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Nutritional screening and cardiometabolic risks in the workers of a University Restaurant

Triagem nutricional e riscos cardiometabólicos nos funcionários de um Restaurante Universitário

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Abstract

Introduction: Cardiometabolic risks are characterized by a set of metabolic dysfunctions that predispose to cardiovascular events, when they coexist in the body. *Objective:* The purposes of this study are to perform the nutritional assessment and to investigate the cardiometabolic risk factors in the employees of a University Restaurant. *Method:* There have been collected socioeconomic, individual, anthropometric, alimentary data and biochemical exams (lipid profile and fasting glycemia) from eighteen employees through a data sheet and the data obtained were analyzed by the DietBox software. *Results:* Among the participants, 33% were overweight and had higher risk of developing chronic noncommunicable diseases, where men presented higher percentage of abdominal circumference (42.8%). Furthermore, it was possible to notice that 33.3% of the employees presented low HDL-C values and 27.7% increased total cholesterol. On average, daily calorie consumption variations were observed in relation to the recommendations of around 38.8% for more and 55.5% for less. Regarding feeding habit surveys, higher protein intake was observed and, among the macronutrients, it was noticed that the general daily intake values were according to the recommendations. Cholesterol, trans fat, sodium, selenium and vitamin C stood out being consumed over the expected; and fibers, calcium, magnesium and vitamins D and E were under the recommendation values. *Conclusion:* This study demonstrated the presence of factors that predispose cardiovascular events in the population. The high rates of overweight and obesity in the analyzed individuals were possibly due to changes in eating patterns and lack of physical exercises.

Keywords: Cardiovascular Diseases. Dyslipidemias. Overweight. Nutritional Deficiencies.

Resumo

Introdução: Os riscos cardiometabólicos são caracterizados por um conjunto de disfunções no metabolismo que predispõem a eventos cardiovasculares, quando coexistem no organismo. *Objetivo:* realizar triagem nutricional e investigar fatores de riscos cardiometabólicos em funcionários de um Restaurante Universitário. *Método:* foi realizada uma coleta de informações de 18 funcionários, por meio de uma ficha de atendimento e os dados obtidos foram analisados através do software *DietBox* e tabelados pelo programa Microsoft Office Excel. *Resultados*: Dentre os participantes 33% apresentaram sobrepeso e maior risco para desenvolvimento de doenças crônicas não transmissíveis, sendo que os homens apresentaram maior porcentagem de perímetro abdominal (42,8%). Além disso, foi possível notar que 33,3% das pessoas estudadas apresentaram valores de HDL-c baixo e 27,7% colesterol total aumentado. Em média, observaram-se variações do consumo diário de calorias em relação às recomendações de 38,8% para mais e 55,5% para menos. Em relação aos inquéritos alimentares, dentre os macronutrientes, destacou-se maior ingestão proteica e, dentre os micronutrientes, o sódio e selênio foram consumidos acima do recomendado e as fibras, enquanto cálcio e vitaminas D e E foram consumidos abaixo da recomendação. *Conclusão:* O estudo demonstrou a presença de fatores que predispõem a eventos cardiovasculares na população. Os aumentados índices de sobrepeso e obesidade nos indivíduos analisados foram possivelmente devidos a alterações dos padrões alimentares e reduzida da prática de atividade física.

Palavras-chave: Doenças Cardiovasculares. Dislipidemias. Sobrepeso. Deficiências Nutricionais.

Introduction

According to the *National Cholesterol Education Program* (NCEP),[1] the cardiometabolic risks (CR) are characterized by a set of dysfunctions in the metabolism and presence of factors predisposing to cardiovascular events. In order to evaluate these factors, fasting glucose, triglyceride and HDL-cholesterol dosages, blood pressure measurement and anthropometric variables (abdominal circumference, weight and height) are considered, and no evidence of insulin resistance is required.[2]

Cardiovascular morbidity and mortality are observed in both developed and developing countries.[2] This is a result of changes in lifestyle, resulting from the processes of industrialization and urbanization, which have reached all races, ethnic and cultural groups.[3]

An epidemiological study with residents of a rural area of Santa Rosa - RS, within the scope of the Family Health Strategy, found that the prevalence of metabolic syndrome is 8.5% for men and 22% for women, being higher with the increase of the age and with strong relation to the feminine gender.[4]

Analyzing food patterns of individuals with CR, Baxter[5] observed that the consumption of diets rich in fatty meats and refined grains (sugars, wheat, salt) caused an increase in the incidence of metabolic syndrome; while diets rich in fruits, vegetables and whole grains were negatively correlated with the syndrome, and it was also a strategy for the prevention and treatment of the syndrome.[6]

Thus, metabolic syndrome treatment includes the association of lifestyle changes with dietary interventions, regular physical activity, and drug use.[7,8] Thus, this association promotes a significant reduction in abdominal circumference, visceral fat, blood pressure, triglyceride levels and considerably increases HDL-cholesterol.[2,8]

The objective of this study was to perform nutritional screening and to investigate cardiometabolic risk factors in employees of the University Restaurant of the Universidade Federal do Tocantins (Federal University of Tocantins), through outpatient visits, biochemical measurements, food consumption evaluation and anamnesis for collecting sociodemographic, health and lifestyle data.

Methodology

This is a cross-sectional study that was based on a population of 33 employees of the University Restaurant (RU) of the Universidade Federal do Tocantins (Federal University of Tocantins), Palmas Campus, and only 18 accepted to participate and signed the Informed Consent Term (TCLE).

The data obtained through the 24h recall (R24h) and dietary prescription were generated using the *DietBox* software, calculating the nutrients from the food composition table.[9] For the descriptive statistical analysis, we used the *Microsoft Office Excel* program, where the information was also tabulated in spreadsheets.

For the collection of the information, an information sheet was used, composed of four parts. The first part dealt with the identification of the participant, collecting: name, gender, address, city, telephone, date of birth, age, recorded on personal identification document, marital status, occupation, income and family composition.

The second one collected health data, such as: if the individual is a smoker, if the individual presented weight changes, physical activities, food preferences, who buys food and prepares meals, which seasonings are used in the preparation, frequency of purchase, with whom the individual eats, the frequency of consumption of alcoholic beverages, if follows any diet, fractionation of meals, use of medication, consumption of water, fat, sugar and salt.

The third part consisted of anthropometric and nutritional assessment, with the collection of weight, height, abdominal perimeter, body mass index (BMI), R24h and blood pressure (BP). The fourth and final part included the biochemical tests, such as fasting glycemia and lipidogram, from the collection of blood samples, performed by a private laboratory. The total energy expenditure of the participants was based on the *Estimated Energy Requirements* (EER), proposed by the *Institute of Medicine*.[10]

For the anthropometry, the following equipment were used: digital platform scale, with capacity of 150 kg and sensitivity of 100 g, of the *Welmy* brand; inextensible and inelastic tape measure, 2.0 meters long, with a sensitivity of 1.0 cm, of the *Stanley* brand; wall stadiometer, of the *Sanny* brand, with measurement

The weight was measured with the individual positioned in the orthostatic position, standing without shoes and wearing only "light clothing", as recommended by the *Anthropometric_ Standardization_Reference Manual*.[11]

The height was measured with the person barefoot, feet together and heels leaning against the wall, without skirting board. The subject was standing and erect, on a flat surface, with the arms along the body and the hands turned towards the thighs, the head, scapula and buttocks were all aligned parallel to the wall, with head in the *Frankfurt* plan.[12]

The BMI determined whether the weight of an individual was adequate for height, establishing the risk of mortality associated with the presence of diseases, being established through a formula where the weight is divided by the squared height (BMI = weight / (height)^2).

The classification of nutritional status was carried out as recommended by the World Health Organization - WHO[13] for adults in: Thinness degree III - grave (<16 kg/m2), Thinness degree II - moderate (16.0 to 16.9 kg/m2), Thinness degree I - light (17.0 to 18.4 kg/m2), Eutrophy (18.5 to 24.9 kg/m2), Overweight (25.0 to 29.9 kg/m2), Obesity degree I (30 to 34.9 kg/m2), Obesity degree II (35 to 39.9 kg/m2) and Obesity degree III (> 40 kg/m2).

Blood pressure was measured on the left arm using the *Omron* sphygmomanometer, after 15 minutes of rest. According to the 7ª Brazilian Arterial Hypertension Guideline,[8] the reference value for definition of Systemic Arterial Hypertension (SAH) of adopted systolic BP was >; 140 mmHg and / or diastolic BP >; 90 mmHg.

The abdominal perimeter was measured with the patient standing, using a non-extensible measuring tape from the midpoint between the costal border and the iliac crest, as determined by the World Health Organization.[14] The cut-off point, according to the NCEP,[1] was 102 cm for men and 88 cm for women.

The evaluation of fasting glycemia took into account the reference value that is lower than 99 mg / dL, according to the Guideline of the Brazilian Society of Diabetes.[15] For the lipidogram performed under fasting conditions, the reference values for total cholesterol, HDL-cholesterol, triacylglycerol (TG) and LDL-cholesterol were those proposed by the Update of the Brazilian Directive on Dyslipidemias and Prevention of Atherosclerosis 2017.[16]

After the first consultation, in which the nutritional diagnosis was made, there was a return of 5 patients among the 18 participants, who presented alterations in the biochemical tests, such as fast glycemia and lipidogram. They were advised to complete three food diaries on non-consecutive days, including one day of the weekend, for further evaluation. After analysis of the diaries, 4 patients received nutritional guidelines for weight loss and dyslipidemias, and 1 received dietary prescription, with food plan and substitution list.

Results

In the studied population, 61.1% were female and 38.9% were male; 55.5% were single; 50% did not make use of alcoholic beverages; 66.6% did not smoke; 55.5% were employed as kitchen assistants; had an average age of 31.3 years, a family composition with an average of 3.5 persons and a mean income of R$ 605.55 *per capita*.

Regarding the information about the food history of the participants, it was observed that 55.5% of the interviewees made their own meals, 55.5% carried out household purchases on a monthly basis, prepared their own meals (55,5%) and ate with family and co-workers (61.1%).

The average number of meals per day was 3.2 times. In the preparations, the vast majority (72.2%) made use of industrialized spices and did not use salt in the meals after being prepared (38.8%). The *per capita* amount of sugar consumed was (3.25 kg / month) and soybean oil (1.98 L / month).

As for food preferences, the meat group was the most cited (30.43%), followed by legumes (21.73%), cereals and vegetables (17.39%), fruits (8.69%), and sweet (4.34%).

Concerning the practice of physical activities, it was observed that only 33.3% practiced them regularly. Regarding medication use, 44.4% used at least one, 25% reported using oral contraceptives, 37.5% using antihypertensive drugs, 12.5% using hypoglycemic, antidepressant and corticoid.

The nutritional status based on BMI, for participants of both genders, is described in Figure 1.

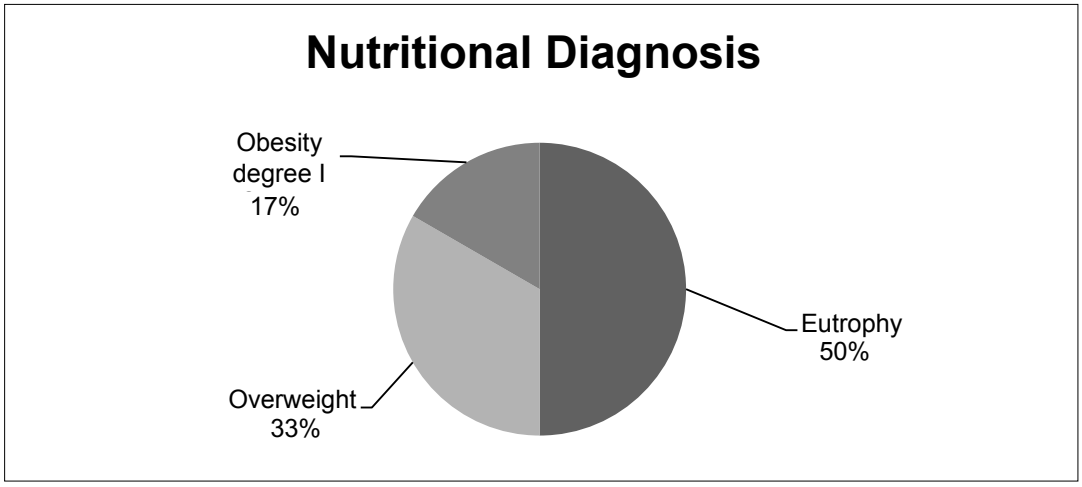

Figure 1. Nutritional diagnosis of the employees of the University Restaurant of UFT, Palmas.

Regarding the abdominal perimeter, 27.2% of the women and 42.8% of the men were above normal values, indicating 33% of the studied population with the highest risk for the development of chronic diseases such as diabetes mellitus, systemic arterial hypertension and cardiovascular diseases. Among the values of blood pressure (BP), 55.5% of the individuals surveyed surpassed only the systolic BP reference value, without changes in diastolic BP.

Table 1 shows the percentages of participants according to reference values for lipidogram and fasting glycemia.

Table 1. Percentage of participants (n = 15) according to the reference values for lipidogram and fasting glycemia. Palmas, TO, 2016.

Biochemistry Dosage	Participants
Fasting Glycemia	
< 99 mg/dL	93.3%
> 99 mg/dL	6.7%
Total Cholesterol	
Desirable (<190 mg / dL)	66.7%
High (> 190 mg / dL)	33.3%
Triacylglycerol	
Desirable (<150 mg / dL)	86.6%
Borderline (150-199 mg / dL)	6.7%
High (200-499 mg/dL)	6.7%
Very high (> 500 mg / dL)	0
LDL - *cholesterol*	
Great (<100 mg / dL)	40%
Desirable (100-129 mg/dL)	20%
Borderline (130-159 mg / dL)	13.3%
High (160-189 mg/dL)	26.7%
Very high (>190 mg/dL)	0
HDL - *cholesterol*	
Desirable (> 40 mg/dL)	66.7%
Low (<40 mg / dL)	33.3%

It was observed that, although the majority of the participants were out of cardiometabolic risk for biochemical glycemia and lipidogram dosages, expressive plots presented high total cholesterol (33.3%), high LDL-cholesterol (26.7%) and low HDL-cholesterol (33.3%), which increases the cardiometabolic risk for these participants.

The average percentage of daily macronutrient intake by the 18 employees, based on the food survey applied, is shown in Figure 2. The consumption of micronutrients is shown in Table 2.

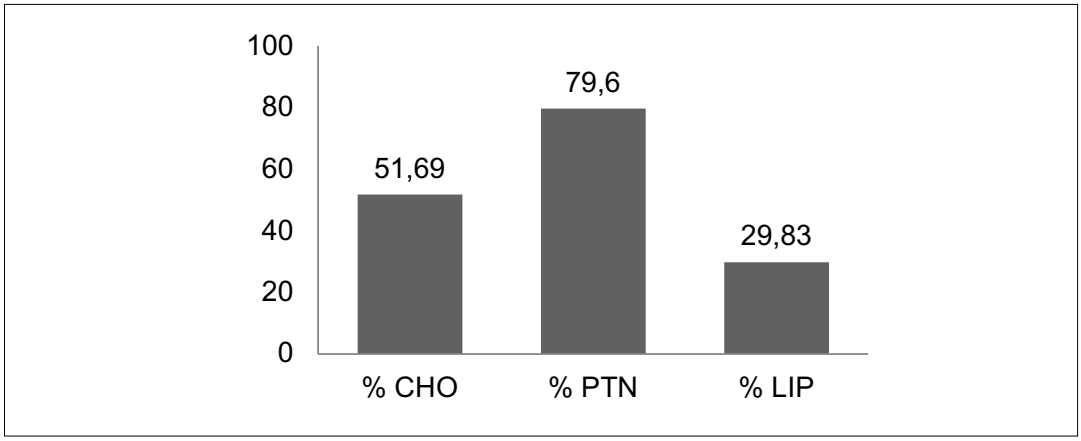

Figure 2. Mean percentages of daily macronutrient intake by the 18 employees of the University Restaurant of UFT, Palmas, 2016.

Table 2. Mean values of daily micronutrient intake by 18 employees of the University Restaurant of UFT, Palmas,TO, 2016.

MICRONUTRIENTS	MEAN INGESTION	RECOMMENDATIONS
Cholesterol (mg)	206.48	<200 mg/day**
Fibers (g)	19.26	30.6 g/day*
Monounsaturated fat (g)	18.5	< 20% VET**
	9.97% TEV	
Trans Fat (g)	256.9	2 g/day***
Polyunsaturated Fat (g)	7.76	<10% TEV**
	4.18% TEV	
Saturated Fat (g)	1.90	<7% TEV**
	1.02% TEV	
Calcium (mg)	339.21	1,142.86 mg / day *
Iron (mg)	9.91	11.3 mg/day*
Phosphorus (mg)	825.99	837.5 mg/day*
Magnesium (mg)	206.07	361.25 mg/day*
Potassium (mg)	1,913.54	4,600 mg/day*

continue

MICRONUTRIENTS	MEAN INGESTION	RECOMMENDATIONS
Sodium (mg)	1,452.35	1,437.5 mg/day*
Manganese (mg)	2.29	2 mg/day*
Selenium (mcg)	55.79	53.12 mg/day*
Zinc (mg)	10.45	9.6 mg/day*
Vit. A (mg)	343.86	787.5 mcg / day *
Vit. C (mg)	93.33	77.5 mg/day*
Vit. B1 (mg)	1.03	1.11 mg/day*
Vit. B2 (mg)	0.91	1.16 mg/day*
Vit. B3 (mg)	10.46	14.75 mg/day*
Vit. B6 (mg)	1.11	1.35 mg/day*
Vit. B9 (mcg)	138.32	387.5 mcg/day*
Vit. B12 (mcg)	3.67	2.32 mcg/day*
Vit. E (mg)	6.05	14.5 mg/day*
Vit. D (mcg)	1.46	6.8 mcg/day*

TEV = total energetic value of the diet

*Average recommendations according to the *Dietary Reference Intakes* (DRI),[17] considering adult men and women and age group of 19 to 50 years.

**Recommendations according to the IV Brazilian Directive on Dyslipidemias and Prevention of Atherosclerosis (2007).[18] ***Recommendation according to Anvisa.[19]

Some of the nutrients that are below the recommendations, such as fiber, calcium, iron, phosphorus, magnesium, potassium, vitamin A, vitamin B1 (thiamine), vitamin B2 (riboflavin), vitamin B3 (niacin), vitamin B6 (pyridoxine), vitamin B9 (folate), vitamin E and vitamin D stand out (Table 2).

However, the values of sodium, manganese, selenium, zinc, vitamin C and vitamin B12 (cobalamin) intake were higher than the recommendations (Table 2).

However, the values of saturated, monounsaturated and polyunsaturated fats and cholesterol obtained in the results were within the recommended, while the value of trans fat was well above the recommendations (Table 2). However, in relation to the food diaries of the 5 participants with alterations in the biochemical tests, it was possible to compare the data obtained with the recommendations by the *Acceptable Macronutrient Distribution Ranges* - AMDR, proposed by the

Institute of Medicine.[20] For Employee 1, the consumption of proteins and lipids was above the references, since the recommendation is 10% to 35% and 20% to 35%, respectively. Already the consumption of carbohydrates was within the range of recommendations from 45% to 65%.

Table 3 shows the caloric consumption obtained by means of the R24h applied.

Table 3. Daily ingested calories obtained through the R24h of the 5 employees of the University Restaurant of UFT, Palmas, TO, 2016.

Employees	Calories (Kcal)	EER (Kcal)
1	2,155.15	2,112.5
2	1,322.68	1,862.5
3	1,036.75	1,730
4	1,131.60	1,622.5
5	1,511.41	1,711.2

The mean daily ingested calories obtained through R24h was

Kcal, with 38.8% consuming more and 55.5% consuming less than the calculated EER.

The analysis of food diaries performed by the five employees who presented changes in the biochemical tests are shown in Figure 3 and Table 4.

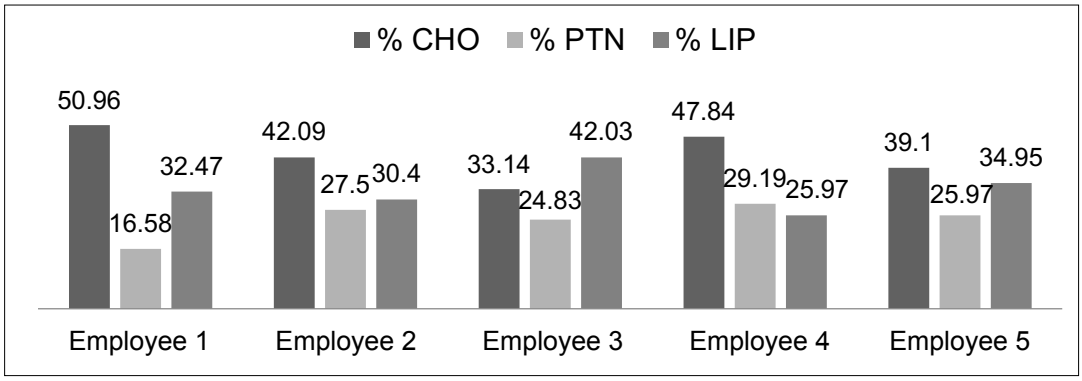

Figure 3. Mean percentages of daily macronutrient intake by 5 employees of the University Restaurant of UFT, Palmas, TO, 2016.

Table 4. Average daily intake of micronutrients, obtained by food registration for 3 days, for employees of the University Restaurant of UFT, Palmas, TO, 2016.

Micronutrients	Employee 1	Employee 2	Employee 3	Employee 4	Employee 5	Recommendation
Cholesterol (mg/day)	253.11	293.28	161.80	121.38	283.79	<200 mg/day*
Fibers (g/day)	16.04	6,60	9.19	17.05	19	30.6 g/day***
Fat Monounsaturated (g/day)	23.02 9.6%TEV	12,9 8.7%TEV	15.82 13.7%TEV	11.38 9%TEV	22.17 13.2%TEV	≤ 20% TEV*
Trans Fat (g/day)	3.77	0.44	0.60	0.28	0.11	2 g/day**
Fat Polyunsaturated (g/day)	10.47 4.3%TEV	7.92 5.38%TEV	5.98 5.19%TEV	1.54 1.22%TEV	10.03 5.97%TEV	≤10% TEV*
Saturated Fat (g/day)	21.21 8.80%TEV	17.41 11.8%TEV	15.47 13.4%TEV	13.26 10.5%TEV	25.01 14.9%TEV	≤7% TEV*
Calcium (mg/day)	458.33	249.03	208.64	118.76	331.36	1,142.86 mg/day***
Iron (mg/day)	14.62	8.62	8.14	6.25	7.02	11.3 mg/day***
Phosphorus (mg/day)	957.86	976.95	857.52	578.60	887.65	837.5 mg/day***
Magnesium (mg/day)	198.66	204.80	124.61	118.1	151.3	361.25 mg/day***
Potassium (mg/day)	2,204.25	1,832.18	1,271.99	1,049.71	1,567.35	4,600 mg/day***
Sodium (mg/day)	3,011.63	1,029.22	938.73	2,038.79	2,192.63	1,437.5 mg/day***
Manganese (mg/day)	1.91	0.8	0.59	1.41	1	2 mg/day***
Selenium (mg/day)	99.22	100.17	61.71	5.99	46.37	53.12 mg/day***
Zinc (mg/day)	10.53	10.42	10.91	11.63	14.49	9.6 mg/day***
Vit. A (mcg/day)	479.35	319.47	115.9	159.41	229.73	787.5 mcg/day***
Vit. C (mg/day)	156.7	18.45	18.24	12.05	216.55	77.5 mg/day***
Vit. B1 (mg/day)	1.66	0.71	0.67	0.29	0.76	1.11 mg/day***
Vit. B2 (mg/day)	1.24	0.99	0.84	0.17	0.81	1.16 mg/day***

continue

Micronutrients	Employee 1	Employee 2	Employee 3	Employee 4	Employee 5	Recommendation
Vit. B3 (mg/day)	18.39	12.67	10.17	6.77	13.92	14.75 mg/day***
Vit. B6 (mg/day)	1.49	1.17	1.14	0.20	0.83	1.35 mg/day***
Vit. B9 (mcg/day)	235.58	115.23	56.94	27.72	40.62	387.5 mcg/day***
Vit. B12 (mcg/day)	7.84	6.8	4.82	0.18	0.79	2.32 mcg/day***
Vit. E (mg/day)	10.21	5.15	5.59	0.38	3.71	14.5 mg/day***
Vit. D (mcg/day)	4.60	2.44	1.23	0.43	1.04	6.8 mcg/day***

Func. = Employee. TEV = total energetic value of the diet

*Recommendations according to the IV Brazilian Directive on Dyslipidemias and Prevention of Atherosclerosis (2007).[18] **Recommendation according to Anvisa.[19]

***Average recommendations according to the *Dietary Reference Intakes* (DRI),[17] considering adult men and women and age group of 19 to 50 years.

As for micronutrients, some values fell below the recommendations. For example, fibers, calcium, magnesium, manganese, potassium, vitamin A, vitamin B9 (folate), vitamin E and vitamin D. In addition, some micronutrients presented values above the recommendations, such as iron, phosphorus, sodium, selenium, zinc, vitamin C, vitamin B1 (thiamine), vitamin B2 (riboflavin), vitamin B3 (niacin), vitamin B6 (pyridoxine) and vitamin B12 (Table 4).

However, saturated fats, trans fats, and cholesterol levels were above recommended levels, while monounsaturated and polyunsaturated fats were within the references (Table 4).

For Employees 2 and 3, regarding macronutrient data, the values of protein and lipid intake are above the reference, since the recommendation is 10% to 35% and 20% to 35%, respectively. Regarding carbohydrate consumption, Employee 2 was within recommendations from 45% to 65%, while Employee 3 was below recommendations (Figure 3).

As regards the micronutrients of Employees 2 and 3, it was notorious that some were below recommendations, such as fibers, calcium, iron, magnesium, manganese, potassium, sodium, vitamin A, vitamin C, vitamin B1 (thiamine), vitamin B2 (riboflavin), vitamin B3 (niacin), vitamin B6 (pyridoxine), vitamin B9 (folate), vitamin E and vitamin D (Table 4).

However, some micronutrients presented values above the recommendations, such as phosphorus, selenium, zinc and vitamin B12 (Table 4). In addition, cholesterol intake of Employee 1 was above recommendations, while that of Employee 2 was within the recommended range. And finally, when it comes to the consumption of fats by Employees 1 and 2, the consumption of saturated fat was above the recommended level, while those of monounsaturated, polyunsaturated and trans fat were within recommended levels (Table 4).

However, Employees 4 and 5 presented changes in macronutrient intake, with protein intake being above the reference values (10% to 35%). Regarding lipids, Employee 4 consumption was within recommendations (20% to 35%), but Employee 5 consumption was above recommended. In relation to carbohydrate consumption, Employee 4 presented intake within the range of recommendations (45% to 65%), but the Employee 5 presented higher intake than recommended (Figure 3).

As for the intake of micronutrients, fibers, calcium, iron, magnesium, manganese, potassium, selenium, vitamin A, vitamin B1 (thiamine), vitamin B2 (riboflavin), vitamin B3 (niacin), vitamin B6 (pyridoxine), vitamin B9 (folate), vitamin B12, vitamin E and vitamin D were below recommendations. On the other hand, vitamin C of Employee 4 was below recommendations, unlike Employee 5, which was above recommended (Table 4).

Despite this, some micronutrients were above recommendations, such as sodium and zinc. As for phosphorus, intake values were obtained below the recommendations for the Employee 4, and above for the Employee 5. In addition, the cholesterol intake of Employees 4 and 5 exceeded that recommended, and finally, with regard to fats, saturated fats were ingested above the recommendation and intakes of monounsaturated, polyunsaturated and trans fats remained within the recommended (Table 4).

Discussion

The anthropometric data obtained in the present study reveal considerable percentages of overweight (33%) and obesity (17%). Studies in Brazil have shown an increase in the prevalence of overweight and obesity. In this work, Tonini et al.,[21] the nutritional status and food habits of the employees of a higher education institution in western Santa Catarina were evaluated, where 39.3% of employees were overweight.

Similarly, Simon et al.[22] found that 60.8% of the professionals in the nutrition and dietetics service of a hospital in Porto Alegre were overweight. Regarding the biochemical tests, the author observed alteration of fasting glycemia, high LDL-C and low HDL-C. Similar to that found in

our results, where 11.1% had high levels of fasting glycemia, an increase in LDL-c (> 16.6%) and HDL-c below desirable (<33.3%) , which reflects a profile of hypercholesterolemia and a high risk for the development of cardiovascular diseases, as also observed by Ruiz-Fernandez et al.,[23] who evaluated CR in a community located in Venezuela.

In the study carried out by Mariath et al.[24] 33% of employees in an industry in Santa Catarina were identified with a high abdominal perimeter, similar to that found in the present study (33%), which represents a higher risk for the development of metabolic diseases associated with obesity.

In the analyzed R24h, the average daily energy consumption was

Kcal, but the majority of participants (55.5%) ate less than recommended by the calculated EER. They are 330.6Kcal less relative to the caloric value of the adult employee proposed by the Worker's Food Program (PAT), with an approximate value of 2,000 Kcal, distributed into breakfast, lunch, snack, dinner and supper.[25]

Comparing macronutrient consumption to the AMDR recommendations, proposed by IOM,[20] in the results obtained for the consumption of proteins, (79.6%) show a protein intake above the recommendation of 10% to 35% of the total energetic value (TEV) that should be ingested daily. Regarding carbohydrate consumption, the recommendations were adequate, in which the average value of carbohydrate intake was 51.6%, since the recommendation is 45% to 65%. For lipids, a mean consumption of 29.8% of the TEV was observed in the study population, with intake values between 20% and 35% being recommended.

Regarding micronutrients, it was observed that the average selenium intake of the participants was higher than recommended (55.79 mcg) by Recommended Dietary Allowances (RDA), but did not exceed the Maximum Tolerable Intake Level (UL).[20] In this context, Stranges et al.[26] analyzed the amounts ingested of excess selenium and the risk of cardiovascular diseases, but found no evidence in this correlation.

In the studied population, it was also identified that fiber intake recommendations (19.26 g) were not reached and sodium consumption exceeded the recommended,[20] factors that increase cardiometabolic risks.[27] These same authors verified that among the metabolic risks in Korean adults, the low intakes of whole grains and fruits, and high sodium intake, stand out; as well as unfavorable anthropometric parameters such as body mass index and elevated BP, a situation that was also observed in the present study, where BP elevations prevailed in 55.5% of the individuals.

Likewise, it was possible to observe values of magnesium intake below recommendations (206.07 mg), which leads to deprotection against cardiovascular events by reducing arterial stiffness.[28] These authors investigated obese and overweight adults supplemented with 350 mg / day of magnesium for 24 weeks and found that there was a beneficial cardiovascular impact. Regarding the low

intake of vitamin E observed in the present study, Hu et al.[29] demonstrated cardioprotective effect of vitamin E, but with mechanisms still unknown, functioning only in some patients and may be affected by factors such as age and gender.

The majority of participants in the present study reached the recommendation of vitamin C, with an average intake of 93.33 mg of vitamin C in the studied group. Soriano-Maldonado et al.[30] postulated that the joint consumption of natural antioxidants of apple juice, such as vitamin C and polyphenols, may have favorable effects on cardiometabolic markers. Catania et al.[31] also described that epidemiological studies proposing diets rich in antioxidants, or simply rich in fruits and vegetables, may reduce CR.

Regarding lipid consumption, the high consumption of trans fat, that is, above 2 g / day, mainly from industrialized foods, draws attention in the study population, characterizing an unfavorable scenario in relation to CR. On the other hand, it was observed an adequacy in the consumption of monounsaturated and polyunsaturated fatty acids.

Oliveira et al.[32] found that the introduction or replacement of saturated and trans fats by unsaturated fatty acids provided benefits for the reduction of cardiovascular risk in obese or overweight and non-diabetic elderly individuals, thus conferring a protection factor.

Conclusion

This study portrays an unfavorable anthropometric and dietary scenario with evidence of factors predisposing the population to cardiovascular events, such as high consumption of trans fats, low fiber intake, sedentary lifestyle and unhealthy lifestyle habits, low ingestion of micronutrients essential to homeostasis and protection of the organism, as well as poor distribution of dietary macronutrients.

The high rate of overweight and obesity in the analyzed population was possibly caused by changes in eating patterns involving both industrialized, high fat and high sugar consumption, and reduced physical activity. Thus, the nutritionist is responsible for evaluating each individual, in a holistic way, in order to guide them according to their needs and, in this way, to improve the biochemical and nutritional parameters.

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Collaborators

All authors contributed at all stages, from the design of the study to the review of the final version of the article.

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