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**Mabounda Kounga Paul Roger**  
Department of Exercise  
Physiology, High institute of  
Physical Education and  
Sportive (ISEPS), Marien  
NGOUABI University,  
Brazzaville, Republic of Congo

**Bouhika Eddie Janvier**  
Department of Exercise  
Physiology, High institute of  
Physical Education and  
Sportive (ISEPS), Marien  
NGOUABI University,  
Brazzaville, Republic of Congo

**Nsompfi Florent**  
Department of Exercise  
Physiology, High institute of  
Physical Education and  
Sportive (ISEPS), Marien  
NGOUABI University,  
Brazzaville, Republic of Congo

**Mbemba François**  
Department of Physiology,  
Faculty of Science and  
Technology (FST), Marien  
NGOUABI University,  
Brazzaville, Republic of Congo

**Wang Ru**  
School of Kinesiology,  
Shanghai University of Sport,  
Shanghai,

**Chen Peijie**  
School of Kinesiology,  
Shanghai University of Sport,  
Shanghai, Republic of China

**Corresponding Author:**  
**Mabounda Kounga Paul Roger**  
Department of Exercise  
Physiology, High institute of  
Physical Education and  
Sportive (ISEPS), Marien  
NGOUABI University,  
Brazzaville, Republic of Congo

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## Evaluation of sports nutrition knowledge among students Congolese sport-type courses

**Mabounda Kounga Paul Roger, Bouhika Eddie Janvier, Nsompfi Florent,  
Mbemba François, Wang Ru and Chen Peijie**

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### Abstract

This study aims to evaluate the knowledge of sports nutrition among Congolese students of typical sports courses. Method: A total of 140 students enrolled in sports-type courses (aged  $23.90 \pm 3.07$  years) constituted the sample for this cross-sectional study conducted at Marien Ngouabi University. The Sports Nutrition Questionnaire for Young People and Adults (NUKYA) was used for data collection. It included 24 questions with 59 items covering four different sections: macronutrients (29 items), micronutrients (19 items), hydration (8 items) and periodicity of food intake (3 items). All data were processed by using SPSS 26.0 Software. The significance difference was set at  $p < 0.05$ . Results: Knowledge of sports nutrition (mean overall score =  $29.17 \pm 4.70$  and adequate response rate = 12%) was very low. Similarly, Knowledge for macronutrient, micronutrient, hydration and periodicity of food intake were also very low. Conclusion: The respondents had presented inadequate knowledge of sports nutrition.

**Keywords:** Knowledge of sports nutrition, NUKYA questionnaire, typical sport course

### 1. Introduction

According to the World Health Organization (WHO), knowledge of sports nutrition is a set of knowledge allowing access to a state of physical, mental and social well-being in the service of performance and maintaining an implicit goal of health <sup>[1]</sup>. Sports nutrition is a relatively modern discipline involving the use of nutritional principles to improve sports performance. It plays a key role in achieving and maintaining good health <sup>[2]</sup>. In the context of performance optimization, it makes it possible to retain: (a) optimal nutrition can reduce fatigue, allowing an athlete to train and compete longer or to recover more quickly between training sessions coaching; (b) proper nutritional practice is essential because it influences almost every process in the body, from energy production to the recovery period after exercise <sup>[3, 4, 5]</sup>. To understand and therefore apply the principles of sports nutrition, a basic understanding of nutrition is necessary. This includes knowledge of the biochemical and physiological processes that occur in different cells and tissues as well as how these processes are integrated throughout the body <sup>[4, 5]</sup>.

Nutrition knowledge can be passed on to individuals through regular and extensive educational programs. It can also be transmitted by individual self-training based on personal research <sup>[6]</sup>. Various studies have focused on the evaluation of knowledge in sports nutrition, mainly targeting coaches or trainers, athletes, students in sports-type courses who receive training in higher sports schools with the aim of deepening them with this knowledge in order to use themselves and pass them on to the future generations <sup>[7, 8]</sup>. The training that students receive in sports schools on sports nutrition can therefore influence their food choices, which in turn can affect the overall performance of their athletes <sup>[9]</sup>. In consequence, these students should obtain proper nutritional information from a credible and certified source, as this will shape their understanding of nutrition <sup>[6, 10]</sup>.

In the Republic of Congo, many studies have been carried out in the field of nutrition in sports (Mbemba *et al.* <sup>[11]</sup>, Bouhika *et al.* <sup>[12]</sup>, Itoua Okouango *et al.* <sup>[13]</sup>, Moussouami *et al.* <sup>[14]</sup>). However, most of these studies have been limited to evaluating either food intake or dietary supplements in Congolese athletes during training or during the competition period. Other studies have been limited to evaluating nutritional education in obese adolescents, or the profile and nutritional status of Congolese students in the various physical and sports activities such as football, athletics, basketball, etc.

None of these studies attempted to assess respondents' knowledge of sports nutrition. Furthermore, none of these studies based their data collection using the Sports Nutrition questionnaire for young people and adults (NUKYA), recognized as an effective tool for assessing nutritional knowledge of athletes [15]. Faced with such a vacuum, we resolved to conduct a study on the evaluation of sports nutrition knowledge among Congolese students of sport-type courses in order to know their current level to beat strategies aimed at optimizing the performance of Congolese athletes.

## 2. Materials and methods

### 2.1 Setting, type and period of the study

This study was conducted in the city of Brazzaville (Republic of Congo), more precisely in one of the eleven establishments of the Marien NGOUABI University, namely the Higher Institute of Physical Education and Sports (ISEPS). This choice is explained by its unique character as an establishment housing a typical sports course. This cross-sectional descriptive study based on a questionnaire, took place from June 11 to July 14, 2022.

### 2.2 Sampling

A total of 140 students enrolled in the Bachelor's and Master's sports program took part in this study. The sample size was estimated by referring to the sample estimation table of Krejcie and Morgan [1970], reported by Nsengiyumva [16]. The students were selected according to the following inclusion criteria: be registered in second or third year of license or be registered in first or second year of Master degree in the sport sector during the academic year 2021-2022; have voluntarily participated in the study and answered to all the items; be present on the day of the survey. All students who did not meet the inclusion criteria were excluded.

### 2.3 Data collection procedure

To carry out this study, a questionnaire for data collection was designed according to the results of the peers and used to obtain information from the participants. It led to evaluation of linguistic validity, construct validity, internal consistency and reliability. This step allowed us to validate the efficiency of the tool and its understanding. During the realization of the pilot study, the items of a questionnaire were elaborated with the collaboration of the other researchers according to the following steps: 1) writing items; 2) have the items reviewed by experts; 3) determine the measurement scale according to the concept to be

measured and 4) carry out a pre-experiment with the questionnaire. Respondents were brought together to explain to them the interest of our study and to reassure them that these questionnaires were anonymous and that their communicated answers did not commit them in any way. Following this, the questionnaires were distributed to 20 students (10 boys and 10 girls), all levels combined. Data collection took place over a period of one month. After completing a preliminary version of a questionnaire, redundant items were eliminated and the description of situations was standardized. Depending on the difficulties encountered and the analysis of filling errors, this questionnaire was slightly modified, adapted and readjusted according to the Congolese context.

### 2.4 Data collection

#### 2.4.1 Nutrition Knowledge Questionnaire for Youth and Adult Athletes (NUKYA)

We assessed knowledge of sports nutrition based on the short version of the questionnaire of nutritional knowledge for young and adult athletes (NUKYA) using the protocol of Vazquez Espino *et al.* [15] and Boumosleh *et al.* [10]. We modified some questions to ensure they were relevant to local practices and culture or the Congolese context. The final questionnaire is composed of 24 questions with 59 items covering four different sections: macronutrients (29 items), micronutrients (19 items), hydration (8 items) and periodicity of food intake (3 items). We gave one point for each correct answer and zero points for an incorrect or "don't know" answer. The total raw score (ranging from 0 to 57) was transformed proportionally on a scale of 0 to 100. Due to the lack of a scoring system, we classified scores of 60% and above as adequate knowledge and vice versa.

### 2.5 Statistical Analysis

All analyzes were performed using IBM SPSS Statistics software, version 26 (SPSS Inc., Chicago, IL, USA). The normality of the data was checked using the Shapiro-Wilk test, a histogram and a scatterplot. Descriptive data were reported as mean and standard deviation for continuous data, and as frequency and percentage for categorical data. A t-test for an independent sample and a one-way ANOVA test were used to compare the sports nutrition knowledge of students in the ISEPS sports-type courses according to socio-demographic factors. A value of  $p < 0.05$  was considered statistically significant.

## 3. Results

**Table 1:** Socio demographic characteristics of respondents

| Variables                    | $\bar{x} \pm \sigma$ ou n (%) |
|------------------------------|-------------------------------|
| Age (old)                    | 23,90 $\pm$ 3,07              |
| Gender                       |                               |
| Male                         | 93 (66,4)                     |
| Female                       | 47 (33,6)                     |
| <b>Study level</b>           |                               |
| Licence 2 <sup>nd</sup> year | 49 (35,0)                     |
| Licence 3 <sup>rd</sup> year | 50 (35,7)                     |
| Master 1 <sup>st</sup> year  | 18 (12,9)                     |
| Master 2 <sup>nd</sup> year  | 23 (16,4)                     |

This table shows that the average age of the respondents was  $23.90 \pm 3.07$  years, with the numbers of 66.4% men.

Moreover, the majority of respondents were in the 3rd year license while the minority was in the 1st year Master's.

**Table 2:** Attitude relative to the sports nutrition course of respondents

| Variables   | N (%)      |
|---|------------|
| <b>Do you have nutrition courses in your class?</b> |            |
| Yes   | 103 (73,6) |
| No  | 37 (26,4)  |
| <b>Sources of information (n=103)</b>               |            |
| Internet  | 71 (45,8)  |
| Television/ Radio                                   | 45 (29,0)  |
| Sports nutrition course                             | 30 (19,4)  |
| Colleagues club/ team                               | 5 (3,2)    |
|   | 3 (1,9)    |
| Magazine  | 1 (0,6)    |
| <b>Course duration per semester (n = 30)</b>        |            |
| 12 hours  | 6 (20,0)   |
| 24 hours  | 14 (46,7)  |
| 36 hours  | 10 (33,3)  |

This table shows that 73.6% of students took sports nutrition courses against 26.4% who did not; most participants used the internet, TV/radio and took sports nutrition classes 45.8%, 29% and 19.4% respectively; the majority of students reported having spent 24 and 36 hours of class per semester respectively 46.7% and 33.3%.

**Table 3:** Score and rate of adequate knowledge in sports nutrition

| Sections                 | Mean score           | Adequate knowledge rate $\geq$ 6% |      |
|--------------------------|----------------------|-----------------------------------|------|
|                          | $\bar{x} \pm \sigma$ | n                                 | %    |
| Global score             | 29,17 $\pm$ 4,70     | 12                                | 8,6  |
| Macronutrient            | 14,05 $\pm$ 3,35     | 18                                | 12,9 |
| Micronutrient            | 10,86 $\pm$ 1,98     | 54                                | 38,6 |
| Hydration                | 2,90 $\pm$ 1,59      | 20                                | 14,3 |
| Frequency of food intake | 1,35 $\pm$ 0,78      | 59                                | 42,1 |

This table shows that knowledge of sports nutrition was very low (29.17  $\pm$  4.70, or an adequate knowledge rate of 8.6%). In detail, knowledge of sports nutrition was lower in macronutrients (14.05  $\pm$  3.35, i.e. an adequate knowledge rate of 12.9%), followed by lack of knowledge of hydration (2.90  $\pm$  1.59, i.e. an adequate knowledge rate of 14.3%). However, a little close to half of the respondents had high knowledge of sports nutrition, respectively for the frequency of food intake (1.35  $\pm$  0.78, i.e. an adequate knowledge rate of 42.1%) and micronutrients (10.86  $\pm$  1.98, i.e. an adequate knowledge rate of 38.6%).

**Table 4:** Comparison of level of knowledge in sports nutrition

| Variables                   | Score moyen          | Sig               |
|-----------------------------|----------------------|-------------------|
|                             | $\bar{x} \pm \sigma$ |                   |
| <b>Gender</b>               |                      |                   |
| Male                        | 28.84 $\pm$ 4.94     | 0.24              |
| Female                      | 29.82 $\pm$ 4.17     |                   |
| <b>Study level</b>          |                      |                   |
| License                     | 29.50 $\pm$ 4.68     | 0.20              |
| Master                      | 28.39 $\pm$ 4.73     |                   |
| <b>Year of study</b>        |                      |                   |
| Second year licence (L2)    | 30.38 $\pm$ 5.27     | L2 > M2 > L3 > M1 |
| Third year licence (L3)     | 28.64 $\pm$ 3.88     |                   |
| First year master (M1)      | 27.88 $\pm$ 3.95     |                   |
| Second year master (M2)     | 28.78 $\pm$ 5.31     |                   |
| <b>Course participation</b> |                      |                   |
| Yes                         | 29.16 $\pm$ 4.60     | 0.95              |
| No                          | 29.21 $\pm$ 5.05     |                   |

The above table shows that there was no significant difference ( $p > 0.05$ ) in sports nutrition knowledge between male and female students (28.84  $\pm$  4.94 vs 29.82  $\pm$  4.17), between undergraduate and master students (29.50  $\pm$  4.68 vs. 28.39  $\pm$  4.73); between years of study (30.38  $\pm$  5.27 vs 28.64  $\pm$  3.88 vs 27.88  $\pm$  3.95 vs 28.78  $\pm$  5.31) and between course attendance or not (29.16  $\pm$  4.60 vs. 29.21  $\pm$  5.05).

**Discussion**

The objective of this study was to assess the level of knowledge in sports nutrition of Congolese students enrolled in the standard sports courses at ISEPS. It was in fact a question of evaluating overall knowledge and knowledge of macronutrients, micronutrients, hydration and the periodicity of food intake. The main results of this study revealed that (1) students from the sport-type backgrounds as a whole had an inadequate level of knowledge in sport nutrition and a very low level of adequate knowledge; (2) The level of knowledge on macronutrients and hydration was very low compared to the level of knowledge on the periodicity of food intake and micronutrients (Table 3).

In this study, the overall score of 29.17  $\pm$  4.70 was low compared to the overall score of 48.78  $\pm$  10.06 reported by Tuner *et al.* [17] in 77 squash players. This low level of knowledge in sports nutrition can be explained by four reasons, namely: (1) the absence of courses on sports nutrition in certain levels; (2) the insufficient distribution of credit to the constituent element of the teaching unit (ECUE) in bachelor's and master's degrees in sport; (3) little time given to online review of sports nutrition courses, even though their phone time is high according to Mabounda Kounga *et al.* [18] and (4) loss of interest relating to the reading of documents in sports nutrition.

Concerning the level of knowledge in sports nutrition, we noticed that it is not high in general, notwithstanding the differences of gender, level of study, year of study and participation in the course of nutrition of the sports (Table 4). This is undoubtedly due to the qualification of the teacher who gives the courses in the establishment. Indeed, the qualification of the teacher was questioned in a study carried out in Kenya by Ngware *et al.* [19]. The authors noted that the qualification of the teacher, which reflects his academic training both at the disciplinary and pedagogical level, influences his applied pedagogical method and his experience. As a result, this leads to a decline in students' knowledge of what is being taught. This collective failure can also be explained by pedagogical practices within the establishment, as these greatly influence the state of knowledge [20]. Indeed, lessons at ISEPS are designed, organized and delivered at the discretion of the teacher. This pedagogical practice can push the teacher to choose the contents which are favorable to him to the detriment of those which would be obligatory to the students according to the level. In this sense, it constitutes a brake in the improvement of students' knowledge because they do not manage to create an average added value in terms of the results of their class.

Regarding the rate of correct knowledge in sports nutrition, it should be noted that it was evaluated on the basis of a threshold of 60% previously reported by Turner *et al.* [17]. We observed that only 12 or 8.6% of respondents had adequate knowledge of sports nutrition knowledge (Table 3). This knowledge of sports nutrition is very low compared to the 68.4% obtained in the study by Couture [21] among

coaches. According to the author, this adequate response rate was explained by their curiosity and closeness to the coaches. Given that the 12 students were athletes regularly participating in national and international championships, their closeness to coaches and colleagues undoubtedly served as a springboard to boost their knowledge of sports nutrition. It also seems that these 12 ISEPS students probably aimed to increase their practices in sports nutrition. In line with Turner *et al.* <sup>[17]</sup>, increasing knowledge can lead to better eating behaviors and athletic abilities. Indeed, sports nutrition practitioners implement a variety of techniques to promote positive eating behaviors, increasing nutritional knowledge in adolescent, college, and elite athletes.

We observed that the vast majority of respondents had a very low adequate response rate (Table 3). In agreement with the results or observations of Dolatkhan *et al.* <sup>[22]</sup>, we dare to believe that they lacked nutritional advice focused on the key concepts of sports nutrition. In addition, their low level of knowledge can be explained by the failure to follow nutritional advice. In line with Ozdoğan and Özcelik <sup>[23]</sup>, the reasons why nutritional advice is not followed may be due to lack of knowledge or information, and interest in changing one's diet, or some obstacles encountered which may prevent them from eating healthier, namely: lack of money (cost), lack of time (too busy with work) and lack of taste.

Regarding knowledge of macronutrients, we observed that respondents had a very low level of knowledge (Table 3). In line with Turner *et al.* <sup>[17]</sup>, it can be explained by their poor knowledge of contemporary carbohydrate guidelines. This is attributable to an inadequate knowledge of food sources of macronutrients, necessitating the undertaking of nutritional education in this area. Moreover, the low level of hydration knowledge is similar to that observed by Couture <sup>[21]</sup> among high school coaches. In these respondents, contemporary guidelines for optimal hydration are worth giving that they understand that fluids must be available before, during and after practices or competitions, and that thirst is not the best liquid requirement indicator.

## Conclusion

In conclusion, the present study, which focused on the evaluation of the level of knowledge in sports nutrition among Congolese students especially in the sport-type course, made it possible to evaluate the overall knowledge and the adequate response rate of the Congolese students. In addition, it made it possible to assess knowledge of macronutrients, micronutrients, hydration and frequency of food intake. The conclusive findings of this study were that (a) the overall knowledge of Congolese students in sports nutrition is inadequate; (b) the adequate response rate is very low; (c) knowledge of macronutrient, micronutrient, hydration and periodicity of food intake were low.

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