

# Dietary and anthropometric profile of patients with acute coronary syndrome admitted to a tertiary hospital

*Perfil dietético e antropométrico de pacientes com síndrome coronariana aguda admitidos em um hospital terciário*

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## ABSTRACT

**Introduction:** Cardiovascular diseases of ischemic origin are associated with inadequate nutrition and excess adiposity. The aim of this study was to determine the dietary and anthropometric profile of patients with acute coronary syndrome (ACS). **Methods:** Cross-sectional study with patients  $\geq 18$  years and ACS admitted in a tertiary hospital in South of Brazil. Socio-demographic, clinical, anthropometric (weight, height, waist and hip circumferences) data and information regarding physical activity were evaluated; a food frequency questionnaire (FFQ) was used to identify the dietary intake. Comparisons between the nutrients' intake obtained by dietary survey and those recommended by the national and international guidelines were carried out using the Student t-test for one mean. **Results:** A total of 104 patients were evaluated, with a mean age of  $60.6 \pm 11.3$  years and 59.6% were man. The prevalence of obesity according to body mass index (BMI) was 32.7%, and 58.6% of the patients presented a very high waist circumference. In relation to diet, the amounts of energy (kcal/kg of body weight), protein (in %), saturated fat (in %) and sodium (in mg) were higher than the recommended by guidelines ( $p < 0.004$ ), and potassium, calcium, magnesium (in mg) and fiber (in g) intake were lower than that recommended ( $p$  values  $< 0.001$ ). **Conclusion:** The prevalence of obesity was high in patients with ACS and the intake of most of the evaluated nutrients was not in accordance with the recommendations of national and international guidelines.

## RESUMO

**Introdução:** As doenças cardiovasculares de origem isquêmica são associadas com alimentação inadequada e excesso de adiposidade. O objetivo deste estudo foi determinar o perfil dietético e antropométrico de pacientes com síndrome coronariana aguda (SCA). **Método:** Estudo transversal entre pacientes  $\geq 18$  anos com SCA admitidos em um hospital terciário de Porto Alegre/RS. Foram avaliados dados sociodemográficos, clínicos, antropométricos (peso, estatura, circunferência da cintura e do quadril) e relativos à atividade física; aplicou-se questionário de frequência alimentar (QFA) para identificação dos nutrientes ingeridos, que foram quantificados por meio do programa Avanutri<sup>®</sup>. A comparação entre os nutrientes obtidos por inquérito dietético e as recomendações sugeridas pelas diretrizes nacionais e internacionais foram realizadas por meio do teste t de Student para uma média. **Resultados:** Foram avaliados 104 pacientes, com idade média de  $60,58 \pm 11,26$  anos. A prevalência de obesidade pelo índice de massa corporal (IMC) foi de 32,7%, e 58,6% dos pacientes apresentaram circunferência da cintura muito elevada. Em relação à dieta, as quantidades de energia (kcal/kg de peso), proteínas, gordura saturada (em %) e de sódio (em mg) consumidos foram superiores às recomendadas (valores de  $p < 0,004$ ), e o consumo de ácidos graxos insaturados (em %), potássio, cálcio, magnésio (em mg) e de fibras (em g) foi inferior ao recomendado pelas diretrizes (valores de  $p < 0,001$ ). **Conclusão:** A prevalência de obesidade foi elevada nos pacientes com SCA e a ingestão de grande parte dos nutrientes avaliados não está de acordo com o recomendado pelas diretrizes nacionais e internacionais.

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## INTRODUCTION

Cardiovascular diseases (CVD) of atherosclerotic origin are the main causes of morbidity and mortality worldwide. In Brazil, they account for approximately 30% of deaths among individuals aged 20 to 59 years old. Of these, from 2008 to 2014, about 134 deaths per 100,000 inhabitants were due to acute coronary syndrome (ACS)<sup>1</sup>, a term used to describe myocardial ischemia, which includes unstable angina (AI), acute myocardial infarction (AMI), and sudden death<sup>2</sup>. Modifiable risk factors for CVD include smoking, sedentary lifestyle, excess of adiposity, hypertension (HTN), diabetes mellitus (DM), dyslipidemia (DLP), stress and an unhealthy diet (excessive intake of saturated fatty acids [SFA], trans fatty acids [TFA], dietary cholesterol and sodium, and insufficient intake of micronutrients such as potassium, calcium and magnesium)<sup>3</sup>.

Acceptance of recommendations for lifestyle changes is complex because it requires changing habits - a healthy lifestyle is based on long-term behavior. Specifically about dietary prescription, about 40% of individuals do not adhere to recommended instructions, abandoning treatment<sup>4</sup>. It is estimated that adherence to a better quality dietary pattern is associated with a 14% reduction in the risk for AMI and a 35% reduction in the risk of death in patients with established CVD<sup>5</sup>. Approximately 60% of patients who have AMI or other coronary event have a high risk of recurrence, and the presence of risk factors such as inadequate diet, sedentary lifestyle and obesity increase this susceptibility<sup>6</sup>. Patients with ACS who remain smoking and with low adherence to dietary and physical exercises have approximately four times the risk of AMI, stroke and death compared to those adhering to treatment<sup>7</sup>.

Therefore, the aim of this study was to determine the dietary and anthropometric profile of patients with ACS admitted to a tertiary hospital, and to compare it with the nutritional recommendations suggested by national and international guidelines.

## METHODS

This was a cross-sectional study conducted among patients admitted to the Institute of Cardiology (IC) of Rio Grande do Sul (Porto Alegre/RS, Brazil). The population was constituted by patients with medical diagnosis of ACS (AI or first AMI) who did not have previous nutritional counseling. Participants were selected from hospital admission units covered by the Brazilian Unified Health System (SUS). Patients of both sexes  $\geq 18$  years were included; exclusion criteria were the presence of cognitive impairment, the lack of conditions for the measurement of anthropometry and incomplete medical records.

Socio-demographic data (sex, age, ethnicity, schooling, occupation, lifestyle habits) and clinical data (medical

diagnoses) were collected through a standardized questionnaire. Smoking was categorized as recent (current smoking), past (if the patient had stopped smoking for more than a year) and never smoked. Abusive alcohol consumption was detected if men and women ingested, respectively, more than two or one dose of alcoholic beverage per day, or if they consumed more than five doses in a single day in the last 30 days. The level of physical activity was evaluated through IPAQ (International Physical Activity Questionnaires)<sup>8</sup>, which allows the classification of individuals into inactive (sedentary), irregularly active and active.

The identification of the dietary components consumed by the patients was done through the application of a food frequency questionnaire (FFQ)<sup>9</sup>, composed of a list of 135 items from different food groups. Patients were questioned about the frequency of food consumption in the last 30 days before the hospital admission. The daily total energy intake (TEI), fats (total fat, SFA, polyunsaturated fatty acids [PUFA], monounsaturated fatty acids [MUFA] and dietary cholesterol), carbohydrate, protein, dietary fiber, sodium, potassium, calcium and magnesium were calculated using Avanutri® Nutritional Evaluation software (Rio de Janeiro, Brazil). The energy density (kcal/kg) was calculated by dividing the average of TEI by the average weight of the patients.

The amounts of total energy and nutrients consumed were compared to the values indicated by national and international guidelines that present nutritional recommendations for prevention and control of CVD, as well as for body weight control; the cutoff points used for the evaluations were:

- Total energy consumption: hypocaloric diet ( $< 25$  kcal/kg), normocaloric (25-30 kcal/kg), and hypercaloric ( $> 30$  kcal/kg)<sup>10</sup>;
- Carbohydrates: 50% to 60% of the TEI<sup>11</sup>;
- Proteins: 10% to 15% of the TEI<sup>11,12</sup>;
- Total fat: 25% to 35% of TEI<sup>11</sup>;
- SFA:  $< 7\%$  of the TEI<sup>11</sup>;
- MUFA: 15% to 20% of the TEI<sup>11,13</sup>;
- PUFA: 5% to 10% of the TEI<sup>11,13</sup>;
- Dietary cholesterol:  $< 300$  mg/day<sup>13</sup>;
- Dietary fibers: 20 to 30 g/day<sup>14</sup>;
- Sodium:  $< 2000$  mg/day<sup>14</sup>;
- Potassium:  $\geq 4700$  mg/day<sup>15</sup>;
- Calcium:  $\geq 1250$  mg/day<sup>15</sup>;
- Magnesium:  $\geq 500$  mg/day<sup>15</sup>.

The anthropometric measurements were weight, height, waist and hip circumferences. Body weight was measured on a Filizola® mechanical anthropometric scale with capacity for 150 kg, duly calibrated, with the patient barefoot and dressed with the least possible clothing. Height was verified using a

stadiometer attached to the scale, with the individual facing the evaluator with an erect head. The body mass index (BMI) was calculated using the formula: weight (kg)/height (m)<sup>2</sup> and it was classified as eutrophy (18.5 to 24.9 kg/m<sup>2</sup>); overweight (25 - 29.9 kg/m<sup>2</sup>) and obesity ( $\geq$  30 kg/m<sup>2</sup>)<sup>16</sup>. Waist (WC) and hip (HC) circumferences were verified with the patient standing and registered in cm. An inelastic measuring tape of 0 to 143 cm was used, with an accuracy of 1 mm. WC was measured midway between the iliac crest and the lower costal border of the patient - who received instructions not to inhale at the time of measurement - and the HC was defined as the highest value measure of the hip. WC was classified as an increased risk for CVD (men 94 to 102 cm and women 80 to 88 cm) and a higher increased risk for CVD (men > 102 cm and women > 88 cm). The waist-to-hip ratio (WHR) was calculated using the formula: WC/HC, and the cut-off points used were  $\geq$  0.95 (for men) and  $\geq$  0.80 (for women) to identify cardiovascular risk considering central adiposity<sup>14</sup>.

The sample size calculation was carried out using WinPepi® program for Windows. Considering the study of Lourenço et al.<sup>17</sup> who detected a prevalence of approximately 74% of adequacy regarding total fat intake recommended by guidelines, an acceptable difference of 10%, a significance level of 5%, and a power of 80%, 98 evaluated patients would be evaluated.

Data were entered in an Excel®-type spreadsheet and analyzed using the Statistical Package for Social Science® program (SPSS version 17.0, Il, USA) for Windows. Continuous variables were described in means and standard deviation or medians and interquartile ranges, and categorical data were described as absolute numbers and percentage. The Student t-test for one mean was used to compare the nutrients intake estimated by FFQ and the values proposed by the guidelines.

The present study is part of a larger project entitled "Nutritional and anthropometric profile of patients with acute coronary syndrome (ACS)", which was approved by the Research Ethics Committee of the Institute of Cardiology/University Foundation of Cardiology (CEP IC-FUC, approved under No. 515,084).

## RESULTS

The sample consisted of 104 patients, with an average age of  $60.6 \pm 11.3$  years, male in majority (59.6%) and who declared themselves white (83.7%). The mean scholarship was  $7.1 \pm 3.9$  years, and the percentage of individuals who were retired was 43.3%. The prevalence of sedentary individuals detected by IPAQ was 39.4%. The clinical characteristics of the population are described in Table 1. There was a high prevalence of HTN and DLP among the patients, as well as a family history of AMI. Individuals who smoke or have smoked

**Table 1** – Clinical characteristics of the sample.

Characteristics	N	%
Acute myocardial infarction	91	87.5
Unstable angina	13	12.5
Smoking		
Actual	25	24
In the past	46	44.2
Abusive alcohol consumption	15	14.4
Diabetes mellitus	42	40.4
Hypertension	70	67.3
Stroke	9	8.7
Dyslipidemia	64	61.5
Chronic kidney disease	5	4.8
Family history of acute myocardial infarction	65	62.5

accounted for more than 68% of the population and there was a significant prevalence of patients reporting abusive consumption of alcohol.

Table 2 shows the nutritional status of the sample according to different anthropometric indicators. A high proportion of individuals presented visceral fat accumulation according to WHR (88.5%), and a significant number presented a higher increased risk to develop CVD according to WC (59.6%) and excess weight of according to the BMI (49.2%). Among men, the means of the anthropometric indicators were: BMI  $28 \pm 5.5$  kg/m<sup>2</sup>, WC  $100.7 \pm 13.9$  cm, and WHR  $1.01 \pm 0.07$ . Among women, the means were similar: BMI  $28.8 \pm 5.8$  kg/m<sup>2</sup>, WC  $98 \pm 13.8$  cm, and WHR  $0.94 \pm 0.08$ .

**Table 2** – Anthropometric characteristics of the population.

Anthropometric indicators	N	%
<b>Waist-hip ratio (WHR)</b>		
Normal	12	11.5
Risk for cardiovascular disease	92	88.5
<b>Waist circumference (WC, cm)</b>		
Normal	19	18.3
Increased risk for cardiovascular disease	23	22.1
Higher increased risk for cardiovascular disease	62	59.6
<b>Body mass index (BMI, kg/m<sup>2</sup>)</b>		
Overweight	38	16.5
Obesity	34	32.7

Regarding dietary components, the mean TEI was 2,476  $\pm$  842.3 kcal, ranging from 1,176.4 to 5,160.2 kcal. The mean energy density was  $33.7 \pm 13$  kcal/kg; 26.9% of the individuals had a diet considered hypocaloric, 22.1% were within the caloric range desirable for weight maintenance and 51% had a hypercaloric diet.

Table 3 shows the means of nutrients intake according to FFQ, as well as the comparison with the guidelines' recommendations. The consumption of carbohydrates,

total fats and dietary cholesterol did not present a significant difference in relation to the recommended values. The amounts of calories, proteins, SFA and sodium consumed were significantly higher than those recommended, and the consumption of MUFA, PUFA, potassium, calcium, magnesium, and dietary fiber was significantly lower than those suggested by the guidelines. Figure 1 shows the proportion of individuals with a nutrient intake considered adequate, above or below the recommended according to values suggested by the guidelines.

**Table 3** – Comparison between the nutrients intake of the sample and those recommended by the guidelines.

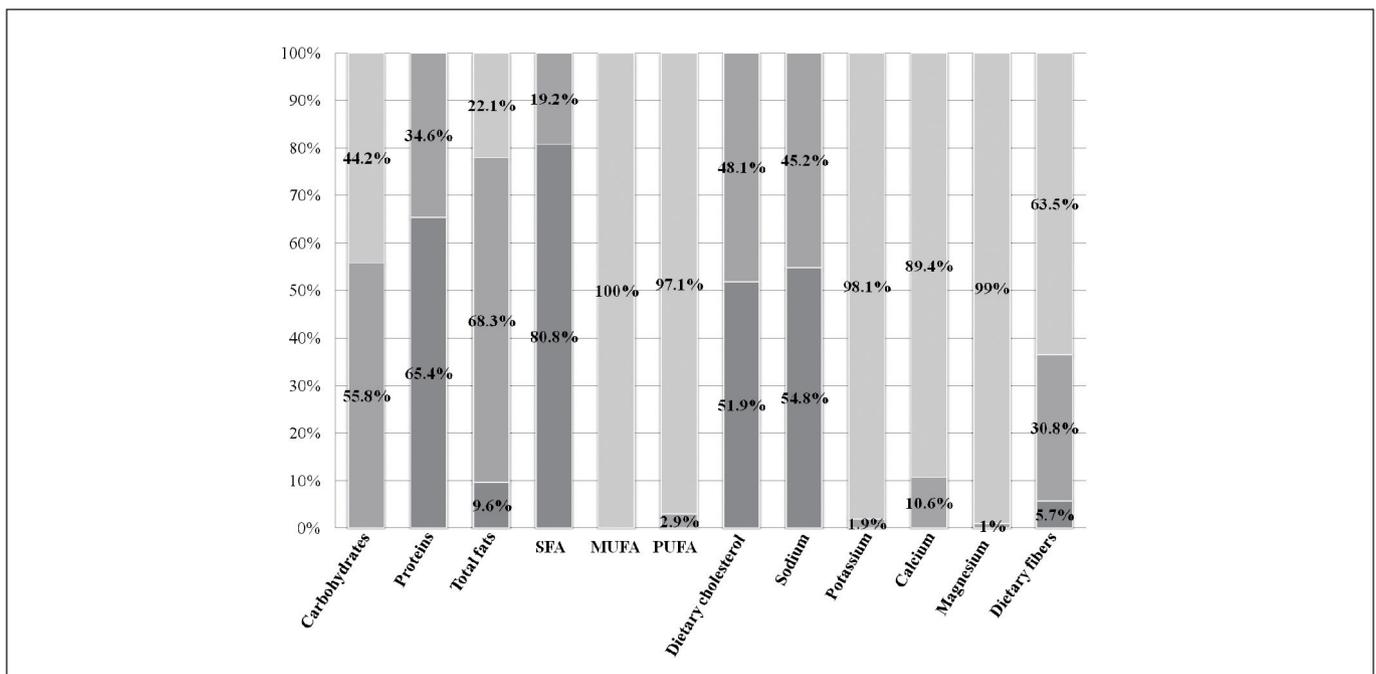
Nutrient	Mean ± SD	Test value*	P-value
Energy density (kcal/kg of weight)	33.7 ± 13	30 kcal/kg	0.004
Carbohydrates (%)	54.6 ± 7.2	55%	0.61
Proteins (%)	16.3 ± 3.3	15%	< 0.001
Lipids (%)	29.1 ± 5	30%	0.06
Saturated fatty acids (%)	9.3 ± 2.5	7%	< 0.001
Monounsaturated fatty acids (%)	7.4 ± 2	17.5%	< 0.001
Polyunsaturated fatty acids (%)	2.9 ± 1	7.5%	< 0.001
Sodium (mg)	2348.2 ± 1045.2	2000 mg	0.001
Potassium (mg)	2375.5 ± 795.9	4700 mg	< 0.001
Calcium (mg)	794.6 ± 339.8	1250 mg	< 0.001
Magnesium (mg)	221.5 ± 77.1	500 mg	< 0.001
Dietary cholesterol (mg)	310.7 ± 136.2	300 mg	0.42
Dietary fibers (g)	18.8 ± 6.1	25 g	< 0.001

\*Recommendations according to the guidelines: Dietary Approaches to Stop Hypertension<sup>15</sup>, Brazilian Society of Cardiology<sup>16, 18, 19</sup>, and Brazilian Ministry of Health<sup>17</sup>.

## DISCUSSION

We observed in our study a high prevalence of obesity in patients with ACS according to different anthropometric indicators, as well as a significant number of individuals who presented inadequate caloric and nutrients intake according to recommendations suggested by national and international guidelines.

The obesity indexes detected in our population were expected, and the mean values of WC and WHR agree to other studies performed among patients with ACS<sup>18</sup>. Compared to men, in our study, the mean values of WC in women indicate a high risk for developing CVD and postmenopausal status plus hormone therapy may contribute to the worsening of this risk<sup>19</sup>. The high caloric intake of the population, represented by the average energy density, was also expected considering the high proportions of obesity and sedentary lifestyle.



**Figure 1** - Proportion of individuals with adequate (grey) nutrient intake, above (dark grey) or below (light gray) that recommended by the guidelines. Acceptable nutrient distribution range: Carbohydrates: 50-60% of the total daily energy intake (TEI); Proteins: 10%-15% of the TEI; Fats: 25-35% of the TEI; Saturated fatty acids: <7% of the TEI; Monounsaturated fatty acids: 15%-20% of the TEI; Polyunsaturated fatty acids: 5%-10% of the TEI; Dietary cholesterol: <300 mg/day; Sodium: <2000 mg/day; Potassium: > 4700 mg/day; Calcium: > 1250 mg/day; Magnesium: > 500 mg/day; Dietary fibers: 20g-30g/day. SFA: saturated fatty acids; MUFA: monounsaturated fatty acids; PUFA: polyunsaturated fatty acids.

It was observed that the averages of macronutrients intake were close to that suggested by the guidelines. The increased consumption of proteins is justified by the dietary pattern of the population who live in South Brazil, which usually consumes high amounts of meat and derivatives<sup>20</sup>. Although quantitatively the consumption of fats seemed adequate among the sample, the quality was inadequate. It is known that the substitution of SFA for MUFA and PUFA decreases the risk for cardiovascular events in approximately 14%<sup>21</sup>. A study that evaluated the qualitative consumption of fats among individuals with previous coronary artery disease showed a pattern of consumption similar to our sample, represented by high SFA intake and low MUFA intake<sup>22</sup>. Approximately half of the population presented a high consumption of dietary cholesterol; however, the restriction of this nutrient has been questioned, due to the knowledge about the contribution of endogenous (and not exogenous) cholesterol in the genesis of CVD<sup>23</sup>.

Other researchers have identified a higher sodium intake among elderly patients with established CVD; however, when stratified according to a previous history of AMI, patients with previous diagnosis of myocardial infarction showed sodium consumption similar to that observed in our study<sup>24</sup>. The consumption of fruits and vegetables, the main sources of dietary potassium, is low among the population living in South of Brazil<sup>25</sup>, which may contribute to the deficiency of this micronutrient in these individuals' daily diet.

About 90% of the sample showed inadequate amounts of calcium intake, suggesting a low intake of source foods (milk and dairy products). A study that explored the relationship between dietary calcium and hard outcomes showed that moderate dietary calcium intake may protect against cardiovascular and all-cause mortality and incident stroke<sup>26</sup>. Regarding dietary magnesium, despite the inverse relationship between its intake and cardiovascular disease<sup>27</sup>, the intake of the amounts suggested by the DASH study is not commonly observed, as it is substantially higher than the values suggested by Dietary Reference Intakes<sup>28</sup>.

In our study, approximately 63% of the subjects ingested less dietary fiber than the recommended – a similar proportion observed among Europeans at risk for developing CVD<sup>29</sup>. Low fiber intake has been reported among individuals at high cardiovascular risk in southern Brazil<sup>30</sup>, and it is known that in general population the intake of fiber-rich foods such as fruits, vegetables and whole food is low. In general, the dietary intake detected in our sample, as well as the prevalence of excessive adiposity, were similar to those observed in other ACS patients who underwent dietary intervention<sup>31</sup>.

About the limitations of our study, we can mention the method used for dietary assessment (FFQ), which can reflect memory bias, may present difficulties in application depending

on the number and complexity of the foods list, has inaccurate quantification of the nutrients and does not estimate absolute consumption, since not all foods consumed by the individual may appear on the foods list; the cross-sectional design, which does not identify associations of causality; some data were collected from medical records or from patients' reports, not ruling out the possibility of admeasurements bias; we did not register the period of the diseases' diagnosis; dietary intake may be underestimated or overestimated – reflecting the flat slope syndrome; we did not carry out statistical methods for assessing intra and interpersonal variance to minimize possible errors related to the FFQ; and we do not control for major biases, as this is a descriptive study.

## CONCLUSION

In conclusion, we detected a low consumption of cardio-protective nutrients in our sample, and a high intake of nutrients whose excessive consumption is considered a risk for the development of CVD, such as SFA and sodium. Effective dietary interventions among these individuals are necessary, and nutritional education is an indispensable factor for the prevention and control of ACS associated diseases.

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**Conflict of interest:** The authors declare not to have.