Anthropometric profile of students on the Food Technology course at IFTM Uberlandia campus from 2012 to 2017

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Carlos José da Silva[1], Leticia Vieira Castejon[2], Deborah Santesso Bonnas[3] and Sidney Fernandes Bandeira[4]

ABSTRACT

The objective of this work was to outline the anthropometric and dietary profile of students taking the food technology course at the Federal Institute of Education, Science and Technology of Triângulo Mineiro – Uberlândia campus, between the years 2012 and 2017. The work was carried out based on application of an anthropometric self-assessment script in which 20 male and 42 female students participated. In the ideal weight profile, 14 students were underweight, 25 with ideal weight and 23 with different degrees of obesity. In the Body Mass Index, the average was 25.27 kg/m², Body Adiposity Index was 28.84%, Waist Hip Index women had an average of 0.81±0.12 and an average waist circumference of 82, 12±13.41 cm, among men the average ICQ was 0.91±0.07 cm, with the average WC being 101.89±9.31cm. Basal Metabolism (MB) according to DuBois and Raymond was on average 1,581.05 kcal/day, according to Harris Benedict 1540.45 kcal/day and according to WHO/FAO 1384.82 kcal/day. In Total Energy Value (VET), the average was 2331.68 kcal/day. In the result of calculating the daily ration, the average intake was 49.99% of carbohydrates, 19.99% of proteins and 29.98% of lipids. According to reference data from Interministerial Ordinance nº 66, of August 25, 2006, students had an average daily carbohydrate consumption below the reference standard. In protein intake, the average was above the reference standard, in lipid intake it was within reference standards. According to data collected, the presence of overweight and obesity in men was notable, which highlights the importance of creating awareness measures about the risks of heart disease.

Keywords: Anthropometric profile, Dietetics, Metabolism.

[1] Graduate of the Food Technology course IFTM Campus Uberlândia
E-mail: cj_teen@hotmail.com
[2] Doctor professors at IFTM Campus Uberlândia
E-mail: leticiavieira@iftm.edu.br
[3] Doctor professors at IFTM Campus Uberlândia
E-mail: deborahb@iftm.edu.br
[4] Doctor professors at IFTM Campus Uberlândia
E-mail: sidneybandeira@iftm.edu.br

INTRODUCTION

In recent years there has been a significant increase in overweight and obesity among the population of developed and developing countries. This fact has been seen as a serious public health problem, as it not only increases the risks to human health, but also increases public spending to remedy the problems caused by overweight and obesity (ONUBR, 2017).

According to Silva (2014), in the Department of Human and Health Services, morbidities associated with overweight and obesity are very common, and some of them, such as type 2 diabetes, hypercholesterolemia, high blood pressure and orthopedic problems, affect not only adults but also children. and overweight adolescents.

According to Mahan and Scott Stump (2005) apud Velásquez et al (2007), the individual, since childhood, is maturing physically, cognitively and psychosocially, and most of the time snacks, out-of-hour meals, eating outside the home and following alternative diet patterns becomes characteristic of their eating habits and can be maintained throughout life.

Genetic, physiological and metabolic factors are important in the beginning of obesity, but those that can also explain the growing increase in obese individuals in developed and developing countries may be related to eating habits and changes in lifestyle (ROSENBAUM AND LEIBEL, 1998 apud VELASQUEZ et al, 2007).

The study of the anthropometric characteristics of a population is very important (Silva, 2014) to create actions that make it possible to reduce weight gain to prevent obesity and illnesses resulting from it, it depends significantly on data that can describe this need.

Therefore, the objective of this work was to outline the anthropometric and dietary profile of students taking the food technology course at the Federal Institute of Education, Science and Technology of Triângulo Mineiro – Uberlândia campus, between the years 2012 and 2017.

THEORETICAL FRAMEWORK

ANTHROPOMETRY

Anthropometry studies measurements of the size and proportions of the human body. Anthropometric measurements such as weight, height, waist circumference and hip circumference are used to diagnose nutritional status (malnutrition, overweight and obesity) and assess the risks of some diseases (diabetes mellitus, heart disease and hypertension) in children, adults, pregnant women and the elderly (MANUAL DE ANTROPOMETRIA, 2013).

The quality of procedures for collecting anthropometric measurements is essential to guarantee the fidelity of the nutritional diagnosis of an individual or a population (MANUAL DE ANTROPOMETRIA, 2013).

Thus, anthropometry should not be understood as a simple action of weighing and measuring, but, above all, as an attitude of vigilance. This means keeping a close eye on nutritional status, allowing early action when any changes are detected. It cannot be forgotten that these measures will subsidize actions aimed at promoting and providing health care, both individually and collectively (ARAÚJO, 2015).

Attention to nutritional status means checking the organic synthesis and metabolism of the individual, considering intrinsic dietary factors (sex, age, heredity, etc.) and extrinsic dietary factors, the relationships between man, nature and food, which are established within a society and its psychosocial state (SAMPAIO, 2012).

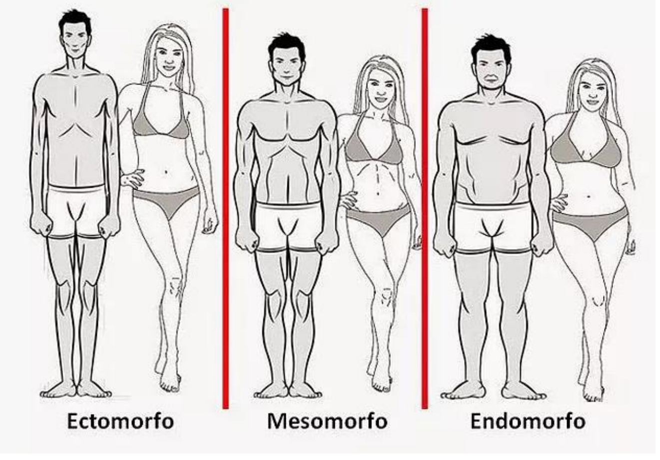
Therefore, the anthropocentrist must carefully carry out the measurements (weight, height, circumferences, etc.), as the quality of the data collected is of vital importance and will significantly reflect on the results (MANUAL DE ANTROPOMETRIA, 2013).

Ideal Weight

According to Trucom (2018), “in the 60s and 70s, the rule was rigid: the ideal was to weigh ten kilos less than your height”. Currently, this rule has changed, as factors such as age and body type are considered, which consequently makes determining the ideal weight more flexible.

Biotypes are biological characteristics of genetic inheritance, which physically define everyone. There are three biotypes that define body structures: ectomorph, mesomorph and endomorph, as seen in Figure 1.

Figure 1: Basic physical biotypes.



Source: http://seocorpoemente.wixsite.com/meusite/single-post/2016/10/21/Os-Biotipos-conhe%C3%A7a-o-seu, 2018.

Ectomorphs have a low percentage of fat, being naturally thin. Their bone structure is narrow, shoulders short, waist thin, and ribcage narrow. Mesomorphs gain and lose weight, whether muscle mass or fat, and have a wide rib cage. Endomorphs, on the other hand, find it quite easy to gain weight, being naturally wide, with a wide rib cage and waist, and have difficulty losing fat (SARDINHA, 2018).

Trucom (2018) states that for each height and age, there is an ideal weight variation that corresponds to different biotypes. One way to calculate the ideal weight for everyone is through the Creff formula (Equation 1), which is considered the most perfect among the majority, since it includes notions of age and morphology (FRANÇA, 2014).

$$IDEAL\ WEIGHT = 0{,}9[(HEIGHT(cm) - 100) + \left(\frac{AGE}{10}\right)] \qquad \text{Eq. 1}$$

Body mass index (BMI)

Body mass index (BMI), expressed as the relationship between body mass in kg and height in m², according to Equation 2 and is widely used as an indicator of nutritional status due to its good correlation with body mass ($r \approx 0.80$) and low correlation with height (SANTOS and SICHIERI, 2005).

$$BMI = WEIGHT / HEIGHT * ALTURA \qquad \text{Eq. 2}$$

According to Silva (2014, p.24) “BMI may not correspond to the same degree of fat in different populations due to different body proportions”, thus suggesting other anthropometric methods that consider body biotypes or the measurement of adipose accumulations.

Body adiposity index

The Body Adiposity Index (IAC) uses the measurement of hip circumference and height to quantify body fat. It is defined as an alternative parameter to the BMI calculation and according to Guedes, Biscuola and Lima (2015), studies that seek to cover population surveys, which can serve as a reference in the analysis of obesity and overweight in different segments of the population, the correct one is use both methods, IAC, and BMI.

According to the World Health Organization (1995) apud Silva (2014, p.24) “it is stated that, based on population studies, the IAC can be used to calculate the percentage of body fat in adult men and women of different ethnicities ”.

Silva (2014) explains about the discovery by researcher Richard Bergman, from the University of Southern California, in *Los Angeles* , and other colleagues of his, who discovered that hip circumference and height were closely linked to body fat, which was enough for the researchers to develop Equation 3 to calculate the IAC.

$$IAC\ (\%) = \left(Hip.circ\ (cm)/height * \sqrt{height}\right) - 18 \quad \text{Eq. 3}$$

Waist-Hip Index

The waist-hip index is a very common way of estimating the fat of the upper body segments (waist) in relation to the lower body segments (hips), having been developed to predict the risk of chronic disease (FERNANDES FILHO, 2003 apud ROCHA, 2009) .

According to Silva (2015), to estimate the ICQ, it is necessary to use the waist measurement (cm) by the hip measurement (cm) and then it must be observed in a specific table (ANNEX 1) whether it is within the acceptable standards for age from 20 to 69 years and for sex, according to Equation 4.

$$ICQ = (WAIST\ CIRCUMFERENCE\ )\ /\ (HIP\ CIRCUMFERENCE) \quad \text{Eq. 4}$$

Silva (2014) states that the place to measure waist circumference is located at the narrowest point between the pelvis and the ribs. Hip circumference is found at the maximum circumference below the pelvic girdle, being at the level of maximum extension of the glutes. These measurements can be obtained using a metal measuring tape, placed across the vertical body being measured, directly on bare skin and without placing excessive pressure.

Avery (1991) apud Silva (2014) highlights that:

> Waist-to-hip ratio values < 0.85 cm for women and < 0.95 cm for men suggest lower risks for coronary artery disease, hypertension, and diabetes. However, the waist-to-hip ratio should not be used to accurately predict the changes that occur in visceral fat after weight loss treatment. Some studies suggest that just measuring the waist would be enough to predict the presence of visceral fat deposits when compared to WHR, as presenting a value >89 cm for women and >102 cm for men alone would be a risk sign.

For individuals who have an ICQ or waist circumference value above the values cited as acceptable, treatment generally involves constant physical exercise, as well as a diet suited to the individual's daily needs and, in some cases, in the use of medications under the supervision of a doctor (LEAN, 1995 apud SILVA, 2014).

DIETETICS

According to Philippi (2006) apud Andrad et al (2014), dietetics not only studies, but also applies the basic principles and processes of Nutrition Science in the human body, allowing the planning, execution and evaluation of diets that suit the biological, socioeconomic, cultural and psychological characteristics of individuals. According to Andrad et al (2014), dietetics studies the different ways of using food, with a view to preserving nutritional value, obtaining desired sensory characteristics, such as enhancing the color or flavor of the food being prepared. .

Portal (2018) states that dietetics is linked to foods and their combinations, adapting a specific type of diet for each person.

Portal (2018) adds that:

> People who need to go on diets, lose weight or who have decided to eat healthier often use diet food, as is the case of people with heart (cardiovascular) problems, who need to reduce or completely exclude fat-containing foods from their diet. , or diabetic people who cannot consume any type of sugar.

Basal and total metabolism (calculation methods)

Living organisms expend energy to try to maintain cellular homeostasis. Daily energy consumption in humans can be divided into three parts: energy consumed at rest accounts for 60-75% of total daily energy expenditure, the thermic effect of food (10%) and physical activity (15 to 30%) (ANTUNES et al, 2005).

Antunes et al (2005, p 71) states that "basal metabolic rate (BMR) measures the minimum amount of energy required to maintain physiological functions at rest". According to the authors, knowledge of this rate is important in clinical applications, as it defines the correct nutritional support and determines the caloric needs for energy balance.

Basal metabolism refers to the minimum amount of energy that the body needs to have while at rest to survive, and this minimum energy rate is necessary for the body so that it can perform vital functions that are not interrupted during sleep, such as breathing and the pumping of blood. Basal metabolism varies from one individual to another, that is, some aspects that define the basal metabolism rate, an index that reveals the amount of energy that each person uses while sleeping, are age, sex, genetic factors, weight, height , type and frequency of physical activity (LEITE, 2018).

Monteiro (2018) states that:

> The calculation of basal metabolism (BMR), when appropriate equipment (respirometer) for direct assessment is not available, can be done using different equations. For healthy individuals, it can be found through the equations suggested by the FAO/WHO committee (1985) that consider age and sex. In pathological states, especially those in which there is marked hypermetabolism, the Harris-Benedict formula (1919) can be applied to males and females and children.

The Harris-Benedict method for calculating calories is based on five different parameters: sex, height, weight, age, and physical activity. With these parameters, the basal metabolic rate (BMR) can be calculated, which is the minimum amount of energy that the body consumes daily, which is equivalent to the amount of calories needed to maintain the current weight (CALCUWORLD, 2018). Follow Equations 5 and 6 to calculate basal metabolism according to Harris-Benedict:

Men: Eq.5

$$DER = 66{,}47 + (13{,}75 * WEIGHT\ Kg) + (5 * HEIGHT\ cm) - (6{,}755 * IDADE)$$

Women: Eq.6

$$DER = 655{,}1 + (9{,}563 * WEIGHT\ Kg) + (1{,}85 * HEIGHT\ cm) - (4{,}676 * IDADE)$$

According to Frade et al (2016), to calculate basal metabolism there are some formulas proposed by the WHO (1985), which consider the individual's sex and age group, which are shown in the table below.

Table 1: Calculation of Basal Metabolism according to the World Health Organization (WHO/FAO).

GENDER	AGE	FORMULA
	10-18	16.6 * P(kg) + 77 * A(m) + 572
MEN	18-30	15.4 * P(kg) + 27 * A(m) + 717
	30-60	1.3*P(kg) + 16*A(m) + 901
	>60	8.8*P(kg) + 1128*A(m) - 1071
GENDER	**AGE**	**FORMULA**
	10-18	7.4*P(kg) + 482*A(m) + 217
WOMEN	18-30	13.3*P(kg) + 334*A(m) + 35
	30-60	8.7*P(kg) – 255*A(m) + 865
	>60	9.2*P(kg) + 637*A(m) - 302

Source: WHO/FAO, 1985 apud Érika LIZ, 2011.

Another way to calculate basal metabolism (BM) is through the Du BOIS and RAYMOND method where the body surface area (ASC) is estimated and then the basal metabolism is calculated according to Erica Liz (2011). Follow equations 7 and 8:

$$ASC(m^2) = 0{,}007184 * height(cm)^{0{,}725} * weight(kg)^{0{,}425} \qquad \text{Eq. 7}$$

$$MB = (Tabled\ value) * 24 * ASC \qquad \text{Eq. 8}$$

The basal metabolism value per hour is found in the metabolism practice guide table (ANNEX 2) considering the sex and age of the individual.

Total energy expenditure and physical activity

According to Monteiro (2018) “total energy expenditure (GET) corresponds to the energy spent by an individual in 24 hours”. Total energy expenditure results from the sum of three components: basal energy expenditure (GEB) or resting energy expenditure (REE), the thermal effect that food provides or diet-induced thermogenesis (TID) and the caloric cost of the activity physical.

The type of physical activity increases individuals' energy needs, and activates metabolic systems designed to increase the use of nutrients and O2 consumption (MONTEIRO, 2018).

The total energy value (TEV) or total energy expenditure can be calculated by identifying the basal energy expenditure and multiplying it by the occupational activity coefficient that each individual performs. The occupational activity coefficient are values referring to daily energy needs according to the occupational work category expressed in multiples of the basal metabolic rate, in relation to sex (FAO/WHO/UN, 1985 apud CARVALHO et al 2012). To perform the calculation, follow Equation 9:

$$V.E.T. = T.M.B * Activity\ coefficient \qquad \text{Eq. 9}$$

To perform the calculation in Equation 9, it is necessary to have the physical activity coefficient, as shown in Table 2.

Table 2: Daily energy needs according to occupational work category expressed in multiples of the BMR, according to sex.

GENDER	**LIGHT ACTIVITY**	**MODERATE ACTIVITY**	**INTENSE ACTIVITY**
MEN	MB * 1.55	MB * 1.78	MB* 2.10
WOMEN	MB * 1.56	MB * 1.64	MB * 1.82
BEEDED PATIENT	MB * 1.27		

Source: WHO/FAO, 1985 apud Érika LIZ, 2011.

1. Light: executive, teachers, independent professionals, housewife (with household appliances).
2. Moderate: work in light industry, drivers, students.
3. Intense: non-motorized farmer, soldier, athletes.

Carvalho (2008) states that physical activity makes the individual have better health conditions, however, a large part of the population does not practice it. This issue reflects the concern of the professional category, institutions dedicated to research, institutions that provide specific services, and the government.

According to Silva (2014), in recent times, people have become less active due to the encouragement of technological advances and practices for identifying childhood and adolescent obesity are becoming commonplace nationally and internationally, as through these practices, it is possible to achieve the results for the diagnosis of obesity. It is important to promote physical activity in childhood and adolescence, as this can establish a basis for reducing a sedentary lifestyle as adults, contributing to a better quality of life.

Strong WB (2005) apud Silva (2014) highlights that quantifying the prevalence of lack of physical activity and identifying risk groups are very important so that intervention strategies can be created.

FOOD: VARIETY, MODERATION AND BALANCE.

A balanced and healthy diet is one that contains nutrients in appropriate quantities, varied in quality, with the aim of ensuring correct growth, mental development, and the proper functioning of the organism (MONTANARI; ANICETO, 2013).

Variety, moderation, and balance should be considered as the basis of a healthy diet. Variety, due to the consumption of different and varied types of food during the day. Moderation, referring to the moderate consumption of food. Balance is related to the concepts of variety and moderation, knowing what and how much to eat. "The success of healthy eating lies in the combination of carbohydrates, protein, fat, fiber, vitamins and minerals, and water, maintaining the quality and balance of nutrients in all daily meals" (MONTANARI; ANICETO, 2013 p.1).

According to Alexandrino (2011), through good nutrition, one can not only treat, but prevent a series of diseases, with dietary re-education being a way of maintaining health and good body shape. It also states that dietary re-education seeks to establish a link between nutrition and satisfaction through changes in eating behavior, making it possible to consume the most varied types of food in a balanced way, so that it provides health and pleasure at the same time.

METHODOLOGY

The present work was carried out based on the application of an anthropometric self-evaluative script as a didactic-pedagogical and evaluative part of the Nutrition and Dietetics discipline, taught in the 3rd period of the Food Technology course at the Federal Institute of Science and Technology of Triângulo Mineiro. Uberlândia campus.

The "Metabolism practice" script (Appendix 2) by Érika Liz (2011) has been used by the subject teacher since 2012. Through the script, variables of ideal weight, body mass index, body adiposity index, waist-hip index were evaluated , basal metabolism, total energy value and daily ration.

The data collected was used in the present work to outline the anthropometric and dietary profile of students on the course until 2017.

When handing over the script, the teacher explains to them how the data should be reported, the need to weigh themselves correctly, use a measuring tape for circumference data, the correct measurement of height and the biological declaration of gender (sex), among others. other contents of the lesson plan on dietetics and anthropometry. Of the 70 scripts applied, 62 were delivered with complete information, the remainder were missing data on hip circumference, height, weight or age.

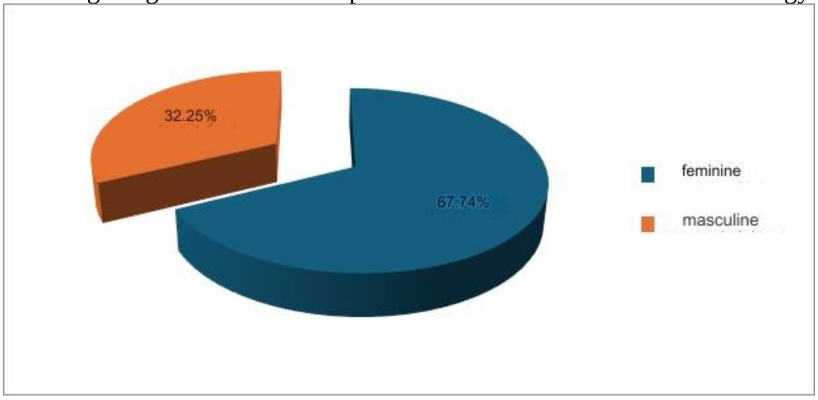
The data were compiled into Excel® spreadsheets (2010) and tabulated for later discussion.

RESULTS AND DISCUSSION

Of the 70 questionnaires (scripts) administered, 62 responded correctly to what was requested. Of these, the age range of students taking the Food Technology course ranged from 18 years old to 69 years old, with the majority being concentrated in the range of 18 years old to 38 years old.

In relation to the biological sex declaration, we have Figure 1, in which 20 students (32.25%) declare themselves to be male and 42 students (67.74%) to be female.

Figure 2: Biological gender declaration profile of students on the Food Technology course.



Source: From the author, 2018.

Predominantly, it can be seen in Figure 2, the participation of women in the university universe and their greater interest in the Food Technology course, which basically deals with the processing of food and its chemical and biochemical transformations through the application of methods.

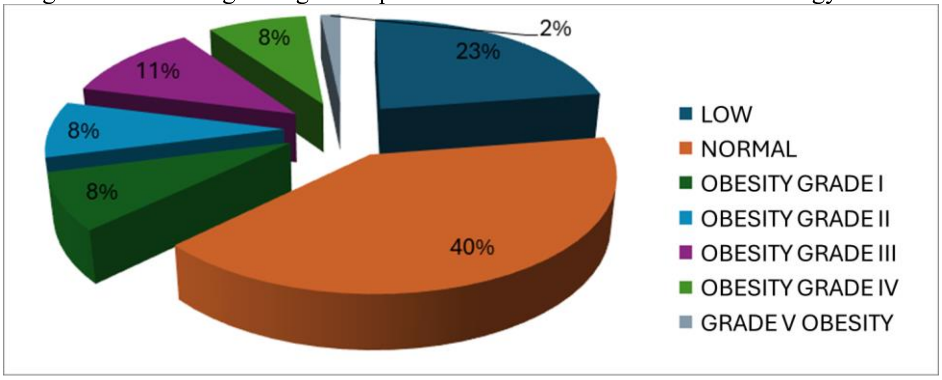
Below is a description of the other dietary and anthropometric data that were determined through the self-evaluation script.

IDEAL WEIGHT

According to Silva and Kawahara (2005), the definition of ideal weight is based on minimum mortality and maximum longevity, which can vary according to some parameters, which are age, sex, body type and height, and serves to reduce the risk of developing serious health problems such as heart disease, diabetes, high blood pressure, high cholesterol and even cancer.

According to the data collected in relation to the ideal weight profile, 14 students (23%) are underweight, 25 students (40%) are at ideal weight (eutrophy) and 23 students (37%) presented different degrees of obesity , with obesity being grade I, grade II, grade III, grade IV and grade V as shown in Figure 3.

Figure 3: Ideal weight diagnostic profile of students on the Food Technology course.



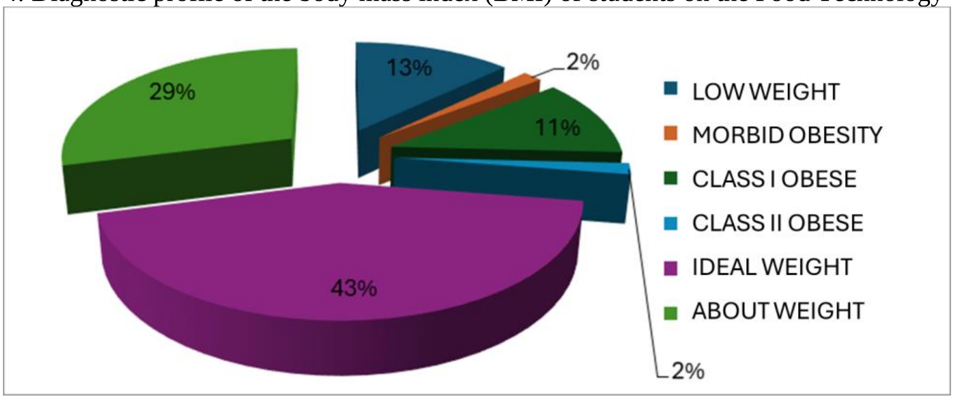
Source: From the author, 2018.

It is observed that the percentage of obesity is almost similar to the percentage of eutrophic individuals, this result reinforces the need to check the body mass index.

BODY MASS INDEX

Regarding the Body Mass Index, students from 2012 to 2017 presented a profile on the BMI of 8 students (13%) diagnosed with underweight, 27 students (43%) with ideal weight, 18 students (29%) with overweight and 9 students (15%) were obese, divided into class I obese, class II and morbid obesity, as shown in Figure 4.

Figure 4: Diagnostic profile of the body mass index (BMI) of students on the Food Technology course.



Source: From the author, 2018.

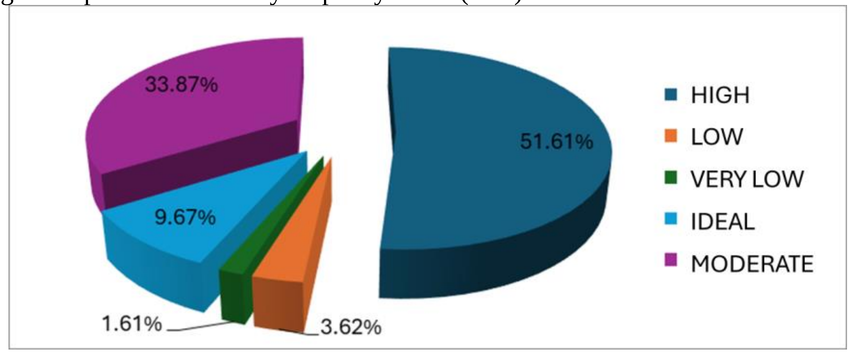
The average BMI was 25.27 kg/m². As for gender, women had a mean BMI of 24.14 ± 4.38 kg/m², while men had 27.66 ± 5.63 kg/m². Therefore, the average BMI determined for students of the Food Technology course at IFTM, Uberlândia campus, in male students is above the range considered ideal weight, which is 20 – 24.9 kg/m², and the women had an average BMI within the range considered ideal weight, according to the Brazilian Obesity Guidelines, 2009/2010.

Similar results were found in the study by Gasparetto e Silva, in 2012, who had 77 women (68.8%) and 35 men (31.2%) in their study, university students studying Nutrition, Nursing, Physiotherapy and Education. physics at the La Salle University Center, located in the city of Canoas (RS), participants in anthropometric research. The age of the students ranged from 17 to 55 years, when evaluating the average BMI according to gender, it was found that women had an average BMI of 23.09 ±3.46 kg/m², while men had 26 .13 ±3.68 kg/m².

BODY ADIPOSITY INDEX

Regarding the Body Adiposity Index, students from 2012 to 2017 presented a nutritional profile regarding the IAC of 1 student (1.61%) with an exceptionally low diagnosis, 2 students (3.62%) with a low diagnosis, 6 students (9.67%) with an ideal diagnosis, 21 students (33.87%) with a moderate diagnosis and 32 students (51.61%) with a high diagnosis, as shown in Figure 5.

Figure 5: Diagnostic profile of the body adiposity index (IAC) of students on the Food Technology course.



Source: From the author, 2018.

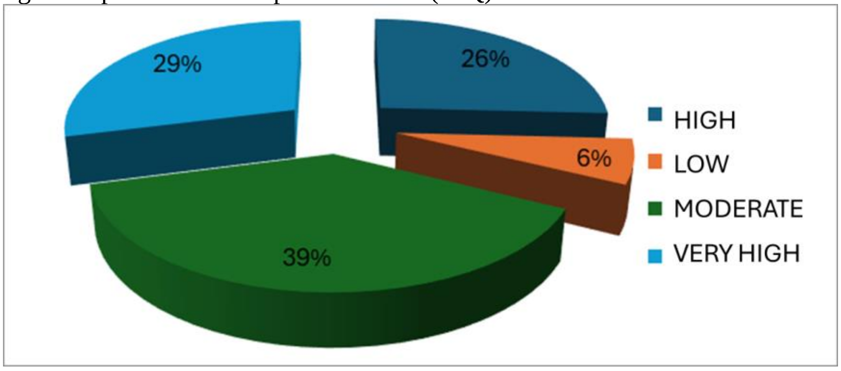
In relation to the data presented, the average IAC was 28.84%. The average IAC regarding gender for female students was 29.37%, the average IAC for male students was 27.73%.

Based on the above result, it can be stated that women had a moderate body adiposity index, since the reference value for this diagnosis ranges from 26 – 29% for women, while men had a well average IAC. high, being compared to the reference value which is 19 – 24% for men according to reference values presented in the work of Heyward and Stolarczyk, (2000) apud Guedes, Biscuola and Lima, (2015).

WAIST-HIP INDEX

Regarding the Waist-Hip Index, students from 2012 to 2017 presented an ICQ profile of 4 students (6%) with a low diagnosis, 24 students (39%) moderate, 16 students (26%) high and 18 students (29%) very high as shown in Figure 6.

Figure 6: Diagnostic profile of the Hip Waist Index (ICQ) of students on the Food Technology course.



Source: From the author, 2018.

Of these, 42 women had an average ICQ of 0.81±0.12, and the average waist circumference (WC) of the students was 82.12±13.41 cm and among the men (20 university students) had an average ICQ of 0.91±0.07 cm, with an average WC of 101.89±9.31. Therefore, the CC determined for students of the Food Technology course at IFTM, Uberlândia campus, in male students is well above the range considered normal, which is 90 cm and women presented the CC a little higher, since the reference is 80 cm, according to the Brazilian Obesity Guidelines, 2009/2010.

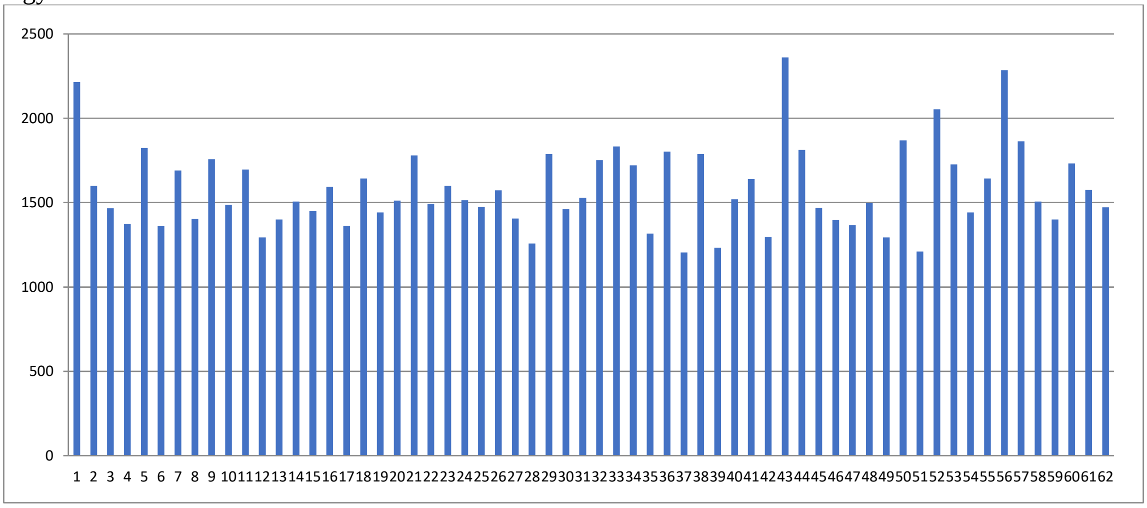
In the study by Gasparetto and Silva, in 2012, when evaluating waist circumference (WC), the average value found for men was 88.61±11.00 cm; that is, within the range considered normal. For women, the WC found was 80.90±9.34 cm, considered above normal standards, with a risk of metabolic complications.

BASAL AND TOTAL METABOLISM

Basal metabolic rate (BMR) refers to the minimum amount of energy required to maintain physiological functions at rest. Knowledge of this rate is important to define adequate nutritional support and determine caloric needs for total energy balance. BMR decreases with age, increased fat mass, altered body fluid content, changes in body temperature, changes in mood and stress, hormonal changes, body surface area, physical inactivity, individual genetics and aging (ANTUNES et al, 2005).

The daily energy requirement or basal metabolism (MB) according to DuBois and Raymond for the students (42 university students) was on average 1,548.83 kcal/day. The average obtained for male students (20 university students) was 1,648.71 kcal/day, and the general average between male and female students was 1,581.05 kcal/day, as shown in Figure 7.

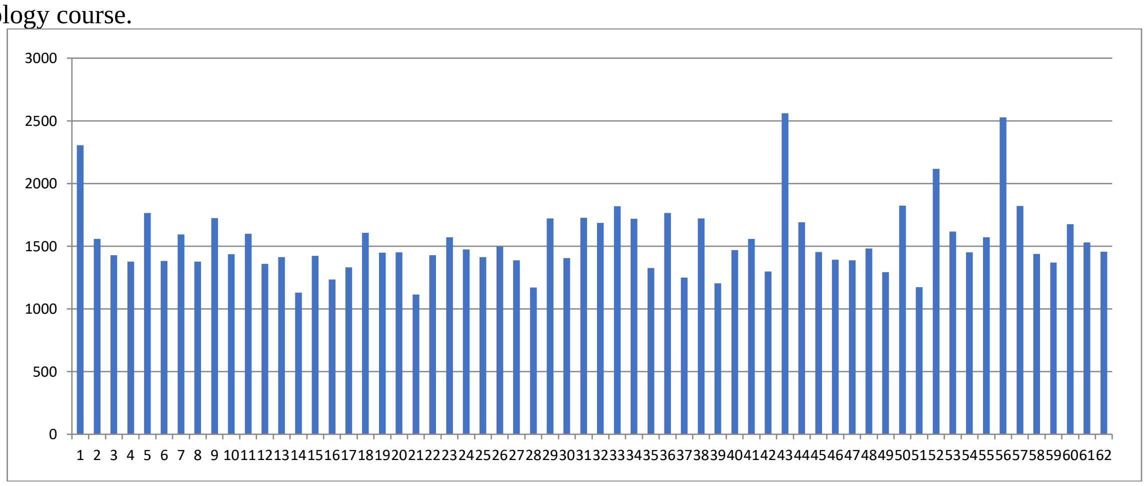
Figure 7: Diagnostic profile of the total energy value (TEV) according to DuBois RAYMOND, of students on the Food Technology course from 2012 to 2017.



Source: From the author, 2018.

The daily energy requirement or basal metabolism (MB) according to Harris Benedict gave an average for the students (42 university students) of 1428.84 kcal/day. The average obtained for male students (20 university students) was 1774.83 kcal/day, and the general average between male and female students was 1540.45 kcal/day as shown in Figure 8.

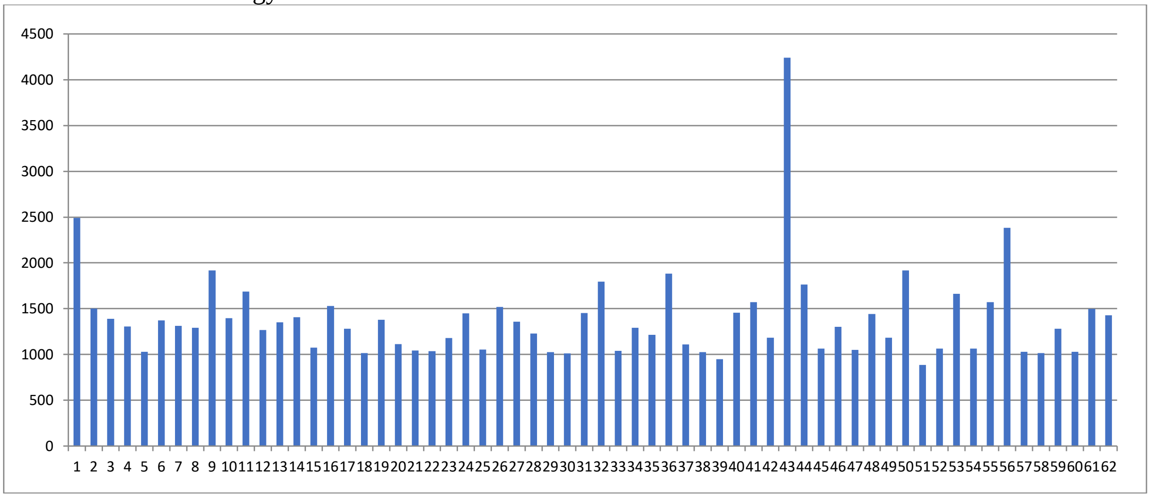
Figure 8: Diagnostic profile of basal metabolism (MB) according to HARRIS BENEDICT, of students on the Food Technology course.



Source: From the author, 2018.

The daily energy requirement or basal metabolism (MB) according to the World Health Organization (WHO/FAO) gave an average for the students (42 university students) of 1307.66 kcal/day. The average obtained for male students (20 university students) was 1546.85 kcal/day, and the general average between male and female students was 1384.82 kcal/day as shown in Figure 9.

Figure 9: Diagnostic profile of basal metabolism (MB) according to the World Health Organization (WHO/FAO), of students on the Food Technology course.

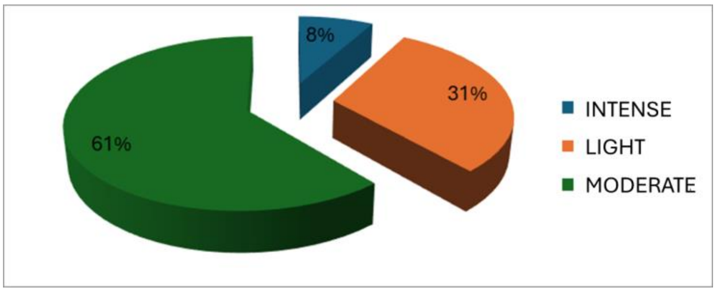


Source: From the author, 2018.

TOTAL ENERGY EXPENDITURE AND PHYSICAL ACTIVITY

In relation to the students' occupational activities, 5 students (8%) carry out intense activity, 19 students (31%) carry out light activity and 38 students (61%) carry out moderate activity as shown in figure 10.

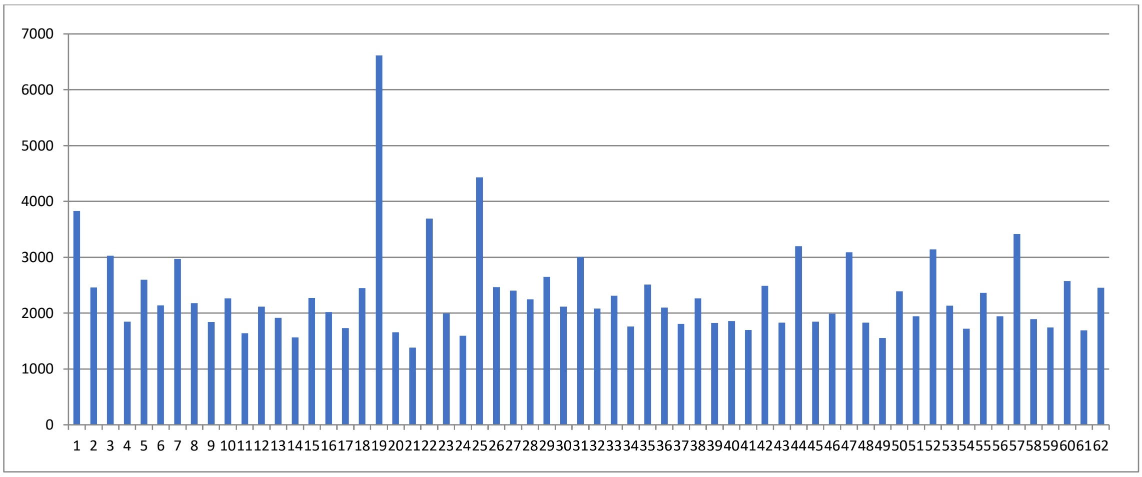
Figure 10: Diagnostic profile of occupational activity to calculate the total energy value of students on the Food Technology course.



Source: From the author, 2018.

In the result of the calculation of the total energy value (TEV) based on WHO/FAO, the students presented a general average of 2331.68 kcal/day as shown in figure 11. In relation to gender, there was an average for the students (42 university students) of 2154.22 kcal/day of VET, and for students (20 university students) there was an average of 2704.34 kcal/day.

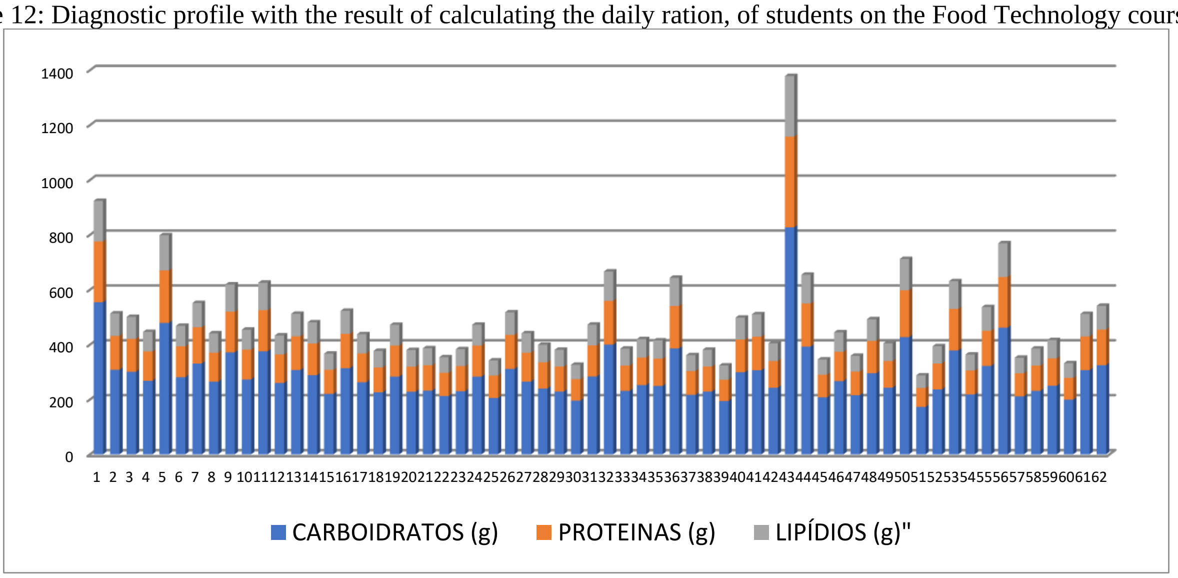
Figure 11: Diagnostic profile with the result of calculating the total energy value, of students on the Food Technology course.



Source: From the author, 2018.

In Figure 12, there is the result of calculating the daily ration, that is, how many grams of carbohydrates, lipids and proteins students on the Food Technology course from 2012 to 2017 should ingest according to the total energy value.

Figure 12: Diagnostic profile with the result of calculating the daily ration, of students on the Food Technology course.



Source: From the author, 2018.

Based on the result of the average total energy value, the result of calculating the students' daily ration is presented, that is, the percentage of carbohydrates, proteins and lipids that students should ingest, according to their total energy expenditure. presented. Therefore, the intake of each nutrient presented an average of 49.99% carbohydrates, 19.99% proteins and 29.98% lipids, with an average of 2331.68 kcal/day according to the activity performed in the day to day. According to **Interministerial Ordinance No. 66, of August 25, 2006, the** nutritional parameters for worker nutrition established in this Ordinance must be calculated based on the following daily reference values for macro and micronutrients shown in table 3.

Table 3: Daily reference values for macro and micronutrients.

Nutrients	Daily Values
Total Energy Value	2000 kcal
CARBOHYDRATE	55 – 75%
PROTEIN	10 – 15%
LIPID OR TOTAL FAT	15 – 30%

Source: MARINHO et al 2006.

Based on the reference values in table 3, it can be said that the students had an average daily carbohydrate consumption slightly below the standard. Regarding protein intake, the students' average was slightly above the reference percentage in table 3, and regarding total fat intake, the students presented an average consumption within the reference standards.

CONCLUSION

According to the presentation and analysis of the measured data, it is possible to obtain some conclusions about the anthropometric characteristics of the food technology course students participating in this study.

Observing the ideal weight profile, it is noted that 40% of students are eutrophic, which means they are within the ideal weight, the rest have different degrees of obesity and low weight. Checking the body mass index, it is concluded that in males there was a prevalence of overweight and obesity, while in females, there was a prevalence of ideal weight.

The prevalence of overweight and obesity observed in males highlights the importance of creating measures to raise awareness among students about the risk of developing heart disease, and such measures can be through evaluative activities applied by teachers which emphasize the importance of physical activity and correct nutrition to achieve a healthy life and greater longevity. It is important to start prevention at school because most students do not have relevant information throughout the day, as they spend a lot of time focusing on the media of games, social networks, television, cell phones, failing to practice physical exercise, reaching the sedentary lifestyle, resulting in overweight and obesity, as well as the harm they can cause to health.

The present work was carried out with anthropometric data from students before the Covid-19 pandemic, a new study of students on the course after the pandemic is being carried out.

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ATTACHMENTS

ANNEX 1 - Cardiovascular Risk Classification Using the Waist-Hip Index.

Male Cardiovascular Risk Classification Using the Waist-Hip Index.

AGE	LOW	MODERATE	HIGH	VERY HIGH
From 20 - 29	**< 0.83**	**0.83 – 0.88**	**0.89 – 0.94**	**>0.94**
From 30 - 39	**< 0.84**	**0.84 – 0.91**	**0.92 – 0.96**	**>0.96**
From 40 - 49	**<0.88**	**0.88 – 0.95**	**0.96 – 1.00**	**>1.00**
From 50 - 59	**<0.90**	**0.90 – 0.96**	**0.97 – 1.02**	**>1.02**
From 60 – 69	**<0.91**	**0.91 -0.98**	**0.99 – 1.03**	**>1.03**

Source: Physical Test 5.0 cited by Bisbo (2004) apud Pinto et al (2007).

Female Cardiovascular Risk Classification Using Waist-Hip Index.

AGE	LOW	MODERATE	HIGH	VERY HIGH
From 20 - 29	**< 0.71**	**0.71 – 0.77**	**0.78 – 0.82**	**>0.82**
From 30 - 39	**< 0.72**	**0.72 – 0.78**	**0.79 – 0.84**	**>0.84**
From 40 - 49	**<0.73**	**0.73 – 0.79**	**0.80 – 0.87**	**>0.87**
From 50 - 59	**<0.74**	**0.74 – 0.81**	**0.82 – 0.88**	**>0.88**
From 60 – 69	**<0.76**	**0.76 – 0.83**	**0.84 – 0.90**	**>0.90**

Source: Physical Test 5.0 cited by Bisbo (2004) apud Pinto et al (2007).

ANNEX 2 - Metabolism Practice Guide

Physiology Discipline
Module: METABOLISM

SEX	AGE (years)	HEIGHT (cm)	CURRENT WEIGHT (Kg)	IDEAL WEIGHT	DIFFERENCE	%	
DIAGNOSIS: MARK WITH AN (X) WHERE THE PATIENT IS							
WEIGHT LOW	0 -10% NORMAL	11 -15% GRADE I OBESITY	16 -20% GRADE II OBSITY	21 - 30% GRADE III OBESITY	31 - 40% GRADE IV OBEITY	41 - 50% GRADE V OBEITY	> 51% MORBID OBESITY
IDEAL WEIGHT = 0.9[(HEIGHTcm -100) + (AGE: 10)]							

2. CALCULATE BODY MASS INDEX (BMI)					
SEX	WEIGHT Kg	HEIGHT IN METER	BODY MASS INDEX (BMI)		
DIAGNOSIS: MARK WITH AN (X) WHERE THE PATIENT IS					
<20	20 – 24.9	25 – 29.9	30 – 34.9	35 – 39.9	>40
LOW WEIGHT	IDEAL WEIGHT	ABOUT WEIGHT	CLASS I OBESE	CLASS II OBESE	MORBID OBESITY

BMI = $\frac{\text{WEIGHT}}{\text{HEIGHT}}$

3. CALCULATE THE BODY ADIPOSITY INDEX					
SEX	HIP CIRCUMFERENCE (cm)	HEIGHT (m)	BODY ADIPOSITY INDEX		
DIAGNOSIS: MARK WITH AN (X) WHERE YOU FIND THE PATIENT					
	EXCEPTIONALLY LOW	LOW	IDEAL	MODERATE	HIGH
MEN	6 – 10%	11 – 14%	15 – 18%	19 – 24%	>25%
WOMEN	10 – 15%	16 – 19%	20 – 25%	26 – 29%	>30%

IAC = $\left[\frac{\text{HIP}}{\text{Height x } \sqrt{\text{height}}}\right] - 18$

4 . ASSESSMENT OF CARDIOVASCULAR RISK AND MORBIDITY USING THE WAIST-HIP INDEX (ICQ) WHICH TAKES INTO ACCOUNT ABDOMINAL FAT DEPOSITION AND AGE.

01. MALE CLASSIFICATION OF CARDIOVASCULAR RISK BY WAIST-HIP INDEX

De40-49	**<0.88**	**0.88-0.95**	**0.96-1.00**	**>1.00**

$$ICQ = \frac{WAIST\ CIRCUMFERENCE}{HIP\ CIRCUMFERENCE} = - = -$$

TABLE 02. FEMALE CARDIOVASCULAR RISK CLASSIFICATION BY WAIST-HIP INDEX (source: Physical Test 5.0 cited by Bisbo (2004} DIAGNOSIS: RISK...................... .

AGE	LOW	MODERATE	HIGH	VERY HIGH

6._CALCULATE THE BASAL AND TOTAL ENERGY VALUE (ACCORDING TO THE ACTIVITY)

Human energy requirements are different from person to person and are influenced by several factors: Age; Body size; Body temperature; Physical activity; Environmental temperature; Growth rate; Sex; Nutritional status; Emotional state; Food intake.

6.1_CALCULATE THE TOTAL ENERGY VALUE ACCORDING TO THE ACTIVITY ACCORDING TO DuBOIS RAYMOND.

PATIENT DATA : SEX:_______AGE:______YEARS WEIGHT Kg:______ AUC:_____

ASC (m ^{2} **) = 0.007184 X** *height (cm* **)** $^{0\ 725}$ **X** *weight (Kg* **)** $^{0\ 425}$

IDADE	HOMEM	MULHER		IDADE	HOMEM	MULHER
5	53	51,6		19	42,9	37,2
6	52,7	50,7		20 - 24	41	36,9
7	52	49,3		25 - 29	40,3	36,6
8	51,2	48,1		30 - 34	39,8	36,2
9	50,4	46,9		35 - 39	39,2	35,8
10	49,5	45,8		40 - 44	38,3	35,3
11	48,6	44,6		45 - 49	37,8	35
12	47,8	43,4		50 – 54	37,2	34,5
13	47,1	42		55 – 59	36,6	34,1
14	46,2	41		60 – 64	36	33,8
15	45,3	39,6		65 – 69	35,5	33,4
16	44,7	38,5		70 – 74	34,8	32,8
17	43,7	37,4		75 - 79	34,2	32,3
18	42,1	37,3				

Weight in kilos

Height in	25	30	35	40	45	$0	55	60	65	70	75	80	8 ã	90	95
200	-	_	_	„	_	.	1.84	1.91	1 . 9 ?	2.68	2.09	2.15	2.21	126	2.31
195	- -	-	-		-	1.73	1.80	1.87	1.93	1.99	2.05	2.11	2.17		2.27
190	-	-	-	1.56	1.63	1.70	1.77	1.84	1.90	1.96	2.02	2.08	2.13	128	2.33
185	! -	-	-	1.53	1.60	1.67	1.74	1.80	1 . 8b	1.92	198	2.04	2.09	2.14	2.19
1*0	-	-	-	1.49	1.57	1.64	1.71	1.77	1 . S 3	1.89	1.95	2.00	2.05	2.10	2.15
175	1.12	1.28	1.36	1.46	1.53	1.60	1.67	1.73	1.79	1.85	1.91	1.96	2.01	106	2.11
170	1.17	1.26	1 . J 4	1.43	1.50	1.57	1.63	1.69	1.75	ui	196	1.91	1.96	2.01	2.06
165	1.14	1.23	1 J 1	1.40	1.47	1.54	1.60	1.66	1.72	1.78	1.83	188	1.93	1.98	2.03
160	1.12	1.21	1.29	1.37	1./4	1.50	1.56	1.62	1.68	1.73	1.78	1.83	1.88	1.93	1.98
155	1.09	1.18	1.26	1.33	1.40	1.46	1.52	1.58	1.64	1.69	1.74	1.79	1.84	1.89	_
150	1.06	1.15	1.25	1.30	1.36	1.42	1.48	1.54	1.00	1.63	1.70	1.75	1 . S 0	-	_
145	1.05	1.12	1.20	1.27	1.33	1.39	1.45	1.51	1.56	1.61	1.66	1.71	_	_	_
140	1.00	1.09	1.17	1.24	1.30	1.36	1.42	1.47	1.52	157	-		-	_	
155	0.97	1.06	1.14	1.20	1.26	1.32	1.38	1.43	1.48			-	_	.	_
130	0.95	1.04	1.11	1.17	1.23	Ú 29	1.35	1.40							
125	0.95	1.01	1.08	1.14	1.20	1.26	UI	1.36	_		_	_	_	_	„
120	0.98	0.98	1.04	1.10	1.16	1.22	1.27	-		-	-	-	-	-	-

MB = ...(MB / HOUR) day

6.2_CALCULATION OF BASAL METABOLISM ACCORDING TO HARRIS BENEDICT (MOST USED FORMULA)

<u>MEN:</u> DER = 66.47 + (13.75 x WEIGHT Kg) + (5 x HEIGHT cm) – (6.755 x AGE)

<u>WOMEN:</u> DER = 655.1 + (9.563 x WEIGHT Kg) + (1.85 x HEIGHT cm) – (4.676 x AGE)

SEX	AGE	WEIGHT Kg	HEIGHT (m)	TOTAL IN Kcal

6.3_CALCULATION OF BASAL METABOLISM ACCORDING TO THE WORLD HEALTH ORGANIZATION (WHO/FAO)

SEX	AGE	FORMULA
MEN	10-18	16.6P(Kg)+77A(m) + 572
	18-30	15.4P(Kg)+27A(m) + 717
	30-60	1.3P(Kg)+16A(m) + 901
	>60	8.8P(Kg)+1128A (m) -1071
SEX	AGE	FORMULA
WOMEN	10-13	7.4P(kg) + 482A(m) + 217
	18-30	13.3P(kg) + 334A(m) + 35
	30-60	8.7P(kg)-255A (m) + 865
	>60	9.2P(kg) + 637A(m)-302

To calculate basal metabolism (BM), choose the formula according to gender and age from the table below

SEX	AGE	MB

CALCULATION OF TOTAL ENERGY VALUE (TEV) AND DAILY RATION (BASED ON WHO/FAO)

OCCUPATIONAL ACTIVITIES

1.- Light: executive, teachers, professionals
liberals, housewife (with household appliances).

2.- Moderate: work in light industry,
Drivers, Students.

3.- Intense: non-motorized farmer,
soldier, athletes.

SEX	ACTIVITY LIGHT	ACTIVITY MODERATE	ACTIVITY INTENSE
MEN	MB X 1.55	MBX 1.78	MBx 2.10
WOMEN	MB X 1.56	MB X 1.64	MB X 1.32
PATIENT BEDDED	MB X 1.27		

VET = BMR x Activity coefficient VET = x =

9.- CALCULATION OF THE DAILY RATION: calculate how many grams of carbohydrates, fats and proteins the individual should ingest

TYPE OF FOOD	VET Kcal/day	%	Value caloric	Total in grams
CARB HYDRATES		50 =	4	
PROTEINS		20 =	4	
FATS		30 =	9	