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Title: The Relative Risk for Sports Injuries based on Pre-Participation Health Evaluation in Uganda

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ABSTRACT

The aim of this study was to examine the relative risk of sports injuries based on pre-participation health evaluation among Uganda athletes. This prospective cohort included 546 athletes, = or > 18 years old, who were free from injury. We examined the relative risk of injuries from 4 main sports (soccer/football, n= 161, track and field, n= 106, basketball, n = 120 and rugby, n= 159) and the likelihood for sports injury based on pre-participation health evaluation (PPHE) using Pearson's Chi square test. After a one year follow up, seventy- five lost-time injuries (n= 75) were reported. There was an increased risk of sports injuries among athletes who didn't undergo PPHE. The relative risk (RR) for sports injuries in athletes without PPHE was greater in rugby (RR= 21.8, 95% CI, 13.6 - 33.88), followed by soccer/football (RR= 21.6, 95% CI, 3.1 - 33.78), followed by track and field (RR= 14.1, 95% CI, 9.0- 23.17) and basketball (RR= 12.2, 95% CI, 7.56 to 19.63). Our chi square tests revealed that the association between injury risk among athletes exposed to injury based on their PPHE was greater and significant among athletes in track and field ($X^2 = 23.2$, $p = .01$), followed by rugby ($X^2 = 12.9$, $p = .02$), and basketball ($X^2 = 10.8$, $p = .02$). Pre-participation health evaluation is an important risk factor in sports injury acquisition. Our findings reveal gaps in practice among personnel involved in the prevention of sports-related injuries in Uganda, thus warranting specific sports regulations.

KEY WORDS: sports injuries, pre-participation, relative risk, Uganda

INTRODUCTION

Sports injuries affect all sports participants regardless of the geographical location or level of sports participation and fitness level. Injuries can be sustained in both contact and noncontact sports leading to an acute, overuse or both scenarios for the athlete (1). In fact, this kind of bodily harm is not a new phenomenon in today's sports (18) and most sports associations or federations are mandated by their international governing organizations to mitigate sports injuries through some form of injury prevention or management protocol. However, the presence of poor injury management practices,

limited resources, inappropriate or inadequate participation skills and absence of policies, rules and regulations may exacerbate the situation (18, 19). In additional, several international governing bodies in charge of the development of various sports have existing frameworks for injury management aimed at reducing the risk for these injuries (7, 8), and these include pre-participation screenings or evaluations. Pre-participation health examinations (PPHE) are a common aspect of sports at different levels in many developed countries, as a standard of care for all athletes (3, 20). Moreover, the nature of health care in many developing countries coupled with the health of many youth warrants genuine consideration prior to participation in contact sports (2, 11, 12, 20). A previous case study on sports related concussions in Uganda revealed gaps in the management of the concussion injury on and off the field, leading to concerns on the type of screening mechanisms prior to sports participation (13). The purpose of this study was to examine the relative risk for sports injuries in Ugandan athletes based on the pre-participation health evaluation status.

METHODS

Participants

Upon receiving approval to conduct research from the author's academic institution (HRECREF: 584/2014) and the Uganda National Council for Science and Technology (UNCST) (Ref: SS3626), a total of 546 healthy and active athletes without reports of injury in the past 12 months were enrolled in the study upon their consent. Only athletes that were 18 years old or above, were enrolled in this study. For our study to have a higher power (> 80%), this sample was adequate based on our solicitation of participants from the main regions of Uganda (Northern, Eastern, Western and Central). The sample size calculation (10) considered a non-response rate of 10%, at a 95% confidence level, with in a 5% margin of error. This stratified sample consisted of exposed and unexposed athletes in four sports/associations including soccer/football (Federation of Uganda Football Association- FUFA), track and field (Uganda Athletics Federation-UAF), basketball (Federation of Uganda Basketball Association- FUBA) and rugby (Uganda Rugby Union- URU). The unexposed athletes didn't compete in the association specific competitions at the time of follow up.

Table 1. Demographic information summary of the injured athletes

Sports/Associations	Average Age (SD)	Gender	Exposed/Injured
Track and Field/UAF	22.8+- 2.5	Female (n = 6)	16
		Male (n = 10)	
Basketball/FUBA	27.8+-4.4	Female (n = 10)	25
		Male (n = 15)	
Football (Soccer)/FUFA	21.7+-3.1	Female (n = 0)	11
		Male (n = 11)	
Rugby/URU	23.1+-3.04	Female (n = 2)	23
		Male (n= 21)	
Total (N)			75

Protocol

Prior to our observations, athletes were interviewed on key demographics including, injury status and their pre-participation health examination status in the most recent competition calendar using the data extraction sheet designed by the researchers. Using a previously validated best medical practices framework (13), we conducted follow up observations of participations in the cohort during practice and competition.

Sports injury Classification

Sports injuries were largely classified following the revised Orchard Sports Injury Classification system (OSICS-10) (16). During the study period, nine injury conditions of abrasion, concussion, hematoma, dislocation, faint, fractures, laceration, sprain and strain were diagnosed among exposed athletes (Table 2). During the follow up period, the exposed athletes sustained injuries either during practice or at competition. The researchers relied on the athletes' diagnosis from the emergency rooms and from the sideline evaluation of health practitioners to classify the injuries based on a standard classification system (16).

Table 2. Athlete injury situations and conditions upon follow-up

	Sample	Injury situation		Specific Injury Exposure								
Sports	Observed	Exposed	Un Exposed	a	b	c	d	e	f	g	h	i
Track and Field	106(19.4%)	16(21.3%)	90(19.1%)	-	-	-	-	1	-	1	10	4
Rugby	159(29.1%)	23(30.7%)	136(28.9%)	1	2	-	-	-	-	3	11	6
Basketball	120(21.9%)	25(33.3%)	95(20.2%)	1	-	-	1	-	1	-	18	4
Soccer/Football	161(29.6%)	11(14.7%)	150(31.8%)	-	1	1	-	-	2	-	2	5
Total	546 (100%)	75 (100%)	471(100%)	2	3	1	1	1	3	4	41	19

a- abrasion, b- concussion, c- hematoma, d- dislocation, e- faint, f-fractures, g- laceration, h-sprain, i- strain

Statistical Analysis

Using descriptive analyses, we compared frequency distributions of PPHE status across the different sports while controlling for age and gender. We calculated the comparisons based on the exposed (13.7%) and unexposed (86.3%) groups. Relative risk for injury among athletes exposed to injuries (N_e= 75) from track and field (n_{tfe} =16), rugby (n_{re} = 23), basketball (n_{be} = 25) and soccer/football (n_{sfu} = 11) (Table 1), was determined using IBM©SPSS© Statistics, version 25 (IBM Corporation, New York). The confidence intervals (CI) were estimated at 95%, at an alpha level of .05. Our reference group consisted of un-exposed athletes (N_u= 471), from track and field (n_{au} =90), rugby (n_{ru} = 136), basketball (n_{bu} = 95) and soccer/football (n_{sfu} = 150) (Table 2). Using Pearson's chi square test (X^2), we compared the differences between the binary categorical variable of PPHE status among athletes from the four sports (Table 4).

RESULTS

Measuring Relative Risk

Using SPSS 25, we calculated relative risk for sports injuries among athletes in four different sports, and yielded statistically significant values ($p < .05$). The relative risk was highest in rugby (RR= 21.8), followed by soccer/football (RR= 21.6), track and field (RR= 14.1) and lowest in basketball (RR=12.2).

Table 3. Relative risk sports injuries among athletes who didn't undergo participation screening

Sports	Relative Risk, RR	95% CI	*P* value
Track and Field	14.1	9.0- 23.2	.004*
Rugby	21.8	13.6-33.9	.001*
Basketball	12.2	7.6-19.6	.003*
Soccer/Football	21.6	3.1-33.8	.004*

*$p < .05$

Pre-Participation Health Evaluation Status

The majority of athletes (97%) that were exposed to injury hadn't undergone through pre-participation health evaluation (PPHE). We calculated the chi square values of the dichotomous categorical variable relating to the athletes' PPHE status (Yes- Received PPHE, No- Didn't receive PPHE) prior to the participation in the season training and competition. We found significant relationships between athletes' exposure to injury and lack of pre-participation health evaluation in three sports (track and field, rugby and basketball). Moreover, the relationship was greater in track and field ($X^2 = 23.2$, $p = .01$), followed by rugby ($X^2 = 12.9$, $p = .02$), and basketball ($X^2 = 10.8$, $p = .02$). The chi square statistic for soccer/football ($X^2 = 11.7$, $p = .06$), revealed that the relationship was not statistically significant.

Table 4. Relationship between Injury exposure and lack of pre-participation evaluation

PPHE Status	Athletes Exposed to Injury during follow up	
	Chi Square (X^2)	*P* value
Track and Field (No) (Yes)	23.2	.01*
Rugby (No) (Yes)	12.9	.02*
Basketball (No) (Yes)	10.8	.02*
Soccer/Football (No) (Yes)	11.7	.06

*$p < .05$

DISCUSSION

The purpose of this study was to examine the relative risk for injury among sports participants in Uganda based on their pre- sports activity participation evaluation and screening. Our study reveals the presence of greater relative risk for injury in rugby compared to soccer/football, track and field and soccer/football respectively. Furthermore, in comparing the results for the associations between exposure to injury and pre-participation evaluation, we found statistically significant associations in track and field, rugby and basketball. However, the association in soccer/football were not statistically significant.

Our study builds on the available but scant literature on sports injuries in Uganda (13) to determine the relative risk for injury for those without pre-participation health evaluation and also establish the relationship between pre-participation health evaluation and injury exposure. A previous study evaluated the relative risk for sports activity among young adults, and found an increased risk for sudden death among male and female participants, especially for those with cardiovascular ailments (13, 14). Our study is supported by previous findings (17) that necessitate some level of pre-activity screening regardless of the existing controversy on key components (5). Our cohort study doesn't ensue without limitations to consider. Our sample of athletes exposed to injury was trivial. Furthermore, the follow up period for injury observation limits the ability to observe and record occurrences outside that time frame. Future research might benefit from a manipulation of these characteristics to increase the observation time frame. Our usage of the Orchard Sports Injury Classification system (OSICS-10) (16) is subject to classification limitations as some of the nine injury conditions can be classified differently under medical documentation. To address this limitation, we considered medical terminology of injuries and their relevant classes used in medical documentation (6).

In light of the above limitations, our findings reveal gaps particularly in the pre-participation screening process for athletic participation in Uganda. Practitioners in Uganda's sports and physical activity programs would benefit from policies that mandate pre-participation evaluation or screening prior to participation, as a way to reduce injury risk (5, 14, 15, 17). Our study indicated the loss of play time in all the four sports due to exposure to injury, which is in line with growing evidence, suggesting an immediate attention in areas of sport injury prevention (9). Furthermore, understanding the etiology of sports injuries is necessary in designing interventions for prevention.

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