



Predictors of Sports' Injuries among Male Professional Footballers in Nigeria

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Abstract. Sports injuries have been found to impede optimal sports' performance. In football, injuries have been identified to result from multiple risks factors and events. The purpose of this study was to assess the influence of playing field, climatic conditions, rate of exposure to matches, skill level and competition level on the occurrence and severity of football injuries among male professional footballers in Nigeria. Cross-sectional survey research design was adopted for the study. A total population of 435 participants from thirteen registered professional football club in South-Western part of Nigeria participated in the study. Purposive sampling technique was used to select the participants for the study. The research question raised was answered using descriptive statistics, and the hypothesis formulated was tested using inferential statistics of multiple regressions at 0.05 alpha levels. A researcher-developed data form was the instrument used for data collection. The instrument was subjected to reliability testing using test-re-test method, and a reliability value of 0.92_r was obtained. After a baseline examination and measurements were performed ascertaining possible predictors of injury, all players were followed up weekly for oneseason during the Nigeria professional league matches to register subsequent injuries and complaints.

Three hundred and sixty-four completed the weekly follow-ups over 1 year.

Results showed that playing field, climatic conditions, rate of exposure to matches, skill level and competition level were predictors of injuries among the professional footballers with cal. f-val. of $3.074 > \text{crit.f-val of } 2.29$ at 0.05 df 5 and 405 . Playing on natural grass, or third-generation artificial turf, acclimatization, reduction of physical overload, among others, were strategies postulated for preventing injuries in football. The study concluded amongst others that, playing on artificial should be discouraged or improved upon and that the rate of exposing footballer players to match situations should be reduced because the more they are exposed to match situations, the more injury prone they are.

Keywords: Sports Injury, professional footballers, predictors, Male footballers.

1. Introduction

Numerous injuries occur each year caused by sports, resulting in decreased physical activity and work time loss in addition to substantial medical costs. Worldwide, the cost of sports injuries has been estimated at \$1 billion annually [Eagger, 2014]. Talabi and Oyerinde [2015], estimated that 3-5 billion injuries occur annually

among competitive and recreational athletes in Nigeria alone. Sports injuries are diverse in terms of the mechanism of injury, how they present in individuals, and how the injury should be managed. Defining exactly what a sports' injury is can be problematic and definitions are not consistent. Verhagen et al [2010], highlighted that definitions of sports injury can be discussed in both theoretical and operational terms. According to Engebretsen, L, LaPrade, R, Mccrory, P, Meeuwisse, W. [2012], a sports injury may be defined as “damage to the tissues of the body that occurs as a result of sports or exercise”.

Risk factors for football injuries are typically divided into intrinsic and extrinsic. Intrinsic or internal risk factors [factors within the body], have been identified as the individual biological or psychological characteristics, such as age, gender, body composition, joint flexibility [including pathologic ligament laxity and muscle tightness], functional instability, previous injuries and inadequate rehabilitation, muscle strength and limb dominance. Extrinsic or external risk factors [factors outside the body], have been considered to include the amount of training and number of games played, climatic factors, pitch surface, playing field conditions, equipment, and also the rules of the game and foul play [Kujala, Sarna and Kaprio, 2001; Murphy, Connolly, and Beynnon, 2003; Bahr, 2005; Aoki, Kohno and Fujiya, 2010; Bjerneboe, Bahr and Andersen, 2014]. A summary of risk factors of football injuries would necessarily include the relevant extrinsic or external risk factors such as the amount of training and number of games played, climatic factors, pitch surface, playing field conditions [for example, dry, wet, uneven], equipment [for example, shin guards, taping, shoes], and also the rules of the game and foul play [Meeuwiese, 2000; Van Mechelen, 2001; Aoki, Kohno and Fujiya, 2010]. Some studies reported that, not only is football a high injury risk sport due to the body contact nature of the game, but other external predisposing factors such as equipment, coaching, playing time, and playing conditions, all contribute to athletes' proneness to injuries [Dvorak, Junge and Chomiak, 2000; Junge, Dvorak and Graf-Bauman, 2004; Soligard, Bahr

and Andersen, 2012; Walden, Hagglund and Ekstrand, 2013]. Factors such as venue, weather and playing surface, such as hard, soft and uneven playing surfaces, poor lighting, dry field condition, shoes that are inappropriate or worn out, inappropriate equipment, and environmental conditions such as hot, cold and humidity can all contribute to football injuries [Boden, Kirkendall and Garret, 2000; Orchard, Seward and McGovern, 2001; Ostenberg and Ross, 2000; Dragoo and Braun, 2010; Williams, Hume and Kara, 2011; Orchard, Walden and Hagglund, 2013; Nilstad, Andersen and Bahr, 2014].

Artificial turf has been implicated as an injury risk factor in football. A study of National Football League athletes conducted between 1980 and 1988 in Japan, reported that playing on artificial turf increased the incidence of knee and foot/ankle injuries. In that study, Tartan Turf had the highest injury incidence rates [IR = 2.36], followed by super Turf [IF = 2.34], and Astro turf [IR = 1.94], compared with grass [IR = 1.78] [Prager, fitton and Cahill, 1999]. Seven studies [Prager, Fitton and Cahill, 1999; Arnason, Gudmundson, Dahl and Johannsson, 2000; NCAA, 2002; Dragoo and Braun, 2010; Williams and Kara, 2011; Nedelec, McCall and Carling, 2013; Nilstad, Andersen, Bahr, 2014; and Hughes, Birdsey and Meyers, 2014], have reported increased incidence of injury on artificial turf compared with grass and gravel. Several prospective studies were reported to have recorded exposure as a factor of injuries in football. The general agreement among researchers is that, the more an athlete is exposed to match situations, the more prone to injuries he is [McGuine, Grene, Best and Levenson, 2000; Mckay, Goldie, Payne and Dakes, 2001; Beynon, Renstronme, Alosa, Baumhauer and Vacek, 2001; <http://www.mih.gov/pmc/articles/PMC/64386>, 2012: Accessed 12/06/2013; Dupont, Nedelec and McCall, 2010; Dauty and Collon, 2011; Ekstrand, Hagglund and Tomqvist, 2013, Junge and Dvorak, 2013; Hagglund, Walden and Ekstrand, 2013]. A study reported a 4.4 ankle sprains per 1000 hours of participation in soccer games, and 0.1 sprains per 1000 hours of practice [Amason, Gudmundson, Dahi and

Johannsson, 2000; van Beijsterveldt, Stubbe and Schmikli, 2015]. Studies have analysed the relation between skill level and injury. In a study related to severe injury in 398 male soccer players, it was reported that, athletes in lower skill level groups had a two fold increase incidence of all severe injuries as a group compared with higher skill level groups [Chomiak, Junge, Peterson and Dvorak, 2000; Bloomfield, Polman and Butterly, 2015].

As regards the level of competition and injury risk in football, it can be assumed that the higher the level of competition in football, the higher the injury rate would be. This assumption is supported by general agreement among researchers that injury incidence is greater during competition than in training session [Nielsen and Yide, 2000; Seil, Rupp and Tempelhof, 2000; Soderman, Alfredson and Werner, 2001; Bengtsson, Ekstrand and Walden, 2013; van Beijsterveldt, Stuble and Schmikli, 2015].

An injury in this study was any incident that caused a player to leave the field of play, required a stoppage in play by the referee or player, or resulted in the player being referred to hospital for medical attention.

Sports injuries result from a complex interaction of multiple risk factors and events. The rapid deceleration, acceleration, single-stance ballistic movements and acrobatic maneuvers, the nature of football explain why overall level of injury to a professional footballer is higher than in other sports. In Nigeria, the standard of professional football has been observed by the researcher to be suffering a great setback due to injuries, particularly hamstrings strains or patella tendionopathy, constituting a threat to the health and career of these professionals. In available literature, most researchers have concerned themselves more with incidence of football injuries than their factors. In consequence, as popular as football is with vigorous league season, large followers and participants, and the high degree of the players' proneness to injuries, the risk factors and mechanisms of injuries in this sport are yet to be fully identified with any appreciable degree of certainty in Nigeria.

Therefore, the purpose of the study was to determine whether playing field, climatic conditions, rate of exposure to matches, skill level and competition level were possible predictors of football injuries among male professional footballers in Nigeria, and to design a prevention programme capable of reducing the rate of injuries among these professional footballers.

1.1 Research Question

A research question was raised for the study:

Will playing field, climatic conditions, rate of exposure to match situations, skill level and competition level be significant predictors of injuries among male professional footballers in Nigeria?

1.2 Research Hypothesis

Playing field, climatic conditions, rate of exposure to match situations, skill level and competition level will not be significant predictors of injuries among male professional footballers in Nigeria.

2. Methodology

The research design adopted for the study was a cross-sectional survey [also known as cross-sectional analysis], because it forms a class of research method that involves observation of a population or a representative subset at a defined time, involving special data collection, including questions about the past, but often relying on data originally collected for other purposes. Purposive sampling technique was used to select the participants for the study. The population for the study consisted of four hundred and thirty-five [435] registered professional football players in South-western part of Nigeria. The sample for the study comprised 435 registered male professional footballers in Ondo [Sunshine F.C. and rising Stars F.C], Oyo [3SC F.C. and Crown F. C], Ogun [Gateway F.C. and Remo F.C], Lagos [Bolowotan F.C. and C.O.D. F.C.], Osun Prime F.C. and Gray F.C], and Kwara [Kwara United F.C., Bukola Babes F.C. and Injectors F.C.] States of Nigeria. Thirty-five

[35] registered male professional footballers were drawn from sunshine F.C; Rising Stars F.C; 3SC F.C. Crown F.C.; Gateway F.C; Bolowotan F.C.; C.O.D. F.C; Prime F.C; Gray F.C. and Kwara United F.C. respectively, while thirty [30] registered male professional footballers were drawn from Remo F.C. and Bukola Babes, and twenty-five [25] from Injectors F.C; using purposive sampling techniques from registration list provided by the thirteen [13] registered professional football clubs. These were the total numbers of players registered by each professional football club for 2013/2014 Nigeria professional football league season. A data generating form developed by the researcher was used to measure the influence of playing field, climatic conditions, rate of exposure to matches, skill level and competition level on participants' injuries. The context criterion validation was done by experts in Health Education, Medicine, Exercise Physiology and Physical Therapy. A pilot study was carried out and the reliability was determined by using a test re-test method, and a reliability co-efficient of 0.92 was obtained.

The procedure for data collection of the prospective study was as follows: A baseline examination was conducted to examine playing field, climatic conditions, rate of exposure to matches, skill level and competition level as possible predictive risk factor variables. All the players were followed up weekly during their league matches for 1 year to register subsequent injuries and complaints.

During the 1 year follow-up of 2013/2014 Nigeria professional football league season, all

teams' physical therapists documented all injuries and complaints, the types of play field, the climatic condition and competition level when the injuries and complaints occurred, the rate of exposure to match situations, and the skill level [According to Coaching Crew Rating], of the players using a special documentation sheet for each player. In the study, an injury was described as an incident that caused a player to leave the field of play, required a stoppage in play by the referee, or player, or resulted in the player being referred to hospital for medical attention. Injuries were classified as severe if the player was eventually hospitalized. The full co-operation and assistance of football coaches, the medical team, welfare officers, participants in each of the professional football clubs, and involvement of five trained research assistants enhanced prompt and effective administration of the data collection sheets. Descriptive statistics was used to describe the data, while Multiple regression Analysis was employed to analyse the data collected using SPSS version 16.0.

Approval for the study was obtained from the management of all the professional football clubs from which the participants were drawn. An initial orientation was organized for the participants intimating them with the details of the study including their rights, risk/discomfort, and confidentiality. Opportunity was given for questions and clarifications, and consent forms regarding their involvement in the study were signed by the participants. The study is new in Nigeria since numerous previous studies on sports injuries were basically on incidence of football injuries while the risk factors and mechanisms of the injuries were not identified

3. Results

Table 1: Descriptive Frequency Analysis of Injuries with Extrinsic Variables of Professional Footballers in Nigeria.

Variables	TYPES OF INJURIES						Total	%
	Sprain	Strains	Knee Injury	Achilles tendon	Fracture	Dislocation		
Playing Surface								
Astro turf	75	6	62	76	12	6	237	65%
Grass	45	5	57	15	5	0	127	35%
Total	120	11	119	91	17	6	364	
Climatic Conditions								
Hot	37	0	6	6	0	0	49	13.5%
Humid	5	0	12	7	0	6	30	8.2%
Cold	72	11	96	73	11	0	263	72.3%
Normal	6	0	5	5	6	0	22	6.0
Total	120	11	119	91	17	6	364	
Rate of Exposure to Matches								
1-2 times per month	40	5	42	5	0	6	98	2.7
3-4 times per month	25	6	36	59	0	0	126	35%
Grater than 4 times per month	55	0	41	27	17	0	140	38.5%
Total	120	11	119	91	17	6	364	
Skill Level								
Low	85	0	6	0	0	0	13	3.6%
Average	28	6	49	53	6	0	142	39%
High	7	5	64	38	11	6	209	57.4%
Total	120	11	119	91	17	6	364	
Level of Competition								
Practices	14	10	39	25	7	0	95	26%
Games	106	1	80	66	10	6	269	74%
Total	120	11	119	91	17	6	364	

Table 1 revealed that, playing on astro turf increased susceptibility rate to injuries with a total number 237 injuries [65%] followed by grass with 127 injuries [35%]. This should be expected because, at amateur level from where these players graduate to professional football level, practices and games are mostly done on grass pitch. So, the artificial and the stiffness of astro turf pitch could, for a long period of time, increase susceptibility rate to injuries among these footballers. Also, the table revealed more injuries during cold weather conditions with 263 injuries [72.3%], followed by hot weather with 49 injuries [13.5%], humid weather condition with 30 injuries [8.2%], and normal weather condition with 22 injuries [6%]. This is an indication that athletes, regardless of type of sport, need acclimatization and adequate warm-up activities, particularly during cold weather condition to avoid incidences of sustaining injuries. High rate exposure to match and game situations have been indicated to increase soccer athletes' susceptibility rate to injuries. Exposure to match and game situations greater than 4 times per month has a total of 140 injuries [38.5%], followed by 3 – 4 times per month [126 injuries] [35%], and 1-2 times per month [98 injuries] [2.7%]. Therefore, the rate of exposing athletes to match and game situations should be reviewed with a view to reducing it because, the more they are exposed to match situations, the more prone they are to injuries. Highly skillful soccer athletes have been found to have incurred high rate of injuries [209 injuries] [57.4%], followed by average skill level athletes with 142 injuries [39%], and low skill level athletes with 13 injuries [3.6%]. This is probably as a result of high rate of exposing good athletes to match situations in the desperate bid to achieve good results. Injury rate has been found greater during games [269 injuries] [74%], to practices with 95 injuries [26%]. This is natural because at the games level, the efforts are intensely geared towards success.

Table 2: Multiple Regression and Model Summary of Regression Analysis of Extrinsic Variables as Predictive Risk Factors for Sports Injuries among Male Professional Footballers in Nigeria.

Multiple Regression Analysis								
Source of Variation	Sum of Squares	df	Mean Squares	Cal. value	F	Crit. values	F Sig.	Decision
Regression	55.163	5	11.033					
Residual	4162.243	405	10.277	3.074		2.29	0.027	Ho ₁
Total	4217.406	410						Rejected

Model Summary of Regression Analysis				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.114	0.013	0.001	3.20580

□ = 0.05

(a) **Predictors: (Constant)**, Playing field, Climatic condition when injury occurred, Rate of exposure to matches, skill level and competition level.

(b) **Dependent Variables:** Injuries among male professional footballers in Nigeria.

Table 2a indicates that, all the independent extrinsic variables were significant predictive risk factors for injuries among professional footballers in Nigeria with calculated f-ratio 3.074, and P = 0.027 which shows that playing surface, climatic conditions, rate of exposure to matches, skill level and level of competition were significant predictive risk factors of sports injuries among the soccer athletes.

Table 2b: The Contribution of Each Independent Variable as Predictive Risk Factor of Sports Injuries among Male Professional Footballers in Nigeria.

Independent Variables	Unstandardised Coefficients		Standardized coefficients β	t-val.	P-val	Decision
	B	Std. Error				
1 (Constant)	9.059	2.172		4.170	0.000	
Playing Field	0.302	0.114	0.101	1.011	0.035	S
Climatic Conditions	0.337	0.329	0.152	1.024	0.031	S
Rate of Exposure to Matches	0.345	0.208	0.185	1.664	0.040	S
Skill level	0.152	0.030	0.086	0.057	0.612	S
Competition Level	0.319	0.202	0.106	1.016	0.059	S

□ = 0.05

The equation for table 2b is:

$$Y = 9.059 + 0.302X_1 + 0.337X_2 + 0.345X_3 + 0.152X_4 + 0.319X_5$$

Dependent variable: Injuries among male professional footballers in Nigeria.

The results of the multiple regression analysis as presented in table 2b indicates that all the five independent variables contributed to predict sports injuries among the athletes. An examination of Beta weight shows that, rate of exposure to matches contributed 0.185 to the model, followed by climatic conditions (0.152), competition level (0.106), playing field (0.101), and skill level (0.06).

4. Discussion of Findings

The study was carried out to determine possible predictive risk factors for sports injuries among male professional footballers in Nigeria with specific references to determining the influence of playing surface, climatic conditions, rate of exposure to match situations, skill level and level of competition on the occurrence and severity of football injuries. The finding lends credence to previous studies which reported increased incidence of injury on artificial turf compared with grass and gravel because of its stiffness and the increased functioning force at the shoe surface. [Arnason, Gudmundsson, Dahl and Johannsson, 2000; NCAA, 2002; Aioki, Kohno and Fujiya, 2010; Soligard, Bahr and

Andersen, 2012; Bjerneboe, bahr and Andersen, 2014]. The result also supports those studies that considered factors such as hard, soft, and uneven playing surfaces, poor lighting, dry field conditions, inappropriate equipment and environmental conditions, such as hot, cold and humidity as significant predictive risk factors for football injuries [see tables 1, 2a and 2b] [Bopden, Kirkendall and Garrett, 2000; Orchard, Seward and McGivern, 2001; Soligard, Bahr and Andersen, 2012; Hughes, Birdsey and Meyers, 2013; Poulos, Gallucci and Gage, 2014. Today, however, the nature of artificial turf has changed very considerably in developed environments by replacing short-pile carpet laid over a thin pad with a surface that contains long “grass-like” fibers embedded with granules of crushed rubber, sand, and/or silica, and laid over a thick pad. This results in a more compliant surface and one that results in a considerably lower shoe-surface coefficient of friction. Nigerian football ruling body should, as a matter of urgency, adopt this third generation artificial turf, encourage its use at all levels of football since natural grass is no longer popular, particularly at international level. Also, football coaches, trainers and team managers should encourage adequate warm-ups particularly during cold weather condition and good level of acclimatization to changing climatic conditions at all levels of the game. The result also identifies with those studies that considered increased exposure to match situations a significant predictive risk factor for injuries in football [see table 1 and 2b]. [Lindberg and Nilsson, 1994; Chomiak, Junge, Peterson and Dvorak, 2000; Bahr, 2005; Danielsson, Dupont, Nedelec and McCall, 2010; Hagglund, Zwerver and Ekstrand, 2011; Bengtsson, Ekstrand, Hagglund, 2013; Bengtsson, Ekstrand and Walden, 2013]. Physical loadwork for the athletes should be reduced to the barest minimal, as physical over load like playing four matches per month and fixture congestion were found associated with increased rates of injuries in football.

Also, the study agrees with those that reported high injury rate among athletes in higher skill level groups compared with athletes in lower skill level groups [see table 1 and 2b] [Chomiak,

Junge, Peterson and Dvorak, 2000; ASA, 2010; Bloomfirled, Polman and Butterly, 2015]. Coaches and team managers should exercise care in fielding star athletes to avoid exposing them to injuries. Start footballers may not be used during unimportant matches. The result of the study also indicates high injury rate during games than during practices [see table 1 and 2b]. The result identifies with those that found a greater injury risk during games than in practice [Ekstrand, and Moller, 1993; Nielson and Yide, 2000; Seil, Rupp and Tempell of 2000; Soderman, Alfredson and Werner, 2001; Aoki, O’Hata and Kohno, 2012; Bengtsson, Ekstrand and Walden, 2013; Hagglund, Walden and Ekstrand, 2013; Lundblad, Walden and Magnusson, 2013; Walden, Hagglund and Ekstrand, 2013]. Considering the high rate of injuries during football matches, football players should be informed adequately well on the importance of disciplined play because once an injury is incurred, it predisposes the victim to recurrent injury or permanent disability.

5. Conclusion and Recommendations

Based on the findings, it was concluded that playing surface, climatic conditions, rate of exposure to matches, skill level and level of competition were significant predictive risk factors for injuries among professional football players in Nigeria.

The following recommendations were made:

- Playing on artificial turf should be discouraged or improved upon, because of its stiffness and the increased frictional force at the shoe surface which places athletes at increased injury risk.
- Climatic conditions should be considered for both training sessions and match situations as very hot and extremely cold weather conditions facilitate occurrence of injuries among athletes.
- Structured training sessions, appropriate warming-up, appropriate game/ training relationship and reduction of physical overload should be observed more seriously as inappropriate application of

- any or all these increase the risk component for sustaining injuries.
- The rate of exposing the soccer athletes to match situations should be reviewed with a view to reducing it, because the more they are exposed to match situations, the more injury prone they are.
 - Considering the high rate of injury occurrence in football, health professionals, coaches, team managers, and all stakeholders in football should include in a systematic way, discussion on importance of disciplined lifestyle as well as information on disciplined play because once an injury is incurred, it predisposes the victim to recurrent injury.

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