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STUDY OF STUDENT ENERGY CONTRIBUTIONS AND EXPENDITURES; Case Study Survey Conducted among University Students of Burundi Sport Nutrition Balance

Nurrochmah [1], Tomoliyus[2*], Sumaryanti, Japhet Ndayisenga[4]

[1]Universitas Negeri Malang
[2-3]Yogyakarta State University, Faculty of Sport Sciences in Indonesia
[4]University of Burundi, Institute of Physical Education and Sports
YOGYAKARTA State University, Jl. ColoBMo, Karang Malang, Caturtunggal, Sleman Regency, Special Region of Yogyakarta

Abstract

Background: Nutrition enhances athletic performance. An active lifestyle and exercise routine, along with eating well, is the best way to stay healthy. Eating a good diet can help provide the energy needed to work, or just enjoy a casual sport or activity.

The purpose: of this research was to assess the eating habits quantitatively and qualitatively, and to estimate the related energy expenditure of the internal students of the University of Burundi (UB) in general physical education and sports (PES) students faced to their daily activities.

The research method: this was quasi-experimental research with quantitative and qualitative approaches. Data collection using measurement of the daily food during 7 days. Data were analyzed using SPSS and standards ANC.

The result showed that the evaluation of the different activities showed that the expenditure of all PES students was higher (1820,26 kcal) compared to the institutes and faculties without sports training (1520,13Kcal).The comparative analysis showed that the energy intakes were close in the two groups with respectively an intake of 1986.99±131.72 kcal /day among all IPES students and 2004.31±96.22 kcal /day in students from other institutes or faculties, but these intake waslower compared to the standards of ANC which recommends an average intake of 2700 kcal /day in men and 2000 in women.

Conclusion nutrition is important for athletes because it provides a source of energy required to perform the activity. The food has an impact on the strength, training, performance and recovery.

Key words: *nutrition, performance, physical activity*

Introduction

Physical or mental activity, regardless of its intensity, constitutes an energy expenditure for the body that it is necessary to compensate by drawing on the energy resources at its disposal (Rindi Nurlaila Sari, 2014, AGIRC & ARRCO, 2015).In the human body, having the food intake adapted to its needs is an essential factor of good health(François, 2018). The concept of health is defined as "a state of complete physical, mental and social well-being, and does not consist only of the absence of disease or infirmity". This definition of health leads us to the capacity of an individual to function optimally in his environment or to adapt to his environment(Jurecka, Skucińska, & Gądek, 2021, Xiao et al., 2021)

Man being at rest or in full physical activity, his body is always in continuous need of energy(Turgut, Soylu, & Metin, 2020), either to cover the expenses of all his vital functions, or to meet the increased needs linked to the practice

of physical activity(Üstün, Üstün, Işık, & Yapıcı, 2020).Physical activity being defined as all the movements of the body produced by muscular contraction, and which lead to an energy expenditure greater than that of rest(Thomas, Burke, & Erdman, 2016), it is the only variable which makes it possible to voluntarily increase the body's energy expenditure(Moon et al., 2021). A very high level of physical activity is closely linked to an increase in food needs (Braun et al., 2020)

Several studies showed that the importance of the regular physical activity practice in the maintenance of a healthy life (WHO, 2003; Mir H., 2009), but also in the good functioning of the body in a sustainable way(Pate et al., 1995).In addition, the physical activity practice is one of the main factors likely to increase the energy needs of our body(Ndayisenga, 2021, Sallis et al., 2021).It is from a good diet that our body finds all the energy elements it needs for proper functioning. The quantity and quality of food therefore play a predominant role in the ability of each individual to maintain their physical form and resistance to effort (Hudson & Sprow, 2020)

Consequently, the reliable scientific data carried out on the diet by different authors showed that a malnourished person is exposed to many risks of complications (cardiovascular diseases, cancers, obesity and diabetes) than a person having a diet conforming to the needs of the body(Biorci, Cugliari, Lucchese, & Ivaldi, 2020).Fortunately, one of the means to prevent these consequences linked to excess or lack of energy in food is to juggle the notion of food intake and energy expenditure linked to the various activities of an individual's daily life(Mt, Fadda, & Angioni, 2020).According to various studies carried out, which establish the link between the energy intake and the energy expenditure of a subject, currently show that nutrition has become one of the most powerful means that allows us to maintain good health by finding a food balance that truly respects our needs(Biorci et al., 2020).The analysis of the numerous scientific data obtained after the evaluation of food intake among students in different countries, showed un balance in caloric intake and the distribution of different nutrients in the total energy intake (Sarah, 2017, Sánchez-Díaz, Yanci, Castillo, Scanlan, & Raya-González, 2020)

Why this research is needed to be done. In view of the energy iBMalance and in different macronutrients found in the results of the students by different authors in certain countries, it seemed interesting to us to verify whether the food intakes of the students of the University of Burundi(UB) living in a community isolated from their family, are really adapted to their expenses.The history of food consumption by students of the UB, from its opening until the present time, showed that it has had a gradual reduction or even total elimination of certain ingredients that are part of the composition of the menus, which as long as we arrived at the total elimination of a meal (breakfast) from March 1, 2016. And this is so, while no study to our knowledge showed the link between nutritional needs and intakes food into energy actually available in the different food intakes provided for these students knowing that no remarkable change has been observed in their daily activities (whether sports or intellectual) over the years.

It is in this context of reflection, that we sought to know the energy contributions and expenditure of internal students of the UB, in order to determine their contribution-expenditure balance, that we were able to carry out our study.In the present study, we are interested in the analysis of foodstuffs commonly encountered in the different dishes of these students: type of food, estimation of food intakes (in energy and macronutrients), as well as the determination of energy expenditure. related to the practice of sporting and habitual activities of their daily lives, in order to assess the intake-expenditure balance and give some suggestions to those concerned if an iBMalance is observed.

Research Methodology

This study was quasi-experimental research with mix methods quantitative and qualitative approaches. The research sampling was 60 university students from various faculties and Institutes of the University of Burundi. The technique collection data using assessment of nutrition of the student daily food. Data were analyzed using paired compared t-test using SPSS software.

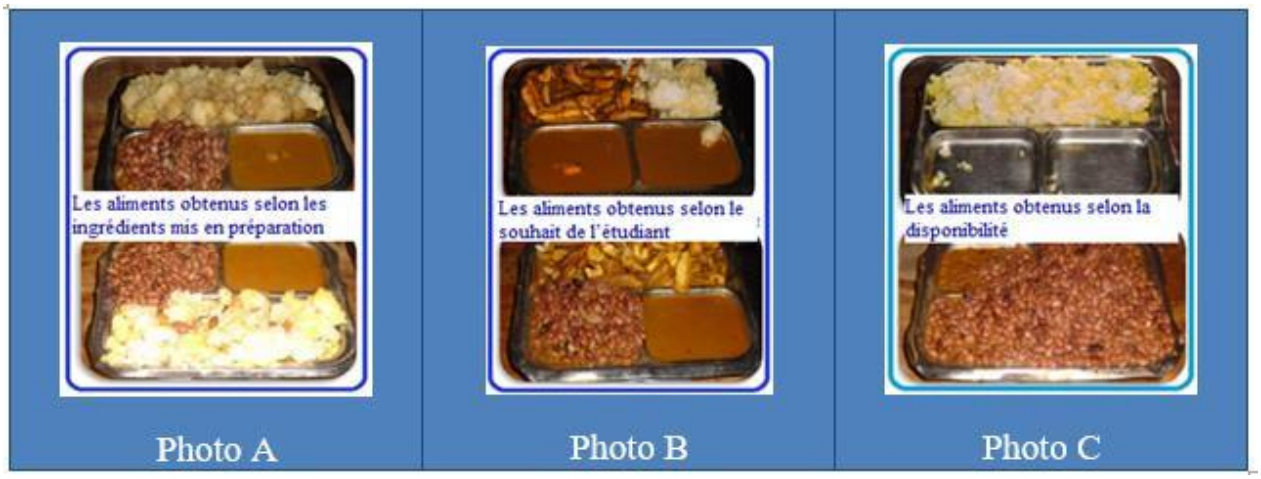
Procedure

Below is the list of ingredients food, the main category has been evaluated in quantity, and quality.

Table 1: List of ingredients commonly used in the preparation of different meals with their portion provided for each student

1.	Potato	
2.	Green banana	
3.	Dry beans	
4.	White rice	
5.	White cabbage	
6.	Red onion	
7.	Palm oil	
8.	Cooking salt	

The list of these different ingredients present in Table 1, above, was not always available in each meal and for all the students. It could change from moment to moment depending on the ingredients put in preparation or their availability at the time of being served but also according to the needs of the student as the 3 photos below.



Result

In this penultimate part, the various results obtained thanks to the statistical analyzes are presented in the form of tables and histograms.The results of this study are presented as Mean Standard Deviation The subjects were from Institute of Physical Education and Sports(IPES), and others came from institute and faculties

Table 2: Basal Metabolism of the students

ers)			

With regard to table 2, above, it is observed that the average of the BM is 1465.07±174.52kcal in all of the subjects surveyed. It was1428.82±154.69 kcal among all IPES students (with an average BM of 1313.93±152.90 kcalfor women against 1543.71±115.16 kcalfor men) lower value compared to the mean of 1501.32±187.93 kcal observed among all students from other institutes or faculties (with an average BM of 1388.56±152.90 kcalfor women against 1614.09 + 150.90 kcal for men).We also note that the BM value of 1578.90 + 136.23 kcal observed in all men (with 1543.71 + 115.16 kcal for men from the IPES against 1614.09 + 150.90 kcal for men from other institutes or faculties) is higher compared to the average BM of 1351.24 + 128.83 observed among all women (with the BM average of1313.93±152.90 kcal for the women of the IPES against 1388.56±152.90 kcal for women from other institutes or faculties).

Table3: Example of Energetic Meal

Food	**Portion (in g)**	**Calories (in Kcal)**	**Proteins (in g)**	**Lipids (in g)**	**Carbohydrates (in g)**
Potato	500	430	10	0.5	100
Dry beans	125	412.5	23.75	1.87	75
White rice	83.3	283.22	4.33	0.91	42.65
White cabbage	62.5	17.5	0.87	0.25	2.81
Red onion	5	1.6	0.06	0.01	0.32
Palm oil	3.25	28.44	0	3.21	0.01
Cooking salt	11.25	0	0	0	0
Quantity of this meal (in g)	**790.3**	**1173.26**	**39.01**	**6.75**	**220.79**
Energetic Level of this meal in Kj or kcal		**4673.1 1116.87**	**663.1 158.48**	**256.5 61.30**	**3753.43 897.07**
Energetic Level meal (in%)		**100**	**14.19**	**5.49**	**80.32**
ANC (in%)		**100**	**12**	**33**	**55**

Table 4: Summary encountered energy among UB Students

Different cases observed	**Macronutrients Foods Portion**	**Quantity of different meals (in g)**	**Global Energy from macronutrients of the different meals in kcal (KJ)**	**Level ofEnergy from the different meals (in %)**
1st case	Portion	790.3		
	Calories		1116.87 (4673.10)	100
	Proteins	39.01	158.48 (663.17)	14.19
	Lipids	6.75	61.30 (256.50)	5.49
	Carbohydrates	220.79	897.07 (3753.43)	80.32
2nd case	Portion	740.3		
	Calories		1621.73 (6785.50)	100
	Proteins	36.66	148.95 (623.22)	9.19
	Lipids	96.25	874.95 (3657.50)	53.90
	Carbohydrates	147.34	598.64 (2504.78)	36.91
3rd case	Portion	373.6		
	Calories		864.53 (3617.34)	100
	Proteins	33.34	135.46 (896.92)	15.67

	Lipids	7.16	65.08 (272.08)	7.52
	Carbohydrates	163.44	664.06 (2778.48)	76.81

In view of table 4, presented above, it has been seen a higher level energy of 1621.73kcal (6785.50 KJ) observable in the second case followed by 1116.87 kcal (4673.10 KJ) observable in the first case and finally comes the third case with 864.53 kcal (3617.34 Kj).

Average total daily energy expenditure (observed in the surveyed population

During the investigation, the researches found that the average of expenditure energy was2419.53 + 499.18among all participants. A clear difference in the average expenditure energy between the sexes and the institutes or faculties of the respondents was observed. Among all men, the mean was2709.33 + 513.29 kcal(with a higher average among IPES students than among students from other institutes or faculties (respectively from2881.74 + 565.29 and 2524.91 + 397.47 kcal /day). This average is higher compared to that of2135.24 + 277.24kcal /day observed in all women (with a higher average among IPES students than among students from other institutes and faculties estimated at2273.22 + 268.67 and 1998.24 + 215.69 kcal /day,respectively). The total expenditure energy was 2591.01 + 533.74 kcalof all IPES students is also higher compared to that of other institutes faculties (2295.65 + 412.87 kcal).One of the factors that could explain a higher average of expenditure of energy among IPES students than in the rest of the students, is that there are in their academic program, courses of the practice of physical activities that one does not find among their counterparts other institutes or faculties.

Discussion

The results of the evaluation of the different activities showed that the expenditure of all IPES students was higher (1820,26) compared to the institutes and faculties without sports training (1,520,13). The expenditure energy in judo was found low according to the intake. The nutrition was found as a strong factor to reach the performance(Degoutte, Jouanel, & Filaire, 2003). The estimate of the energy expenditure of the population studied showed that the highest average was very remarkable among all PES students (2591.01±533.74 kcal /day) than the rest of all students (2295.65±412.87 kcal /day).It necessary to evaluate the expenditure of energy in order to expect the balance between nutrition and expenditure energy during physical activity or sports(Malliaronopoulos, n.d.). The average of 2709.33±513.29 kcal /day was observed in men is significantly higher compared to that of 2135.24±277.24 kcal/day was observed in women. The analysis of the frequency of food consumption during the various meals showed that the diet of UB students is characterized 100% by foods of plant origin. This has the consequence not to meetall organism needs as certain nutrients which are only available in foods of animal origin(Kerksick et al., 2018).For balanced diet, it is advisable to provide the body with a ration containing 60% of plant origin food and 40% of animal origin (Guérin & Veyrié, 2009,Frings-Meuthen et al., 2021).

The evaluation of food intakeshowed that caloric intake was 1995.65±114.98 kcal /day in the entire population surveyed. The comparative analysis showed that the energy intake was close in the two groups with respectively an intake of 1986.99±131.72 kcal /day among all PES students and 2004.31±96.22 kcal/day in students from other institutes or faculties, but these intakes were lower compared to those of the ANC which recommends an average intake of 2700 kcal /day in men and 2000 in women (Coggan, Baranauskas, Hinrichs, Liu, & Carter, 2021). The distribution of the different nutrients (proteins, lipids and carbohydrates) were in all the respondents was in balance with an excess of carbohydrate calories (78.45%) and a deficit of lipid calories (6.47%) compared to ANC (52% for carbohydrates and 33% for lipids). However, the protein intake was 15.8%, a value very close to the ANC (15%). The food provided to the University students has many lack the reason why the athletes can have good performance whether they don’t have enough energy. The sports activities vitamin market is an interesting animal. On the one hand, there are clear organizations of buyers who proceed to are

trying to find the performance gains that nutritional supplementation can grant in conjunction with training. On the other hand, anybody who buys a sports activities diet product(Kerksick et al., 2018). The total energy showed that the students of the PES as a whole cover their energy needs at a rate of 76.69%, with indeed a much higher cover energy for women (85.95%) than for men (70.02%). %). The cover energy in students from other institutes or faculties was estimated at 87.32%, with a cover energy higher in women (100, 40%) than in men (79.31%). The result above showed that university students, especial those from Institute of Physical Education and Sports were bad fed. The energy proved from their food can allow them to perform whether there was unbalance between intake and output.

Conclusion

The prospective of this study focused on a workforcetotal of 60 University students interns divided into two groups including 30 from PES (15 women and 15 men) who practice regular physical activity, and 30 from other institutes or faculties (15 women and 15 men) whom were not regular in sports activity .Taking into account the objective of our work, a food and physical activity survey was carried out through two diaries (notebooks) during a period of 7 days with the students of the UB in the premises of the Kiriri campus. Overall, the study population exhibited the same characteristics withan average age of 26.95 ± 2.13 years, the extreme ages being 23 to 33 years; the average body mass index was21.31 ± 3,59 kg/m^2, the mean body mass and height were respectively58.59 ± 7.91 kg and 58.59 ± 7.91 m.In the processes, the researches needed the use 7-day food diary to collect all the purely dietary data, and a 7-day physical activity diary, to record the various activities, life-related, likely both to influence the nutritional process and to be influenced by it.

The conversion of food intakes into nutritional intakes was made possible thanks to tables of food compositions of 100 g of the edible part.In conclusion, the result found showed that the food of the students of the UB, does not cover their energy needs related to their daily activities. In addition, this diet is neither varied nor diversified because all the food groups are not presented. From a nutritional point of view, it is noted that the supply of each macronutrient

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Conflict of Interest

All the researchers tasted that there is no conflict of interest

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