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Pattern of sport injuries and its association with injury prevention strategies in male professional footballers in Calabar, Nigeria

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Abstract

Background: Understanding the pattern of sports injuries is essential to developing targeted injury prevention programs. This study investigated the pattern of sport injuries among male professional footballers in Calabar and evaluated the association between sport injury patterns and injury prevention strategies.
Materials and Method: The study was a cross-sectional survey that recruited 130 male footballers from six professional clubs via consecutive sampling. Participants' ages were obtained, while anthropometric parameters were measured with standard instruments. Pattern of sports injury and injury prevention strategies were assessed with an adapted questionnaire on injury prevention strategies from a previous study. Descriptive statistics of mean, standard deviation, frequency and percentage were used to summarize data, while Chi-square was use to analyze the association between injury patterns and injury prevention strategies at $p < 0.05$.
Results: The mean age, height, weight, and BMI of participants were 25.19±4.26years, 1.70±0.07m, 67.65±7.95Kg and 23.42±3.36Kg/m^2, respectively. A 63.8% risk of sustaining injury was found with the most frequent injury being dislocation (27.7%), followed by sprains (26.2%). The thigh (43.1%) was the most exposed injured body part, while the knee was the most (40%) injured body part. Significant association ($\chi 2=68.9$, $p=0.010$) was obtained between injury prevention strategies and nature of sport injury. Injury prevention strategies were not significantly associated ($p>0.05$) with part of the body injured.
Conclusion: A high risk of sport injuries exist among male professional footballers in Calabar, with dislocations and sprains as the most common injuries. Injury prevention strategies were associated with the nature of injuries sustained.

Key words: Sport injuries, Injury pattern, Injury prevention strategies, Professional footballers

Introduction

Football is globally recognized as a highly demanding sport characterized by intermittent high-intensity activities including sprinting, sudden changes of direction, jumping, and physical contacts.[1,2] These intense demands expose players to substantial risks of musculoskeletal injuries, which often result in significant time lost from training and competition, impacting individual careers and team performance.[3,4] Lower limb injuries such as hamstring strains, ankle sprains, and anterior cruciate ligament tears constitute the majority of injuries reported in professional footballers.[4,5] Moreover, recurrent injuries and inadequate rehabilitation can lead to chronic problems and early career termination.[3,6]
Understanding the pattern of sports injuries including their frequency, type, severity, and context is

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essential to developing targeted injury prevention programs.[7] Such data allow clinicians, coaches, and sport scientists to tailor prevention strategies that address the specific risks encountered in professional football.[8] In response to this need, injury prevention frameworks have been developed globally, most notably the Translating Research into Injury Prevention Practice (TRIPP) and the Sequence of Prevention Model (SPM), which emphasizes injury surveillance, risk factor identification, intervention implementation, and evaluation of effectiveness.[8,9] Within football, interventions such as the *Fédération Internationale de Football Association*(FIFA) 11+ and warm-up programs have demonstrated efficacy in reducing injury incidence by improving neuromuscular control and muscular strength.[10,11] FIFA 11+ was primary developed to prevent injury among amateur footballers and its efficacy has been tested in other sports.[2,10,12] Other forms of injury prevention strategies in football include strength training program, endurance training, foam rolling, neuromuscular program, stretching program, proprioception training among others.[2]

Despite the growing evidence supporting injury prevention strategies, the translation of these programs into practice is often hindered by contextual factors including lack of resources, inadequate medical support, and cultural attitudes toward injury and prevention.[12,13] This is particularly relevant in African football contexts, where professional clubs may face infrastructural and financial constraints that limit the implementation of comprehensive prevention strategies.[14] In Nigeria, football remains the most popular sport, with a large talent pool and growing professional leagues;[14] however, researches examining injury patterns and prevention practices among Nigerian professional footballers are few. Calabar is a Nigerian city with vibrant football culture and several professional teams represents an ideal setting to investigate these dynamics. Understanding the pattern of injury among male professional footballers in Calabar, alongside the association with their injury prevention practices, is crucial to formulating appropriate interventions. Evaluating the effectiveness and adherence to injury prevention strategies in this context can identify gaps and inform stakeholders, including clubs, coaches, and healthcare providers. Therefore, this study was designed to investigate the pattern of sport injuries among male professional footballers in Calabar and evaluate how these patterns relate to the use of injury prevention strategies.

Materials and Method

This study was a cross-sectional design that consecutively recruited participants from six known professional football teams in Calabar Metropolis. Each team has 30 players and comprised the Calabar Rovers, May and Frank, Diamond Stars, Rock Stars, FAANS FC and Ricky Max. Inclusion criteria were male professional footballers aged 18 years and above with a minimum of one year active football play, having ability to read and understand English and willing to provide informed consent. Players who had not competed in official matches for the past six months were excluded from the study.

The Yamane formula,[15] $n = N/[1 + N(e)^2]$ was used to determine the sample size of the study, where n = expected sample size, N = total population under consideration (180), and e = acceptable sample error at 0.05. Hence, the expected sample size, $n = 180/1 + 180 (0.05)^2 = 124$. However, a total of 130 participants were recruited owing to anticipation of 5% drop-out. Ethical approval was obtained from the Health and Research Ethics Committee of the University of Calabar Teaching Hospital (UCTH/HREC/33/Vol.III/360). Participants provided written informed consent prior to participation. After obtaining ethical approval, the researcher also obtained permission from the six clubs to conduct the study. The researcher was introduced to the coaches of the various clubs who granted permission to collect data immediately after their training sessions. Each club was visited for at least twice and data collection lasted for 8 weeks. On each day for data collection, participants' age was obtained and recorded. Anthropometric measurements were performed with the participants wearing light apparel and no shoes. Body weight was measured using a portable weighing scale (Hanson bathroom weighing scale) to the nearest 0.1Kg. Participants were instructed to stand on the weighing scale with the head looking straight and the hands by the sides. Also, height was measured with a height meter to the nearest 0.1m. Participants were told to stand with the head looking straight, hands by the side and the back resting on the height meter. The researcher placed a meter rule on the vertex to obtain the reading from the height meter. Body mass index (BMI) was computed by calculating the ratio of weight to height in Kg/m^2.

The study instrument used to collect data on sport

injuries and injury prevention strategies was the injury prevention questionnaire by Geertsema et al.[16] The questionnaire was adapted to this study given that it was originally developed and validated for elite female football players. This is because of its comprehensive coverage of key domains relevant to injury pattern and prevention strategies, including players' perception and exposure to prevention programmes. The domains on the knowledge of injury risk factors and use of specific prevention strategies of the injury prevention questionnaire were adapted to this study (Appendix 1). The domain on knowledge of injury risk factors assessed players' understanding of what increases the risk of injury in football. It sought information on risk of sustaining sport injury, most type of injury sustained, most part of the body exposed, part of the body frequently injured, and most common reasons for injury. The domain on use of injury prevention strategies obtained participants information on common injury prevention strategies used including Warm-up routines, FIFA 11+ program, strength training, proprioception training, stretching and cool down. The questionnaire was self-administered and was given to all participants to fill immediately after collecting their anthropometric parameters. However, the players were told to indicate if they lack understanding of sport injuries such as sprains, strain, dislocation and fracture, as well as, if they lack understanding of injury prevention strategies such as warm-up, FIFA 11+, strength training, proprioception training, stretching and cool down. The researcher was available to provide explanation to players with lack of understanding of sport injuries and prevention strategies. The completed questionnaire was collected the same day.

Data was analyzed with the IBM statistical package for social sciences version 25. Descriptive statistics of mean, standard deviation, frequency and percentage were used to summarize the data. Inferential statistic of Chi-square was used to test the association between injury prevention strategies and the nature of sport injury, as well as, between injury prevention strategies and the part of the body injured at $p < 0.05$.

Results

A response rate of 100% was obtained for the administered questionnaires, as all participants recruited completed their questionnaire given the onsite availability of the researcher at the time the respondents were completing the questionnaire. Table 1 revealed the physical characteristics of the participants. The mean age of the participants was 25.19±4.26 years. The youngest participant was 18 years old, and the oldest was 35 years old. The mean height of the participants was 1.70±0.07m. The heights of the players ranged from a minimum of 1.52m to a maximum of 1.86m. The mean weight was 67.65±7.95Kg. The players' weights varied from a minimum of 52Kg to a maximum of 85Kg. The mean BMI was 23.42±3.36Kg/m^2.

In Table 2, the risk of sustaining injuries was high in most (63.8%) participants. Dislocations were the most (27.7%) frequent type of injury sustained, followed by sprains (26.2%), strains (23.1%), and fractures (22.3%). The thigh (43.1%) was identified

Table 1: Physical Characteristics of all Participants (n=130)

Variables	Mean ± SD	Minimum	Maximum
Age(years)	25.19 ± 4.26	18.00	35.00
Height (m)	1.70 ± 0.07	1.52	1.86
Weight (Kg)	67.65 ± 7.95	52.00	85.00
BMI (Kg/m^2)	23.42±3.36	15.03	36.78

Table 2: Participants pattern of sport injuries and risk of sustaining injuries

Variables		Frequency (n)	Percentage (%)
Risk of sustaining injuries	High	83	63.8
	Moderate	30	23.1
	Low	14	10.8
	Don't know	3	2.3
Most type of injury sustained	Sprain	34	26.2
	Strain	30	23.1
	Dislocation	36	27.7
	Contusion	1	0.8
	Fracture	29	22.3
Most exposed part of the body	Thigh	56	43.1
	Hip	12	9.2
	Knee	34	26.2
	Ankle	28	21.5
Part of the body frequently injured	Head	2	1.5
	Thigh	44	33.8
	Knee	52	40.0
	Ankle	32	24.6
Most common reasons for injury	Too little training	6	4.6
	Too much training	14	10.8
	Too many matches	23	17.7
	Hard tackles	17	13.1
	Low muscle strength	21	16.2
	Reduced mobility	19	14.6
	Reduced recovery time	12	9.2
	Artificial turf	12	9.2
	Poor pitch quality	5	3.8

as the most exposed body part to be injured, followed by the knee (26.2%) and the ankle (21.5%). The knee was most (40%) frequently injured body part, followed by the thigh (33.8%) and ankle (24.6%). For common reasons for injury, factors included too many matches (17.7%), low muscle strength (16.2%), reduced mobility (14.6%), and hard tackles (13.1%) (Table 2). Regarding the medical support staff available for players injury prevention were Doctors (22.3%), Physiotherapists (49.2%) and 28.5% were others including massage therapists and sport scientists (Figure 1).

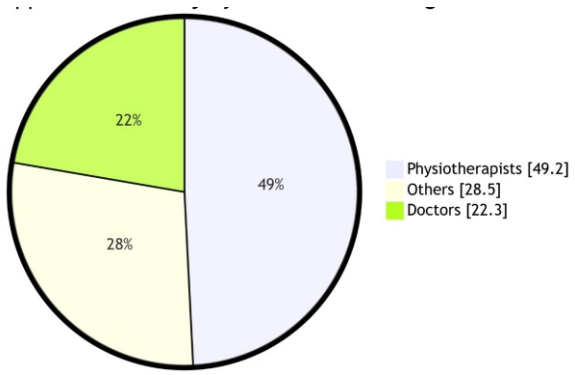

Figure 1: Medical Support staff available in the various teams for injury prevention strategies

The association between participants sport injury prevention strategies and the nature of sport injury sustained is presented in Table 3. Statistically significant association ($\chi 2=68.9$, $p=0.010$) was obtained between injury prevention strategies and nature of sport injury sustained. About a third (42, 32.31%) of the participants associated FIFA 11+ to preventing sport injuries out of which 6(17.14%) indicated sprain, 10(28.57%) strain, 6(17.14%) dislocation, and 13(37.14) fracture. Similarly, about a quarter of the participants (31, 23.85%) associated warm-up program to preventing sport injuries out of which 9(29.03%) indicated sprain, 6(19.35%) strain, 9(29.03%) dislocation, and 7(22.5%) fracture. On the other hand, few participants (12, 9.23%) associated sport specific movements to preventing sport injuries out of which 3(25%) indicated sprain, 2(16.66%) strain, 5(41.66%) dislocation, and 2(16.66%) fracture. Similarly, few participants (12, 9.23%) associated cool down to preventing sport injuries out of which 4(33.3%) indicated sprain, 3(25.00%) strain, 2(16.66%) dislocation, and 3(25.00%) fracture. Only very few participants (7, 5.38%) associated strength training to preventing sport injuries out of which 4(57.14%) indicated sprain, 2(28.57%) strain, and 1(14.28%) fracture. Out of the very few participants that associated flexibility program before and after football with sport injury prevention strategies, 1(14.28%) was indicated for strain, 5(71.42%) for dislocation, and 1(14.28%) for contusion. Similarly, out of the very few participants that associated balance and core stability with sport injury prevention strategies, 1(20.00%) was indicated for sprain, 3(60.00%) for dislocation, and 1(20.00%) for fracture.

Table 3: Association of sport injury prevention strategies and nature of sport injury (n=130)

Variables	Pattern of Injury						
	Sprain n(%)	Strain n(%)	Dislocation n(%)	Contusion n(%)	Fracture n(%)	χ^2	p-value
Injury prevention strategies							
FIFA 11+	6(17.14)	10(28.57)	6(17.14)	0(0)	13(37.14)	68.69	0.010
Warm up programme	9(29.03)	6(19.35)	9(29.03)	0(0)	7(22.5)		
Sport specific movement	3(25)	2(16.66)	5(41.66)	0(0)	2(16.66)		
Strength training (pitch)	0(0)	3(30)	6(60)	0(0)	1(10)		
Strength training (separate session)	4(57.14)	2(28.57)	0(0)	0(0)	1(14.28)		
Flexibility training (pitch)	1(20)	0(0)	1(20)	0(0)	3(60)		
Flexibility training (before/after football)	0(0)	1(14.28)	5(71.42)	1(14.28)	0(0)		
Flexibility training (separate session)	0(0)	3(100)	0(0)	0(0)	0(0)		
Sprint training	50(1)	50(1)	0(0)	0(0)	0(0)		
Cool down	4(33.3)	3(25)	2(16.66)	0(0)	3(25)		
Specific prevention protocol	1(100)	0	0	0	0		
Balance and core stability	1(20)	0	3(60)	0	1(20)		

Keys: *FIFA–Fédération Internationale de Football Association*

Table 4: Association between sport injury prevention strategies andthe part of the body injured (n=130)

Variables	Pattern of Injury					
	Thigh n(%)	Hip n(%)	Knee n(%)	Ankle n(%)	χ^2	p-value
Injury prevention strategies						
FIFA11+	19(45.28)	2(5.71)	9(25.7)	5(14.2)	32.28	0.503
Warm up programme	13(41.93)	1(3.22)	5(16.12)	12(38.7)		
Sport specific movement	3(25)	3(25)	3(25)	3(25)		
Strength training (pitch)	5(50)	2(20)	2(30)	0(0)		
Strength training (separate session)	3(42.85)	1(14.28)	1(14.28)	2(28.5)		
Flexibility training (pitch)	2(40)	0(0)	3(60)	0(0)		
Flexibility training(before/after football)	2(28.57)	0(0)	3(42.85)	2(28.57)		
Flexibility training (separate session)	1(33.33)	0(0)	1(33.33)	1(33.33)		
Sprint training	1(50)	0(0)	1(50)	0(0)		
Cool down	5(41.66)	3(25)	2(16.66)	2(16.66)		
Specific prevention protocol	0(0)	0(0)	1(100)	0(0)		
Balance and core stability	2(40)	0(0)	2(40)	1(20)		

Keys: *FIFA–Fédération Internationale de Football Association*

Meanwhile, this study did not find any statistically significant association between participants sport injury prevention strategies and part of the body injured (Table 4).

Discussion

This study indicates the pattern of sport injuries and its association with injury prevention strategies in male professional footballers in Calabar, Nigeria. This study achieved a 100%

response rate, which suggests a high level of engagement and interest in participating in sport studies among professional footballers in Calabar. The physical characteristics of the players provide valuable context for understanding injury patterns and the application of preventive strategies in this population. The mean age of the players indicates that most of the participants were in their athletic prime. This age range (18–35 years) is consistent with peak physical performance in professional football,[17,18] which has been associated with both increased physical demands and vulnerability to injury.[7] It is suggested that younger athletes may experience more acute injuries due to aggressive play and less experience, while older players may be more prone to overuse injuries due to cumulative physical strain.[7]

The mean height and weight fall within expected ranges for elite-level athletes in Nigeria.[19] Tyoakaa et al found a mean height of 1.71m and a mean weight of 67Kg among professional football league players in North central Nigeria,[19] which is comparable to the mean height of 1.70m and mean weight of 64Kg obtained in this study for professional football players in Calabar, Nigeria. Also, the mean BMI of players obtained in this study indicates that most players were within the normal weight range, suggesting minimal risk from weight-related comorbidities. It is believed that elite football players generally exhibit superior lean body mass and fat mass metrics compared to those in the general population.[20] These anthropometric parameters are crucial in evaluating biomechanical and physiological factors that may predispose athletes to specific types of injuries. However, variations in BMI, especially at the higher end, could correlate with an increased load on joints and musculature, potentially influencing injury type and frequency. Though low and high BMI are identified as risk factors for musculoskeletal injuries, a lower BMI may reflect a deficiency in bone mass, whereas a higher BMI as a risk factor is difficult to assess due to the nature of the measure.[21] It is essential to interpret BMI carefully in athletic populations, as increased muscle mass can result in higher BMI without necessarily indicating poor conditioning.

Also, this present study revealed that a majority of the participants were at high risk of sustaining injuries, highlighting the physically demanding nature of professional football in Calabar. This high injury risk aligns with previous research indicating that footballers often face considerable injury exposure due to the intensity and frequency of competitive play.[7] Among the types of injuries reported, dislocations were the most frequent, closely followed by sprains, strains, and fractures. The predominance of dislocations is notable and may reflect the dynamic, contact-heavy nature of football, where rapid changes in direction and forceful impacts are common. This pattern contrasts somewhat with other studies that often cite sprains and strains as the leading injuries, suggesting possible regional or training-related differences in injury mechanisms.[20,22] Regarding the anatomical distribution of injuries, the thigh was the most exposed body part to injury, yet the knee emerged as the most frequently injured site. The ankle was also a common injury site. These findings emphasize the vulnerability of the lower limbs in football, consistent with global injury surveillance data.[7,20] The knee's high injury rate may be attributed to its complex biomechanics and susceptibility to both acute trauma and overuse damage, which can impair players' performance and longevity.[23]

The common injury factors reported by participants such as too many matches, low muscle strength, reduced mobility, and hard tackles underscore the multifactorial nature of injury causation. Overloading through frequent matches likely contributes to fatigue and decreases neuromuscular control, increasing injury risk.[22,24] Similarly, insufficient muscle strength and reduced mobility highlight the importance of targeted conditioning and flexibility programs as integral components of injury prevention strategies.[25,26] Hard tackles, representing external impact forces, reaffirm the role of enforcing the playing rules in football and fair play enforcement in mitigating injury risk. Collectively, these findings point to the need for comprehensive injury prevention programs that address not only physical conditioning but also match scheduling and game regulations, tailored to the unique demands faced by professional footballers in this region.

Furthermore, this study demonstrated a statistically significant association between injury prevention strategies employed by the footballers and the nature of injuries sustained, highlighting the impact of preventive measures on injury patterns. Notably, the FIFA 11+ program was the most commonly recognized injury prevention strategy among participants, reflecting its growing acceptance worldwide as an effective comprehensive warm-up

designed to reduce common football injuries.[12,27,28] Interestingly, among those who associated FIFA 11+ with injury prevention, fractures and strains were the most commonly reported injuries preventable by FIFA 11+, followed by sprains and dislocations. This distribution highlights the significance of FIFA 11+ in preventing certain injury types which are known to affect players' participation and performance in football. Warm-up programs were also frequently acknowledged and appeared linked to a somewhat more balanced distribution of sprains, strains, and dislocations. This reinforces the established role of warm-ups in preparing the musculoskeletal system for physical demands, increasing flexibility, and reducing muscle stiffness.[29]

Conversely, fewer participants associated sport-specific movements, cool-down routines, strength training, flexibility programs, and balance/core stability exercises with injury prevention, despite evidence suggesting these components contribute significantly to reducing injury risk.[28] For example, strength training was mostly associated with reducing sprains, indicating that targeted muscle conditioning may help stabilize joints vulnerable to such injuries. Flexibility and balance programs appeared particularly relevant to preventing dislocations and strains, underscoring their importance in maintaining joint integrity and neuromuscular control. The limited use or recognition of some of these sports injury prevention strategies could suggest gaps in knowledge dissemination or resource availability among professional footballers in Calabar, Nigeria. It may also reflect varying degrees of emphasis placed on different components of injury prevention by coaching or medical staff. These findings highlight the need for comprehensive education and structured implementation of multi-faceted injury prevention programs to optimize their protective effects across diverse injury types.

In contrast to the significant association found between injury prevention strategies and the nature of injuries sustained, this study did not reveal a statistically significant association between sports injury prevention strategies and the specific body parts injured. This lack of association suggests that while injury prevention programs may influence the type of injuries players sustain, they may not differentially protect particular anatomical regions. This could be due to the multifactorial nature of injuries in football, where various extrinsic (e.g., playing surface, tackles) and intrinsic (e.g., biomechanics, fatigue) factors contribute to injury occurrence across multiple body parts.[7,30]

Overall, the findings of this study emphasize the importance of adopting comprehensive injury prevention strategies that address multiple risk factors rather than focusing narrowly on protecting isolated body areas. Future research may benefit from longitudinal designs and detailed biomechanical assessments to clarify how specific prevention components affect injury location. This study had several limitations that should be considered when interpreting the findings. First, the reliance on self-reported questionnaires may introduce recall bias, potentially affecting the accuracy of injury histories and prevention strategy usage. Second, the cross-sectional design limits the ability to establish causal relationships between prevention strategies and injury outcomes. Third, the study was confined to male professional footballers in Calabar, which may limit the generalizability of the results to female players, or amateur levels of play.

Also, the adapted questionnaire was not designed to establish a direct causal link between specific sport injuries and their underlying mechanisms, hence the obtained associations were subjective because it relates to hypothesis generated from players perception rather than confirmatory diagnosis from expert evaluation. Although the majority of the respondents indicated the availability of medical support staff for their teams including Doctors, Physiotherapists, massage therapists and sport scientists, which may explain players familiarity with sport injury terminologies. Based on the findings of this study, it is recommended that professional football clubs in Calabar and similar settings should prioritize education on comprehensive injury prevention strategies, including the FIFA 11+ program, strength training, flexibility, and balance exercises. Coaches and medical staff should ensure proper implementation and adherence to these programs to maximize protective benefits. Additionally, scheduling considerations to reduce player overload and addressing modifiable risk factors like muscle strength and mobility deficits are crucial. Future research should adopt longitudinal designs and incorporate objective injury and compliance monitoring to better understand causality and optimize prevention protocols.

Conclusion

This study highlights a high risk of injuries among male professional footballers in Calabar, with dislocations, sprains, and strains being the most common injuries. There is a significant association between injury prevention strategies and the nature of injuries sustained, underscoring the impact of targeted preventive measures like the FIFA 11+ program and warm-up routines. However, no significant association was found between prevention strategies and the specific body parts injured, indicating the need for holistic approaches to injury prevention.

References

1. Dello Iacono A, McLaren SJ, Macpherson TW, Beato M, Weston M, Unnithan VB, Shushan T. Quantifying Exposure and Intra-Individual Reliability of High-Speed and Sprint Running During Sided-Games Training in Soccer Players: A Systematic Review and Meta-analysis. Sports Med. 2023 Feb;53(2):371-413. doi: 10.1007/s40279-022-01773-1.
2. Vasileiadis I. Injury Prevention Strategies in Football: A Systematic Review. Sport Mont. 2020;18(3):109-113. doi: 10.26773/smj.201001.
3. Stathas I, Kalliakmanis A, Kekelekis A, DanassiAfentaki D, Tsepis E, Fousekis K. Effectiveness of an On-Field Rehabilitation framework for return to sports in injured male professional football players: a single-blinded, prospective, randomised controlled trial. BMJ Open Sport Exerc Med. 2024 Jan 19;10(1):e001849. doi: 10.1136/bmjsem-2023-001849.
4. López-Valenciano A, Ruiz-Pérez I, Garcia-Gómez A, Vera-Garcia FJ, De Ste Croix M, Myer GD, Ayala F. Epidemiology of injuries in professional football: a systematic review and meta-analysis. Br J Sports Med. 2020 Jun;54(12):711-718. doi: 10.1136/bjsports-2018-099577.
5. Waldén M, Hägglund M, Ekstrand J. Injuries in Swedish elite football--a prospective study on injury definitions, risk for injury and injury pattern during 2001. Scand J Med Sci Sports. 2005 Apr;15(2):118-25. doi: 10.1111/j.1600-0838.2004.00393.x.
6. Zhang G, Brink M, Aus der Fünten K, Tröß T, Willeit P, Meyer T, Lemmink K, Hecksteden A. The Time Course of Injury Risk After Return-to-Play in Professional Football (Soccer). Sports Med. 2025 Jan;55(1):193-201. doi: 10.1007/s40279-024-02103-3.
7. Ekstrand J, Hägglund M, Waldén M. Injury incidence and injury patterns in professional football: the UEFA injury study. Br J Sports Med. 2011 Jun;45(7):553-8. doi: 10.1136/bjsm.2009.060582.
8. Finch C. A new framework for research leading to sports injury prevention. J Sci Med Sport. 2006 May;9(1-2):3-9; discussion 10. doi: 10.1016/j.jsams.2006.02.009.
9. Ross AG, Donaldson A, Poulos RG. Nationwide sports injury prevention strategies: A scoping review. Scand J Med Sci Sports. 2021 Feb;31(2):246-264. doi: 10.1111/sms.13858.
10. Bizzini M, Dvorak J. FIFA 11+: an effective programme to prevent football injuries in various player groups worldwide-a narrative review. Br J Sports Med. 2015 May;49(9):577-9. doi: 10.1136/bjsports-2015-094765.
11. Soligard T, Myklebust G, Steffen K, Holme I, Silvers H, Bizzini M, Junge A, Dvorak J, Bahr R, Andersen TE. Comprehensive warm-up programme to prevent injuries in young female footballers: cluster randomised controlled trial. BMJ. 2008 Dec 9;337:a2469. doi: 10.1136/bmj.a2469.
12. Owoeye OBA, McKay CD, RÄisÄnen AM, Hubkarao T, Palacios-Derflingher L, Emery CA. Psychosocial Factors and the Effects of a Structured Injury Prevention Workshop on Coaches' Self-Efficacy to Implement the 11+ Exercise Program. Int J Exerc Sci. 2020 Dec 1;13(5):1459-1475. doi: 10.70252/FEDU3136.
13. Bolling C, van Mechelen W, Pasman HR, Verhagen E. Context Matters: Revisiting the First Step of the 'Sequence of Prevention' of Sports Injuries. Sports Med. 2018 Oct;48(10):2227-2234. doi: 10.1007/s40279-018-0953-x.
14. Owoeye OB, Akinbo SR, Olawale OA, Tella BA, Ibeabuchi NM. Injury prevention in football: Knowledge and behaviour of players and availability of medical care in a Nigerian youth football league. South African Journal of Sports Medicine. 2013 Oct 2;25(3):77-80.
15. Yamane T. Statistics: An Introductory Analysis, 2nd Edition, 1967; 876-912. New York: Harper

and Row.
16. Geertsema C, Geertsema L, Farooq A, Harøy J, Oester C, Weber A, Bahr R. Injury prevention knowledge, beliefs and strategies in elite female footballers at the FIFA Women's World Cup France 2019. Br J Sports Med. 2021 Jul;55(14):801-806. doi: 10.1136/bjsports-2020-103131.
17. Jamil, Mikael, and Samuel Kerruish. "At What Age Are English Premier League Players at Their Most Productive? A Case Study Investigating the Peak Performance Years of Elite Professional Footballers." Int J Perf Anal Spor 2020;20(6): 1120–33. doi:10.1080/24748668.2020.1833625.
18. Figueira B, Gonçalves B, Masiulis N, Sampaio J. Exploring how playing football with different age groups affects tactical behaviour and physical performance. Biol Sport. 2018 Jun;35(2):145-153. doi: 10.5114/biolsport.2018.71603.
19. Tyoakaa AA, Chukwudo D, Iortimah CG. Height and weight as determinants of playing positions in nigeria professional league football players in North Central Nigeria. NJHWLS. 2025;5: 1-9.
20. Schulz SVW, Matits L, Schwarz E, Jerg A, Otte M, Wiedemann P, Bizjak DA, Kirsten J, Henze AS. Lower limb injuries and their association with anthropometrics - an observational study of 381 German elite youth football players. BMC Sports Sci Med Rehabil. 2025 Jun 4;17(1):143. doi: 10.1186/s13102-025-01190-7.
21. Andersen KA, Grimshaw PN, Kelso RM, Bentley DJ. Musculoskeletal Lower Limb Injury Risk in Army Populations. Sports Med Open. 2016;2:22. doi: 10.1186/s40798-016-0046-z.
22. Della Villa F, Massa B, Bortolami A, Nanni G, Olmo J, Buckthorpe M. Injury mechanisms and situational patterns of severe lower limb muscle injuries in male professional football (soccer) players: a systematic video analysis study on 103 cases. Br J Sports Med. 2023 Nov 30;57(24):1550-1558. doi: 10.1136/bjsports-2023-106850.
23. Makuch R, Kucharski A, Pilarski K, Chrościcka A, Gała K, Czajka A, Lenard P, Michalska S, Dewicka M, Wawrzyniak, AM. Knee joint injuries in football players: types of injuries, etiology, diagnostics and prevention. Quality Sport. 2024;15:51945. doi:10.12775/QS.2024.15.51945
24. Marqués-Jiménez D, Calleja-González J, Arratibel-Imaz I, Terrados N. Match Loads May Predict Neuromuscular Fatigue and Intermittent-Running Endurance Capacity Decrement after a Soccer Match. Int J Environ Res Public Health. 2022 Nov 21;19(22):15390. doi: 10.3390/ijerph192215390.
25. Bank N, Hecht C, Karimi A, El-Abtah M, Lauren HR, Mistovich J. Raising the Young Athlete: Training and Injury Prevention Strategies. JPOSNA 2022;4(2):462. doi:10.55275/JPOSNA-2022-0037.
26. McCall A, Pruna R, Van der Horst N, Dupont G, Buchheit M, Coutts AJ, Impellizzeri FM, Fanchini M; EFP-Group. Exercise-Based Strategies to Prevent Muscle Injury in Male Elite Footballers: An Expert-Led Delphi Survey of 21 Practitioners Belonging to 18 Teams from the Big-5 European Leagues. Sports Med. 2020 Sep;50(9):1667-1681. doi: 10.1007/s40279-020-01315-7.
27. Sadigursky D, Braid JA, De Lira DNL, Machado BAB, Carneiro RJF, Colavolpe PO. The FIFA 11+ injury prevention program for soccer players: a systematic review. BMC Sports Sci Med Rehabil. 2017 Nov 28;9:18. doi: 10.1186/s13102-017-0083-z.
28. Thorborg K, Krommes KK, Esteve E, Clausen MB, Bartels EM, Rathleff MS. Effect of specific exercise-based football injury prevention programmes on the overall injury rate in football: a systematic review and meta-analysis of the FIFA 11 and 11+ programmes. Br J Sports Med. 2017 Apr;51(7):562-571. doi: 10.1136/bjsports-2016-097066.
29. Fradkin AJ, Zazryn TR, Smoliga JM. Effects of warming-up on physical performance: a systematic review with meta-analysis. J Strength Cond Res. 2010 Jan;24(1):140-8. doi: 10.1519/JSC.0b013e3181c643a0.
30. Bakare U, Olivier B, Brandt C, Godlwana L. Injury prevention knowledge, beliefs, and practices among women's football teams in South Africa. SAJSM. 2021;33(1):v33i1a9505. https://doi.org/10.17159/2078-516X/2021/v33i1a9505.