Designing a study on footballers' injuries in the 2024 African cup of nations competition (Ivory Coast)

Conception d'une étude sur les blessures des footballeurs lors de la Coupe d'Afrique des Nations 2024 (Côte d'Ivoire)

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ABSTRACT

Introduction: To enhance players' performance and implement effective injury prevention protocols and surveillance programs in football, it is essential to conduct epidemiological studies. Since significant disparities in injury rates across various football competitions were reported, it is important to characterize injuries in the context of the African cup of nation (AFCON) competition.

Aim: To determine the incidence and factors associated with injuries among African footballers during the 2024 AFCON competition, which will be held in Ivory Coast from January 13 to February 11, 2024.

Methods: Two expert physician in sports medicine will perform an analytical study (i.e.; a video-based analysis) of the 52 matches that will be played during the 2024 AFCON. The following parameters will be noted: i) Injury incidence, ii) Characteristics of injured players such as age, on-field position, and player league continent, iii) Characteristics of injuries such as mechanism, body location, moment of injury in terms of the minute of play and the round of the match, place of the injury in term of stadium zone, replacement consequent to the injury, absence next match, re-injury, recurrence of the injury with the same location during the competition, referee decision, and stoppage time for on-field injury, and iv) Characteristics of matches such as the match' schedule, ambient temperature, humidity, and wind speed.

Conclusion: This study will allow enriching the existing literature with additional data regarding the injuries and the players' characteristics in the African context.

Key words: African Footballers, Epidemiological Study, AFCON 2024, Football Injuries, Injury Prevention, Soccer

RÉSUMÉ

Introduction: L'amélioration des performances des joueurs et la mise en place des protocoles de prévention et de surveillance des blessures en football nécessitent la réalisation d'études épidémiologiques. Étant donné la disparité dans les taux de blessures notés dans diverses compétitions de football, il est important de caractériser les blessures dans le contexte de la Coupe d'Afrique des Nations (CAN) 2024.

Objectif: Déterminer l'incidence et les facteurs associés aux blessures chez les footballeurs africains lors de la compétition de la CAN 2024 (Côte d'Ivoire; 13 janvier-11 février 2024).

Méthodes: Deux médecins experts en médecine du sport réaliseront une étude analytique (une analyse basée sur la vidéo) des 52 matchs qui seront joués. Les paramètres suivants seront notés: i) Incidence des blessures, ii) Caractéristiques des joueurs blessés (âge, position sur le terrain, et continent de la ligue du joueur), iii) Caractéristiques des blessures (mécanisme, localisation du corps, moment de la blessure en termes de minute de jeu et de tour du match, lieu de la blessure en termes de zone du stade, remplacement du joueur consécutif à la blessure, absence au prochain match, récidive, récurrence de la blessure au même endroit pendant la compétition, décision de l'arbitre et temps d'arrêt pour blessure sur le terrain), et iv) Caractéristiques des matchs (horaire du match, température ambiante, humidité et vitesse du vent).

Conclusion: Cette étude permettra d'enrichir la littérature existante avec des données supplémentaires concernant les blessures et les caractéristiques des joueurs dans le contexte africain.

Mots clés: Blessures de Football, CAN 2024, Étude Epidémiologique, Football, Footballeurs Africains, Prévention des Blessures

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INTRODUCTION

Football stands as the most widely embraced sport globally, boasting over 265 million licensed players worldwide, including a staggering 46 million in Africa (1). The inherent nature of football, characterized by repetitive and high-impact movements, exposes players to an elevated risk of injuries (2). Crucially, the implementation of protocols and programs geared towards injury prevention is paramount, underscoring the necessity of surveillance initiatives aimed at identifying and quantifying the epidemiological characteristics of injuries with heightened risk for players (3). These protocols and programs assume a vital role in dissecting the causes and nature of injuries, subsequently enabling the formulation of action protocols designed to curtail the risk and incidence of injuries(3). This aligns seamlessly with the van Mechelen model (4), wherein the initial steps involve assessing the incidence, followed by comprehending the causes and mechanisms of injuries. Furthermore, within the domain of sports medicine, epidemiological studies prove indispensable, acting as a cornerstone for enhancing athletic performance and crafting effective injury prevention programs (4–6). It is noteworthy that injury characteristics may be influenced by geographical factors such as climate and competition type (7, 8), thereby emphasizing the need for region-specific data to tailor preventive measures accordingly.

Injury rates manifest significant disparities across various football competitions (9). Particularly noteworthy is the rate of 32.3 injuries per 1000 hours of exposure in national leagues, escalating to 41.1 in international tournaments (9). Even within Africa, substantial variability exists (10, 11). For example, while the South African league reported 24.8 injuries per 1000 match hours (10), the EPFKIN (for Entente Provinciale de Football de Kinshasa) league in Congo RDC documented a stark contrast with 182 injuries per 1000 match hours (11).Understanding the epidemiology of injuries assumes pivotal importance for tailoring preventive measures to local contexts (3). Prior studies have employed different methods for data collection, often relying on an injury report form developed by Fuller et al. (12), encompassing multiple outcomes, with team physicians actively participating in data collection. While epidemiological studies have been conducted previously for various competitions, such as FIFA (Fédération Internationale de Football Association) tournaments and the Olympic Games (13), there is a gap in data specifically related to African Cup of Nations (AFCON). As of end December 2023, and to the best of the authors' knowledge, no study has explored injury characteristics during any of AFCON competitions. The latter is distinguished by the diversity of players who participate in different leagues and are exposed to climates that markedly differ, particularly from those prevalent in Europe, where a majority of players is based. This discrepancy is accentuated in the 2024 edition of the AFCON, which is slated to take place in Ivory Coast, a sub-Saharan country characterized by an equatorial and tropical climate. This climate is typified by elevated temperature and humidity levels (14, 15).

Taking into account the aforementioned points, the primary aim of this study will be to determine the incidence of injuries among African footballers during the 2024 AFCON competition, slated to be held in Ivory Coast from January 13 to February 11, 2024. The secondary aim will be to identify factors associated with injuries, with particular attention to the characteristics of injured players, types of injuries, and match attributes.

METHODS

Study design and context

This will be an analytical study. Two expert physician in sports medicine will perform an analytical study (i.e.; a video-based analysis) of the 2024 AFCON matches. The 2024 AFCON competition is scheduled to be held in Ivory Coast, commencing on January 13 and concluding on February 11, 2024. The competition will feature the participation of twenty-four national teams, listed here in alphabetical order: Algeria, Angola, Burkina Faso, Cameroon, Cape Verde, DR Congo, Ivory Coast, Egypt, Equatorial Guinea, Gambia, Ghana, Guinea, Guinea-Bissau, Mali, Mauritania, Morocco, Mozambique, Namibia, Nigeria, South Africa, Senegal, Tanzania, Tunisia, and Zambia. The finalized 23-player squad list for each national team will be made available ten days prior to the start of the competition (i.e.; January 3, 2024). The event will encompass fifty-two matches, spanning from the group stage to the final (Box 1).There is no need for an ethical committee approval, as the data will be taken from publicly available video footages.

Study protocol and injury definition

Each independent expert physician in sports medicine (AC and AJ in the authors' list) will actively engage in live streaming the 52 matches (Box 1). During this process, they will systematically collect various data pertinent to each match. Additionally, if deemed necessary, these physicians are authorized to review replay footage of injury moments for a more comprehensive assessment. Subsequently, each physician will complete an injury report form (Box 2).To ensure the accuracy and reliability of the collected data, the two physicians will convene either online or in person on the day following each match. This meeting is crucial to verify the concordance of their recorded observations noted in the injury report forms. In the event of any disparities or divergences in their notes, the physicians have the prerogative to jointly review the replay footage of injury moments. This collaborative review aims to facilitate a consensual decision, resolving any discrepancies and ensuring the integrity of the data collected during the study.

The adopted definition for football injury in this study will be as follows: "Any physical complaint sustained by a player that results from a football match or football training, irrespective of the need for medical attention or time loss from football activities" (12).

Box 1. List and times (T) of the 52 matches scheduled during the African Cup of Nations-2024 competition.

Round of groups: from January 13 to 24

Group A	Group B	Group C	Group D	Group E	Group F
Ivory Coast vs. Guinea Bissau (T_3)	Egypt vs. Mozambique (T_2)	Senegal vs. Gambia (T_1)	Algeria vs. Angola (T_3)	Tunisia vs. Namibia (T_2)	Morocco vs. Tanzania (T_2)
Nigeria vs. Equatorial Guinea (T_1)	Ghana vs. Cape Verde (T_3)	Cameroon vs. Guinea (T_2)	Burkina Faso vs. Mauritania (T_1)	Mali vs South Africa (T_3)	DR Congo vs. Zambia (T_3)
Equatorial Guinea vs. Guinea Bissau (T_1)	Egypt vs. Ghana (T_3)	Senegal vs. Cameroon (T_2)	Algeria vsBurkina Faso (T_1)	Tunisia vs. Mali (T_3)	Morocco vs. DR Congo (T_1)
Ivory Coast vs.Nigeria (T_2)	Cape Verde vs. Mozambique (T_1)	Guineavs. Gambia (T_3)	Mauritania vs. Angola (T_2)	South Africavs. Namibia (T_3)	Zambia vs. Tanzania (T_2)
Guinea Bissau vs. Nigeria (T_2)	Mozambique vs. Ghana (T_3)	Gambiavs. Cameroon (T_2)	Mauritania vs. Algeria (T_3)	Namibiavs. Mali (T_2)	Zambia vs. Morocco (T_3)
Equatorial Guinea vs. Ivory Coast (T_2)	Cape Verde vs. Egypt (T_3)	Guinea vs. Senegal (T_2)	Angolavs. Burkina Faso (T_3)	South Africavs. Tunisia (T_2)	Tanzania vs. DR Congo (T_3)

Round of 16: 8 matches form January 27 to 30

Quarter-final: 4 matches in February 2 and 3

Semi-final: 2 matches in February 7

Match for 3rd place: February 10

Final: February 11

T_1: 15:00; T_2: 18:00; T_3: 21:00

Box 2. Injury report form

Injured player characteristics
- National team
- Name
- Age
- Position
- League

Injury characteristics
- Mechanism
- Moment of injury (min)
- Round of match
- Stadium zone
- Body location
- Referee decision
- Replacement (yes/no)
- Absence next match (yes/no)
- Re-injury (yes/no)

Match conditions
- Schedule
- Temperature
- Humidity
- Wind speed

Data collected and incidence of injury

Outcomes will be meticulously recorded on a pre-established injury report form (Box 2), encompassing various aspects related to the characteristics of the injured player, the injuries themselves, and the matches. Regarding the characteristics of the injured player, the following data will be gathered: Age (in years), on-field position (e.g.; goalkeeper, defender, midfielder, or forward), and the player's league continent (i.e.; Africa, Europe, North America, South America, Asia, or Australia).Concerning the characteristics of injuries, a comprehensive set of data will be collected. Firstly, the injury mechanism will be classified as direct contact (i.e.; occurring at the point of contact), indirect contact (i.e.

force not directly applied to the injured area), or non-contact (i.e.; occurring without direct or indirect contact) (16). Secondly, the moment of injury will be identified in terms of the minute of play and the round of the match (i.e.; group stage, round of 16, quarterfinals, semi-finals, third place, or final). Thirdly, the stadium zone where the injury occurred (i.e.; defense, midfield, or attack zone) will be documented. Fourthly, the specific body location, utilizing the Orchard sports injury classification system (17, 18) (Box 3), will be reported. Additionally, supplementary information will be recorded, including the replacement consequent to the injury, absence from the next match, re-injury (recurrence of the injury with the same location during the competition), referee decision (foul for, foul against, or no foul), and stoppage time for on-field injury (19).Concerning the characteristics of the matches, the following data will be documented: match schedule, temperature, humidity, and wind speed as presented at the commencement of each match just before kick-off.Furthermore, the two physicians will actively seek injury details from pre- and post-match press conferences and official websites of the corresponding country confederations and the Confederation of African Football. This comprehensive approach aims to ensure a thorough and accurate compilation of injury-related information throughout the competition.

Box 3. Body location according to the Orchard sports injury classification system

Head	Neck	Shoulder
Upper arm	Elbow	Forearm
Wrist and hand	Chest	Trunk and abdomen
Thoracic spine	Lumbar spine	Pelvis and buttock
Hip and groin	Thigh	Knee
Lower leg	Ankle	Foot
Location unspecified		

The calculation of injury incidence will be expressed in terms of both match and training exposure. For match exposure, the calculation will involve multiplying 11 players by 1.5 hours for a standard 90-minute match and

2 hours for matches with additional extra time.

As for training exposure, the total minutes played during training sessions will be obtained from the respective teams' medical staff. The injury incidence will then be calculated per 1000 hours of both match and training time, in accordance with established methodology (9).

Statistical analysis

The collected data will undergo analysis using IBM SPSS version 23.0. The distribution of quantitative data will be assessed using the Kolmogorov–Smirnov test, and the results will be presented as means ± standard deviation (95% confidence interval) or as median (interquartile). Categorical data will be represented by numbers and percentages. For the analytical study, comparisons between means and medians of two groups, such as African vs. Non-African league players or injured vs. non-injured players, will be conducted using the Student t-test or Mann-Whitney U test, respectively. The 2-sided Chi-squared test will be employed to compare categorical data and rates between groups. The significance level for all analyses will be set at $p < 0.05$.

CONCLUSION

To the best of the author's knowledge, this study will be the first to determine the incidence of injuries during the 2024-AFCON and analyze their characteristics. The results of our investigation will offer valuable insights into injury patterns and will help to elaborate specific prevention strategies relevant to the AFCON context.

DECLARATIONS:

i) To enhance the academic writing of our paper, we employed the language model ChatGPT 3.5 (20, 21).

ii) Our team (Chaabeni A, Kalai A, Ben Saad H, Zerguini Y, Tabben M, Chamari K, Jellad A) authored an original paper titled "Injury incidence and associated factors among male soccer players during the 2021 African cup of nations competition: A pilot study". The paper aims to investigate soccer injuries during the 2021 AFCON, which occurred in Cameroon from January 9 to February 6, 2022. It has been submitted to F1000Research. As of February 8, 2024, the paper's status is "Awaiting review".

REFERENCES

1. Kunz M. 265 million playing football. Link: https://www.yumpu.com/en/document/view/7283064/265-million-playing-football-fifacom (Last visit: December 17, 2023).

2. Ekstrand J, Waldén M, Hägglund M. Hamstring injuries have increased by 4% annually in men's professional football, since 2001: a 13-year longitudinal analysis of the UEFA Elite Club injury study. Br J Sports Med. 2016;50(12):731-7.

3. Eirale C, Ekstrand J. Epidemiology of injury in football. Aspetar Sports Medicine Journal.2013; 2:144-9. Link: www.aspetar.com/journal/viewarticle.aspx?id=64 (Last visit: December 17, 2023).

4. Van Mechelen W. Sports injury surveillance systems. 'One size fits all'? Sports Med. 1997;24(3):164–8.

5. Arnason A, Sigurdsson SB, Gudmundsson A, Holme I, Engebretsen L, Bahr R. Risk factors for injuries in football. Am J Sports Med. 2004;32(1 Suppl):5S-16S.

6. Ekstrand J. Keeping your top players on the pitch: the key to football medicine at a professional level. Br J Sports Med. 2013;47(12):723–4.

7. Waldén M, Hägglund M, Orchard J, Kristenson K, Ekstrand J. Regional differences in injury incidence in European professional football. Scand J Med Sci Sports. 2013;23(4):424–30.

8. Orchard JW, Waldén M, Hägglund M, Orchard JJ, Chivers I, Seward H, et al. Comparison of injury incidences between football teams playing in different climatic regions. Open Access J Sports Med. 2013;4:251–60.

9. López-Valenciano A, Ruiz-Pérez I, Garcia-Gómez A, Vera-Garcia FJ, De Ste Croix M, Myer GD, et al. Epidemiology of injuries in professional football: a systematic review and meta-analysis. Br J Sports Med. 2020;54(12):711–8.

10. Owoeye OBA, Aiyegbusi AI, Fapojuwo OA, Badru OA, Babalola AR. Injuries in male and female semi-professional football (soccer) players in Nigeria: prospective study of a National Tournament. BMC Res Notes. 2017;10(1):133.

11. Zerguini Y, Bungu Kakala JP, Junge A, Dvorak J. Examination of injuries in an African national football league. The 2006–2007 EPFKIN championship in Kinshasa (Congo DR). J de Traumatol du Sport. 2010;27(4):171-6.

12. Fuller CW, Ekstrand J, Junge A, Andersen TE, Bahr R, Dvorak J, et al. Consensus statement on injury definitions and data collection procedures in studies of football (soccer) injuries. Br J Sports Med. 2006;40(3):193–201.

13. Junge A, Dvorak J, Graf-Baumann T, Peterson L. Football injuries during FIFA tournaments and the Olympic Games, 1998-2001: development and implementation of an injury-reporting system. Am J Sports Med. 2004;32(1 Suppl):80S-9S.

14. Kouassi JL, Wandan N, Mbow C. Observed climate trends, perceived impacts and community adaptation practices in Côte d'Ivoire. Environ Socio-Econ Stud. 2022;10(3):43–58.

15. Amoutchi AI, Ugbor ON, Kouamelan EP, Mehner T. Morphological variation of African snakehead (Parachannaobscura) populations along climate and habitat gradients in Côte d'Ivoire, West Africa. Environ Biol Fish. 2023;106(6):1233–46.

16. Bahr R, Clarsen B, Derman W, Dvorak J, Emery CA, Finch CF, et al. International Olympic Committee consensus statement: methods for recording and reporting of epidemiological data on injury and illness in sport 2020 (including STROBE Extension for Sport Injury and Illness Surveillance (STROBE-SIIS)). Br J Sports Med. 2020;54(7):372–89.

17. Rae K, Orchard J. The Orchard sports injury classification system (OSICS) version 10. Clin J Sport Med. 2007;17(3):201–4.

18. Orchard JW, Meeuwisse W, Derman W, Hägglund M, Soligard T, Schwellnus M, et al. Sport medicine diagnostic coding system (SMDCS) and the Orchard sports injury and illness classification system (OSIICS): revised 2020 consensus versions. Br J Sports Med. 2020;54(7):397–401.

19. Dönmez G, Torgutalp ŞŞ, Özkan Ö, İlicepınar ÖF, Korkusuz F, Kudaş S. Evaluation of stoppage time due to field injuries in professional football games: do players really need medical help so often? Res Sports Med. 2022;30(6):593–602.

20. Dergaa I, Chamari K, Zmijewski P, Ben Saad H. From human writing to artificial intelligence generated text: examining the prospects and potential threats of ChatGPT in academic writing. Biol Sport. 2023;40(2):615-22.

21. Dergaa I, Ben Saad H. Artificial Intelligence and promoting open access in academic publishing. Tunis Med. 2023;101(06):533-6.