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ORIGINAL ARTICLE

Nutritional profile of patients with type 2 Diabetes Mellitus in Ribeirão Preto family health units

Perfil nutricional de pacientes com Diabetes Mellitus tipo 2 em unidades de saúde da família de Ribeirão Preto

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ABSTRACT

Objective: To describe the nutritional profile and the metabolic control of type 2 diabetes mellitus patients in family health units of Ribeirão Preto.

Materials and Methods: This is a descriptive study, inquiry type, with patients registered in family health units of Ribeirão Preto – SP. The sample was 100 patients, being laboratory data assessed by means of medical records. The sociodemographic and clinical variables, as well as those related to the nutritional profile were obtained through home visits. Furthermore, anthropometric evaluation of the patients was performed. Body fat (%) was assessed by electric bioimpedance. The local Ethics and Research Committee approved this research.

Results: The average age of the patients was 66.7 years, 64 % female, predominantly white (78%), married (58%), and with an incomplete basic school level (56%). The self-reported morbidity with the greatest prevalence was systemic arterial hypertension (71%). Concerning the nutritional diagnostic, 75% of the patients were overweight or presented obesity. As regards to glycemic control, it was evidenced that 75 and 60% of the patients, respectively, were with fasting glycemia and glycated hemoglobin (Hb1Ac) values above the recommended. The odds ratio was used to verify the association between the biochemical variables and the fat mass. However, no significant association was found.

Conclusion: The majority of patients were overweight or had obesity and inadequate metabolic control.

Keywords: nutritional assessment; primary attention; diabetes mellitus.

RESUMO

Objetivo: *Descrever o perfil nutricional e o controle metabólico dos pacientes com Diabetes Mellitus, tipo 2 em unidades de saúde da família de Ribeirão Preto.*

Materiais e Métodos: *Trata-se de um estudo descritivo, tipo inquérito, realizado com pacientes cadastrados em unidades de saúde da família de Ribeirão Preto-SP. A amostra foi constituída por 100 participantes, sendo que os dados laboratoriais foram obtidos por meio de registros em prontuários médicos, e as variáveis sociodemograficas, clínicas, e às relacionadas ao perfil nutricional foram obtidas mediante entrevista domiciliar. Além disso, foi realizada a avaliação antropométrica dos pacientes. Para cálculo da massa de gordura corporal (%) foi utilizada a bioimpedância elétrica. Os dados foram digitados no software Epi Info™ 7 e analisados pelo programa estatístico Stata 9.0. O trabalho foi aprovado pelo Comitê de Ética e Pesquisa.*

Resultados: *A média de idade dos participantes foi de 66,7 anos, sendo 64% do sexo feminino, com predomínio de brancos (78%), casados (58%), com ensino fundamental incompleto (56%). A morbidade auto referida de maior prevalência foi a hipertensão arterial sistêmica (71%). Com relação ao diagnóstico nutricional, observou-se que 75% dos pacientes estavam com excesso de peso ou obesidade. No que se refere ao controle glicêmico, evidenciou-se que 75 e 60% dos pacientes, respectivamente, estavam com a glicemia de jejum e hemoglobina glicada (Hb1Ac) acima dos valores recomendados. Utilizou-se o odds ratio para verificar a associação entre as variáveis bioquímicas e a massa de fato. No entanto, nenhuma associação significativa foi encontrada.*

Conclusão: *A maioria dos pacientes estava com excesso de peso ou obesidade e controle metabólico inadequado.*

Palavras-chave: *avaliação nutricional; atenção primária; diabetes mellitus.*

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INTRODUCTION

Diabetes mellitus (DM) is a chronic disease that occurs when the pancreas is unable to produce insulin, or when the body can not make good use of the insulin it produces[1]. Type 2 DM is the most prevalent form of DM, which affects 90 to 95% of cases[2]. The prevalence of DM is increasing worldwide, and currently there are 415 million adults with diabetes and with an estimate of 642 million in 2040. This means that currently one in every eleven adults has a diagnosis of DM[1].

The factors that justify this increase in the prevalence of DM are: population growth and aging, urbanization, increasing prevalence of obesity, sedentary lifestyle and increased survival of patients with DM and lifestyle in general[3,4]. The World Health Organization (WHO) shows that the etiological factors related to the increased prevalence of obesity in the world are due to diets with high energy densities associated with a sedentary lifestyle[5].

Thus, the treatment of diabetes is to modify ones lifestyle and adhere to prescribed treatment regimens[6]. It is valid to point out that non-pharmacological treatment is an effective and essential measure to control DM at any stage of the disease, being able to control glucose levels, prevent complications and slow the onset of drug treatment[2]. This type of treatment includes the following strategies: education, lifestyle modification, increased physical activity, reorganization of eating habits, weight reduction and reduction or abandonment of some vices harmful to health, such as smoking and alcohol[7].

Adherence to pharmacological and non-pharmacological treatment becomes of great importance as DM is a costly disease, both for the affected individuals and their families, and for the health system, because of its chronic nature, its complications and the means to control the disease[8]. DM is an issue of growing public health so it is necessary to know the nutritional status of patients to implement effective interventions in this area. This study aimed to describe the nutritional profile and metabolic control of patients with DM2.

MATERIALS AND METHODS

This research is characterized as a descriptive study, inquiry type, conducted with 100 patients from four family health units (FHU) in Ribeirão Preto-SP. Users of both sexes were included, aged over 18 years, registered with and followed by the FHU, diagnosed with DM2, and being registered in the medical records with at least one result of Hb1AC and fasting glycemia over the past 12 months. The electrical bioimpedance equipment was not permitted to be used with patients who undertake dialysis, pregnant women, using pacemakers, receiving chemotherapy, and with dementia, so patients with any of these criteria were excluded from the study.

For identification of patients with DM the information system of primary care (ISPC) was used. Subsequently the medical records of patients, for the verification of blood glucose fasting and Hb1AC, was also used. Invitations to patients to participate in the study were made at home. A pre-test with five patients was performed in order to verify recruitment and research strategy, test instruments collection, check understanding of the respondent, and allow experience for the researcher in the management of these data collection instruments.

Unique and individual anthropometric measurements were performed. The following data were collected: weight (kg), height (cm), waist circumference (cm), hip circumference (cm), thigh circumference (cm) and neck (cm). To obtain the weight of the patients a *Plenna*® balance with a maximum capacity of 150 kg and 100 g division was used. The weigh-in was held with barefoot patients wearing light clothing. Height was measured on an *Altura Exata*® portable stadiometer for which the respondent remained barefoot, upright, arms hanging with hands flat on the thighs and looking towards the horizon.

With weight and height values, body mass index (BMI) was calculated by the formula BMI = weight (kg)/height^2 (cm), and thus adults were classified according to the WHO (1997) and the elderly according to the criteria of Lipschitz (1994)[9,10]. Waist circumference (WC) was measured using a flexible inelastic tape. To obtain this data the measurement in centimeters took place on the narrowest part of the trunk, between the iliac crest and the last rib, in centimeters. For WC cutoff the criterion of the National Cholesterol Education Program – NCEP (2001) was used, being represented by the following values: ≥102 cm for men and ≥88 cm for women[11].

The waist-hip relation (WHR) was calculated as the ratio of waist circumference and hip circumference. For men, risk increased when (WHR >1.0) and for women at increased risk (WHR> 0.85). The measurement of neck circumference (NC) was taken at the midpoint of the neck height using a flexible inelastic tape. For classification, the following criteria were used: for men <37 cm without risk of being overweight, ≥37 cm at risk of being overweight, and ≥39.5 cm may be associated with BMI greater than 30 kg/m^2; for women, <34 cm without risk of being overweight, ≥34 cm with the risk of being overweight and ≥36.5 cm may be associated with BMI (kg/m^2) greater than 30[12].

The assessment of body composition was performed by the bioelectrical impedance method using a *BIA*-

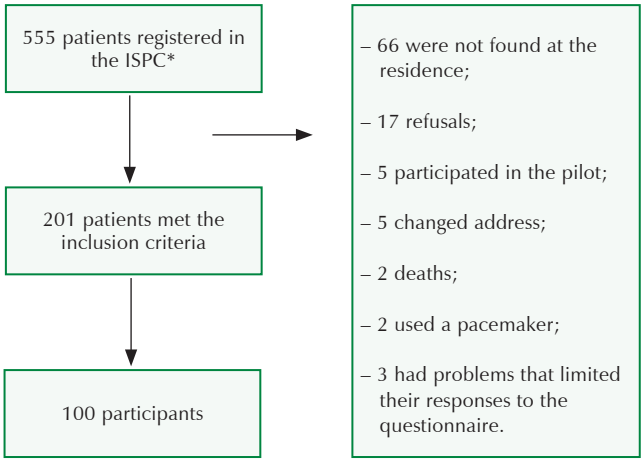
Biodynamics®, model 450, Body Composition Analyzer, Seatttle, *WA, USA*. The electrodes were placed on the hands and feet on the right side; one of the electrodes was fixed in the space between the index and middle fingers of the hand and the other on the wrist; on the feet, one of electrodes was positioned between the first and second toe and another in the anterior tibial region. The cutoff points for fat mass percentage were 25% for men and 35% for women[13].

The collected data were entered into Epi Info TM 7 software, which allowed classification of the investigated variables and descriptive analysis of these results. Statistical analyzes were performed using Stata 9.0 software. To perform this evaluation, the χ^2 and Fischer's exact tests were used to test associations between groups for categorical variables. To verify differences between continuous quantitative variables, the average test (Student t test) was used. Used the odds ratio to verify the association between the biochemical variables and the fat mass. However, no significant association was found.

The study was approved by the Ethics Committee of the FMRP-USP (CEP-CSE-FMRP-USP), whose approval protocol was No. 857,568.

RESULTS

A total of 555 patients were identified with DM2 in the ISPC, of which 201 met the inclusion criteria and 100 participants were included in the study (**Figure 1**). Regarding refusals (17), we observed that most (11) were female with a mean age 65.5 years.



* ISPC: Information System of Primary Care.

Figure 1. Flowchart of identifying patients with type 2 diabetes mellitus (n=100) followed up in the family health units in Ribeirão Preto-SP.

Of the 100 (100%) study participants, the age ranged from 42 to 92 years, with a mean of 66.7 years and a predominance of elderly subjects (70%), white (78%), female (64%), married (58%), retired (63%) and incomplete primary school education (56%). Regarding the guidelines received by health professionals, 98% reported having received guidance on the care with DM2. Professionals most mentioned by the participants were medical (91%), nurses (21%) and nutritionists (13%). Only 4, 2, 1 and 1%, respectively, cited pharmaceutical, physical educator, psychologist and physical therapy as professionals who advise on such care.

Comorbidities associated with DM2 most cited by participants were systemic arterial hypertension (SAH) (71%), dyslipidemia (63%), depression (14%) and kidney problems (5%). In addition, 56% of participants reported having other diseases, the most reported being: "thyroid problem" (n=9), "back problem" (n=8), fibromyalgia (n=5), glaucoma (n=4), cancer (n=2), osteoporosis (n=4) and arthritis (n=4).

The analysis of nutritional status according to BMI showed that 75% of adults and elderly individuals were overweight or obese. Among 30 adult patients, most of them were overweight or obese [(overweight (n=10), obesity I (n=10), obesity II (n=6) and obesity III (n=2)] and only 2 eutrophic adult patients. Regarding nutritional assessment of the elderly, it was observed that most present excess weight (n=47). The others were underweight (n=2) and eutrophic (n=21).

It was observed that women (34.2%) showed mean values of body fat (%) higher than men (25.2%) ($p<0.05$) (**Table 1**). Regarding WC, 41.7% of men had values that are associated with a risk of cardiovascular disease (>102 cm), while among women, the prevalence of WC measures above 88 cm was higher (75%) ($p<0.05$). The WHR presents differences between the sexes with the highest average among men, showing that the majority (63%) of the total study population is at risk of diseases associated with obesity, being 39% of men and 77.6% women.

With the evaluation of NC, it was observed that only 1% of respondents are at no risk of being overweight, while 34% are at risk of being overweight and 65% have NC values associated with BMI greater than 30 kg/m^2.

In relation to metabolic control, 75% of patients presented higher fasting glycemia above 100 mg/dL and 60% had Hb1Ac≥7. Of the 75 patients with fasting glycemia ≥100 mg/dL, the majority (60%) presented excess weight gain or obesity (**Table 2**). There is no association between the biochemical parameters and the percentage of fat mass (**Table 3**).

Table 1. Means and standard deviations of anthropometric variables and laboratory characteristics of patients with type 2 diabetes mellitus (n=100) in follow-up in family health units of Ribeirão Preto.

Variables	Men (n=36) Mean (SD)	Women (n=64) Mean (SD)	Total (n=100) Mean (SD)	*p**
Age (years)	67 (11.8)	66.5 (10.9)	66.7 (11.2)	0.4118
Weight	83.2 (17.2)	71.4 (12.1)	75.6 (15.2)	0.0001
Height	167.1 (7.8)	153.7 (6.5)	158.5 (9.5)	0.000
BMI	29.5 (5.3)	30.3 (4.8)	30.0 (4.9)	0.7657
Fat mass	25.2 (10.5)	34.2 (9.8)	31.0 (10.9)	0.000
Lean body mass	74.7 (10.7)	65.8 (9.8)	69.0 (10.9)	0.000
Waist circumfernce	100.5 (9.6)	94.5 (9.8)	96.7 (10.2)	0.0024
Hip circumference	101.3 (9.7)	106.4 (10.2)	104.6 (10.3)	0.0085
Thigh circumference	47.4 (5.0)	49.6 (5.5)	48.8 (5.5)	0.0259
Neck circumference	42.1 (3.1)	37.4 (2.6)	39.1 (3.6)	0.000
Waist/Hip	0.98 (0.05)	0.88 (0.07)	0.92 (0.8)	0.000
Neck/Thigh	0.87 (0.13)	0.76 (0.08)	0.80 (0.1)	0.000
Fasting glycemia	147.1 (55.7)	129.3 (48.7)	135.4 (51.7)	0.0445
HbA1c (%)	8.1 (1.7)	7.6 (2.0)	7.8 (1.9)	0.0837

*Mean comparison test for two independent populations (Student t test). BMI: body mass index; Hb1Ac: glycated hemoglobin.

Table 2. Fasting glycemia (mg/dL), according to the nutritional status of patients with type 2 diabetes mellitus (n=100) in follow-up in family health units of Ribeirão Preto.

Nutritional State	Fasting Glycemia		Total
	<100mg/dL	≥100mg/dL	
Malnourished or eutrophic	10	15	25
Excessive weight or obesity	15	60	75
Total	25	75	100

χ^2=14.0317; p=0.051.

Table 3. Odds ratio of variables laboratory characteristics and percentage of fat mass of patients with type 2 diabetes mellitus (n=100) in follow-up in family health units of Ribeirão Preto.

	Hb1Ac		OR	IC
	≥7%	<7%		
Percentage of fat mass elevated	38	26		
Percentage of fat mass adequate	22	14	0,93	0,36-2,31
	Fasting Glycemia		OR	IC
	<100 mg/dL	≥100 mg/dL		
Percentage of fat mass elevated	45	19		
Percentage of fat mass adequate	30	6	0,47	0,13-1,43

Hb1Ac: glycated hemoglobin; OR: odds ratio: IC: confidence interval.

DISCUSSION

The high frequency of elderly in this study can be justified by the clinical profile of DM2 which affects older individuals, because with increasing age there is progressive pancreatic beta-cell dysfunction[14]. Similar frequencies were found in other epidemiological studies on patients with DM2[15,16]. Because the majority of respondents are married, it is believed that eating habits are determined by a supposed routine, hindering the action of health professionals on the changes necessary to implement a food plan[17].

It was observed that most did not finish primary school education (56%), a result similar to the study of Jost and colleagues (2010), held in the city of Luzerna in the Brazilian state of Santa Catarina, which found 67% of patients with DM2 with incomplete elementary school[18]. According to Silva (2010), low education deserves attention when the achievement of good metabolic control of DM2 is required, as this factor can influence the understanding of the guidelines offered by health professionals, including the correct use of medicines and nutritional follow-up[19]. Data from VIGITEL (2014) show that in both sexes the frequency of DM decreased strongly with the highest level of education of respondents[20].

Even with the reduced proportion of patients who reported receiving guidance from a nutritionist (13%), it is valid to point out that Article 6 of Law No. 8080 of 1990 "provides nutritional counseling" to patients assisted by the public health system (PHS) [21]. The lack of such guidance can be justified by the lack of this professional in the four study units. Also noteworthy is that in a study conducted in Ribeirão Preto-SP of patients with DM, it was observed that most nutritional guidelines (96.5%) were performed by physicians[22].

In this context, it is important to emphasize the relevance of nutritional counseling in the treatment of patients with DM conducted by a nutritionist, because scientific evidence shows that nutritional monitoring favors glycemic control, causes a reduction in Hb1Ac levels, regardless of the type of DM and time diagnosis, and with this reduces costs to the health system[23-25].

Regarding the comorbidities associated with DM2, a study in southern Brazil with DM2 patients in a unit of primary health care, found a smaller proportion (27.1%) of patients who had DM and SAH concomitantly[26]. Currently SAH and DM2 are among the top five global risks for overall mortality[27]. Because these comorbidities can be avoided and controlled through healthy lifestyle habits, it is very important that health staff work in implementing actions that promote physical and healthy eating activities, in order to prevent micro and macrovascular complications related to DM2[28].

With regard to the nutritional status of the participants it is important to consider that being overweight and obesity are risk factors for the development of insulin resistance, which is the main feature of DM2[29]. This finding reinforces the need for prevention actions and control of DM2 in an interdisciplinary way, including professional nutritionists and fitness trainers as effective and permanent members of health teams. The nosological data related to the anthropometric profile of Brazilians also reinforces this need for interventions to improve lifestyle, as Brazil is among the countries with the highest prevalence of overweight people[20].

Studies show the positive association of increased fat mass (%) with the development DM2[30,31]. The fact that women present average fat mass (%) higher than men is in agreement with the literature, showing that women have a higher percentage of fat mass[13]. This is because for men about 3% body fat is considered essential while in women the essential fat is higher (12%). This statement is justified by the higher percentage of body fat in the breasts, pelvic region and thighs[31].

This is a result that resembles another study in which there was a higher prevalence of abdominal obesity among women[32]. WC is a common measure in nutritional evaluation studies in patients with DM2 that is used to assess abdominal fatness according to their association with non-communicable chronic diseases (NCD)[33-36]. Recent studies have found a positive association between abdominal obesity and DM2[37,31]. One reason for this high prevalence of individuals with increased WC in this study is that the majority (61%) of those here investigated have a sedentary lifestyle.

Regarding metabolic control, the results of this study corroborate the study by Sampaio & Figueiredo[38], in which the majority of respondents have high levels of both markers (fasting glycemia and Hb1Ac). These results show that the disease is not adequately controlled. In this regard, such patients require continued support from the perspective of education in DM, to achieve the targets set to control the disease.

However, it must be considered that when planning education in DM for this population, it is important that the health team takes into account the level of education and age of individuals, since 56% of them have only completed elementary school, and 70% are elderly. These characteristics require specific strategies to promote self-care and empowerment of patients.

It was observed that there was no association between the biochemical parameters and the percentual of fat mass. However, data from the literature show the relationship between fat deposition, mainly in the abdominal region, and the increase in insulin resistance [39]. A cohort study performed with patients with Diabetes Mellitus showed that nutritional therapy contributed to the better adaptation of the anthropometric and biochemical variables[40].

The present study shows that the vast majority of patients with DM2 are overweight and/or obese, and most have poor metabolic control. Faced with such evidence, there is a need to implement nutritional strategies to improve nutritional care and consequently provide better glycemic control of patients with DM2.

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