Journal of Sport Science Technology and Physical Activities
ISSN : 1112-4032
eISSN 2543-3776

Vol: 19 / N°: 2 (december 2022),
p :118-130

Body composition and feeding behaviour of karatekas members of national teams

MIMOUNI N[1]., ZAKI S[2]., MOUAZ N.F[3].

1. Laboratory of Biological Sciences applied to Sport, ES/STSAlger, nmimou@live.fr
2. Laboratory of Training and Technology, ES/STS. Alger, zakisaliha@yahoo.fr
3. Faculty of Bilogical des Sciences. USTHB Bab Ezzouar, mouaz.10.fella@gmail.com

ARTICLE INFORMATION

ORIGINAL RESEARCH PAPER
RECEIVED : 09/07/2022
ACCEPTED : 08/10/2022
PUBLISHED: 01/12/2022

KEYWORDS :
Nutrition, composition corporelle, karaté

Auteur correspondant : Mimouni Nabila
Email: nmimou@live.fr

ABSTRACT

The aim of this study is to see how a karate can improve its performance by considering the nutritional profile as well as the body composition. Our study was carried out on a population composed of 24 high-level karatekas which are subdivided into two groups according to their sex, represented by 15 men and 9 women. The food survey was conducted using a food questionnaire, a body composition analyzer (IN BODY 770) and the anthropometric method allowed us to assess body composition. The results show excess fat in karatekas men, unlike women. On the Overall our male karatekas do not have a good body composition (excess fat), while the latter is an indispensable index of the evaluation of the nutritional profile, unlike women who represent a good body composition.

Introduction:

Karate is a force-speed sport, as each strike is a short-lived explosive impulse, followed by an impact requiring maximum force. Also, karate requires flexibility of the joints of the legs and hips in the execution of movements (Imamura H,et al. 2016). Karate requires on the one hand anaerobic endurance to perform rapid motion sequences of explosive blows as well as a high degree of speed and momentary power . On the other hand, aerobic power and endurance are also essential to maintain a high and constant level of intensity, since the efforts are short, intense and repeated, lasting several minutes, with no possibility of complete recovery. The physical demands of karate therefore generate a nutritional need of 60 to 65% carbohydrates, 15 to 20% protein and 20 to 25% lipids (Imamura H, et al., 2015).

The energy balance is equal to the total energy input minus the total energy output. Thus, dietary intake and energy expenditure related to physical activity determine the plateau around which body weight and fat are regulated. Traditionally, weight loss is promoted during aerobic-type exercises well known to stimulate lipid metabolism. Karate is a sport with a weight category, gain or loss (Rankin, 2002).

When we talk about sports performance, compared to training, nutrition is sometimes left in the background by the practitioners of most disciplines, yet food occupies a central place in the achievement of performance.

It is essential to have an optimized food hygiene in order to strive for excellence. Eating well means knowing how to measure your nutrition by promoting high-quality food in the right amounts but also at the right time, it means that there are better times to eat. A good diet therefore corresponds to a balanced balance between the food intake of the athlete and his energy needs to meet a targeted activity (Wilmore, 1983).

Indeed, the contributions and needs will not be the same according to the activity practiced, its duration and intensity, but also the profile of the athlete, his sex, age, height and weight. Energy requirements depend on two distinct factors: basic metabolism (BM) and level of physical activity (PA).

We have chosen to work on the high-level karatemas of both sexes who are members of the national teams, preparing for the 2022 Oran Mediterranean Games. The practice of karate requires proper nutrition to keep or regain shape.

The objective of this work is precisely to know how to predict all the parameters on which a sportsman can influence to improve his performance, thanks to the scientific advances as well as the knowledge we have acquired.

2. Methods and tools :

The sample chosen for our research work consists of a group of 24 karatemas of both sexes, aged between 17 and 27 years, adults. They are all members of the Algerian national teams preparing for the Mediterranean Games June 2022 in Oran and the World Championships (2022).

Table 1: Characteristics of total karate parameters

	Age ans	Stature cm	Weight kg
Men	23,07±3,22	179,22±7,68	78,78±11,03
Women	18,89±1,29	167,01±5,89	62,43±7,82

In order to better understand the body composition of karatemas, we used the bioimpedancetry method. We used the «In Body 770» device which gives us several parameters of body composition. In less than 60 seconds, In Body Check-ups provides information about basic metabolism, lean mass and fat mass for each segment of the body. By measuring each body segment separately, In Body is able to provide a thorough analysis of a patient's water profile for each segment. These results include intracellular water, extracellular water. The results provided as part of an in-depth body analysis are subdivided into two parts according to the table below.

Main results	Additional results
Weight	Active cell mass
Total body water	Skeletal mass index
Intracellular water	Visceral fat level
Extracellular water	Basic metabolism
Extracellular water ratio	Weight control
Body fat and its percentage	Target weight
Skeletal muscle mass	Protein and mineral estimation
Segmental lean mass	Raw impedance and reactance results

Statistical Calculations:

For all calculations, we used descriptive statistics:

- Arithmetic mean: this is the sum of the measured values divided by their number, it determines the average value of a calculation series.
- Standard Deviation Calculation: A measure of the dispersion of values relative to the mean.
- Coefficient of variation: Dimension less and independent of the selected units, it allows to compare statistical series expressed in different units.

Calculations of these statistical parameters were performed using Excel 2010.

3. Results:

• Total parameter results:

Our male sample is characterized by an age of young adults with an average of 23.07 years ±3.22). The average weight is 78.78 kg ±11.03). While the average stature of our men karate is 179.22cm ±7.68. Analysis of the total parameters shows that our male sample has a very high degree of homogeneity in stature (CV = 4.29%) and average homogeneity in weight (CV = 14%) and age (CV = 13.59%).

The female sample has an average age of 18.89 years ±±1.29, an average stature of 167.01 cm ±5.89, and for the weight the average is 62.43 kg± 7.89. Our female sample shows very high homogeneity (CV= 6.81%) at the age level, as well as at the height level (CV=3.53%), and average homogeneity at the weight level.

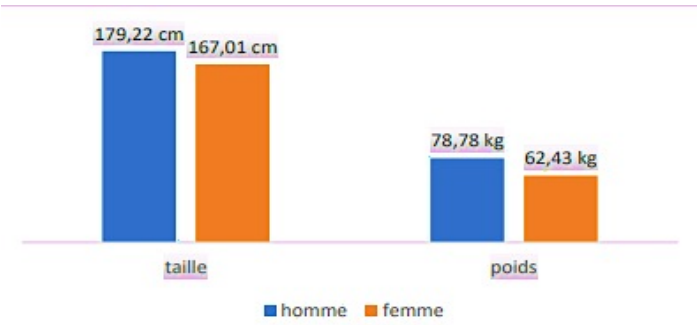

Figure 01: Total Karate Parameters for Men and Women based on In Body 770 data.

• Trace element results:

When reading the results of the trace elements, the mean of the proteins being 13.49 kg ± 1.86 is higher than that of the minerals being 4.82 ±0.73

kg for men karatekas, while for women, the mean of the proteins is 9.11 kg ± 1.03 compared to minerals which is 3.33kg ± 0.41.

Table 02: Karate trace elements results

	Men		Women	
	Proteins kg	Minerals kg	Proteins kg	Minerals kg
Average	13,49	4,82	9,11	3,33
SD	1,86	0,73	1,03	0,41
C%	13,76	15,13	11,31	12,21

• **Water consumption results:**

On average, water accounts for half or two-thirds of body weight. We observe that the average total water of men is 48.26 liters ±7.63 divided between 31.21 liters ±4.30 inside cells and 18.36 liters ±4.30 in extracellular space.

For women, the average total water is 33.76 liters± 3.78 divided between 21.07 liters ±2.35 inside cells and 12.69 liters± 1.43 in extracellular space.

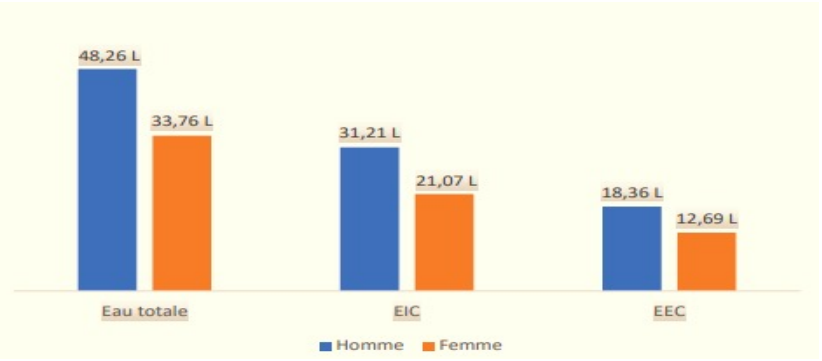

Figure 2: Graphical representation of body water

- **Body weight fat components:**

Male karatekas have a fat mass of 21.83 kg ±15.45 representing 13.36% of the total body mass. The average fat mass in women karatekas is 15.30 kg± 4.72, which represents 24.60% of the total body mass.

This parameter has a very high heterogeneity within the two karate groups.

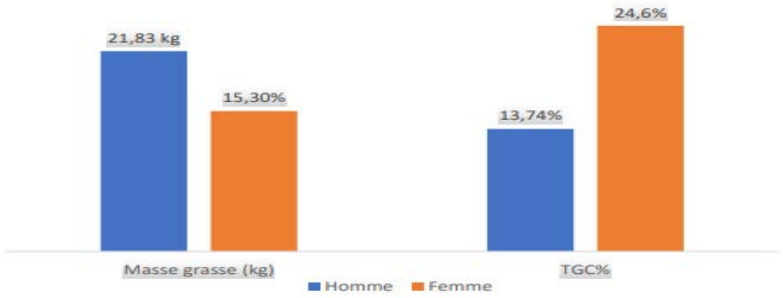

Figure 03: Body fat component in karatekas.

- **Results of the muscle composition:**
  The highest average of muscle mass is represented by the value 38.61Kg±5.4 with a percentage of 64% for men karate
  For women karatekas, the average muscle mass is 25.48 kg±3.07 with a percentage of 62% is higher than the average fat mass 15.30 kg±4.72 with a percentage of 38%.

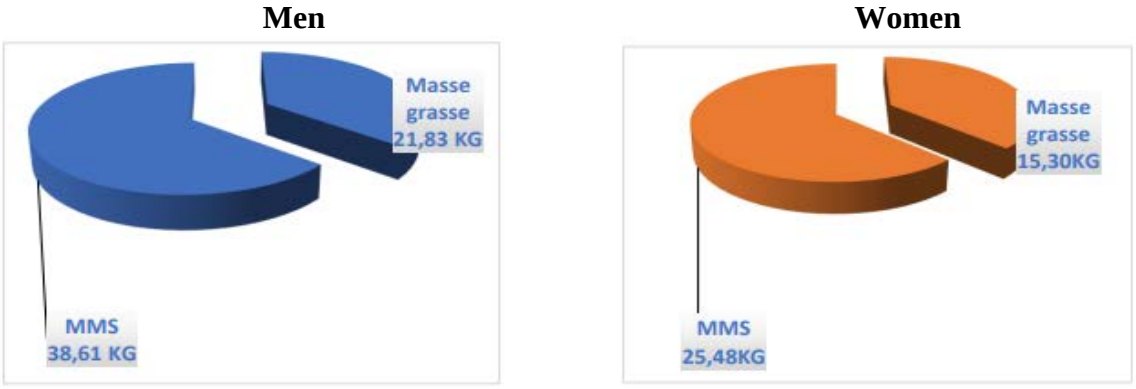

Figure 04: Body composition results based on In Body 770 data.

Analysis of questionnaire results:

• Maintaining body weight

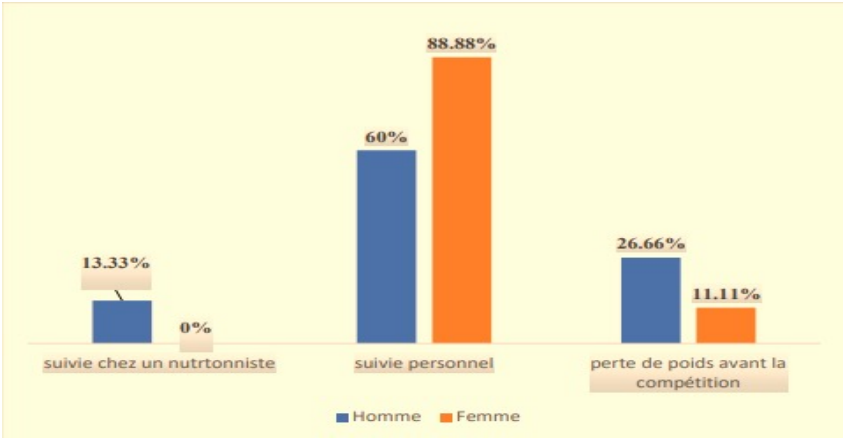

Figure 05: In Body 770 weight loss results.

The result is that :

- 13.33% of male karatekas follow-up with a nutritionist, unlike women who have a percentage equal to 0.
- For personal follow-up, there is a percentage of 60% for men karate and 88.88% for women karate.
- 26.66% of men karatekas opt for weight loss just before the competition, in contrast to women who have a percentage of 11.11%.

- **Water consumption:**

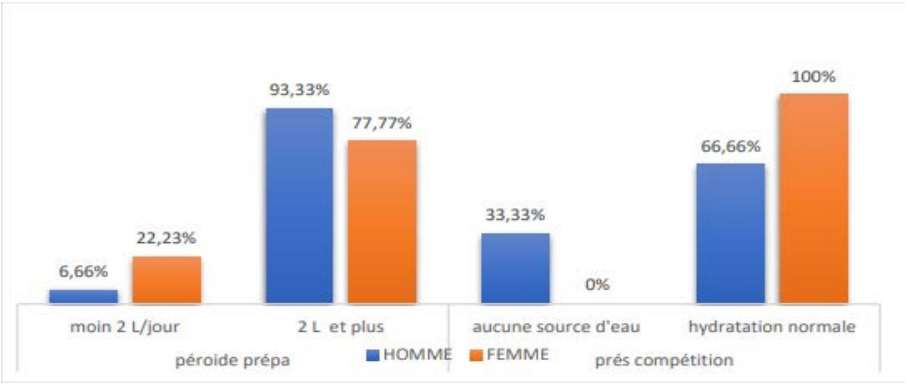

Figure 6: Water consumption results

During the preparation period: Hydratation is a very important parameter, it is advisable to take 2 liters or more per day distributed in 500ml. 93.33% of men's karatekas and 77.77%

of women respect this, while 6.66% of men and 22.23% of women drink less than 2 litres per day.

During the pre-competition period: During this period, all women karatekas opt for normal hydratation, the same as men with a percentage of 66.66% and the rest represented by 33.33% do not take any source of water.

- **Carbohydrates consumption**

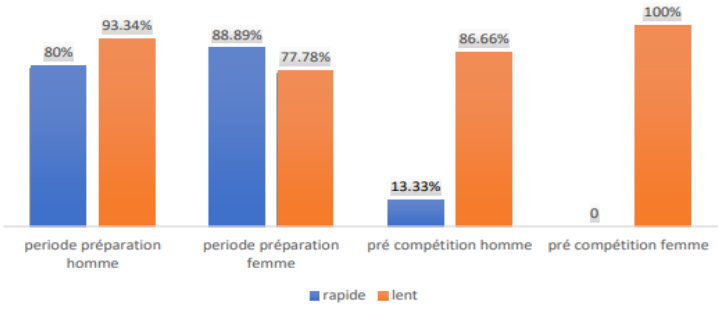

Figure 7: Carbohydrate consumption in sports preparation

During the preparation period: 80% of men consume fast sugars and 93.34% consume slow sugars, while 88.89% of women consume fast sugars and 77.78% of them consume slow sugars. During the pre-competition period: 13.33% of men consume fast sugars and 86.66% consume slow sugars, while all women consume slow sugars.

- **Protein consumption:**

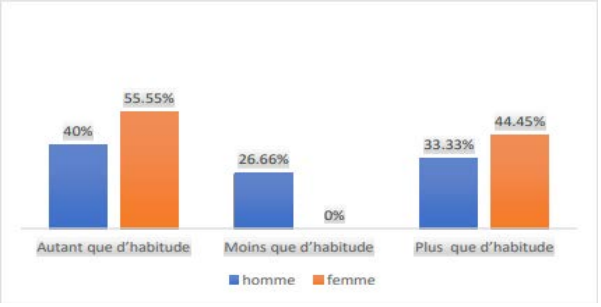

Figure 8: Protein consumption in sports preparation

This distribution indicates that during this preparation period, 40% of men karate do not change their protein intake, 26.66% of men consume less than

usual and 33.33% increase their intake for better performance. For women, the majority 55.55% do not change their consumption and the remaining 44.44% use more than usual.

• Consumption of dietary supplements :

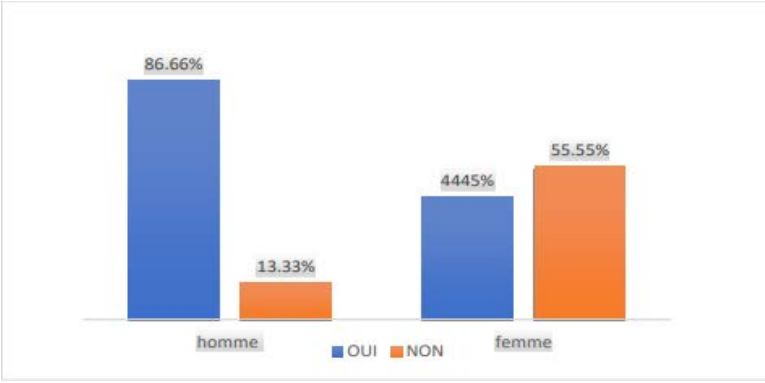

Figure 9: Consumption of dietary supplements during sports preparation

This breakdown shows that the majority of male karatekas (86.66%) consume dietary supplements such as Whey, BCAA, creatine, isolate, EAA, or 13.33% do not. For women, almost half use it (44.45%) and the other half do not.

Discussion:

The diet of the sportsman is an extremely vast subject, which depends on the type of effort provided, its duration, the intensity and the muscles (or rather the muscle fibers) used. Like training and recovery, nutrition is a determining factor in a sportsman's performance. Because the body has a particular metabolism and modified needs due to its activity, dietary adaptations will be necessary to avoid deficiencies, muscle fatigue and injuries, while optimizing physical abilities.

In fact, diet is of great importance in achieving intense effort. Karateka has higher requirements for energy, protein, vitamins and minerals (Boutonnier, 2016). This sport requires a specific weight category when fighting. For this, body weight is a must, and the athlete must have a fit weight in competitions, corresponding to the weight where the athlete is at the maximum of his abilities and can express the full extent of his potential (Shepard et al. 1995). In addition to body weight, hydration plays a fundamental role in most

physical activities. Dehydration, even slight, leads to a significant decrease in performance and is associated with increased risk of injury. 1% dehydration leads to a 10% decrease in physical performance, and when we feel thirst, our body has already lost 10% of its physical capacity (Fereira et al. 2016). Body weight and fat control strategies aim to promote performance by decreasing the ratio of muscle mass to fat mass (Koutedakis et al., 1994). Appropriate monitoring seems necessary, depending on the specificities of the sport and the athlete.

The objective of our work is to see the relationship of nutrition on the components of body weight in order to propose different dietary strategies adapted to different weight categories.

Each sport requires a specific diet according to its energetic needs (Cascua, 2010). After assessing the fat mass, we found that men karatemas have excess fat with an average of 21.83 kg, and for women have a standard fat level with an average of 15,30 Kg. These results are not consistent with the questionnaire results. For high-performance athletes, with high daily energy expenditure, the best strategy for weight loss and fat reduction is to reduce total energy intake (decrease in the amount of calories consumed, the percentage of fat and the amount of carbohydrates with a high glycemic index) (Wilmore, 2006).

We find that the highest average is that of muscle mass represented by the value 38.61 Kg for men karate, for women karate, the average muscle mass being 25.48 Kg. These data are consistent with the results of the questionnaire (Brouns F.1999). To avoid initiating the physiological process of proteolysis, the solution seems to lie in increasing the protein ration it would even be possible to increase muscle mass by a protein intake greater than 2 g. Kg-1 day 1 despite caloric restriction, consuming dietary supplements such as “WHEY” (Koutedakis et al., 1994). In addition, Fogelholm (2003) points out another benefit of eating protein foods is the increased energy expenditure they induce on digestive work. Protein intake increases post-prandial thermogenesis and energy expenditure (20 - 25%) more than carbohydrate (5%) or lipid (3%) intake (Vermorel et al., 2005). Finally, protein absorption has a greater satiety effect than the absorption of carbohydrates or lipids (Westerterp-Plantenga, 2003).

The analysis of hydration shows that, in terms of questionnaire responses, during the preparation period 93.33% of male karate kas and 77.77% of female karatekas consume more than 2 liters (L) per day. We note that the In Body results give us an average of 48.26 L for men and 33.76 L for total

water levels. Because hydration is very important at the level of the body, we see that our athletes hydrate well. As regards the pre-competition period, all women hydrate in a normal way, as regards karate men 33,33% tend to limit their intake in Results and Discussions 67 water and will find themselves in a chronic dehydration state that will progress at high speed before the competition towards an acute dehydration state. Indeed, he opts for the usual and fast solution, although it is harmful to draw on water to be at the weight, which will result in poor performance (Rousseau, 2010). Age, weight and stature have always been determining factors in the achievement of performance as stated (Tomas, 1981).

Based on our results, the statistical treatment of morphological parameters has allowed us to make a diagnosis that will allow us to propose corrective measures concerning the strategy pursued by the coaches regarding the planning and the realization of the various programs of preparation of karate for international competition.

Conclusion :

The management of the specific diet of a sportsman, whether it be endurance or development of muscle mass (also specific) cannot be done validly at the last moment, shortly before a competition. This real follow-up, an integral part of the medical follow-up, is to be implemented from the beginning of the sports season. Dietary errors are often detected, to be corrected gradually. In Algerian sport in general and at the level of the karate federation in particular, no strategy for nutritional management exists. From this study, it was found that karatekas, members of national teams, do not follow any diet.

The practice of karate requires an appropriate diet to keep or regain shape. So we must adapt the diet of the practitioner. By the indispensable elements it brings, food is indeed of great importance in the realization of an intense effort. Karateka has higher requirements for energy, protein, vitamins and minerals. We have to make a distinction between food, which is the consumable product, and nutrients, which are the substances that the body can absorb. In the light of this work, we would like to raise awareness among sports stakeholders, coaches, trainers and managers to establish nutritional management within the various national teams.

References :

- Brouns F. (1999) : Nutritional Needs of Athletes) on Amazon.com. Editions Wiley-Blackwell.
- Cascua S. (2010) : Alimentation pour le sportif - De la santé à la performance. Editions Vigot.
- Didier R., (2019) : Sports d'endurance et nutrition: macro ou micronutriments ? Editions Amphora. 301 pages.
- Fereira A.A., J.R. Weeds, R.V. Santos, C.E.A Combra Jr. (2016) : Nutritional statusand growth of indigenous xavantechildren central Brazil. Nutrition Journal 1-3
- Ferreira, C., Heulin, A., & Garnier, V. (2016). L'assiette du sportif recettes équilibrées avant, pendant et après l'effort. Paris (France):
- Fogelholm, G.M., Koskinen, R., Laakso, J., Rankinen, T., et Ruokonen, I. (1993). Gradual and rapid weight loss: effects on nutrition and performance in male athletes. Med. Sci. Sports Exercise, 25 : 371-377. PMID:8455453.
- Fogelholm, M. (1994) : Effects of bodyweight reduction on sport performance. Sports Med. 18 : 249-267. PMID:7817064.
- Fogelholm, M. (2003) : Dairy products, meat and sports performance. Sports Med. 33 : 615-631. doi:10.2165/00007256-200333080-00006. PMID:12797842.
- Fourre M. (2003) : Le karaté préparation physique et performance. Editions INSEP. Paris.
- Hubert T. (1997) : Hugues D. (2012) : Nutrition de l'endurance - Les secrets pour booster vos performances. Paperback – May 24, 2012
- Imamura H, Miyahara K, Oda K, Kojima N, Matsuo K, Tai K, Yoshimura Y, Iide K, (2016). Calcaneal bone status in elite karate practitioners. Journal of Athletic Enhancement 5:4 doi: 10.4172/2324-9080.1000236
- Imamura Hiroyuki, Kentaro Tai, Kazuhide Iide, Yoshitaka Yoshimura : (2015). Dietary quality among men and women in 187 countries in 1990 and 2010: A systematic assessment. The Lancet Global Health 3(3):e132-42. DOI: 10.1016/S2214-109X(14)70381-X. Source PubMed
- Rankin, J.W. 2002. Weight loss and gain in athletes. Curr. Sports Med. Rep. 1 : 208-213.
- Rankin, J.W., Ocel, J.V., et Craft, L.L. 1996. Effect of weight loss and refeeding diet composition on anaerobic performance in wrestlers. Med. Sci. Sports Exercise, 28 : 1292-1299. PMID:8897387.

- Boutonnier (2016) : Glucides et alimentation : aspects physiologiques, nutritionnels et sanitaires. https://doi.org/10.51257/a-v1-f6153
- Ross, W. D., Carr, R., Guelke, J. M., & Carter J. E. L. (2003). ISAK Standards, International Society for the Advancement of Kinanthropometry, Rosscraft / Turnpike Electronic Publications, compact disc.
- Rousseau R., L. Chiquet a,e, F. Devierea,f , J. Jouffriault g , S. Menarda,h, L. Winkler A. Freya,i , B. Vessellea,j (2019) : Le Judo : un sport pour tous Judo: A sport for everyone. Science et sports (2019)34, 281-294. ELSEVIER
- Rousseau, V. ; Cascua, S. (2005) : Alimentation du sportif , De la santé à la performance. Edition amphora.2008. 301pages Sheldon, W., Stevens, S. S. and
- Thomas (1981) : The varieties of human physique: An introduction to constitutional psychology, New York: Harper & Bros.
- Shephard, R.J., et Shek, P.N. 1995. Heavy exercise, nutrition and immune function: is there a connection? Int. J. Sports Med. 16 : 491-497. PMID:8776201.
- Westerterp-Plantenga, M.S. 2003. The significance of protein in food intake and body weight regulation. Curr. Opin. Clin. Nutr. Metab. Care, 6 : 635-636. PMID:14557793.
- Wilmore J.H. (1983) : “Body composition in sport and exercise: directions for future research,” Medicine and science in sports and exercise, 15 (1). 21-31. 1983.
- Wilmore. G, (2006), physiologie du sport et de l’exercice, adaptation physiologique à l’éxercice , Eds, De Boeck 3éme édition, p198