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## Original article

# Food intake assessment and quality of life in women with fibromyalgia<sup>☆</sup>



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## ABSTRACT

**Objective:** To compare the food intake of women with and without fibromyalgia and verify if the food intake of patients with fibromyalgia interferes with the pain and quality of life.

**Methods:** Study participants were women with fibromyalgia (FM) seen in Fibromyalgia Out-patient Clinic, Hospital das Clínicas/UFPR and a control group (CT) with healthy women. Data collection was conducted from March to October 2012. For the assessment of food intake we used the Food Registration and the analyzed items were total calories, carbohydrates, proteins, lipids, vitamins (A, C, B12, D and E) and minerals (folate, selenium, zinc, iron, calcium and magnesium). The software used was Avanutri Online<sup>®</sup>. To evaluate the quality of life, the Fibromyalgia Impact Questionnaire (FIQ) and pain threshold were used.

**Results:** 43 patients with FM and 44 healthy women were evaluated. CT group showed a mean consumption of nutrients greater than FM group except for iron. However, only caloric intake, carbohydrates, proteins and lipids in grams and percentage of lipids, vitamin A, E, B12, folate, selenium and calcium were statistically significant. In FM group, there was a negative correlation between vitamin E and FIQ and a positive correlation between percentage of protein and pain threshold.

**Conclusion:** Women with FM showed a lower qualitative and quantitative intake in comparison with CT group. Only vitamin E correlated with quality of life and percentage of protein in the diet with sensation of pain.

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## Avaliação da ingestão alimentar e qualidade de vida de mulheres com fibromialgia

### R E S U M O

#### Palavras-chave:

Fibromialgia  
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**Objetivo:** Comparar a ingestão alimentar de mulheres com e sem fibromialgia e verificar se a ingestão alimentar das pacientes com fibromialgia interfere na sensação de dor e qualidade de vida.

**Métodos:** Participaram do estudo mulheres com fibromialgia (FM) atendidas no Ambulatório de Fibromialgia do Hospital de Clínicas/UFPR e para o grupo controle (CT) foram convidadas mulheres saudáveis. A coleta de dados foi feita de março a outubro de 2012. Para a avaliação do consumo alimentar foi usado o Registro Alimentar e os itens analisados foram: calorias totais, carboidratos, proteínas, lipídeos, vitaminas (A, C, B12, D e E) e minerais (folato, selênio, zinco, cálcio, ferro e magnésio). O *software* usado foi o Avanutri Online®. Para avaliação da qualidade de vida foi usado o Questionário de Impacto da Fibromialgia (FIQ) e limiar doloroso.

**Resultados:** Foram avaliadas 43 pacientes com FM e 44 mulheres saudáveis. O grupo CT apresentou consumo médio de nutrientes superior ao grupo FM, com exceção para o ferro. Entretanto, somente a ingestão calórica, carboidratos, proteínas e lipídeos em gramas, porcentagem de lipídios, vitamina A, E, B12, folato, selênio e cálcio foram estatisticamente significativas. No grupo FM houve correlação negativa entre vitamina E e FIQ e correlação positiva entre porcentagem de proteína e limiar doloroso.

**Conclusão:** As mulheres com FM apresentaram ingestão qualitativamente e quantitativamente inferior ao grupo CT. Somente a vitamina E apresentou correlação com a qualidade de vida e a porcentagem de proteína na dieta com a sensação de dor.

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## Introduction

Fibromyalgia (FM) is one of the most frequent rheumatic diseases. In Brazil, FM affects about 2–3% of the population, usually appear between 30 and 35 years of age and is more common among women.<sup>1,2</sup> According to the classification criteria of the American College of Rheumatology, the definition of this syndrome uses two variables: Bilateral pain above and below the waist plus axial pain and a widespread chronic pain over three months' duration, and pain on palpation of at least 11 of 18 specific sites in the body, known as tender points.<sup>3</sup>

Together with the pain, these patients often have a decrease in their quality of life due to symptoms such as sleep disturbances, fatigue, morning stiffness, subjective sense of accumulation of body fluids, extremity paresthesias, depression, headache, dizziness and bowel disorders.<sup>1,2</sup>

Although its etiology and pathogenesis are not known, evidence suggests that some individuals may have a genetic predisposition to this disease when exposed to certain environmental factors. Studies suggest involvement of the hypothalamus–pituitary–adrenal axis and the autonomic nervous system in response to stress in patients showing vulnerability for this disease, or its symptoms.<sup>4–6</sup>

The eating habits of these patients are important, the reason for which studies have shown improvement in symptoms of the disease with a balanced and healthy diet.<sup>7–10</sup>

Vegetarian diets appear to alleviate some symptoms of FM, and this may be due to their low fat and protein content, high levels of fiber, vitamin C, beta carotene, minerals (magnesium,

potassium, zinc, selenium) and antioxidants.<sup>8</sup> According to the Brazilian Society of Rheumatology, care must be taken with nutrition in FM patients, for instance, reducing the consumption of sugar, salt, fat and alcohol and increasing the intake of fiber, fruits, vegetables and fluids in order to avoid the appearance of other chronic diseases and of overweight.<sup>9</sup> Specific micronutrients such as calcium (Ca) and magnesium (Mg) are important in muscle contractions, for helping to produce muscle spasms and nerve impulses. Evidence shows that increasing intake of food sources of tryptophan can be beneficial, because this amino acid plays a role in serotonin synthesis.<sup>10</sup>

The strategy for the treatment of fibromyalgia requires a multidisciplinary approach, with or without pharmacological treatment.

The aim of this study is to compare the food intake of women with and without fibromyalgia and verify if the food intake of fibromyalgia patients interferes with their perception of pain and with quality of life.

## Patients and methods

This is an analytical, cross-sectional, observational study. The project was approved by the Human Research Ethics Committee of Hospital das Clínicas, Universidade Federal do Paraná (CEP-HC/UFPR). Female patients diagnosed with fibromyalgia seen in the Fibromyalgia Outpatient Clinic, Hospital das Clínicas/UFPR, aged between 18 and 60 years, were recruited for this study. For the control group (CT), healthy women in

the same age group were invited. All women in the study signed an Informed Consent Form. The exclusion criteria in the study were medication change in the last four weeks, use of corticosteroids and vitamin supplements, unbalanced hypothyroidism, being pregnant or breastfeeding, illiterate women, and food registration not filled. Data collection took place between March and October 2012.

For the assessment of food consumption, a Food Registry was used. Each volunteer was instructed to register three non-consecutive days of dieting (two weekdays and one weekend day) and should include detailed foods or preparations. Later the data were tabulated in the Avanutri Online® software and the mean 3-day intake was adjusted to reduce intrapersonal and interpersonal variation. The items examined were total calories, carbohydrates, proteins, lipids, vitamins (A, C, B12, D and E) and minerals (folate, selenium, zinc, iron, calcium and magnesium). To assess the adequacy of macronutrients (carbohydrates, proteins and lipids), AMDR (Acceptable Macronutrient Distribution Range)<sup>11</sup> was used as the base; for vitamins and minerals, EAR (Estimated Average Requirements) was used.<sup>12,13</sup>

To analyze the subjects' quality of life, the participants completed the Fibromyalgia Impact Questionnaire (FIQ).<sup>14</sup> FIQ assesses how much the disease interferes with day-to-day activities through a score from 0 to 100. Thus, the closer to 100, the greater the impact of the disease on quality of life.

To measure pain threshold, the Fisher algometer, a device that determines the intensity of pressure on a particular area, was used. In this study, the area used to check the intensity of pain endured by the subject was the right trapezius muscle. The measurements were performed in triplicate by the same examiner.

The nutritional status of the study participants was measured using the Body Mass Index (BMI), according to the World Health Organization (WHO 1998).<sup>15</sup> To calculate the height, we used a Tonelli & Gomes stadiometer. Body weight was measured with the participants wearing the minimum amount of clothes on a portable digital scale with a maximum capacity of 150 kg.

For statistical analysis, the Mann-Whitney *U* test was used to detect differences between means of non-parametric data, and Spearman correlation was applied for non-parametric data. R software version 2.11.1 (2010-5-31) Statgraphics Centurion and SPSS Statistics 17.0 were used in the statistical analysis. The level of significance was set at  $p < 0.05$ .

## Results

103 women were evaluated in this study; of this total, 16 were excluded for lack of data on their Food Register. The final sample consisted of 43 patients with fibromyalgia and 44 controls. Age and BMI were similar in both groups, while pain threshold, FIQ and calorie intake were significantly different (Table 1).

The proper distribution of macronutrients in the diet of FM patients was 88.37% ( $n = 38$ ) for carbohydrates (CHO), 97.67% ( $n = 42$ ) for proteins (PTN), and 74.42% ( $n = 32$ ) for lipids (LIP). On the other hand, in control group, 86.36% ( $n = 38$ ) of patients exhibited a suitable distribution of CHO, 100% ( $n = 44$ ) of PTN, and 79.55% ( $n = 35$ ) of LIP. In FM group, inadequate intake of micronutrients was present in over 65% of patients, except for consumption of iron and selenium, with 100% of adequacy. In CT group, the micronutrients that showed the highest percentage of adequacy were selenium with 100% and iron with 77.27%. Folate intake was inappropriate in 100% and the other micronutrients presented low intake percentages of adequacy (Table 2).

When CHO, PTN and LIP intake (in g) was compared between FM versus CT group, a statistical difference was noted. However, when the percentage of adequacy of these same nutrients was compared, only LIP showed difference (Table 3).

As for micronutrient intake, CT group showed an adjusted mean intake higher than FM group, except for iron. Vitamin A, E, B12, folate, selenium, calcium and iron intakes showed a statistically significant difference (Table 4).

In the correlations of FIQ and pain threshold versus nutrient intake in FM group, it was observed that vitamin E showed a moderate and negative correlation with FIQ, and %PTN presented a moderate and positive correlation with pain threshold (Table 5).

## Discussion

FM and CT groups showed no statistical difference in the variables age and BMI, revealing homogeneity. As expected, FIQ and pain threshold values were different, but the control group food intake was higher with respect to calories.

FM group had a lower adjusted mean intake of macronutrients (in grams), vitamins and minerals versus CT subjects, with the exception of iron. However, vitamin A, E, B12, folate, selenium and calcium intakes were statistically significant. The

**Table 1 – Sample characterization.**

	FM (n=43) Mean ± SD	CT (n=44) Mean ± SD	p-Value
Age	49 ± 7.92	46.8 ± 10.36	0.4911
BMI (kg/m <sup>2</sup> )	26.96 ± 4.64	25.72 ± 3.76	0.1841
Pain threshold (kg/cm <sup>2</sup> )	2.87 ± 0.76	5.33 ± 1.65	<0.0001 <sup>a</sup>
FIQ (0–100)	69.12 ± 18.85	8.63 ± 10.78	<0.0001 <sup>a</sup>
kcal	1442.5 ± 409	1752 ± 451.1	0.0024 <sup>a</sup>

FM, fibromyalgia group; CT, control group; SD, standard deviation; BMI, Body Mass Index; FIQ, Fibromyalgia Impact Questionnaire; p-value, value of the probability associated with the tested statistics.

<sup>a</sup> Statistically significant difference ( $p < 0.05$ ) between FM and CT groups with Mann-Whitney test.

**Table 2 – The adequacy of food intake of fibromyalgia patients and controls.**

Intake	Reference value	FM		CT	
		Suitable % (n)	Inadequate % (n)	Suitable % (n)	Inadequate % (n)
CHO (%)	45–65	88.37 (38)	11.63 (5)	86.36 (38)	13.64 (6)
PTN (%)	10–35	97.67 (42)	2.33 (1)	100 (44)	–
LIP (%)	20–35	74.42 (32)	25.58 (11)	79.55 (35)	20.45 (9)
Vitamin A (µg/d)	500	13.95 (6)	86.05 (37)	29.55 (13)	70.45 (31)
Vitamin C (mg/d)	60	23.26 (10)	76.74 (33)	45.45 (20)	54.55 (24)
Vitamin D (µg/d)	10	–	100 (43)	2.27 (1)	97.73 (43)
Vitamin E (mg/d)	12	9.3 (4)	90.7 (39)	2.27 (1)	97.73 (43)
Vitamin B12 (µg/d)	2	30.23 (13)	69.77 (30)	47.73 (21)	52.27 (23)
Folate (µg/d)	320	–	100 (43)	–	100 (44)
Selenium (µg/d)	45	100 (43)	–	100 (44)	–
Zinc (mg/d)	6.8	32.56 (14)	67.44 (29)	29.54 (13)	70.46 (31)
Calcium (mg/d)	800/1000 <sup>a</sup>	2.33 (1)	97.67 (42)	4.55 (2)	95.45 (42)
Iron (mg/d)	8.1/5 <sup>b</sup>	100 (43)	–	77.27 (34)	22.73 (10)
Magnesium (mg/dl)	255/265 <sup>c</sup>	–	100 (43)	2.27 (1)	97.73 (43)

FM, fibromyalgia group; CT, control group; %CHO, carbohydrate intake percentage; PTN%, protein intake percentage; LIP%, lipid intake percentage; n, number of patients.

<sup>a</sup> 19–50 years: 800 mg/d and >51 years: 1000 mg/d.

<sup>b</sup> 19–50 years: 8.1 mg/d and >51 years: 5 mg/d.

<sup>c</sup> 19–30 years: 255 mg/d and >31 years: 265 mg/d.

**Table 3 – Macronutrient food intake in fibromyalgia and control groups.**

	AMDR	FM (n = 43) Mean ± SD	CT (n = 44) Mean ± SD	p-Value
Carbohydrates (g)	–	191.79 ± 62.05	226.48 ± 65.06	0.0152 <sup>a</sup>
Carbohydrates (%)	45–65	52.95 ± 6.33	51.72 ± 5.56	0.4474
Proteins (g)	–	58.57 ± 18.97	68.5 ± 17.9	0.0102 <sup>a</sup>
Proteins (%)	10–35	16.5 ± 3.57	15.87 ± 3.2	0.2136
Lipids (g)	–	45.78 ± 17.28	61.05 ± 20.45	0.0007 <sup>a</sup>
Lipids (%)	20–35	28.15 ± 5.69	31.01 ± 4.96	0.0214 <sup>a</sup>

FM, fibromyalgia group; CT, control group; SD, standard deviation; AMDR, Acceptable Macronutrient Distribution Ranges; p-value, value of the probability associated with the tested statistics.

<sup>a</sup> Statistically significant difference ( $p < 0.05$ ) between FM and CT groups with Mann–Whitney test.

**Table 4 – Micronutrient food intake in fibromyalgia and control groups.**

	EAR	FM (n = 43) Mean ± SD	CT (n = 44) Mean ± SD	p-Value
Vitamin A (µg/d)	500	302.7 ± 231.29	446.14 ± 274.03	0.0021 <sup>a</sup>
Vitamin C (mg/d)	60	49.47 ± 29.27	66.9 ± 51.73	0.2571
Vitamin D (µg/d)	10	1.78 ± 1.65	2.04 ± 1.98	0.4348
Vitamin E (mg/d)	12	6.58 ± 3.83	10.29 ± 0.87	<0.0001 <sup>a</sup>
Vitamin B12 (µg/d)	2	1.96 ± 2.2	2.4 ± 1.85	0.0359 <sup>a</sup>
Folate (µg/d)	320	83.29 ± 55.27	101.27 ± 0.05	0.0015 <sup>a</sup>
Selenium (µg/d)	45	48.46 ± 0.07	51.97 ± 0.09	<0.0001 <sup>a</sup>
Zinc (mg/d)	6.8	5.67 ± 2.59	5.75 ± 2.36	0.8221
Calcium (mg/d)	800/1000 <sup>b</sup>	404.13 ± 235.53	510.87 ± 210.2	0.0428 <sup>a</sup>
Iron (mg/d)	8.1/5 <sup>c</sup>	11.64 ± 0.23	9.52 ± 3.78	<0.0001 <sup>a</sup>
Magnesium (mg/dl)	255/265 <sup>d</sup>	135.84 ± 58.87	149.86 ± 49.9	0.1712

FM, fibromyalgia group; CT, control group; SD, standard deviation; EAR, Estimated Average Requirement; p-value, value of the probability associated with the tested statistics.

<sup>a</sup> Statistically significant difference ( $p < 0.05$ ) between FM and CT groups with Mann–Whitney test.

<sup>b</sup> 19–50 years: 800 mg/d and >51 years: 1000 mg/d.

<sup>c</sup> 19–50 years: 8.1 mg/d and >51 years: 5 mg/d.

<sup>d</sup> 19–30 years: 255 mg/d and >31 years: 265 mg/d.

**Table 5 – Relationship among food intake, FIQ and pain threshold in FM group.**

	FIQ		Pain threshold	
	r	p-Value	r	p-Value
Kcal	-0.032	0.837	-0.171	0.273
PTN (g)	-0.005	0.976	0.180	0.247
PTN (%)	0.129	0.410	0.358	0.018 <sup>a</sup>
CHO (g)	-0.122	0.437	-0.247	0.111
CHO (%)	-0.166	0.287	-0.147	0.345
LIP (g)	-0.063	0.688	-0.126	0.421
LIP (%)	-0.104	0.506	-0.019	0.901
Vitamin A (µg/d)	-0.131	0.403	-0.005	0.975
Vitamin C (mg/d)	0.189	0.224	-0.160	0.305
Vitamin D (µg/d)	0.05	0.749	0.106	0.498
Vitamin E (mg/d)	-0.303	0.048 <sup>a</sup>	0.198	0.203
Vitamin B12 (µg/d)	0.253	0.102	-0.025	0.875
Folate (µg/d)	0.018	0.910	0.159	0.310
Selenium (µg/d)	-0.068	0.665	-0.187	0.229
Zinc (mg/d)	0.176	0.260	0.159	0.310
Calcium (mg/d)	-0.085	0.587	0.200	0.200
Iron (mg/d)	0.191	0.221	0.064	0.685
Magnesium (mg/dl)	0.207	0.183	0.185	0.236

FIQ, *Fibromyalgia Impact Questionnaire*; PT, pain threshold; r, correlation coefficient; p-value, value of the probability associated with the tested statistics.

<sup>a</sup> Statistically significant difference ( $p < 0.05$ ), with Spearman correlation.

results indicate that FM patients presented qualitatively and quantitatively lower intakes *versus* CT subjects.

The combination of the antioxidants found in vitamins and minerals with analgesic agents can reduce the doses of these drugs and consequently improve the sensation of pain of FM patients. It was also demonstrated that antioxidants are critical in reducing the oxidative stress induced by FM.<sup>16</sup> Based on this study, it was noted that a proper nutritional guidance for these patients can decrease the symptoms of the disease.

In most of the FM subjects, an inadequate ingestion of vitamin C was observed. Richard et al.<sup>16</sup> showed that the prolonged use of analgesics can increase the excretion of vitamin C and potassium, causing, as a result, iron deficiency anemia. Women with FM exhibited an adequate intake of iron, and the presence of anemia was not assessed in this study. Maintaining a healthy and balanced diet with vitamins and minerals is important to minimize future deficiency in their blood levels.

When pain threshold and FIQ were related to food intake of FM patients, vitamin E showed a moderate and negative correlation with FIQ, indicating that the higher the intake of this vitamin, the better would be the quality of life. Studies show that antioxidant-rich diets improve the symptoms of FM by promoting vasodilation. Katz et al.<sup>17</sup> explain that the pain in FM might occur due to vasomotor dysregulation, which in turn causes muscle hypoperfusion.

In the study by Sakarya et al.,<sup>18</sup> the authors evaluated blood levels of antioxidant vitamins and magnesium and correlated with clinical parameters of FM. The authors found no correlation between vitamins A, C, E and Mg levels, number of tender points, pain severity, functional ability and depression in patients with FM. The results suggest that poor intake of these nutrients do not necessarily signify low blood levels.

%PTN in the nutrition of FM women had a moderate and positive correlation with pain threshold, showing that the

higher the protein percentage, the greater the tolerance to pain. Patients with FM showed PTN intake within AMDR recommendations, and arguably if this percentage were outside normal range, the result would not be the same. The study by Shiavon and Portero<sup>19</sup> evaluated protein origin, concluding that the lower consumption of animal protein and the higher consumption of vegetable protein, associated with the consumption of fruits, vegetables and legumes, provide a healthier state to body tissues. But our study did not assess the ingested PTN quality; thus, it was not possible to check if the intake of PTN of different origins would interfere differently in pain threshold.

A relationship between food intake and pain was also found in the study by Bell et al.<sup>20</sup>; these authors found that folate and vitamin B12 are essential for regulation of central nervous system, and that their deficiency results in peripheral neuropathy pain. While vitamin C deficiency can cause myalgia and bone pain, vitamin D deficiency can cause musculoskeletal pain.

Although the relationship of the other studied nutrients in improving the quality of life and pain sensitivity has already been established, in our study, we could not verify any statistical correlation, possibly due to the small sample size or because of a highly inadequate intake of several micronutrients.

FM is a chronic disease that manifests itself differently from person to person, affecting the quality of life of patients thanks to physical and psychological symptoms. The pharmacological treatment alone is inadequate for most patients; thus, multidisciplinary approaches have been used in clinical practice. Studies have shown that the combination of moderate physical activity and supplementation/intake of antioxidants may be beneficial, because this combination plays a role in modulating oxidative stress.<sup>1,21,22</sup>

## Conclusion

Women with FM exhibited a qualitatively and quantitatively lower intake versus CT subjects. Vitamin E showed a moderate and negative correlation with quality of life and with percentage of protein in the diet, and a moderate and positive correlation with pain threshold. These results show the importance of a proper and healthy nutrition to improve FM symptoms. More studies are needed to determine the potential association between clinical parameters of FM and macronutrient and micronutrient intake.

## Conflicts of interest

The authors declare no conflicts of interest.

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