ORIGINAL ARTICLE

Analysis of Head Exposure in Male Youth Soccer Players

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ABSTRACT

Introduction: Heading is a technique in soccer to offense or defense. The aim of this study is to analyze of head exposures in youth male soccer players. **Method:** This is a descriptive study involving soccer players with an average age of 13.40 ± 1.22 years. Head exposure was recorded with a camera from 7 matches. Logistic regression was used to determine factors contributing to head exposure. **Results:** The average head exposure in one match was 9 ± 1.82. Clearing headings, open play match situations, striker's position and location at the penalty box provide greater contributions to head exposure. Type heading is one of the factors that significantly contributes to the head exposure from shooting heading (p<0,05). **Conclusion:** In conclusion, the results of this study provide an overview of the head exposure in young male soccer players, influenced by the type heading, player position, match situation, and area of heading occurrence.

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INTRODUCTION

Soccer is the most popular sport in the world (1). Soccer is unique because players use their heads to make contact with the ball (2). Heading can be used for shooting, passing, or controlling the ball (3). The heading can be used for offense or defense (4). Previous Research by Mićović et al. (2022) showed that 17%- 20% of the number of goals scored from headings in the World Cup 2002 until World Cup 2018 (5).

Heading does not use head protection when in contact with the ball (6). This can cause several risks of head injury in children including cognitive decline, concussion, and headaches (7,8). According to Chatha et al. (2020), every year concussion occurs around 2.51%, with details of 45% (1469 people) in women and 49% (1617 people) in men from research in 2008-2016 in 100 hospitals (8). To prevent the risk of head injury, the strengthening of the neck muscles and the trunk is a part that needs to be considered (9,10).

Several studies have recorded heading to analyze the heading technique (11–13). Some studies using video recordings or direct observations head exposure (6) and that the incidence head exposure increases with age (13,14). Research by Langdon et al. (2022) showed that different player positions also had differences in the frequency of heading (14).

However, there is still a lack of information on the head exposure and the factors can be contribute to head exposure in male youth soccer players. The main objective of this study was to analyze head exposure in youth soccer players. The study will be based on video-based observations and recordings.

MATERIALS AND METHODS

Subject and Procedure

This research is conducted directly during the friendly matches and training matches of Indoras FC Sumenep. The total number of subjects is 22, with an average age of 13.40 ± 1.22 years. The subjects have at least 1 year of experience playing soccer. In the procedure, we obtain permission from managers and coaches to record the matches during friendly and training sessions, using a smartphone (iPhone 15 Max) for the recordings. The recorded data is used to determine the frequency and factors contributing to head exposure from heading among youth soccer players. The aspects of heading are studied include the number of headers during matches and training, the types of headers (clearing, passing, and shooting), player position (goalkeeper, defender, midfielder, and striker), match situation (open play, free kick, throw-in, and corner kick), and the positions of the headers (penalty box or the other).

Ethical Clearance

This study was approved by the Ethical Clearance Committee of East Kalimantan Ministry of Health Poltekkes (Reference No: DP.04.03/F.XLII.25/0145/2024)

Statistical analysis

The statistical analysis used was descriptive and logistic regression. The resulting data will be in the form of numbers and percentages for variable categories. Logistic regression was used to determine factors contributing to head exposure by type heading, player position, match situation and heading event.

RESULTS

Male youth soccer players of the Indoras FC Sumenep team were analyzed for head exposure during 7 matches (3 friendly match and 4 match training). The total number of headers was 63. The type of heading that occurs most often is the clearing type compared to the passing and shooting types. The position of the most heading player is a sticker. The process of heading the most is during the open play. Most occurrence of heading in the field is in the penalty box

The Hosmer and Lemeshow test's p-value was 0.331, indicating that the binary logit model was appropriate (p-value>0.05). The Apparent Error Rate (APPER) is 71.4%, classified as good. Logistic regression test results (Table III) with control groups for each variable were midfielder (player position), throw in (match situation), passing (type heading) and other (heading event). Type heading is the variable that has the most significant influence on the head exposure (p-value<0.05). Defender have a probability (Odds Ratio) of 3.072 times

Table I: Average head exposure in one match

Variable	Mean (SD)
Age (years)	13.40 (1.22)
Head exposure one match	9 (1.82)
Player head exposure in one match	0.81 (0.16)
Type Heading:	
Passing	2.71 (0.95)
Clearing	4.57 (1.27)
Shooting	1.71 (0.48)
Match Situation:	
Free Kick	1 (0.0)
Corner Kick	1.42 (0.53)
Open Play	4.85 (1.67)
Throw-in	1.71 (1.25)
Player Position:	
Defender	2 (0.0)
Midfielder	2.57 (0,78)
Striker	4.42 (1.39)
Goalkeeper	0 (0.0)
Heading events:	
Penalty box	5.85 (2.11)
Other	3.14 (1.34)

Table II: Percentage head exposure

Variable	Percentage (%)
Type Heading:	
Passing	30.16
Clearing	50.79
Shooting	19.05
Match Situation:	
Free Kick	11.11
Corner Kick	15.87
Open Play	53.97
Throw-in	19.05
Player Position:	
Striker	49.21
Midfielder	28.57
Defender	22,22
Goalkeeper	0
Heading events:	
Penalty box	65.08
Other	34.92

Table III: Logistics Regression Test Results

Variable	p-value	Odds Ratio
Type Heading:	0.014	-
Clearing	0.104	4.019
Shooting	0.005	30.661
Match Situation:	0.56	-
Free Kick	0.301	4.654
Corner Kick	0.659	0.619
Open Play	0.926	0.918
Player Position:	0.435	-
Striker	0.834	0.823
Defender	0.271	3.072
Heading events (Penalty Box)	0.286	2.162

greater head exposure than midfielders. Free kick has a probability (Odds Ratio) of 4.654 times greater of head exposure than throw-in. Shooting has a probability of 30.661 times greater and clearing has a probability of 4.019 times greater of head exposure than passing. Penalty box has a 2.162 times greater of head exposure than other locations.

DISCUSSION

Results showed several factors causing head exposure: type heading, player position, match situation, and head exposure location. Type heading is a major determinant of head exposure. Shooting and clearing are the types with greater contribute to head exposure. Clearing is the type heading that is common in the field. This study is similar to the previous study (14). These results are different from the results of research conducted by Beaudouin et al. (2020) which shows that the most common type of heading passing occurs during matches (60.5%) and training (75.4%) (13). Clearing is typically used as a form of defense, this means that defenders have great head exposure (14). Any player, in any position, can make a clearing when the defending team appears to have the ball. Shooting and clearing heading need the neck and core muscle must be strong to generate the force needed to move the ball fast and far (9,10). If neck muscles are not good enough, the head will absorb the force of the ball.

In player position that the striker was a header more often than the midfielder and defender. This result is different from the previous research which shows that the position of the midfielder is the player who makes the most headers (6). Research by Langdon et al. (2022) showed that the defender (68.3%) was in a player position with great head exposure (14). The results of the logistic regression show that the position of the player with the highest head exposure is the defender. This is same with previous study (15). The head exposure due to defender can be caused by a duel or by direct contact with the ball (16). The defenders have great head exposure because defender often clearing heading to defend, so defender must have good posture and great heading technique.

The most heading occurred during open play. This study's findings are consistent with previous research (13). This shows that heading has an important role in soccer. Heading can be a strategy to win the match. A player who has good heading techniques in terms of posture and jumping is usually the intended player.

The majority of heading occurred in the penalty box. The results are consistent with previous research (17). This is in line with the purpose of heading, which is to score goals and as a form of defense and offense. In the penalty box, defenders and stickers are the most common players who do the heading. In the penalty area, high passes are often aimed at players who are heading for the ball. This can increase the head exposure.

The study's results showed something unique. Clearing heading became the most frequently performed heading type, but the sticker position often performed heading. The reason is that the subjects were still youth and not very good at heading therefore, not able to demonstrate the right type of heading. Youth or adolescence is a time to focus on a particular sport. (18). Strengthening the muscles around the neck and trunk can reduce the risk of injury from heading (10). The right training will improve performance heading.

The current study has several limitations. First, comparing between age groups and gender. Second, a large number of matches. Third, identify the forms of impact on the head while on the field. It is hoped that the results of this study can provide information on factors that contribute to the head exposure in youth soccer players.

CONCLUSION

This research concludes striker and defender position, free kick situation, shooting heading and penalty box are provide greater contributions to head exposure. It is hoped that the results of this study will provide a basis for discussion on improving the heading performance of young male soccer players through the creation of a structured training program that will improve performance.

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