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Nutrition and boy composition of algerian wrestlers. Case of freestyle and greco-roman fight

Nutrition et la composition corporelle des lutteurs algériens. Cas de la lutte libre et gréco-romaine

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ABSTRACT: The aim of our study is to determine the relationshipbetween nutrition and body composition by comparingbetween the two styles of the discipline:" freestylewrestling" and" Greek-roman wrestling" in order to establish a food plan following the good nutrition norms. The study was carried out on highlevel Algerian national team practicing twofighting styles. Weused the anthropometricmethod and the questionnaire to determine the relationshipbetween body composition and nutrition. The analysis concerning the two types of wrestling showed, in relation to the total parameters, a similarity of age, a veryhighweight and a high stature on one hand and on the other hand, the absolute and relative mass composition in the freestyle and Greek-roman wrestlers to an overdevelopment in muscle and fat. The comparison between the two forms of the discipline is able to well define the most performed style in Algeria.

Key words: wrestlers, food plan, body composition.

1. Introduction :

Nutrition is a crossroads of physiological metabolism by which the body transforms the food consumed into nutrients, which are biochemical substances divided into two categories: macronutrients (fat, protein and carbohydrates) and micronutrients (vitamins, minerals and phyto-nutrients) essential for the proper metabolic functioning, growth and restoration of the various tissues. Most of the nutrients are supplied by the different food groups because the human metabolism is not able to synthesize them. The daily caloric requirement for macronutrients and micronutrients varies according to age, gender, body weight, fitness, hormonal status, activity and physical exercise (McArdle et al., 2004).

The human body needs a well-balanced daily diet, which is divided into three main meals and two snacks, (with proportions of: 25% breakfast/ 40% lunch/ 15% dinner/ with 5% snacks) and a qualitative and quantitative energy intake that varies between 1500 and 2000 kcal/day and more. This is all the more important in the case of high-level athletes (Steen, S et al., 1990).

In order to characterize the constitution of sportsmen and women, the evaluation of the body composition is very important. It is of great interest to many scientific sport researchers and physical education (Wilmore; 1993). In sport's morphology, the definition of human body composition has received great approval as a method of assessing physical development in athletes of different disciplines. In order to control training, body weight is not sufficient to accurately assess the differences between two athletes of the same body weight. Kozlov and Gladisheva (1977) classified fat and muscle tissue as high variability components and bone tissue as low variability component. In wrestling, a sport where "making weight" is essential, knowledge of one's own body composition is extremely helpful in the weight loss process (Kern, B. D., & Robinson, T. L. 2011). This data will help wrestlers to determine which weight class is best for them to compete in, and also to determine the duration of an effective and healthy 'weight loss' (Chambinaud, 2002). This process aims to decrease the amount of body fat while maintaining a lean body mass. A decrease in lean body mass can lead to a decrease in strength and power (Koçak, S., &Karli, U., 2003).

In Algeria, we noted that each participation in the various competitions, whether at the Olympic Games or the World Championships, debates are

initiated between the various officials in the light of the results obtained, at the end of which a balance sheet is drawn up highlighting the positive and negative points of the weight of form. The results obtained by Algeria in this field remain below the expectations of the coaches. In these debates, the importance of body composition and body weight during fights remains one of the terms that comes up quite often (Keney et al. 2013), thus motivating us to take an interest in the nutrition of these athletes and its impact on body composition.

2. Methodology:

Anthropometric techniques are used to make measurements which are based on anthropometric points that can be easily located using different landmarks (bone, skin folds or specific items) standardized by Martin R. (1928), then by Ross et al (1982).

The equipment used was a Siber Hegner G.P.M. anthropometric suitcase. Various measurements were made, namely lengths, widths, perimeters and skin folds.

From these measurements we have calculated the physical development indexes such as:

-Body surface area: It is expressed in m^2, its determination is the main indicator of the state of physical development of the athlete (wrestler). It is defined by the arithmetic formula of Haycock et al. using the body characteristics weight and height as variables.

$$\mathbf{S\ (m^2)} = 0{,}024265 \times \mathbf{T}^{0.3964} \times \mathbf{P}^{0.5378}$$

Quetelet's Index:

According to Quetelet's formula (1869) this index reveals the level of physical development of an athlete, it is expressed in g/cm, whose value is 350 for sedentary people and more than 400 g/cm in high level athletes. This formula is:

$$IQ = P/T \ g/cm$$

-Sheldon index:

This index tells us something about the longilinearity of an individual and is calculated according to the following formula:

$$ISh = T/\sqrt[3]{P}$$

-Body Mass Index (BMI):

The body mass index is related to overweight in adults. It is translated into standard ranges (thin, normal index, overweight, obese). This index is calculated on the basis of height and mass.

$$IMC = poids(kg) / stature^2(m^2)$$

Body weight composition:

The composition of body weight is represented by fat, bone and muscle mass. These components of body weight are determined by the formulae of Mateigka (1921). The body weight components are calculated according to the following formulas:

-Fat component: To determine the fat component of body weight, we used the simple and less expensive skinfold method.

-Muscle component in kg :

The following formula allows us to define the absolute amount of muscle component is

$$M.M = L \times R^2 \times K$$

-Bone component in kg :

The following formula which determines the absolute bone component.

$$M.O(kg) = T \times O^2 \times K$$

-Statistical method:

In our research work, we used the following statistical calculation tools:

Descriptive statistics according to (Champely.S, 2004)

In order to process all the data collected, we calculated

-Arithmetic mean: It represents the sum of the measured values divided by their number, it determines the average value of a series of calculations.

-Calculation of the standard deviation: Is considered as a measure of the dispersion of the values in relation to the average.

-Coefficient of variation: Independent of the units chosen.

The wrestlers were subjected to a nutritional survey and we report the main answers.

3:**Results**

Presentation of the total parameters of the Algerian wrestlers .

Table 1: Total parameters of the wrestlers (freestyle)

	Age	**Stature**	**Poids**
Maximum	26	182,6	124
Moyenne	24,25	175,28	93,25
Minimum	23	170,40	73
Ecart Type	1,50	5,75	24,51
CV%	6,19	3,28	26,29

The group of athletes practicing freestyle wrestling has average values for age and stature of 24.25 ±1.50 years and 175.28 ±5.75 cm respectively, as well as coefficients of variation of 6.19% and 3.28% respectively, representing a high

degree of homogeneity between the members of the group. On the other hand, the average weight values 93.25 ±24.51 kg, show heterogeneity according to their coefficients of variation.

Greco-Roman wrestling :

Table 2: Total parameters of Greco-Roman wrestlers.

	Age	Stature	Poids
Maximum	33	186,5	126
Moyenne	25,50	177,03	95,25
Minimum	21	170,6	74
Ecart Type	5,26	6,78	22,77
CV%	20,63	3,83	23,90

The group of wrestlers (Greco-Roman) presents average values for age and weight of 25.5 years ±05.26 and 95.25 kg ±22.77 as well as coefficients of variation of 20.63% and 23.90% respectively, representing a heterogeneity between the members of this group, on the other hand the stature shows average values of 177.03cm and CV 3.83% respectively, representing a very great homogeneity.

- Indices of physical development:

Absolute and relative surface area:

-Free wrestling:

Table 3: Results of the freestyle wrestlers' surface areas

	S = m²	**S rel %**	**Index energy expenditure cm²/kg**	**Scheider Index kg/ m²**
Max	2,5	0,0	0,0	50,3
Average	2,09	0,02	0,02	44,18
Min	1,84	0,02	0,02	38,40
SD	0,28	0,00	0,00	5,80

CV%	13,54	13,10	13,10	13,12

Absolute area (m^2) relative area, the energy expenditure index and the Schreider index show a medium homogeneity

-Greco-Roman wrestling:

Table 4: Area results of the Greco-Roman wrestlers

	S = m^2	**S rel %**	**I energy expenditure cm^2/kg**	**I de Scheider kg/ m^2**
Maximum	2,5	0,025	0,0	49,9
Average	2,12	0,023	0,02	44,43
Minimum	1,8	0,020	0,0	40,1
SD	0,29	0,002	0,00	4,33
CV%	13,89	9,52	9,52	9,74

Apart from the absolute area, which has a medium degree of homogeneity, the rest (relative area, energy expenditure index and scheider index) is very homogeneous.

- Robustness and build indexes :

-Freestyle wrestling:

Table 5: Wrestlers' Indexes Results (Freestyle)

	I de QUETELET	**I de KAUP**	**I de Sheldon**
Maximum	0,7	0,0	42,4
Average	0,53	0,00	39,04
Minimum	0,41	0,00	36,59
SD	0,13	0,00	2,91
CV%	24,26	22,69	7,45

Apart from the Sheldon index which is very homogeneous, the rest of the robustness indices are heterogeneous.

-Greco-Roman wrestling:

Table 6: Wrestlers' index results (Greco-Roman).

	I de QUETELET	I de KAUP	I de Sheldon
Max	0,7	0,0	40,6
Average	0,54	0,00	39,03
Min	0,4	0,0	37,2
SD	0,11	0,00	1,57
CV%	19,88	15,97	4,03

Body composition :

-Freestyle wrestling :

Table 7: Results of absolute mass of freestyle wrestlers

	Fat mass kg	Muscle Mass kg	Bone mass kg
Maximum	42,4	51,7	13,2
Average	23,50	40,55	11,64
Minimum	10,05	31,79	9,97
SD	15,98	9,12	1,34
CV%	67,99	22,50	11,50

The muscle and fat components show heterogeneity, but the bone mass shows a coefficient of variation of 11.50%, representing average homogeneity.

-Greco-Roman Wrestling :

Table 8: Results of the absolute mass of Greco-Roman wrestlers.

	Fat mass kg	Muscle mass kg	Bone mass kg
Maximum	49,9	45,4	13,7
Average	25,26	41,85	12,51
Minimum	9,1	39,6	11,6
SD	18,57	2,51	1,00
CV%	73,51	6,00	8,01

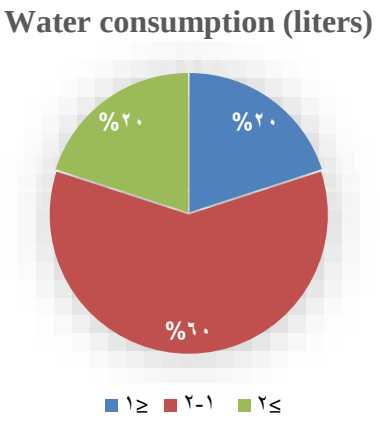
The muscle and bone components show a high degree of homogeneity, whereas the fat mass shows a coefficient of variation of (73.51%) representing heterogeneity.

Results of the nutritional survey:

In order to determine the relationship between diet and performance of wrestlers we established a questionnaire with 29 questions for 10 competitive wrestlers. We report here the most relevant answers.

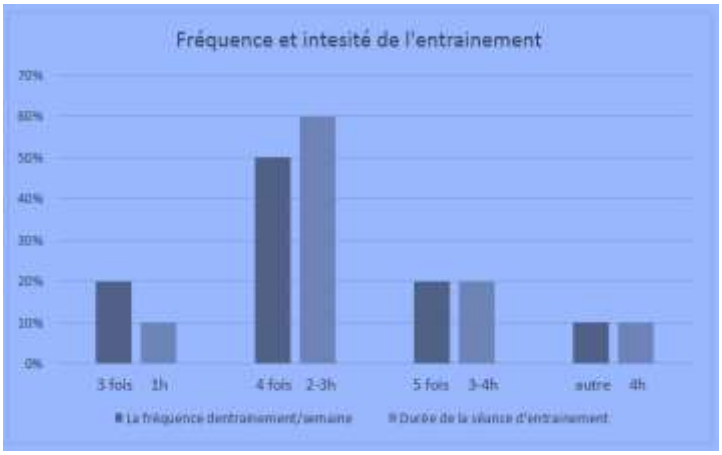
Water consumption:

It was observed that 60% consumed less than 2 litres of water per day, 20% consumed between 1 and 2 liters and 20% consumed more than 2 liters per day.



Training and physical preparation:

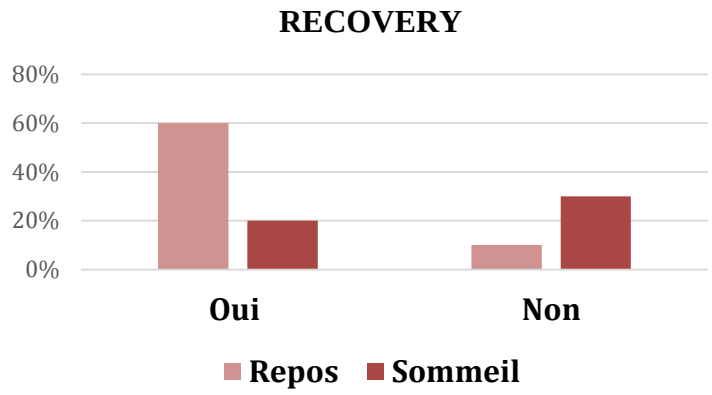
The wrestlers were asked about the frequency of their training and the duration of each training session, we obtained that 20% of the wrestlers train 3 times a week and with the same percentage 5 times a week, 50% 4 times and 10% answered by other (irregular training).



The diet of wrestlers is based on proteins, fats and carbohydrates like any other diet. Because of their training and in order to increase their weight they take in a large amount of food. Their diet is often high in protein, fat and carbohydrates and may exceed the recommended limits. The recommended limits for the use of protein are 15% of the caloric value in the daily diet of the athlete and 30% of fat calories in the ration. The accepted percentage for carbohydrates is 55% of the daily ration (J Klepping, D. Moreau and J-C Gaillard, 1976).

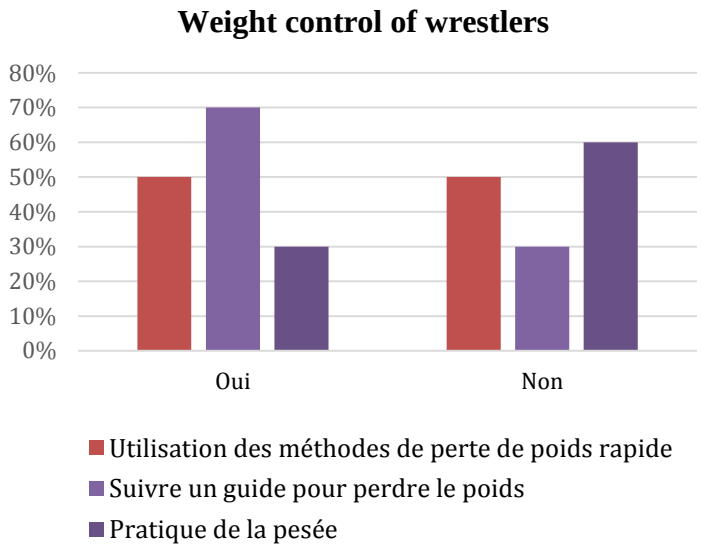
Recovery:

High level wrestlers are involved in regular and intense training program, which require a good deal of rest and sleep. The results of the questionnaire showed that 60% of wrestlers get enough rest, while 40% do not.



Weight control:

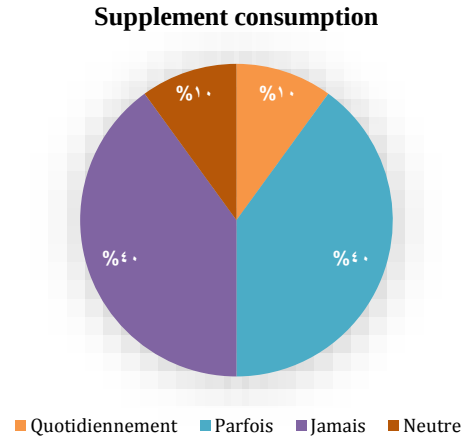
For wrestlers it is essential not to take the risk of dropping down in weight category or rising to a higher category. Post and pre-training weighing is therefore necessary for weight control. In our sample, 30% of the wrestlers answered yes to the practice of weighing, while 60% and 10% of the wrestlers remained neutral.



Despite the evidence against this practice, rapid weight reduction remains prevalent among wrestlers. Rapid weight reduction has significant negative consequences that can affect athletic performance, physical health and normal growth and development. (Oppliger and al. 1996).

Supplement consumption:

We observed that 10% of the athletes consumed supplements daily, 40% occasionally and others never with a percentage of 40%. And 10% remained neutral.



In addition to training, nutrition plays a vital role in sports preparation. In sportsmen and sportswomen, energy requirements are much higher than for a sedentary person, and vitamin and mineral intakes must be adjusted (particularly for mineral loss during exercise). Dietary supplements are useful

primarily to supplement your diet when it is imperfect. The aim of supplements is to make you perform better during your sporting efforts.

4. Discussion:

Following the results obtained, we note that following the statistical analysis:

Total parameters: Age, weight and stature have always been determining factors in the achievement of performance as stated by Billat (2012).

Age: The average age of our wrestlers is 23.67±1.51 years for the freestyle wrestlers and 25.50±5.6 years for the Greco-Roman wrestlers with a non-significant difference between the two groups.

-Stature: Our wrestlers have an average of (172.28±6.44cm) for freestyle wrestlers and an average value of (177.03±6.78) for Greco-Roman wrestlers, surpassing freestyle wrestlers by 5cm.

The weight: As far as the weight is concerned, the great value goes to the Algerian wrestlers with an average value of (83.33±24.52) for the freestyle wrestlers and an average value of (95.25±22.77) for the Greco-Roman wrestlers.

In summary, the analysis of these parameters and the comparison between the two styles shows us that at the level of age, they present similar characteristics, with a high stature and a very developed weight. The causes of this difference between the characteristics of our wrestlers can be found in the selection of the wrestlers in terms of the concordance between their morphology and the morphological requirements of the discipline:the food hygiene programmed for the benefit of the wrestlers and the training program. (Paillard, T., 2006).

This proves that the planning of training sessions is poorly thought out or poorly executed.

The fact that the food safety included in the training programs directly influences the skin folds proves that the strategy for the implementation of the diet on the one hand and the training programs on the other hand are far from being in conformity with the requirements of the standard norms which make it possible to bring out successful wrestlers who can be part of the Olympic elites. (Moeri.A and Baud.R., 2019).

It should be recalled that the support of our wrestlers is devoid of periodic controls that allow the detection of shortcomings and the implementation of corrective measures before it is too late.

-Body composition in kg:

The analysis of the body composition (absolute mass) of the Algerian freestyle and Greco-Roman wrestlers in comparison with the reference data shows that the Algerians present an overdevelopment concerning the muscular mass and the fat mass. This discrepancy is due to the food safety, the training program in general and the periodic controls in particular. It should be remembered that periodic checks allow the food safety and training programs to be corrected every time and consequently to manage the body composition of the wrestlers as to adapt them to elite Olympic standards (Auvinet and al. 2013).

This shocking finding proves that the training programs or their implementation have been directed in the opposite direction to the norms, whereas the objective of these programs was to lead to a reduction in fat mass in favor to the muscle mass, we find ourselves faced with a situation contrary to the desired results (Brownell et al. 1987). It should be remembered that the integration of morphological tests at the beginning of the training as well as periodic controls is necessary because they make it possible to correct the training programs and the food safety in order to adapt the body composition of our wrestlers to the Olympic standards of the elite wrestlers.

Conclusion:

Every sporting activity requires an environment conducive to good performance. Thus, it is necessary to integrate mental, tactical, technical and general and specific physical preparation (quantitative or qualitative). Overall, it is necessary to adopt an appropriate diet in order to maintain a good state of "preparation" and to facilitate the recovery phases between the muscular and physiological "conditioning" sessions. In fact, nutrition enables the body's capacity to adapt to the effort to be maximized and to arrive in the best possible condition on the day of the competition. The diet is oriented towards a basic dietary balance, with enrichment in complex carbohydrates, omega 3 fatty acids, good quality proteins and nutrients with high anti-oxidant value. The nutritional strategy is the choice of foods ingested, whereas the micro-

nutritional strategy concerns the choice of micronutrients ingested, i.e. vitamins, minerals, trace elements, etc.

At the end of our work devoted to the relationship between nutrition and body composition of wrestlers, we would like to remind you that through our study we wanted to draw the attention of sports actors (coaches, managers) to the importance of nutrition during the training and preparation of athletes for competitions. This work should contribute to the establishment of a reference of nutritional point of view which can be used as a guide in the elaboration of the strategy of career management of the Algerian wrestlers through a mode of selection, a food hygiene and adequate training programs.

The results of our analysis have enabled us to make a diagnosis of the state of our wrestlers. Thus, our wrestlers show a cruel deficit compared to the standards. This observation allowed us to say that our strategy of management of the career of our wrestlers is to be revised so we will allow us to propose corrective measures concerning the nutritional care and to work out a strategy which makes it possible to reach such a profile and this by taking into account all the factors which contribute to it namely: The mode of selection, the food hygiene, the training program.

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