THE PATTERN OF INJURIES AMONG HIGH SCHOOL RUGBY PLAYERS AND THE INITIAL TREATMENT IN ELDORET, KENYA

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ABSTRACT

Background: Rugby is a team sport involving contact and collision of players and consequently has a high injury rate. Many studies on injuries in rugby have concentrated on professional players leaving out the high school players. This study takes into consideration the latter group.

Objective: To find out the pattern and initial care of sports injuries among High School rugby players in Eldoret, Kenya.

Methods: A prospective descriptive study conducted in four public secondary schools within Eldoret town (September 2015 - April 2016). Recruited rugby players who met inclusion criteria were 123. Consent and assent were obtained, and validated interviewer administered questionnaires were used for data collection. Physical examination was done on all injured players. Data analysis was done using R and presented in tables and prose so as to make detailed interpretations.

Results: Forwards were 69 while backs were 54. Average age, weight, height and BMI were 17.6 years, 68.7kgs, 177.2cm and 22.1kg/m^2 respectively. The 47 and 6 players each sustained one and two injuries each respectively. The backs and forwards recorded 53% and 47% injuries respectively. Anatomic distribution: lower limbs 23 (39%), upper limbs 22(37%), head and neck 8 (14%) and trunk 6 (10%). Injury variables included contact with other players, tackle and scrum were 32 (54.2%), 28 (47.5%), and 9 (15.3%) respectively. First and second half, and added time injuries were 12 (35.3%), 20 (58.8%) and 2 (5.9%) respectively. Minor- mild, and moderate- severe injuries were 68% and 32% respectively. Initial care to all injured was by peers and coaches / teachers on field, involved use of ice-packs, bandaging, topical analgesics, rest and massage, with 24 (40.7%) out of 59 injured referred to various health institutions. Increase in weight was associated with increased risk of injury to the participant, p=0.038.

Conclusions: Majority of the injuries occurred on the lower limbs mainly on the knee. The initial care was first aid on the field offered by peers and coaches/ teachers.

Key words: Pattern of injuries, High school rugby players, Initial treatment

INTRODUCTION

Rugby union also known as rugby is a team sport involving contact and collision of players running at fast speeds. Rugby is a physically demanding sport characterized by massive physical contact, collisions, and physical aggression because contesting for possession of the ball is one of the basic characteristic of the game, and consequently has a high injury rate. The estimated incidences are variable at 6%-96% (2,5) with most authors in different studies documenting as high. To gain a better understanding of nature and causes of rugby injuries, in particular their association with training and age of players (2,6) among others is quite important.

Many studies on musculoskeletal injuries in rugby games have been carried out, generally focusing on premier level men (8,9), though few described injuries to women players. The increasing popularity of rugby among high school students due to increased global popularity places them at risk of receiving similar injuries. In another study (7), the senior level witnessed higher incidences than the junior, with muscular in the former and fractures in the latter. There have, however, been differences in injury definitions in these studies which make comparisons between them difficult. Some studies report rates as “player-injury rate” per 1000 player-hours, while others use percentages .

The purpose of this study therefore was to find out the patterns and initial care of sports injuries

among the high school rugby players in Eldoret. The information obtained will be quite useful to and not limited to the managers of schools and the related community; the hospitals; ministries of education, health, sports and youth affairs for purposes of strategic planning and proper management of the patients.

MATERIALS AND METHODS

The study sites were four public secondary schools in Eldoret that participated in rugby: Wareng, Uasin Gishu, Kamagut and Kapsoya. Prospective descriptive study design was used. Study population was by census of 123 male students, all rugby players participating in practice and competitive games met the inclusion criteria, giving a provision of 30 (2 teams of 15s) from each high school. They were followed for 6 months from the beginning to end of season.

Data collection tools were validated questionnaires which were filled by Principal Investigator (PI) and Research Assistants (RAs) in case an injury occurred (during training and competition: from September 2015 to April 2016) to capture the pattern and initial care given to the injured players. Data analysis was done using environment for statistical computing (18). Categorical variables such as presence or absence of injury, position played, and the sites of the injury among others were summarized using frequencies and the corresponding percentages.

Continuous variables- age, weight, height and BMI summarized using mean and the corresponding Standard Deviation (SD). Injury rates were calculated as a percentage. Association between categorical variables such as presence of injury and the position played was assessed using Pearson's Chi square test. Fisher's exact test was used whenever the Chi Square assumptions were violated. Independent sample t-test was used to compare two continuous variables.

Permission and clearance to conduct the study was provided by the Institutional Research Ethics Committee (FAN; IREC 1241), and Moi University, Eldoret, Kenya. For a participant who was a minor, consent from parent/ guardian or teacher on behalf was sought which was signed, while the minor assented to the study. Enrolment into the study was voluntary.

RESULTS

Demographic characteristics of 123 player who participated in the study are shown in Table 1.

Distribution of the rugby players by position played: The backs were 54 (43.9%) while the forwards were 69 (56.1%).

Injuries suffered: Fifty-three (43.1%) rugby players sustained injuries with 47 (88.7%) having had 1 injury each and 6 (11.3%) two injuries each; however 70 (56.9%) had no injury.

Table 1
Demographic characteristics (N = 123)

Variable	Range	Mean	SD	Significance (*p*- value)
Age (years)	14.0- 21.0	17.6	1.3	0.735
Weight (Kg)	50.3 - 82.0	68.7	6.7	0.038
Height (cm)	163.0 – 189.0	176.2	6.7	0.317
BMI (Kg/m^2)	16.7 - 27.6	22.1	2.0	0.164

Table 2
Description of the site of injury

Injury site	Frequency	(%)
Lower extremity	23	39
Upper extremity	22	37
Head and neck	8	14
Abdomen and pelvis	3	5
Chest	2	3
Spine	1	2
Total	59	100

The lower extremity was most affected 23 (39%): knees and ankle accounting for 9 (15.3%) and 5 (8.5%) respectively, lower leg 4 (6.8%), foot 3 (5.1%), upper leg 1 (1.7%) and toe 1 (1.7%).

The upper extremity followed with 22 (37%): wrists and shoulders accounting for 6 (10.2%) and 4 (6.8%) respectively, hand 3 (5.1%), lower arm 3 (5.1%), upper arm 2 (3.4%), the thumb and finger 2(3.4% each). These lower and upper extremity injuries were mainly sprains. No rugby players sustained dislocations.

Anatomical distribution: The lower limb had the largest number of injuries (39%), followed by upper limb (37%), head and neck (14%) and trunk-abdomen and pelvis, chest and spine (10%). These injuries were mainly of soft tissues (mild strains). No fractures were sustained by the rugby players.

Description of the injury variables was as profiled as shown in Table 3.

Table 3
Description of the injury variables suffered

Injury variables	Frequency	(%)
Mechanism of injury	59	100
Phase of play	59	100
Time of game	34	58
Relationship of ball and injured player	59	100
Play type	59	100

Majority of the injuries were noted as follows depending on:

The mechanism of injury: Contact with another player- 32 (54.2%), hit by ball, and during movement with each 13 (22%), and contact with obstacle 1 (1.7%).

The phase of the play: Tackle- 28 (47.5%); scrum 9 (15.3%); collision, kicking and pileup with each 5 (8.5%); maul 4 (6.8%); lineout 2 (3.4%) and other 1 (1.7%).

The time of game: Second half- 20 (58.8%), first half 12 (35.3%) and added time 2(5.9%).

The relationship of ball and injured player: Near ball- 52 (88.1%), behind play- 7 (11.9%).

The play type: Competitive game led- 35 (59.3%), followed by normal training 24 (40.7%).

Injury sites were profiled as shown in Table 2.

Forms of treatments received by rugby players and outcomes were profiled as shown in Table 4.

Table 4
Treatments and outcomes

Variables	Frequency	(%)
On site treatment	59	100
Health Institution treatment	24	40.7
Outcome	59	100

All (59) injured rugby players received on-site treatment or care (first aid). The majority (55 or 93.2%) were cared for by the peers, while only 4 (6.8%) considered by peers as more severe injuries needed the coaches/ teachers to handle.

Eventually the coaches/ teachers decided that 35 (59.3%) did not need health institution care, and so 24 (40.7%) were taken to nearby health centers, from where 2 were treated and discharged on treatment, 2 needed further care and few hours of observations at health center, while for the remaining 20, decision was made that 13 (65%) were referred to Sub-county hospitals and 7 (35%) to MTRH.

Of those referred to MTRH, the PI noted that 5 had right sided first degree while 2 had left sided second degree medial collateral ligament sprain of the knees. Rugby players with first degree sprain received outpatient treatment. They were applied crepe bandages and sent back to schools on analgesics with advice that they elevate their limbs. However second degree sprained rugby players were admitted for further evaluation and found to have intact meniscus and cruciate ligaments. They were put on analgesics and well padded posterior splints and limb elevation encouraged. When swelling subsided after 48 hours, they were mobilized on crutches and discharged on analgesics with posterior splints for follow up in the outpatient clinic weekly. Rugby players treated at Health centers and Sub-county hospitals had minor injuries (mild sprains and soft tissue strain injuries).

The outcome of various forms of care or treatments was favourable as all were eventually able to return to their rugby sports activities. Those who sustained minor injuries (26 or 44.1%) were able to return to rugby play in 2-3 days. The rest were as follows: mild (14 or 23.7%) in 4-7 days, moderate (9 or 15.3%) in 8- 21 days, while severe (10 or 16.9%) in over 21 days. Hence it can be summed up as minor-mild were 67.8% while moderate- severe were 32.2% (rounded up figures of 68% and 32% respectively) and can therefore be used to grade severity of injury in this study. Associations between variables have been profiled as shown in Table 5.

Table 5
Association between injury and demographic characteristics

Variable	Injured		†*p*- value
	No Mean (SD)	Yes Mean (SD)	
Age (years)	17.5 (1.5)	17.6 (1.2)	0.735
Weight (Kg)	67.5 (5.9)	70.1 (7.4)	0.038
Height (cm)	175.7 (6.9)	176.9 (6.4)	0.317
BMI (Kg/m^2)	21.9 (1.8)	22.4 (2.2)	0.164

†independent samples t – test

Only those who were injured appeared heavier than those who were not injured, with mean weight: 70.1 (SD: 7.4) kilograms versus 67.5 (SD: 5.9) kilograms, p = 0.038, hence statistically significant.

Association between the position played and occurrence of an injury: Although the backs were more regularly injured (52.8%) than the forwards (47.2%), the findings were not statistically significant (p= 0.121).

DISCUSSION

This study was conducted in high schools with the participants aged 15-21 years. The mean age was 17.6 (SD 1.2) years; this is a true reflection of the student population given the age range above. This is in agreement with that found in the Rugby Injury Surveillance in Ulster schools (RISUS) study by Archbold *et al*. (2) where the mean age was 16.9 years, and in a study in Zimbabwe that had a mean age of 16 years as documented by Chiwaridzo *et al*. (11).

In this study high injury risk was associated with higher weight. The above findings are in agreement with those by the RISUS study where injury risk was also associated with higher weight and increased BMI. Increased weight and BMI may be associated with the higher forces that occur during collision with opposing player.

As for injury frequency, few studies have been conducted involving high school rugby players injuries compared to the many studies conducted for the elite league players. This study recorded 59 injured out of 123 participants giving injury rate of 48%. The RISUS study found the injury rate to be 36.8% (2). This injury frequency in this study was higher than that of the RISUS study; this may be attributable to the differences in the player settings in terms of the terrain of the field, protective gear, match officiating; which may have been better for the players in the RISUS study compared to those in this study. The results of this study agree with those reported in Zimbabwe where the injury rate was 58.2 % as documented by Chiwaridzo *et al*. (11).

The head and neck are the most common sites of match injuries in senior rugby players, while knees are the most common sites of injury in junior league rugby players as documented by Freitag *et al*. (5). This study found that the extremities presented the highest number of injuries. This is in agreement with McManus and Cross (15). The finding in a study by Gabbet (14) is in disagreement with this study having found injuries to the head and neck at 25%, and the knee at 11% among amateur rugby players in a study carried out for three consecutive seasons. Collins *et al*. (13) also found the head as the most injured part followed by the knee contrasting the findings of this study. This is because most sports involve lots of running and turning. In rugby this happens as the player has contact with other players such as during the tackle leading to lower limb injuries.

Rugby game has four main phases of play: tackle, rucks and maul, set pieces (scrum and line-out), and open play. Most injuries occur in the tackle phase of playing both in high school and elite leagues. This study had 47.5% of injuries occurring in the tackle phase followed by the scrum (15.3%). These figures are in agreement with findings from studies by Bathgate *et al*. (3), Muma *et al*. (8), and Collins *et al*. (13). The mechanism of injury contributing to the highest number of injuries was contact with another player (32% or 54.2%). This mainly occurred during the tackle in both the tackler and the tackled player followed by the scrum (8% or 15.3%). This is in agreement with many studies both in the elite and high school sports. Wekesa *et al*. (9) had 40.7% of injuries occurring during the tackle.

This study found out that the second half had most injuries 20 (58.8%), while first half and added time had 12 (35.3%) and 2 (5.9%) respectively. Bathgate *et al*. (3), Wekesa *et al*. (9), and Gabbett (14) also found the second half as the phase of play where most injuries occurred. Other authors (9,13) in their studies found that most injuries tend to occur in the last quarter. This can be attributed to physiologic fatigue among players especially if they have low fitness levels. Most of the injuries occurred when the player was near the ball because the mechanism of injury and phase of play when the injury occurred was the tackle, when the tackled player has the ball in his hands.

Severity of injuries was defined as per rugby injury consensus statement of 2007 as documented by Fuller *et al*. (12). Most epidemiological studies have recorded majority of players sustaining minor and moderate injuries as compared to severe injuries which is in agreement with this study that had 10 (16.9%) of the players sustaining severe injuries while the rest had minor (26% or 44.1%), mild (14% or 23.7%) and moderate (9% or 15.3%). Collins *et al*. (13) conducted a similar study and found most of the injuries resolved in less than 10 days while 26.9% resolved in more than 21 days. Chiwaridzo *et al*. (11) had 7.7% of injuries reported as severe, with the rest being reported as mild or moderate. They recorded fewer injuries compared to this study. This study did not report any life threatening injuries.

Treatment of sports injuries included the initial on field treatment or care and then referrals to various health institutions. Treatment modalities included cold therapy with a cryotherapy spray, bandaging, soft tissue massage with topical analgesics and resting of the injured part (summed up as RICE). These were not quantifiable as they were mostly used together. This study had 24 of high school rugby players with injuries seeking attention at various health institutions of different levels while the rest of the injured rugby players were attended to on the field and at the school. This number was higher compared to those in a study by Constantinou and Bentley (16) that had 21% of those injured being taken to hospital, this however may not compare well with this study as the former had a team physician on the field while the players in this study had none, hence injuries that may have not required attention at the hospital may have been taken to hospital. Some of the schools in this study were day schools and did not have a resident nurse; hence treatment was sought at the nearest health institution. The boarding schools however had a resident nurse and had minor procedures such as dressing of wounds done at the school. The medical personnel however did not attend to the students on the field as most games were held over the weekend leaving only first aiders and coaches who were school teachers to attend to the injured players. In the developed countries (7,17), a trained doctor (team physician) and a physiotherapist attend to injured players and also follow them up to determine when the player returns to play.

In this study, the majority of rugby players 26 (44.1%) took 2- 3 days, while 10 (16.9%) took at least 21 days to return to play. Though based on self-reports, to ensure that no rugby player returned to play when he was not fully healed, the Principal Investigator personally physically examined the rugby players and certified that they were safe to return to the field to play. This is in conformity with recommendations by Brown *et al.* (17).

The PI also took keen interest and made follow up of the injured rugby players referred to MTRH to verify the injury severity, which actually involved medial collateral ligaments, and were grades one (right sided) and two (left sided), none was grade three. The medial collateral ligaments injury in the knee is of contact type, usually due to impact to lower thigh or upper leg which causes valgus stress to the flexed and externally rotated knee during tackle phase of the game. These patients received nonoperative treatments (summed up as RICE).

In this study, rugby players sustained mostly soft tissue strain and sprain (at most grade two) injuries but no overt dislocation and fractures. This is in contrast to the study by Patricios *et al*. (7) who documented that fractures occur mainly in juniors.

The strength of the study was the descriptive prospective design used. The study, however, relied heavily on the coach and self-reporting for the time loss injuries through phone calls hence could have compromised on comparability with other studies. The determination of severity of the injuries was not standardized hence there could have been over or under treatment, that is, those who required medical attention could not have gotten it or vice-versa.

It can be concluded from this study that: the mean age, body weight, height and BMI were quite in keeping with existing demographic characteristics of high school rugby players; the pattern showed that majority of the injuries involved the extremities (both the upper and lower limbs); and that the initial care given was first aid on the field by the peers and coaches/teachers. The recommendations include: the need for continuous surveillance of risk factors associated with rugby injuries due to high injury rate and ways to mitigate such risks should be encouraged; protective equipment such as skin shields should be used to reduce the injuries; and that event organizers should hire medical personnel to readily attend to the injured students especially at competitive levels.

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