American Journal of Sports Science
2016; 4(6): 105-111
http://www.sciencepublishinggroup.com/j/ajss
doi: 10.11648/j.ajss.20160406.12
ISSN: 2330-8559 (Print); ISSN: 2330-8540 (Online)

Sports Injuries and Therapeutic Patterns in Professional Footballers

Moses Monday Omoniyi[1], Boateng Arthur Kwaku[2], Osei Francis[1]

[1]Department of Sports and Exercise Science, Faculty of Allied Health Sciences, College of Health Sciences, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

[2]Medical Department, National Sports Authority and Asante Kotoko Sporting Club, Kumasi, Ghana

Email address:

moniy152002@yahoo.com (M. O. Moses), mmomoniyi.chs@knust.edu.gh (M. O. Moses), oseifrancis7@gmail.com (F. Osei), abk.michelle@yahoo.com (A. K. Boateng)

To cite this article:

Moses Monday Omoniyi, Boateng Arthur Kwaku, Osei Francis. Sports Injuries and Therapeutic Patterns in Professional Footballers. *American Journal of Sports Science.* Vol. 4, No. 6, 2016, pp. 105-111. doi: 10.11648/j.ajss.20160406.12

Received: September 22, 2016; **Accepted**: October 8, 2016; **Published**: November 18, 2016

Abstract: Athletes attach vital values to full recovery after injury based on the needs for optimal performance. However, limited quantitative studies emphasising playing position, age and circumstance, and therapeutic patterns used for the treatment of injured First Capital Plus Premier League soccer players have been conducted. This study hence describes (a) injury types based on playing position, age and circumstance, and (b) therapeutic patterns used for the treatment of injured First Capital Plus Premier League soccer players. Athletes' case files containing medical teams' injury reports for 2012/2013 and 2013/2014 Ghana Football Association league seasons and a total of 209 injury cases of football players with age range of 19-30 years and mean age of 23.67±0.90 years were described. Ages 25-27(78, 37.32%) sustained more injuries while fracture lasted for 90 days. Eighty-eight (42.1%) athletes had contusion which lasted for between 3-28 days, Strain (37, 17.1%) and Sprain (23, 11.0%) were most prevalent. Midfielders sustained higher injury (83, 39.72%) of foul contact (186, 89.0%) circumstance. Frontal head (63, 30.2%) and Knee (43, 20.5%) were anatomical structures mostly hampered by injury. Significant differences exist in injury based on playing positions, causes and players' age ($p<0.05$). Therapeutic patterns of RICE (123, 58.85%, $p<0.05$), psychotherapy (122, 58.37%, $p>0.05$), analgesia (114, 54.55%, $p<0.05$) and tapping and wrapping (110, 52.65%, $p<0.05$) administered to injury sustained were significant. Given that RICE is the mostly used therapeutic pattern based on injury type, we recommend that all Ghana club owners should abundantly make portable cold application materials and methods available to medical teams for use during games. This could reduce the risk of acute injury and lessen early career termination of premier league soccer players.

Keywords: Injury Types, Therapeutic Patterns, Soccer Players, Premier League

1. Introduction

Sports injuries reports across spectrum of games remain valuable in athletics issues. Studies in advanced countries have reported athletic injury in various sports [1-5]. Attention had also being focused on specific sport related injuries [6-11]. These attempts continued to lesson injury prevalence, improve sports performance and increase active lifespan of athletes to the domineering position presently occupied. Developing countries have continued to make significant efforts to reduce sports injury incidences through scientific interventions and evaluations [12-15] but more reports are required.

One of the recent studies with Ghana athletes population reported injury patterns in many games [16] without specific attention on football which is the most celebrated and popular game in Ghana. Physical and emotional demands to optimize performance in football are however distinctive to other games [17]. The flair attached to football by typical Ghanaian youths often leads to downfall of some clubs in case of injury to its players [18]. The traumatic nature of injury mostly to footballers should attract standard preventive therapy that can sustain the growing football careers in Ghana. Injured footballers in Ghana Football Association premier league continued to be on the increase which calls for the need to spend more time on therapeutic patterns.

Although, injury prevalence can be reduced, study had showed that injury cannot but occurred in football because the

muscolo-skeletal systems that provide the primary support mechanism were not designed to meet all the demands of optimal forces placed on these structures [19-20]. In addition, football remains one of the major contact games where superiority is demonstrated via maximum utilization of muscular strength and explosive force. Ghana Football Association premier league players are competitively committed to showcase their capabilities whenever they meet opponents as well as seeking for greener pastures. These committed characteristics among footballers in Ghana will only assume prominent status when injured players are rehabilitated smoothly and fully recovered to resume active play. It was observed that incessant media reports on injury cases on Ghana Football Association premier league players without the corresponding scholarly reports on types and therapeutic patterns tend to weaken fans commitment. Describing injury types based on playing position, age and circumstance, and therapeutic patters used for the treatment of injured First Capital Plus Premier League soccer players in Kumasi, Ghana becomes vital.

2. Materials and Methods

2.1. Team Selection

This is a descriptive survey design study of injury types and therapeutic patterns on players of Ghana Football Association's (GFA) First Capital Plus Premier League (FCPPL). Due to media report on the incidence of players' injury in the GFA male premier league clubs, four top teams were purposively contacted for players' medical injury case file for two consecutive seasons of 2012/2013 and 2013/2014 [21]. One team/club with thirty six registered players agreed to participate and delivered complete data on players with mean age of 23.67±0.90 ranging from 19-30 years.

2.2. Data Collection

Data collection was in line with international consensus agreements on procedures for epidemiological studies of football injuries recommended by FIFA [22]. The injury case file submitted has yearly baseline information collected at the beginning of each season. Each player was registered by the club on a standard exposure form and team medical staffs were responsible for recording each injury sustained on a standard injury form which provided information on the date of injury, scheduled activity, type and location of injury, circumstances surrounding injury occurrence, treatment modalities, and length of recovery. Two hundred and nine cases (209) of injury variations during matches for the two seasons (2012/2013 and 2013/2014) were obtained and analysed.

2.3. Statistical Analysis

Statistical analyses were performed with IBM SPSS Statistics version 20.0, USA. The Pearson chi-square test, NPar test and multivariate analysis were used to calculate statistical difference between injury types by positions of play, causes of injury and age groupings; and to determine landmark injury prevalence and therapeutic patterns set at significance level of $p<0.05$.

3. Results

Results on severity of injury in days showed that fourteen athletes sustained sprain that lasted for 10-21 days. Nineteen sustained strain for 14-42 days. Sixty had contusion for 3-28 days. Out of the five lacerations sustained, one lasted for a day while 4 extended till 14 days. Two post traumatic bony contusions (PTBC) sustained persisted for 30 days and another three for 60 days. Nine fractures were recorded during the seasons under consideration where six lasted for 60 days and three persisted for 90 days. The five concussions reported lasted for 8 days. Five cases of syncope were on record in which 2 persevered till 6 days and 3 continued till 8 days. Three bruises sustained continued till day five. The two dislocations recorded kept on for 14 days while the four ruptured injury recorded lingered till 60 days.

Table 1. *Distribution of Injury Types by Playing Positions.*

Injury Types	Playing Positions				Total n (%)
	Goalkeepers	Defenders	Mid-fielders	Strikers	
Sprain	3	5	9	6	23(11.0)
Strain	-	13	12	12	37(17.1)
Contusion	-	24	39	25	88(42.1)
Bleeding	-	4	4	1	9(4.3)
Laceration	-	5	-	-	5(2.4)
PTBC	-	-	2	3	5(2.4)
LCL injury	-	2	-	-	2(1.0)
MCL injury	-	-	-	2	2(1.0)
Fracture	-	-	6	3	9(4.3)
Concussion	-	3	2	-	5(2.4)
Syncope	2	-	3	-	5(2.4)
PCL injury	-	-	3	-	3(1.4)
ACL injury	-	3	-	-	3(1.4)
Bruises	-	2	3	2	7(3.3)
Dislocation	-	2	-	-	2(1.0)
Rupture	2	-	-	2	4(1.9)
Total	7(3.35)	63(30.14)	83(39.72)	56(26.79)	209(100.0)

Pearson Chi-Square=117.633[a], df = 45, Pvalue = 0.000, PTBC=Post traumatic Bony contusion

Description of injury prevalence in Table 1 positioned contusion (88, 42.1%), strain (37, 17.1%) and sprain (23, 11.0%) significantly where Mid-fielders (83, 39.72%), Defenders (63, 30.14%) and Strikers (56, 26.79%) were mostly affected.

Table 2. *Distribution of Injury Types by Circumstances and Age.*

Injury Types	Circumstances		Total	Age (years)			
	Foul Contact	Over-stretch	n (%)	19-21	22-24	25-27	28-30
Sprain	20	3	23(11.0)	1	7	12	3
Strain	23	14	37(17.1)	8	9	14	6
Contusion	88	-	88(42.1)	6	38	21	23
Bleeding	9	-	9(4.3)	1	-	7	1
Laceration	2	3	5(2.4)	-	-	2	3
PTBC	5	-	5(2.4)	-	-	4	1
LCL injury	2	-	2(1.0)	-	-	2	-
MCL injury	2	-	2(1.0)	-	2	-	-
Fracture	8	1	9(4.3)	-	3	4	2
Concussion	5	-	5(2.4)	2	-	-	3
Syncope	3	2	5(2.4)	-	2	3	-
PCL injury	3	-	3(1.4)	-	-	3	-
ACL injury	3	-	3(1.4)	-	-	3	-
Bruises	7	-	7(3.3)	2	4	1	-
Dislocation	2	-	2(1.0)	-	2	-	-
Rupture	4	-	4(1.9)	-	2	2	-
Total	186(89.00)	23(11.00)	209(100.0)	20(9.57)	69(33.01)	78(37.32)	42(20.10)
Pearson Chi-Square	83.335[a]			81.771[a]			
Df	30			45			
P-value	0.000			.001			

a. 41 cells (85.4%) have expected count less than 5. The minimum expected count is .22.

According to Table 2, athletes within ages 25-27(37.32%), 22-24(33.01%) and 28-30(20.10%) respectively have the highest percentage of injury occurrence as a result of foul contact (89.00) mainly.

Table 3. *Distribution of Injury Prevalence by Anatomical Landmarks.*

Anatomical Position	Landmark (n & %)							P-value
Head	None 165(78.9)	Frontal 32(15.3)	Temporal 8(3.8)	Occipital 4(1.9)				0.334
Facial	None 190(90.9)	Eye 4(1.9)	Cheek 2(1.0)	Nose 6(2.9)	Chin 2(1.0)	Mouth 2(1.0)	Jaw/Maxilla 3(1.4)	0.538
Neck	None 207(99.0)	Yes 2(1.0)						0.872
Shoulder	None 202(96.7)	Left 2(1.0)	Right 5(2.4)					0.604
Spine	None 207(99.0)	Lumbar 2(1.0)						0.872
Chest	None 206(98.6)	Left 1(0.5)	Right 2(1.0)					0.000
Forearm	None 202(96.7)	Lower 1(0.5)	Wrist 4(1.9)	Phalanges 2(1.0)				0.604
Abdominals	None 195(93.3)	Rectus Abdominis 3(1.4)	External oblique 2(1.0)	Internal oblique 1(0.5)	Latissimus dorsi 8(3.8)			0.291
Groin	None 194(92.8)	Left 8(3.8)	Right 5(2.4)	Genitals 2(1.0)				0.000
Knee	None 166(79.4)	Patella 15(7.2)	ACL 7(3.3)	PCL 12(5.7)	MCL 5(2.4)	LCL 4(1.9)		0.000
Hamstring	None 119(96.7)	Yes 4(3.3)						0.001
Calf	None 198(94.7)	Left 9(4.3)	Right 2(1.0)					0.550
Ankle	None 108(87.8)	Anterior Talofibular Ligament 4(3.3)	Posterior Talofibular Ligament 2(1.6)	Calcaneofibular Ligament 7(5.7)	Posterior inferior tibiofibular ligament 2(1.6)			0.884
Achilles Tendon	None 115(93.5)	Yes 8(6.5)						0.426
Cartilages	None 203(97.1)	Meniscus 6(2.9)						0.001

Anatomical Position	Landmark (n & %)			P-value
Bones	None	Forearm	Lower Leg	0.553
	201(96.2)	3(1.4)	5(2.4)	
Shin	None	Left	Right	0.425
	127(94.8)	4(3.0)	3(2.2)	

From table 3, injury cases recorded include 32(15.3%) to the frontal head, 6(2.9%) to the nose, 5(2.4%) to the right shoulder, 2(1.0%) to the lumbar, right chest and upper limp phalanges regions, 8(3.8%) to latissimus dorsi and Left groin, 15(7.2%) to patella, 7(5.7%) to calcaneofibular ligament, 8(6.5%) to Achilles tendon, 6(2.9%) to meniscus cartilages, 5(2.4%) to lower leg bones and 4(3.0%) to the left region of the shin.

Table 4. *Multivariate Analysis between Injury Types and Therapeutic Patterns.*

Therapeutic Patterns	n	%	Type III SS	Df	MS	F	P-value
RICE	123	58.85	.000[a]	10	.540	7.332	.000
POP	7	3.35	6.602[b]	10	.660	3.448E32	.000
Calcium Supplement	62	29.67	8.035[c]	10	.804	3.962	.000
Glucosamine Supplement	60	28.71	7.869[d]	10	.787	3.855	.000
Analgesia	114	54.55	3.113[e]	10	.311	6.668	.000
Massage	21	7.24	11.674[f]	10	1.167	22.776	.000
Tapping and Wrapping	110	52.65	5.350[g]	10	.535	9.547	.000
Psychotherapy	122	58.37	.535[h]	10	.053	.988	.458

a. R Squared =.21 (Adjusted R Squared =.321) b. R Squared = 1.000 (Adjusted R Squared = 1.000) c. R Squared =.261 (Adjusted R Squared =.195) d. R Squared =.256 (Adjusted R Squared =.190) e. R Squared =.373 (Adjusted R Squared =.317) f. R Squared =.670 (Adjusted R Squared =.641) g. R Squared =.460 (Adjusted R Squared =.412) h. R Squared =.081 (Adjusted R Squared = -.001)

4. Discussion

This study described injury types and therapeutic patters used on premier league soccer players in Kumasi, Ghana. We observed (table 1) that contusion (88, 42.1%), strain (37, 17.1%) and sprain (23, 11.0%) were the most prevalent injuries respectively although there were cases of dislocations and fracture that lasted for 60 days and above. Prominent of contusion implies that the athletes respond to shaking of the brain within the confines of the skull as a result of hematoma or heavy bleeding into or around the brain [3, 7, 22]. It also connotes that the athletes are vulnerable to ankles, knees and wrists injuries due to weakness of muscles or tendons or cords of tissues connecting muscles to bones [1, 23]. Injury prevalence based on position of play showed that mid-fielders (83, 39.72%) were mostly affected followed by defenders (63, 30.14%), strikers (56, 26.79%) and goalkeepers (7, 3.35%). These may be associated with positional demands during matches as mid-field players are expected to contest for all balls to increase their ball possessions. Defenders by responsibility should keep balls or opponents away from their own goal area which most often calls for consistent muscular exertion [24]. Foul contacts significantly caused injuries in football (table 2) which supports earlier submissions that foul contact contributes greatly to soccer injuries [25-28] (20–23) with respect to 89.00% observed.

The factor of age in optimal sport performance has been emphasized [29]. Literature has also reiterated that decline in sports performance with increasing age is quadratic rather linear [30] Injury incidence within prime sports age could be psychologically, socially and most especially, performance damping. The age range of 19-30 years and mean age of 23.67±0.90 years observed couple with injury distribution shown in table 2 which affects footballers within 22-27 years affirmed that the athletes are in their youthful prime age. In a distinct clarification, age 25-27 years were mostly affected (37.32%) compared to 22-24(33.01%). National or regional sport clubs with high injury rate within these ages are likely to experience stunted athlete career development except standard therapeutic measures are in place. Studies have reported debilitating effects of early injury to young athletes [31-34].

As observed in table 3, at the upper extremities, the athletes in this study had 44(21.0%) injury cases at the frontal-temporal-occipital region of the head, facial region was 19(8.6%) while neck has 2(1.0%) as against 7(3.4%) at the shoulder, 2(1.0%) at the spine, 3(1.5%) at the chest and 7(3.4%) at the forearm. The few proportion of upper extremity injuries recorded in this study corroborates earlier studies that injury to this part of the body is uncommon to footballers expect the goalkeepers [35-38].

Latissimus dorsi and left groin had most (8, 3.8%) injury cases at the trunk region which compared positively with the quantity reported in literatures [39-42]. Lower extremity injuries were the most common injuries observed based on anatomical landmark. This confirmed the earlier submission that regardless of the playing position, lower extremity injuries are the most common injuries among football players [43]. The greater percentage of injury to the lower extremity was at the knee [Patella, 15(7.2%); PCL, 12(5.7%); ACL, 7(3.3%); MCL, 5(2.4%) and LCL, 4(1.9%)]. Knee injuries had been reported overtly [44-49] with ACL been frequently reported among elite footballers in developed countries. Our study however showed that Ghanaian footballers experience patella, posterior cruciate ligament (PCL), medial collateral ligament (MCL) and lateral collateral ligament (LCL) probably proportionate to muscular force output exhibit

during competitive matches. Application of force in ball distribution without understanding the principles of sports mechanics, as peculiar to most home-based footballers in Africa, may result in acute injuries [50].

We also noticed in this study that bone injury occurred (8, 3.8%) to the footballers which has negative implications. Therefore, given that the mean severity of injury cases per number of days observed in this study was 19.02±16.55 days, bone injure may pose major threat or even end sport career of these athletes earlier than expected [48].

The frequency of injury treatment modes in our study (table four) showed that RICE was the most significantly used pattern (123, 58.85%) followed by psychotherapy (122, 58.37%), analgesia (114, 54.55%), taping and wrapping (110, 52.65%), calcium supplement (62, 29.67%), glucosamine supplement (60, 28.71%), massage (21, 7.24%), and POP (7, 3.35%) respectively. The trend of these therapeutic patterns pictures injury occurrence prevalence among study sample. These confirm reported overwhelming application of RICE principles in the conditions of traumatic injury, overuse syndrome, inflammation and pain [37-39, 44-46]. Prevalence of psychotherapy usage may not be unconnected with the element of frustration, depression, anger, tension, fear, negative effect, low self-esteem, anxiety and other emotional responses associated with sports injury [44]. Literatures have also indicate that injuries such as stretch – induced muscle strains, muscle contusions and delayed onset muscle soreness as observed are mostly treated with analgesia for short-time relief [45-51].

We also observed that supplementary therapy formed part of the treatment regimens applied by team doctors to fitness because in football, fitness is a major factor in injury prevention and players' recovery from previous injury [15]. In addition, massaging, taping and wrapping as well as POP patterns were used to enhance healing processes maybe for injuries such as dislocations and fractures as recommended [52].

The practical implications of this study could be seen in some ways. In the first instance, 96.65% of the players in this study suffer multiple injuries including rupture. Rupture would have negative impact on psychological apart from physiological involvement of players and loved ones. Rehabilitation or recovery from rupture is often prolong sometimes three to six months depend on its nature. These injuries potent danger on the performance ability of the players coupled with poor motivational conditions.

Also based on position of play, although soccer is team sports, playing activity is most intense at the defensive compartments (Defense and Mid-field) where this study recorded high prevalence (69.82%). This implies that holding or possession of ball would be negatively affected, general ball distribution would be inefficient and ineffective and team rating would suffer improvement. On the long run, match fitness of the team and selection for national assignment would be hindered. National rating and economic benefits would suffer setback.

5. Conclusion

The Ghana premier league football players studied sustained sprain, strain, contusion, PCL injury, LCL injury, MCL injury, fracture, dislocation and concussion injuries. Mid-field players as well as players within 25-27 years suffer more injury. Therapeutic patterns notably used were RICE, calcium and glucosamine supplements, analgesia, massage, taping and wrapping, POP and psychotherapy. Footballers should be exposed to strategic sports injury reduction intervention and all Ghana club owners should abundantly make portable cold application materials available to medical teams for use during games.

References

[1] D. T. P. Fong, Y. Hong, L. K. Chan, P. S. H. Yung, Chan K-M. "A systematic review on ankle injury and ankle sprain in sports". *Sports Med.* Vol. 37, no. 1: pp. 73–94, 2007.

[2] A. S. Goldberg, L. Moroz, A. Smith, T. Ganley. "Injury surveillance in young athletes: A clinician's guide to sports injury literature". *Sports Med.* Vol. 37, no. 3: pp. 265–278, 2007.

[3] M. Hübscher, A. Zech, K. Pfeifer, F. Hänsel, L. Vogt, W. Banzer. "Neuromuscular training for sports injury prevention: A systematic review". *Medicine and Science in Sports and Exercise.* Vol. 42, no. 3: pp. 413–421, 2010.

[4] K. McBain, I. Shrier, R. Shultz, W. H. Meeuwisse, M. Klugl, D. Garza, G. O. Matheson. "Prevention of sports injury I: a systematic review of applied biomechanics and physiology outcomes research". *British Journal of Sports Medicine.* Vol. 46, no. 3: pp. 169–173, 2012.

[5] K. McBain, I. Shrier, R. Shultz, W. H. Meeuwisse, M. Klugl, D. Garza, G. O. Matheson. "Prevention of sport injury II: a systematic review of clinical science research". *British Journal of Sports Medicine.* Vol. 46, no. 3: pp. 174–179, 2012.

[6] J. Ekstrand, M. Hägglund, M. Waldén. "Injury incidence and injury patterns in professional football - the UEFA injury study". *British Journal of Sports Medicine*, 2009. Available from: http://dx.doi.org/10.1136/bjsm.2009.060582.

[7] J. M. Hootman, R. Dick, J. Agel, J. "Epidemiology of collegiate injuries for 15 sports: Summary and recommendations for injury prevention initiatives". *Journal of Athletic Training.* Vol. 42, no. 2: pp. 311–319, 2007.

[8] A. L. Kitson, Å. M. Athlin. "Development and preliminary testing of a framework to evaluate patients' experiences of the fundamentals of care: a secondary analysis of three stroke survivor narratives". *Nursing Research and Practice*, Vol. 2013, Article ID 572437, 12 pages, 2013. doi: 10.1155/2013/572437.

[9] J. O. Koh, J. D. Cassidy, E. J. Watkinson. "Incidence of concussion in contact sports: a systematic review of the evidence". *Brain Injury,* Vol. 17, no. 10: pp. 901–917, 2003.

[10] O. B. A. Owoeye. "Pattern and Management of Sports Injuries Presented by Lagos State Athletes at the 16th National Sports Festival (KADA Games, 2009) in Nigeria." *Sports Medicine, Arthroscopy, Rehabilitation, Therapy and Technology: SMARTT* 2 (2010): 3. *PMC*. Web. 23 Sept. 2016.

[11] T. Pillay, J. Frantz. "Injury prevalence of netball players in South Africa : The need for injury prevention". *South African Journal of Physiotherapy.* Vol. 68, no. 3: pp. 7–10, 2012, doi: 10.4102/sajp.v68i3.17.

[12] O. B. A. Owoeye, A. K. Akodu, B. M. Oladokun. "Incidence and pattern of injuries among adolescent basketball players in Nigeria". *South Afican Journal of Sports Medicine,* Vol. 25, no. 3: pp. 77-80, 2013. doi: 10.7196/sajsm.471.

[13] J. A. Adjei, M. O. Moses, F. K. Nutakor, A. Gyinaye. "Sports injuries and injury management techniques among domestic athletes in kumasi, Ghana". *International Journal of Sport Science and Fitness,* Vol. 5, no. 1: pp. 31–41. 2015.

[14] M. O. Moses, B. Duduyemi. "Sports participation, anthropometric and physiological profiles of university athletes". *Nigerian Journal of Physiological Sciences,* Vol. 31, no. 1: pp. 063–069. 2016.

[15] T. Dansu. "Sports injury prevention eduaction: expanding the frontier for sports science and safe performance". *Journa of Nigerian Association of Sport Science and Medicine,* Vol. 15, pp 73–80, 2014.

[16] O. K. Adepoju. "Effectiveness of a physiotherapy sports injury educational package for senoir secondary school students". Masters Thesis, Obafemi Awolowo University, Ile-Ife, Nigeria; 2007.

[17] J. Ekstrand, T. Timpka, M. Hagglund. "Risk of injury in elite football played on artificial turf versus natural grass: a prospective two-cohort study". *British Journal of Sports Medicine*, Vol. 40, no. 12: pp. 975–981, 2006.

[18] C. Kang, D. S. Hwang, S. M. Cha. "Acetabular labral tears in patients with sports injury". *Clin Orthop Surg*. Vol. 1, no. 4: pp. 230–235, 2009.

[19] T. D. Dissanayaka, A. J. B. Rathnayaka. "Awareness on acute knee soft tissue injury management among rugby players". *International Journal of Scientific and Research Publications,* Vol. 4, no. 7: pp. 7–9, 2014.

[20] C. G. Koutures, A. J. M. Gregory. "Injuries in youth soccer". *Pediatrics*. Vol. 125, no. 2: pp. 410–414, 2010.

[21] E. Alentorn-Geli, G. D. Myer, H. J. Silvers, G. Samitier, D. Romero, C. Lázaro-Haro, R. Cugat. "Prevention of non-contact anterior cruciate ligament injuries in soccer players. Part 1: Mechanisms of injury and underlying risk factors". *Knee Surgery Sport Traumatology Arthroscopy*. Vol. 17, no. 7: pp. 705–729, 2009.

[22] E. Giza, L. J. Micheli. "Soccer injuries". *Medicine and Sport Science*, 49: pp. 140–169. 2005.

[23] H. Paajanen, L. Ristolainen, H. Turunen, U. M. Kujala. "Prevalence and etiological factors of sport-related groin injuries in top-level soccer compared to non-contact sports". *Archives of Orthopaedic and Trauma Surgery*, Vol. 131, no. 2: pp. 261–266, 2011.

[24] P. Wicker, C. Breuer, T. Pawlowski. "Promoting sport for all to age-specific target groups: the impact of sport infrastructure". *European Sport Management Quarterly*. Vol. 9, no. 2: pp. 103–118, 2009.

[25] M. Kallinen, A. Markku. "Aging, physical activity and sports injuries. An overview of common sports injuries in the elderly". *Sports Medicine*, Vol. 20, no. 1: pp. 41–52, 1995.

[26] A. L. Chen, S. C. Mears, R. J. Hawkins. "Orthopaedic care of the aging athlete". *Journal of American Orthopaedic Surgery*. Vol. 13, no. 6: pp. 407–416, 2005.

[27] M. J. Daley, W. L. Spinks. "Exercise, mobility and aging". *Sports Medicine*. Vol. 29, no. 1: pp 1-12, 2000.

[28] H. Bracq, M. Chapuis, P. Violas. "Traumatology in football among children and teenagers". *Science and Sports*. Vol. 14, no. 5: pp. 242–247, 1999.

[29] J. Ekstrand, M. Hägglund, H. Törnqvist, K. Kristenson, H. Bengtsson, H. Magnusson, M. Waldėn. "Upper extremity injuries in male elite football players". *Knee Surgery, Sport Traumatological Arthroscopy*, Vol. 21, no. 7: pp. 1626–1632, 2013.

[30] F. Cromwell, J. Walsh, J. Gormley. "A pilot study examining injuries in elite gaelic footballers". *British Journal of Sports Medicine*, Vol. 34, no. 2: pp. 104–108, 2000.

[31] B. J. Shiple. "Hamstring strains in elite footballers: predicting recovery and recurrence". *Clinical Journal of Sport Medicine*, Vol. 21, no. 4: pp. 372–373, 2011.

[32] B. Rogalski, B. Dawson, J. Heasman, T. J. Gabbett. "Training and game loads and injury risk in elite Australian footballers". *Journal of Science and Medicine in Sport.* Vol. 16, no. 6: pp. 499–503, 2013.

[33] J. W. Orchard, P. Farhart, C. Leopold. "Lumbar spine region pathology and hamstring and calf injuries in athletes: is there a connection?" *British Journal of Sports Medicine*, Vol. 38, no. 4: pp. 502-504, 2004.

[34] M. Waldén, M. Hägglund, J. Ekstrand. "High risk of new knee injury in elite footballers with previous anterior cruciate ligament injury". *British Journal of Sports Medicine*, Vol. 40, no. 2: pp. 158-162, 2006.

[35] K. O'Sullivan, B. O'Ceallaigh, K. O'Connell, A. Shafat. "The relationship between previous hamstring injury and the concentric isokinetic knee muscle strength of Irish Gaelic footballers". BMC Musculoskelet Disorders. 9: 30. 2008, doi: 10.1186/1471-2474-9-30.

[36] J. P. Slavotinek, G. M. Verrall, G. T. Fon, M. R. Sage. "Groin pain in footballers: the association between preseason clinical and pubic bone magnetic resonance imaging findings and athlete outcome". *American Journal of Sports Medicine*, Vol. 33, no. 6: pp. 894–899, 2005.

[37] F. Yamaner, A. Kartal. "Evaluation of Injuries in Professional Turkish Football Players". *European Journal of General Medicine*, Vol. 8, no. 2: pp. 98–104, 2011.

[38] T. E. Hewett, G. D. Myer, K. R. Ford, R. S. Heidt Jr., A. J. Colosimo, S. G. McLean, A. J. van den Bogert, M. V. Paterno, P. Succop. "Biomechanical measures of neuromuscular control and valgus loading of the knee predict anterior cruciate ligament injury risk in female athletes: a prospective study". *American Journal of Sports Medicine,* Vol. 33, no. 4: pp. 492-501, 2005.

[39] J. H. Stubbe, A. M. van Beijsterveldt, S. van der Knaap, J. Stege, E. A. Verhagen, W. van Mechelen, F. J. Backx. "Injuries in professional male soccer players in the netherlands: a prospective cohort study". *Journal of Athletic Training,* Vol. 50, no. 2: pp. 211–216, 2015; doi: 10.4085/1062-6050-49.3.64.

[40] G. Dupeux, C. Cohen, D. Q. AnneLe Goff, C. Clanet. "Football curves". *Journal of Fluids and Structures*. Vol. 27: 659–667, 2011.

[41] L. Ristolainen. "Sports injuries in finnish elite cross-country skiers, swimmers, long-distance runners and soccer players. Masters Dissertation University of Jyväskylä, Finland, 2012.

[42] J. T. Costello, P. R. A. Baker, G. M. Minett, F. Bieuzen, I. B. Stewart, C. Bleakley. "Whole-body cryotherapy (extreme cold air exposure) for preventing and treating muscle soreness after exercise in adults (Review)". The Cochrane Collaboration Bone J and MTG, editor. Australia: JohnWiley & Sons, Ltd.; 2015. Issue 9. Art. No.: CD010789. DOI: 10.1002/14651858.CD010789.pub2.

[43] T. A. Järvinen, M. Järvinen, H. Kalimo. "Regeneration of injured skeletal muscle after the injury". *Muscles Ligaments Tendons Journal*. Vol. 3, no. 4: pp. 337–345, 2013.

[44] D. Spermon, Y. Darlington, P. Gibney. "Psychodynamic psychotherapy for complex trauma : targets, focus, applications, and outcomes". *Psychology Research and Behaviour Management*. Vol. 3: 119–127, 2010.

[45] D. F. Drake, S. F. Nadler, L. H. Chou, S. D. Toledo, V. Akuthota. "Sports and performing arts medicine. 4. Traumatic injuries in sports". *Archives of Physical Medicine and Rehabilation,* Vol. 85, (3 Suppl 1): pp. S67–71, 2004.

[46] U. Jørgensen. "Epidemiology of sports injuries". *Nordisk* Medicine, Vol. 109, no. 2: pp. 47–49, 1994.

[47] D. Hawkins, J. Metheny. "Overuse injuries in youth sports: biomechanical considerations". Medicine and Science in Sports and Exercise. Vol. 33, no. 10: pp. 1701–1707, 2001.

[48] K. Young. "Sports injuries and TCM". *Journal of Chinese Medicine*. Vol. 78: pp. 10, 2005.

[49] R. B. Anderson, K. J. Hunt, J. J. McCormick. "Management of common sports-related injuries about the foot and ankle". *Journal of American Academy of Orthopaedic Surgeon.* Vol. 18, no. 9: pp. 546–556, 2010.

[50] F. De Paulis, A. Cacchio, O. Michelini, A. Damiani, R. Saggini. "Sports injuries in the pelvis and hip: diagnostic imaging". *European Journal of* Radiology, Vol. 27, (Suppl 1): pp. S49-S59, 1998.

[51] D. R. Patel, T. L. Nelson. "Sports injuries in adolescents". *Medical Clinic of North America*, Vol. 84, no. 4: pp. 983–1007, 2000.

[52] T. W. Kaminski, J. Hertel, N. Amendola, C. L. Docherty, M. G. Dolan, J. T. Hopkins, E. Nussbaum, W. Poppy, D. Richie. "National athletic trainers' association position statement: Conservative management and prevention of ankle sprains in athletes". *Journal of Athletic Training,* Vol. 48, no. 4: pp. 528–545, 2013.