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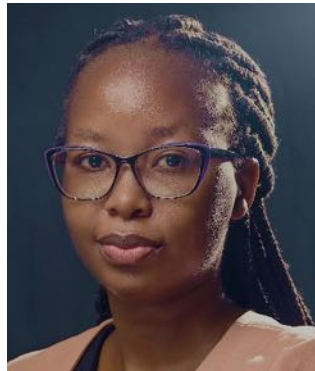
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## NUTRITIONAL KNOWLEDGE AND PRACTICE OF ELITE RUGBY PLAYERS IN KENYA

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## ABSTRACT

Rugby is a sport that has great physical and physiological demands that come with heavy requirements on the body's nutrient stores. Nutrition plays a key role when it comes to good performance in rugby and in turn, aspects of nutrition specifically relevant to rugby are used to improve on how an athlete performs throughout the year: pre-season, competition season and off season. Despite the tremendous growth of rugby within the global and Kenyan scene, there are few studies that have been done on the nutrition knowledge and practices of elite rugby union players. The general objective of this study was to investigate the nutritional knowledge and practices of elite rugby players in Kenya. This study adopted the descriptive cross-sectional design. The research was carried out in Nairobi and Kakamega counties in Kenya. Purposive sampling was used to select elite rugby players called up to the national team and the sample size for this study was sixty-seven (67). The data was analysed using SPSS version 25. The study's results showed that 46% of the respondents were found to be in the age bracket of 25-30 years, with 52% of the respondents having attained tertiary education. Sixty percent (60%) of the respondents played the back position. A large proportion (75%) of the respondents correctly responded that carbohydrates were the main source of energy for the body, whereas only 23% correctly responded that sports drinks are the best to replace fluids on the field of play. The average daily kilocalorie intake of the respondents was low at 2097kcal against a recommended 2165kcal. Milk and milk products were the most consumed sources of protein at 37% (5-6 times a week). Cereals were the most common sources of energy at 30% (daily). There was no significant relationship between nutrition practice and nutrition knowledge amongst elite rugby players in Kenya ( $r(67) = -0.106, p = .400.$ ). In conclusion, good nutrition knowledge did not necessarily translate to better nutrition practices. There is need for increased nutrition education amongst elite rugby players to ensure dietary intake is per set recommendations.

**Key words:** nutrition, knowledge, rugby union, elite rugby players, practice, dietary intake

## INTRODUCTION

Rugby also referred to as ‘rugby union’ is a team sport that involves full contact and features bursts of high intensity running, tackles and recurrent body contact between players [1]. Rugby Union in Kenya dates back to 1923 with the establishment of Nondescripts Rugby Football Club (RFC) and Kenya Harlequin RFC [2]. The sport has grown over the years and risen to the level of World Cup qualifiers, coming in second at Africa Cup in 2018 and this has made the game increasingly competitive among players with an aim to attain elite status which is marked by being called up to join the national team.

Rugby union is classified as a strength-power sport and with that nutrition is important for fuelling of strength training, recovery from training and to promote adaptations key in training [3]. Good performance in Rugby Union is pegged around a proper training regime which includes a sound nutrition plan. Zinn [4] found that proper nutritional practices rank third among factors that affect athletic performance and is key in promoting overall health as well as optimal training and competition performance of rugby league players [5]. Additionally, Zawila [6] stated that no single aspect contributes to ideal performance as does good nutritional practices. Adequate dietary intake is a key determinant of sporting and athletic performance and therefore adequate nutrition ensures that an athlete builds up the necessary energy required for activity and post- activity recovery [5].

Sakamaki *et al.* [7] emphasizes that high levels of nutrition knowledge translate to positive dietary habits. There has been indication of a significant correlation between nutrition knowledge and the quality of athletes’ dietary intake. This shows a link between good nutrition practices and maintaining an athlete’s overall health and wellbeing and in turn, the role of adequate nutrition knowledge cannot be denied [8, 9].

Adequate dietary and nutrient intake has been found to positively impact on the performance of athletes [11]. Inadequate dietary intake equates to insufficient energy intake resulting in a negative energy balance and weight loss which is undesirable in rugby union [11] and can also contribute to amplified cases of overtraining and injury [12]. Moreover, inadequate protein intake may have a detrimental effect on lean mass that is key in rugby performance [13]. In scenarios where nutritional practices fall below par, athletic performance and achievement of true maximal effort may be forfeited [14].

This study sought to find out the nutritional knowledge and practice of elite rugby players in Kenya. This study also explored if there was a relationship between nutritional knowledge and practice of elite rugby players in Kenya.

## MATERIALS AND METHODS

### Study design and population

This study was carried out in Kenya covering Nairobi and Kakamega Counties using a descriptive cross-sectional study design. The study population was elite male rugby



union players drawn from both junior and senior national team squads. Purposive sampling was used to select the study's respondents who were elite rugby union players. The sample population stood at 70 and census was used to ensure all 70 respondents participated in the study and this greatly reduced any sampling error that would arise.

### **Data collection techniques**

Data was collected using a structured questionnaire administered to the study participants. To ensure maximum response rate, the researcher ensured that the questionnaires were administered and collected on the same day. Questionnaire items were drawn from the study's objectives and categorized into the following sections: demographic characteristics, nutrition knowledge, nutrition practice, 24hr dietary recall and food frequency questionnaire.

Demographic characteristics including age, level of education, source of income and playing position were covered in part one of the structured questionnaire. Nutrition knowledge was established by finding out who the respondents' source of nutritional information was and general nutrition knowledge questions. Nutrition practice was investigated by asking the respondents what type of diet they partake during training, prior and after a competitive match and what type of supplements they consumed. A 24-hour dietary recall was used to find out the food intake of the respondents in the last 24 hours. A food frequency questionnaire was used to give an approximate close to the respondents' consumption of various food groups in a week's time.

### **Data Management and Analysis**

Data was entered, coded, cleaned and analyzed using NutriSurvey and SPSS version 25 for both descriptive and inferential statistics. Before analysis, data entries that contained wide-ranging missing data were excluded. Analysis was carried out using descriptive statistics and inferential statistics. Descriptive statistics including mean, mode and standard deviation was calculated for the nutritional knowledge levels and nutritional practices for elite rugby players. Bivariate analysis was used to test the association between nutrition knowledge and nutrition practice of elite rugby players. Pearson correlation at 0.05 significance level was used to test the null hypothesis which stated that there is no important relationship between nutritional knowledge and nutritional practice of elite rugby players.

### **Logistical and Ethical Considerations**

An institutional introductory letter and approval was sought from the Masinde Muliro University of Science and Technology School of Graduate Studies (SGS) and ethical approval sought from the Institutional Ethics Review Committee (IERC) of Masinde Muliro University of Science and Technology (MMUST) (REF. NO: MMUST/IERC/49/19). A research permit was obtained from the National Commission for Science, Technology and Innovations (NACOSTI) (REF. NO: 324417). Permission was also sought from the Kenya Rugby Union to conduct the study among the elite rugby union players.



## RESULTS AND DISCUSSION

The study found that 46.3% of the respondents were of the age bracket 25-30 years. Findings of this study indicated that 52.2% of the respondents had attained tertiary level of education. An equal proportion of the study's respondents at 27% were engaged in part-time employment and self-employment respectively. A larger proportion of the respondents at 60% played the back position. This is summarized in Table 1.

Seventy five percent of the respondents answered correctly that carbohydrates are the main source of energy in the body. A majority of the study's participants at 73% responded correctly that as rugby players, their food intake should increase. Of the total study participants, a minority at 23% responded correctly that sports drinks were the best to replace body fluids on the field of play. A larger proportion of the respondents at 79% answered affirmatively that alcohol consumption can negatively affect the absorption and utilization of nutrients. Additionally, 83% of the respondents answered correctly that the last meal before a competition should be consumed 3 hours prior to an event.

It was found that 66% of the respondents were aware of nutrition complications that would affect performance. Fifty four percent (54%) reported that the main source of nutritional knowledge with regard to food intake and nutrition supplement use amongst the study's respondents was the strength and conditioning coach with only 6% reporting to have sought this information from a nutritionist/dietician.

The findings of this study revealed that the mean daily kilocalorie intake consumed by respondents was 2097 kcal. Seventy percent (70%) of the respondents did not skip meals before a competition event whereas 64% just ate after a competition event. Nearly half of the respondents at 54% reported to consuming food before a competitive match with rice and chicken being the most preferred meal. proportion of the study's participants at 39% consumed a high carbohydrate, high protein diet during training. Results indicate that 60% consumed 1-3 meals a day. On hydration during training, 73% did not consume sports drinks.

Results from the food frequency questionnaire revealed that the most frequently consumed source of protein amongst respondents was milk and milk products and eggs at 37% and 33% 5-6 times a week respectively. Fruits were consumed by 43% of the respondents 5-6 times a week with a further 48% consuming vegetables 5-6 times a week. Cereals which are a source of energy were consumed 3-4 times a week by 31% of the respondents and 30% of the respondents daily. This is summarized in Table 2.

A correlation analysis was computed at 0.05 significance level to confirm if the null hypothesis stating there is no significant relationship between nutritional practice and nutritional knowledge among elite rugby players was true. At 0.05 significance level, the null hypothesis was accepted  $r(67) = -0.106, p = .400$ . This informed the conclusion that there was no significant relationship between nutritional practices and nutritional knowledge among elite rugby players. This bivariate analysis means that



elite rugby players with great nutritional knowledge were not likely to have better nutritional practices compared to the ones with poor nutritional knowledge.

The study found that a majority of the respondents sought their nutrition knowledge from the strength and conditioning coach. This is similar to a study [15] where strength and conditioning coaches were the main source of nutrition information and supplement usage amongst university athletes. This is contrary to a study by Trabucco [16] carried out in Italy and Serbia where athletic trainers and registered dieticians were found to be the main source of information on nutrition related matters. A study carried out amongst university athletes by Froiland *et al.* [17] found that athletes were least likely to seek nutrition related information from more knowledgeable sources such as registered nutritionists and dieticians. Similarly, this study found that nutritionists and dieticians were the least common source of nutrition knowledge with regard to food intake and supplement usage. This could be because of a limited number of nutritionists and dieticians as part of the technical team of the national rugby teams. Such findings increase concern among researchers from various previous studies that athletes could be receiving misleading and possibly harmful nutritional information [18].

On analysis, it was found that the mean daily kilocalorie intake was 2097kcal against a recommended mean daily kilocalorie intake of 2165kcal. This shows that the study participants did not meet their energy requirements as is recommended for team sports. This is similar to a study carried by Murphy *et al.* [19], where the total caloric intake of elite soccer players in the U.K was found to be lower than the set caloric recommendations established for team sports. In a review by Holway *et al.* [20] it was found that competing athletes in team sports did not meet recommended dietary intake needs which is similar to the findings of this study. It was suggested in previous studies that interrogated the low energy intakes amongst elite athletes in rugby union, that the presence of team culture on matters of body composition goals that included decreasing body fat and/or increasing lean muscle mass influenced dietary intake [21].

This study's findings revealed that whey protein supplement was the most popular supplement followed by creatine monohydrate amongst the study participants. This is consistent with a study carried out by Duvenage *et al.* [22] where it was found that protein supplements were the most commonly used supplements amongst elite rugby players. However, this is inconsistent with another study where vitamin and mineral supplements were the most frequently used supplements among state-based athletes [23].

This study noted that amongst the respondents, daily consumption of cereals was at 30% which was the highest compared to other food groups. This was consistent with recommendations by American Dietetic Association [24], which advocates for acceptable intake of carbohydrates to enhance and fuel sports performance.

In a previous study, it was reported that there was a positive correlation between nutritional knowledge and the quality of collegiate athletes' dietary intake [8]. Contrary to this study's findings, it was found upon analysis that there was no significant relationship between nutrition knowledge and nutrition practices among elite rugby

players in Kenya. This meant that elite rugby players with good nutritional knowledge were not likely to have better nutritional practices compared to their counterparts with poor nutritional knowledge. A study carried out by Devlin *et al.* [25] reported that players who had a higher nutrition knowledge score were more aware of protein recommendations and in turn consumed intakes closer to the recommendations which differed from the findings of this study.

In a systematic review carried out on nutrition knowledge in athletes, it was highlighted that there was a weak positive association between nutrition knowledge and better nutrition practices among athletes [26]. This is however inconsistent with the findings of this study. However, in a study carried out to analyze collegiate track athletes' nutrition knowledge, attitudes and dietary intake, it was highlighted that nutrition knowledge is not necessarily a primary factor impacting on nutrition practice which is consistent with this study's findings [27]. Another study found that there exist a significant gap between an athlete's nutritional knowledge and their real dietary intake [19], consistent with this study's findings.

## CONCLUSION

In conclusion, it was found that the most common source of nutrition information amongst elite rugby players in Kenya was the strength and conditioning coach. The study's respondents consumed a mean daily kilocalorie intake that did not meet the recommended daily kilocalorie intake. Given that a dietary intake that does not meet the necessitated energy needs by athletes has numerous detrimental effects, it is recommended that nutrition education should be carried out amongst elite rugby players to negate this. Future research should attempt to identify effective ways to improve athletes' nutrition knowledge and nutrition practice and in turn, address ways of optimizing performance.

## Competing Interest

The authors declare they have no competing interests.

## Conflict of Interest Statement

The authors declare no conflict of interests.





**Table 1: Socio-Demographic Characteristics of Respondents**

Demographics		Frequency	Percentage
<b>Age bracket</b>	Below 25 years	24	35.8
	25-30 years	31	46.3
	31-35 years	8	11.9
	35-40 years	4	6.0
	<b>Total</b>	<b>67</b>	<b>100.0%</b>
<b>Highest level of education</b>	Secondary Complete	11	16.4
	Tertiary Incomplete	21	31.3
	Tertiary Complete	35	52.2
	<b>Total</b>	<b>67</b>	<b>100.0%</b>
<b>Current playing position</b>	Forward position	27	40.3
	Back position	40	59.7
	<b>Total</b>	<b>67</b>	<b>100.0%</b>
<b>Source of Income</b>	Full-time employment	17	25.4
	Part-time employment	18	26.9
	Self-employment	18	26.9
	Not in paid employment	11	16.4
	Others	3	4.5
	<b>Total</b>	<b>67</b>	<b>100%</b>
<b>Religion</b>	Christian	64	95.5
	Muslim	1	1.5
	Other	2	3.0
	<b>Total</b>	<b>67</b>	<b>100.0%</b>

Table 2: Food Frequency Questionnaire Respondents' Summary

	1-2 times a week (%)	3-4 times a week (%)	5-6 times a week (%)	Daily (%)	Never/Rarely (%)	Frequency
<b>Milk and Milk Products</b>	11.9	31.3	37.3	11.9	3.0	63
<b>Beef</b>	43.3	37.3	10.4	6.0	0	65
<b>Poultry</b>	55.2	22.4	1.5	7.5	3.0	60
<b>Sausages/Ham</b>	32.8	10.4	10.4	7.5	25.4	58
<b>Eggs</b>	17.9	28.4	32.8	13.4	0	62
<b>Legumes (Beans, Peas)</b>	25.4	20.9	28.4	10.4	0	57
<b>Nuts, Peanut Butter</b>	19.4	23.9	22.4	6.0	9.0	54
<b>Green grams</b>	28.4	20.9	10.4	13.4	10.4	56
<b>Cereals</b>	6.0	31.3	7.5	29.9	9.0	56
<b>Fruits</b>	1.5	31.3	43.3	9.0	1.5	58
<b>Vegetables</b>	4.5	11.9	47.8	20.9	3.0	59
<b>Spreads (margarine, butter, jam)</b>	17.9	9.0	23.9	9.0	25.4	57
<b>Soft drinks (juices, soda)</b>	31.3	23.9	16.4	9.0	9.0	60
<b>Alcoholic beverages</b>	26.9	1.5	0	16.4	49.3	63
<b>Water</b>	1.5	1.5	32.8	64.1	0	67
<b>Energy bars/shakes</b>	20.9	13.4	9.0	7.5	31.3	55
<b>Protein shakes</b>	11.9	35.8	7.5	6.0	29.9	61
<b>Sports Drinks</b>	13.4	23.9	13.4	6.0	32.8	60

**Table 3: Association between nutrition knowledge and practice**

		<b>Practice</b>	<b>Attitude</b>
<b>Practice</b>	Pearson Correlation	1	-.106
	Sig. (2-tailed)		.404
	N	67	65
<b>Knowledge</b>	Pearson Correlation	-.106	1
	Sig. (2-tailed)	.400	
	N	65	65

## REFERENCES

1. **Zemski JA, Slater JG and ME Broad** Body Composition Characteristics of Elite Australian Rugby Union Athletes According to Playing Position and Ethnicity. *Journal of Sports Sciences*, (2015)  
<https://doi.org/10.1080/02640414.2014.977937>
2. **Kenya Rugby Union**. “About Us- Kenya Rugby Union” (2015).
3. **Slater G and S Phillips** Nutrition guidelines for strength sports: Sprinting, weightlifting, throwing events, and bodybuilding. *Journal of Sports Sciences*. 2011; **29 Suppl 1**: S67-77. <https://doi.org/10.1080/02640414.2011.574722>
4. **Zinn C, Schofield G and C Wal** Evaluation of Sports Nutrition Knowledge of New Zealand Premier Club Rugby Coaches. *International Journal of Sport Nutrition and Exercise Metabolism*. (2006); **16**: 214-25.  
<https://doi.org/10.1123/ijsnem.16.2.214>
5. **Broad EM and GR Cox** What is the optimal composition of an athlete’s diet? *European Journal of Sport Science*, 2008; **8(2)**: 57–65.  
<https://doi.org/10.1080/17461390801919177>
6. **Zawila LG, Steib CM and B Hoogenboom** The Female Collegiate Cross-Country Runner: Nutritional Knowledge and Attitudes. *J Athl Train*; (2003); **38(1)**:67-74.
7. **Sakamaki R, Toyama K, Amamoto R, Liu CJ and N Shinfuku** Nutritional knowledge, food habits and health attitude of Chinese university students--a cross sectional study. *Nutrition Journal* (2005), 4, 4.  
<http://doi.org/10.1186/1475-2891-4-4>
8. **Dunn D, Turner LW and G Denny** Nutrition Knowledge and Attitudes of College Athletes. *Sports Journal*, (2007); **10(4)**: 45-52.
9. **Horvath G, Meyer NI, Konrad M and E Müller** Determining the Nutrition Knowledge of Junior Athletes in Austria. Translation and Adaptation of the Adolescent Sport Nutrition Knowledge Questionnaire. *Ernährungs Umschau*. (2014); **61**:138-143.
10. **Potgieter S** Sport Nutrition: A review of the latest American College of Sports Medicine (ACSM), International Olympic Committee (IOC) and International Society for Sports Nutrition (ISSN) guidelines for exercise and sport nutrition. *South African Journal of Clinical Nutrition*; (2013) ;**26(1)**:6-16.
11. **Loucks AB, Kiens B and HH Wright** Energy Availability in Athletes. *Journal of Sports Sciences*, (2011) (29(sup1), S7-S15.

12. **Kerksick CM, Wilborn CD and MD Roberts** ISSN exercise & sports nutrition review update: research & recommendations. *J. Int. Soc. Sports Nutr.*, (2018); **15**: 38. <https://doi.org/10.1186/s12970-018-0242-y>
13. **Jones B, Till K, Barlow M, Lees M, O'Hara J and K Hind** Anthropometric and Three-Compartment Body Composition Differences between Super League and Championship Rugby League Players: Considerations for the 2015 season and beyond. *PloS One*, (2015); **10(7)**: e0133188.
14. **Martin L, Lambeth A and D Scott** Nutritional practices of national female soccer players: analysis and recommendations. *J Sports Sci Med*. 2006; **5**:130-137.
15. **Burns RD, Schiller MR, Merrick MA and KN Wolf** Intercollegiate Student Athlete Use of Nutritional Supplements and the Role of Athletic Trainers and Dieticians in Nutrition Counseling. *J Am Diet Assoc* 2004;**104(2)**:246–9.
16. **Trabucco G** Nutritional Knowledge and Behavior Among Students Practicing Sports: Comparison Between Two Countries. *Scientific Journal of The Faculty of Medicine in Niš*;(2013);**30(4)**:201-208.
17. **Froiland K, Koszewski W, Hight J and L Kopecky** Nutritional Supplement Use Among College Athletes and Their Sources of Information. *Int J Sport Nutr Exerc Metab*. 2004;**14(1)**:104-120.
18. **Benari P and PA Quatromoni** A model for nutrition education for use with female collegiate athletes. *Sports, Cardiovascular and Wellness Nutritionists 'Pulse*, (2008);**27(3)**: 1-4.
19. **Murphy S and Y Jeanes** Nutritional Knowledge and Dietary Intake of Young Professional Football Players. *The Journal of Nutrition and Food Science*, (2006) ;**36(5)**: 343-348.
20. **Holway FE and LL Spriet** Sport-specific nutrition: Practical strategies for team sports. *J. Sports Sci*. (2011); **29**: S115–S125.  
<https://doi.org/10.1080/02640414.2011.605459>
21. **Bradley WJ, Cavanagh BP, Douglas W, Donovan TF, Morton JP and GL** Close Quantification of training load, energy intake, and physiological adaptations during a rugby preseason: A case study from an elite European rugby union squad. *J. Strength Cond. Res.*, (2015); **29**: 534–544,  
<https://doi.org/10.1519/JSC.0000000000000631>
22. **Duvenage KM, Meltzer ST and SA Chantler** Initial Investigation of Nutrition and Supplement use, Knowledge and Attitudes of Under-16 Rugby Players in South Africa. *S Afr J Sports Med* ;(2015) ;**27(3)**:67-71.

23. **Dascombe BJ, Karunaratna M, Cartoon J, Fergie B and C Goodman** Nutritional supplementation habits and perceptions of elite athletes within a state-based sporting institute. *Journal of Science and Medicine in Sport* 13 (2010) 274–280.
24. **American Dietetic Association (ADA).** Position of the American Dietetic Association, Dieticians of Canada, and the American College of Sports Medicine: Nutrition and Athletic performance. *Journal of the American Dietetic Association*, (2009);**109(3)**: 509-527.
25. **Devlin BL, Leveritt MD, Kingsley M and R Belski** Dietary Intake, Body Composition and Nutrition Knowledge of Australian Football and Soccer Players: Implications for Sports Nutrition Professionals in Practice. *International Journal of Sport Nutrition and Exercise Metabolism*. (2017) Human Kinetics, Inc.
26. **Heaney S, O'Connor H, Michael S, Gifford J and G Naughton** Nutrition knowledge in athletes: A systematic review. *International Journal of Sport Nutrition and Exercise Metabolism*, (2011) ;**21(3)**: 248–261. [PubMed](#).
27. **Rash CL, Malinauskas BM, Duffrin MW, Barber-Heidal K and RF Overton** Nutrition-Related Knowledge, Attitude, And Dietary Intake of College Track Athletes. *Sport Journal*, (2008); **11(1)**: 48-54.