

# Nutritional counseling to individuals with diabetes *mellitus* in the Primary Health Care\*

## *Aconselhamento nutricional de indivíduos com diabetes mellitus na Atenção Primária à Saúde*

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### ABSTRACT

**Introduction:** Diabetes mellitus (DM) is a global public health problem, and nutritional counseling is one priority strategy to control this disease. **Objective:** to analyze the effectiveness of individual nutritional intervention in people with DM. **Method:** this was an intervention study with the before and after perspectives, for 12 months, including adults and elders with destabilized DM referred for nutritional counseling in the Basic Health Unit. The intervention, based on nutritional counseling, consisted of individual sessions with an interval of 30-50 days and was analyzed by anthropometric and food intake evolution. **Results:** 11 overweight patients were evaluated, most women with a high prevalence of nutritional inadequacies. After the intervention, a reduction per capita in sugar ( $p = 0.03$ ) and salt ( $p = 0.05$ ) consumption were observed. **Conclusion:** The nutritional intervention showed poor results. We suggest the implementation of new intervention studies that evaluate the cost-effectiveness of an educational instrument that could be commonly used throughout the health care team in order to achieve greater effectiveness.

**Key words:** Diabetes Mellitus; Counseling; Nutrition, Public Health; Primary Health Care; Health Personnel.

### RESUMO

**Introdução:** diabetes mellitus (DM) é problema de saúde pública mundial, sendo o aconselhamento nutricional uma das estratégias prioritárias para o seu controle. **Objetivo:** analisar a efetividade de intervenção nutricional individual em pessoas com DM. **Método:** estudo de intervenção do tipo antes e depois, durante 12 meses, com todos os adultos e idosos com DM desestabilizados encaminhados para acompanhamento nutricional na Unidade Básica de Saúde. A intervenção, pautada no aconselhamento nutricional, constou de atendimentos individuais com intervalo de 30-50 dias e foi analisada pela evolução antropométrica e do consumo alimentar. **Resultados:** avaliaram-se 11 pacientes com excesso de peso, a maioria mulheres, com elevadas prevalências de inadequações alimentares. Após a intervenção, houve redução do consumo per capita de açúcar ( $p=0,03$ ) e sal ( $p=0,05$ ). **Conclusão:** a intervenção nutricional apresentou resultados pouco expressivos. Sugere-se a realização de novos estudos de intervenção que avaliem o custo-efetividade de instrumento educativo de uso comum de toda a equipe de saúde, visando alcançar mais efetividade.

**Palavras-chave:** Diabetes Mellitus; Aconselhamento; Nutrição em Saúde Pública; Atenção Primária à Saúde; Pessoal da Saúde.

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## INTRODUCTION

Diabetes mellitus (DM) is a global public health problem and one of the main causes of morbidity and mortality. In Brazil, it is estimated that 11.3 million people will be diabetics in 2030.<sup>1</sup>

Lifestyle modifications such as suspending smoking and alcoholism, increasing physical activity, re-organizing eating habits and, if necessary, using medicines are highlighted among appropriate strategies to prevent and control DM.<sup>2,4</sup> The recommended eating strategy includes adequate consumption of fibers based on whole foods, grains, fruits, and vegetables and low consumption of sucrose and foods rich in fats.<sup>2,3</sup>

The implementation of counseling is suggested to enable these eating strategies as a process built on the dialogue between patient/group and health professional. Counseling can be influenced by factors such as the intensity and time of the intervention performed, limiting external factors – such as availability of food – and feasibility of replacing foods in the usual diet.<sup>5</sup>

Nutritional counseling assumes that the individual with DM must possess skills for self-care that enable disease control, adopting the proper nutrition that will reflect on improvement of their quality of life. Hence, the continuous and effective therapeutic support from health professionals is essential.<sup>6</sup>

However, despite that counseling provides a promising therapeutic intervention, few health professionals perform it.<sup>7</sup> Considering the importance of nutritional counseling for the control of DM and the difficulties from health professionals in performing it, this article aimed to analyze the effectiveness of individual nutritional interventions in the life of people with DM.

## METHODS

An intervention study of a before and after type was conducted for 12 months with all adults and elders referred to nutritional monitoring in a Basic Health Unit (UBS) in Belo Horizonte, Minas Gerais. These individuals were referred between October 2007 and December 2009 for presenting destabilized DM.

The instruments used for the baseline assessment and reassessment after 12 months consisted of: socio-economic data (occupation, age, monthly household income, and education); health data (morbidity and use of medicines); eating habits (number of daily meals; good chewing; “snacking” on food between

meals; eating watching television; per capita salt, sugar, and oil consumption; water, fruits, and vegetables intake; fat consumption from meat and chicken skin); food consumption (24 hours Feeding Recall and Feeding Frequency Questionnaire); and anthropometric data (weight, body mass index, waist circumference, and waist/hip ratio).<sup>8</sup> The biochemical data were not contemplated because of insufficient data recorded in the patients’ medical charts.

The data were obtained by nutritionists and scientific research students from the Nutrition School from the Federal University of Minas Gerais (UFMG) who were properly trained and worked under the supervision of the responsible researcher.

The individuals’ food consumption was evaluated through the 24 hours Feeding Recall (R24) and the Feeding Frequency Questionnaire (QFA). The QFA for the last six months consisted of a list of 29 foods. It was built based on the list of food obtained in the calibrated QFA for populations in the country side of Minas Gerais, revised based on the food obtained in the R24 analysis applied in nine Basic Health Units in Belo Horizonte, including the place of this study.<sup>9</sup>

The evaluation was conducted based on the consumption of calories and nutrients estimated from the R24 and as proposed by the Institute of Medicine.<sup>10</sup> The caloric adequacy considered nutritional status, gender, and level of physical activity.<sup>10</sup> The Brazilian Consensus recommendations for Diabetes were used for carbohydrates and lipids intake.<sup>4</sup> Data from the American Diabetes Association<sup>2</sup> were also used for protein, saturated fat, and cholesterol intake. The consumption of monounsaturated and polyunsaturated fats was evaluated using the World Health Organization recommendation (WHO).<sup>11</sup>

The adequacy of salt, sugar, water, and oil consumption adopted the guidelines proposed by the Food Guide for the Brazilian Population<sup>12</sup> and the recommendations proposed by ADA.<sup>2</sup>

The anthropometric measurements were taken according to the WHO recommendations<sup>13</sup> and included body mass index (BMI=weight/high m<sup>2</sup>), distinctly classified for adults<sup>13</sup> and elderlies.<sup>14</sup> The waist/hip ratio (RCQ=CC/circumference of the hip) was classified as recommended by the WHO.<sup>15</sup>

The intervention consisted of individual nutritional consultations carried out by Nutrition students and nutritionists, with intervals of 30 to 50 days, according to the needs of each patient. The average number of consultations held in the period of 12 months of follow-up was 8.8 ± 1.4.

The individualized counseling was based on the needs, eating habits, and health conditions of each patient. The counseling was made through verbal and written guidelines and the establishment of an agreement, between the professional and patient, for the proposition of a therapeutic plan. Three guidelines per consultation were provided at most in order to promote adherence. Illustrative guidelines were given to illiterate individuals in addition to verbal information. Ludic activities were conducted to enhance the understanding of the guidelines provided and the pathophysiological process of DM. Food plans created in accordance with the recommendations of the Institute of Medicine<sup>10</sup> were provided only when necessary, through the patient's wishes or difficulties to adhere to guidelines.

The nutritional counseling was regulated by the Food Guidelines for the Brazilian Population<sup>12</sup> and the Brazilian Society of Diabetes guidelines.<sup>3,4</sup>

Firstly, the guidelines provided to patients during the consultations were listed for the analysis of the nutritional counseling performance; secondly, the guidelines were grouped and analyzed according to their objectives.

A descriptive analysis and the Kolmogorov Smirnov normality test were conducted with variables with the normal distribution through average and standard deviation, and through median and minimum and maximum values for the other variables. The McNemar, Wilcoxon, and Wilcoxon statistical tests of signaled posts were used for the paired analysis.

The statistical analysis was performed with the aid of the Statistical Package for the Social Sciences (SPSS) for Windows (SPSS, Inc. Chicago, IL) software version 19.0. The significant level of 5% was considered in all tests.

This study was approved by the Ethics Committees from the Federal University of Minas Gerais (ETIC 32806) and Belo Horizonte City Hall (Protocol no: 0172007). All individuals were informed about the study and signed the Volunteer Informed Consent Term in accordance with Resolution 466/12 from the National Health Council.

## RESULTS

In the study period, 22 patients with diabetes mellitus were assisted by the Nutrition team in the UBS, however, 45.4% (n=10) abandoned the nutritional care and one individual had not completed one year of monitoring during the study, therefore, there were 11

analyzed patients. Most of them were women (90.9%), with low income and education level, and median age of 64.0 years old (54.1; 68.1). In addition to DM, 81.8% of patients reported having hypertension and 63.7% having dyslipidemia. All subjects reported using medicines; the most commonly used were antihypertensive and oral hypoglycemic medicines (Table 1).

**Table 1** - Sociodemographic and health profile of participants. Belo Horizonte, 2011

Variables	Total (n = 11)
<b>Gender (%)</b>	
<i>Female</i>	90.9
<i>Male</i>	9.1
<b>Age (years)</b>	
< 40 (%)	9.1
40-59 (%)	18.2
≥ 60 (%)	72.7
<b>Income per capita (\$)</b>	
	348.4 (205.6; 491.1)
<b>Years of study</b>	
	4.0 (1.6;7.5)
<b>Occupation (%)</b>	
	4.0 (1.6;7.5)
<i>Retired</i>	45.5
<i>Homemaker</i>	36.4
<i>Self-employed</i>	9.1
<i>Unemployed</i>	9.1
<b>Morbidity referred (%)</b>	
<i>Hypertension</i>	81.8
<i>Hypercholesterolemia</i>	36.4
<i>Hypertriglyceridemia</i>	27.3
<b>Use of medicines (%)</b>	
<i>Anti-hypertensives</i>	81.8
<i>Hypoglycemics</i>	45.5
<i>Insulin</i>	9.1
<i>Antidepressants</i>	-

All participants were overweight; 90.9% with very high risk for metabolic complications associated with obesity and 81.8% with the risk for developing cardiovascular diseases according to CC and RCQ, respectively (Table 2).

The analysis of baseline eating habits showed inadequacies such as high consumption of salt, sugar, and oil (Table 2) and low daily intake of greens (20%) and vegetables (15%). Fruits were consumed daily by 73.7%, and greens and vegetables by 20.0% and 15.0%, respectively. The daily consumption of milk was reported by 60.0% of patients with a median consumption of 135 mL/day (77.2; 321.7); the most consumed types were skimmed and whole milk (42.1% each).

**Table 2** - Evolution of nutritional status and dietary habits of the participants after nutritional intervention. Belo Horizonte, 2011

Variables	Baseline (n = 11)	12 months (n = 11)	p * value
Weight (kg)	80.6 (74.9; 84.9)	79.7 (74.9; 84.5)	0.93 <sup>1</sup>
Body mass index (kg/m <sup>2</sup> )	32.5 (30.8; 34.6)	32.7 (30.5; 34.7)	0.89 <sup>1</sup>
Overweight (%)	100.0	100.0	-
Waist circumference (cm)	99.7 (94.7; 106.4)	98.5 (93.6; 105.1)	0.22 <sup>1</sup>
Without risk	0.0	0.0	
High risk	9.1	9.1	1.00 <sup>2</sup>
Very high risk	90.9	90.9	
Waist/hip ratio	0.90 (0.87; 0.96)	0.91 (0.86; 0.94)	0.23
Without risk	18.2	18.2	
With risk	81.8	81.8	1.00 <sup>2</sup>
Number of daily meals	4.0 (3.8;5.3)	4.0 (3.6;4.8)	0.21 <sup>3</sup>
<i>Daily per capita consumption</i>			
Salt (g)	6.7 (3.8;16.1)	4.2 (3.2;5.2)	0.05 <sup>3</sup>
Oil (mL)	21.0 (14.1;50.7)	16.7 (12.1;31.1)	0.20 <sup>3</sup>
Sugar (g)	66.7 (34.3;95.1)	16.7 (2.9;62.9)	0.03 <sup>3</sup>
Water (mL)	750.0 (544.6;1573.5)	1500.0 (930.7;1712.9)	0.07 <sup>3</sup>
Daily servings fruits legumes, and vegetables	3.5 (2.8;5.1)	3.2 (2.7;3.9)	0.11 <sup>3</sup>
Fruits	1.0 (1.1;2.0)	1.0 (0.8; 1.9)	0.59 <sup>3</sup>
Vegetables	0.5 (0.4;1.5)	0.7 (0.6;1.0)	0.95 <sup>3</sup>
Legumes	1.5 (1.0;1.9)	1.0 (0.8;1.4)	0.13 <sup>3</sup>
<i>Chicken skin (%)</i>			
Prepared without skin	72.7	63.6	
Always remove	9.1	27.3	
Never remove	9.1	9.1	0.34 <sup>3</sup>
Sometimes remove	9.1	0.0	
<i>Apparent meat fat (%)</i>			
Do not eat meat with fat	27.3	36.4	
Always remove	63.6	45.5	
Never remove	9.1	9.1	0.45 <sup>3</sup>
Do not eat meat	0.0	9.1	

\* Compared with the baseline. <sup>1</sup> Wilcoxon Test; <sup>2</sup> McNemar Test; <sup>3</sup> Wilcoxon signaled posts teste.

The sugar-rich foods most commonly consumed daily were pastries (10.0%) and regular soft drinks (10.0%). Sweeteners were consumed daily by 75.0% of the patients; low consumption of diet/zero/light soft drinks was reported (60.0% never or rarely consume them).

The analysis of calories and nutrients intake adequacy (Table 3) identified a high prevalence of an excessive consumption of calories (45.0%), lipids (45.0), saturated (40.0%) and polyunsaturated fatty acids (50.0%), and sodium (70.6%); and high prevalence of insufficient intake of calories (40.0%), proteins (24.0%), monounsaturated (60.0%) and polyunsaturated fatty acids (35.0%), calcium (90%), zinc (50.0%), vitamin A (45.0%), D (85.0%) and C (80%), and fibers (75%).

The most frequent guidelines provided during nutritional counseling were related to the number of daily meals, increase in the consumption of vegetables, reduction in sugar-rich and complex carbohydrates foods, decrease in the consumption of oil and fatty foods, increase in water intake, and preferential consumption of sugar-free foods: zero, light, or diet.

The analysis of the evolution of individuals after 12 months identified statistically significant reductions per capita in sugar ( $p=0.03$ ) and salt consumption in the limit of significance ( $p=0.05$ ). The other variables did not show significant variations (Tables 2 and 3).

**Table 3** - Evolution in the consumption of calories and nutrients in the participants according to the nutritional intervention. Belo Horizonte, 2011

Nutrients	Baseline (n = 11)	12 months (n = 11)	p * value
Calories (kcal)	1.621.0 (1173.7;2639.3)	1.444.0 (1211.2;2060.7)	0.79
Proteins (%)	11.8 (8.7;15.7)	15.0 (12.6;18.8)	0.08
Carbohydrates (%)	52.5 (47.6;61.7)	50.6 (44.8;57.7)	0.53
Lipids (%)	33.2 (27.4;38.8)	34.6 (27.7;38.5)	1.00
AGS (%)	7.8 (6.1;11.1)	7.7 (7.1;11.0)	0.72
AGM (%)	8.2 (6.7;10.6)	7.4 (6.7;10.1)	0.72
AGP (%)	10.9 (6.8;13.6)	9.1 (7.8;12.9)	0.93
Cholesterol (mg)	115.0 (65.2;335.6)	155.4 (87.7;391.8)	0.37
Calcium (mg)	332.8 (199.6;702.9)	348.8 (224.4;734.9)	0.93
Sodium (g)	3.2 (2.4;5.1)	2.6 (2.0;3.6)	0.24
Iron (mg)	5.8 (4.0;8.7)	5.6 (3.4;9.5)	0.42
Zinc (mg)	5.5 (3.7;8.6)	6.3 (4.6;9.3)	0.29
Vitamin A (mcg)	427.5 (225.4;1207.1)	312.2 (108.5;1791.1)	1.00
Vitamin D (mcg)	2.8 (2.5;15.4)	2.2 (0.7;4.3)	0.52
Vitamin E (mg)	21.6 (16.2;41.8)	22.8 (16.5;144.6)	0.79
Vitamin C (mg)	36.3 (22.6;86.6)	34.6 (19.6;92.8)	0.86
Vitamin B12 (mcg)	1.8 (0.5;9.9)	1.7 (0.7;2.1)	0.20
Fiber (g)	12.6 (7.8;22.4)	14.9 (9.0;21.1)	0.66

Note: AGS: Saturated Fatty Acids, AGM: Monounsaturated Fatty Acids, AGP: Polyunsaturated Fatty Acids.

\* Compared to baseline data. Wilcoxon Test.

## DISCUSSION

Individual nutritional counseling showed modest evolution of eating habits in DM patients with little expression on the identified ample prevalence of inadequacy of eating habits and nutritional status.

The reduction in sugar intake was an important strategy for a better control of DM and weight among the participants. The amount and type of carbohydrates consumed are relevant for the postprandial blood glucose control and, consequently, to prevent the development of complications from DM decompensation.<sup>2</sup>

The observed reduction in salt intake, though within the limit of significance, represents a possible contribution to patients that also suffer from hypertension. Furthermore, less consumption of sodium becomes more important due to the risk of development of cardiovascular diseases.<sup>3</sup>

The maintenance of reduced consumption of fruits and vegetables (FLV), less than what is recommended, is highlighted.<sup>12</sup> In general, the regular intake (five or more times per week) of these foods is also insufficient among Brazilians (29.8%).<sup>16</sup> However, this reduced consumption by DM patients and, con-

sequently, of fibers, could contribute to worsening the control of DM and weight.

In relation to calorie intake, most of the individuals stated insufficient calorie consumption. Considering that the positive energy balance is among the etiological factors of the overweight condition, it is assumed that the low caloric intake observed at 12 months of nutritional intervention could be related to underreported food intake because there was no weight reduction in the analyzed period. It should be noted that this underestimation is especially common among the obese or overweight, especially women, who were the main clientele in this study.<sup>17</sup>

The difficulties encountered in this study to verify significant reductions in weight and BMI in order to better control DM are also found in other studies. Torres et al. (2011)<sup>6</sup> aimed to evaluate educational activities in promoting self-management in DM care by following up 27 individuals with DM type 2 for four months and observed significant increase in weight and BMI and non-significant reduction of glycated hemoglobin values.

This low impact from interventions can be related to difficulties related to characteristics of participants and their adherence as well as the involvement of a multi-

disciplinary team in the assistance offered. Thus, other studies should investigate the causes of non-adherence, aiming at providing more effective interventions.

In this study, most participants were women and elderly (>60 years old) with low level of education. Age and low level of education may limit the understanding of the guidelines received from health professionals, hampering self-care and, consequently, the control of the disease.<sup>18</sup>

Adherence has been highlighted among the main limitations for the control of chronic diseases; especially DM.<sup>11</sup> Lifestyle changes are very difficult for most people, especially when it comes to changes in eating habits. In particular, people with DM, who must take several lifelong decisions to control their disease, may have difficulties to adhere to treatment and self-care.<sup>19</sup> Thus, it is important that interventions for the control of DM be agreed between subject and professionals in order to seek viable alternatives.

It should be noted that the insufficient integration between the family health and nutrition teams in this study may have also contributed to a fragmented health care. Additionally, the absence of a common instrument to everyone to guide and strength nutritional guidelines provided by different members of the team have also been a limiting factor for successful interventions.

Considering these difficulties faced in the intervention and the need to expand the participation of the subject in his self-care for DM control,<sup>6</sup> studies that evaluate the cost-effectiveness of interventions using educational tools containing simple guidelines are suggested, directed to professionals and individuals with DM, constructed from the nutritional recommendations proposed for its care<sup>2,4,20</sup> as proposed by the Brochures of Basic Care – Strategies for the Care of Persons with Chronic Diseases - diabetes mellitus from the Ministry of Health.<sup>20</sup> The use of educational instruments aiming to self-care in DM could facilitate the completion of counseling by health professionals and guide on eating habits for individuals with DM since the completion of counseling exclusively by the nutrition team, through individualized guidance, had few effects on the health of these individuals. It is expected that teamwork will promote a common language among different professionals, providing understanding and strengthening guidelines and consequent adherence by users.

The insufficiency of data in the medical charts did not allow the use of biochemical parameters such as

blood glucose and glyco-hemoglobin to verify the improvement in glycemic control through the reduction of sugar intake. This was an important limitation considering that only 54.6% were using pharmacological treatment and were referred because of inadequate control of DM. This situation suggests that most of the participants expressed some difficulty to adhere to the therapy or had received their diagnoses recently.

The use of only one 24 hours Feeding Recall to evaluate nutrient consumption was also limiting, however, it enables feasible use in the daily life of a health service. In addition, the QFA was used to corroborate its results.

The importance of implementing more effective means to prevent complications associated with DM in APS is highlighted in order to achieve better quality of life for individuals and reduce costs related to the disease, particularly nutritional counseling.<sup>5</sup> However, the insufficient repercussion of the counselling performed on the anthropometric measurements of participants and eating habits was observed, demonstrating the need to improve nutritional counseling.

## CONCLUSION

This study observed insufficient influence of individual nutritional counseling on the promotion of healthy eating habits in individuals with DM and overweight condition, followed up at APS. These results reveal the need for new studies conducting interdisciplinary nutritional counselling in health services and using appropriate educational instruments to achieve more effectiveness.

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