility	
Unable to complete movement	3 (6.00%)
Able to complete movement with compensation	37 (74.00%)
Able to perform movement without compensation	10 (20.00%)
Active Straight Leg Raise	
Right Active straight Leg Raise	
Unable to complete movement	1 (2.00%)
Able to complete movement with compensation	41 (82.00%)
Able to perform movement without compensation	8 (16.00%)
Left Active Straight Leg Raise	
Unable to complete movement	0 (0.00%)
Able to complete movement with compensation	5 (10.00%)
Able to perform movement without compensation	45 (90.00%)
Rotary Stability Test	
Right Rotary Stability	
Unable to complete movement	0 (0.00%)
Able to complete movement with compensation	3 (6.00%)
Able to perform movement without compensation	47 (94.00%)
Left Rotary Stability	
Unable to complete movement	2 (4.00%)
Able to complete movement with compensation	38 (76.00%)
Able to perform movement without compensation	10 (20.00%)

Amongst all the 50 soccer players, 17 (34.00%) were found out to be on a greater risk of injury whereas 23 (46.00%) were found to have a lesser risk of injury as shown in figure 1.

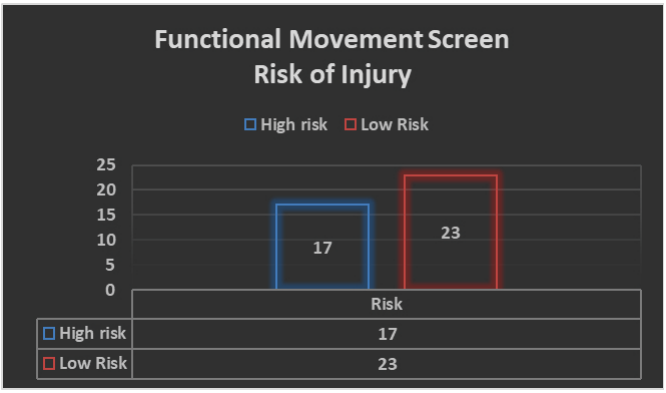

Figure 1: Functional Movement Screen Test

DISCUSSION

The aim of the study was to assess the risk of injury based on fundamental movement pattern among non-professional adolescent soccer athletes. Those athletes who have score of FMS <14, are at high risk of injuries in future. Recent studies have shown the risk of future injuries with low FMS scores as prediction [16-18]. During the current course of study, risk of injury among adolescent non-professional soccer players was done by the Functional Movement Screen (FMS) scores [13]. Athletes have high risk of injuries in future who have the scores <14 after assessment. Current study demonstrated that the FMS is used to predict the risk of injuries among non-professional adolescent soccer athletes. Results of the present study are consistent with the previous study that the athletes who have scores <14 have greater risk of injuries in future [7]. A previous study concluded that, among the high school athletes, FMS scores were the poor predictor of risk of injuries in future as they showed varying levels of motor control, motor development and maturity regarding their age and FMS is not appropriate test tool to predict the risk of injuries among this population. Results of the present study were in accordance to those conducted by Portas which concluded that maturity has substantial effects on FMS performance [14]. The functional Movement Screen test assesses the risk of injury as evident and as per the previous research, evidences say that a score of 14 or less increases the risk of injury in the near future considerably which even can be 50% (15, 16, 19, 20). The results of this study also indicate that a detailed analysis of all trials should be conducted and the players should participate in specialized functional training with an aim to reduce risk of injury by enhancing players mobility, stability, control and by adapting correct fundamental pattern of movements. Numerous extrinsic factors have also reported to be a cause of injury or are somewhere related to the injury. Inadequate workload distribution, improper warm up and a reduced muscle regeneration are few of the very commonly cited extrinsic

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risk factors for injury (12, 14, 17). The results of this study were found to be consistent with those of this study.

CONCLUSIONS

Soccer players are at a greater risk of injury according to the results of Functional Movement Screen test and should adopt accurate positioning and movement patterns in order to avoid injury.

Authors Contribution

Conceptualization: FH
Methodology: SA2
Formal analysis: SA1
Writing-review and editing: FH, SA1, SA2, HMA, SW

All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflict of interest.

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