Dietary habits in patients with fibromyalgia: a cross-sectional study

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Received on May 28, 2021; accepted in revised form on June 9, 2021.

Clin Exp Rheumatol 2021; 39 (Suppl. 130): S170-S173.

Key words: fibromyalgia, rheumatoid arthritis, diet, dietary habits, nutrition

Competing interests: none declared.

ABSTRACT

Objective. *To the scarce information on dietary habits in fibromyalgia (FM), it is added that there are no comparative studies with other rheumatic diseases. The objective of this study was to characterise the dietary habits of patients with FM by comparing, for the first time, with healthy controls (HC) and rheumatoid arthritis (RA).*

Methods. *This cross-sectional, observational study was based on data obtained from the Dietfibrom project for FM and from the IMID Consortium for RA and HC. All participants completed a food frequency questionnaire evaluating their weekly dietary intake of main food groups. The three cohorts were compared using a multiple logistic regression model adjusted for age, sex, and body mass index.*

Results. *After quality control, n=287 FM, n=1,983 HC and n=1,942 RA patients were analysed. We found that FM had a profound impact in the diet compared to HC, reducing the consumption of dairy (OR=0.32, p<0.0001), bread and/or whole grain cereals (OR=0.59, p=0.0006), fresh fruit (OR=0.66, P=0.008), and fish (OR=0.64, p=0.002). These same four food groups were also significantly reduced in FM patients in comparison to RA patients (p<0.0005 in all cases). Additionally, a lower consumption of pasta, rice and/or potatoes was also observed in FM compared to RA (OR=0.72, p=0.028).*

Conclusion. *The present cross-sectional study shows that FM is associated to a significant change in the normal dietary patterns. These results underscore the importance of diet in this prevalent disease and are a warning of the potential long-range effects of a deficient nutritional status.*

Introduction

Fibromyalgia (FM) is a chronic disease, of unknown aetiology, characterised by widespread musculoskeletal pain and multiple accompanying symptoms, including fatigue and sleep disorders (1, 2). Most patients are treated with multidisciplinary therapies comprising pharmacological and non-pharmacological therapeutics (2), including physical exercise and general measures, such as nutritional advice. Following a diagnosis of FM, 30% of patients modify their dietary habits and 7% have food allergies and/or intolerances (3, 4). The relationship between FM and obesity is well established (5, 6) but there is scarce evidence evaluating the dietary habits in this prevalent disease. High intake of fruits and vegetables and moderate intake of fish has been associated with better mental health in patients with FM (7). Also noteworthy is a study that compared healthy controls (HC) with FM patients and showed greater food avoidance in the FM group and significant differences in the consumption of various food groups (8).

Rheumatoid arthritis (RA) is a chronic inflammatory disease with a different pathophysiology and more effective treatments than FM (9). The influence of diet on its development and evolution has been studied more extensively (10-13). Some studies have shown that high added sugar and/or high-fat diets can increase incidence and/or activity of the disease (10) and others have demonstrated that a Mediterranean diet can contribute to reduced inflammation (11). It has also been observed that RA patients have worse adherence to the Mediterranean diet and have poorer dietary quality than patients with os-

teoarthritis (12) and may avoid certain foods or have intolerances (13).

To the scarce information on dietary habits in FM, it is added that there are no comparative studies with other rheumatic diseases such as RA. More studies on dietary habits in FM and RA, with comparisons between them, are required to improve understanding of their dietary patterns and formulate more targeted nutritional recommendations. The objective of this study was to characterise the dietary habits of patients with FM by comparing, for the first time, with HC and RA.

Methods

Research design and participants

This observational, descriptive, cross-sectional study compared the dietary habits (food consumption per week) of patients with FM (data obtained from the Dietfibrom project) with patients with RA and HC (data obtained from Immune-Mediated Inflammatory Disease Consortium, IMIDC). DietFibrom is a Spanish, multicentre project which aimed to assess the dietary habits of patients with FM and IMIDC is a network of Spanish biomedical researchers focused on the study of the molecular basis of immuno-mediated inflammatory diseases. All the patients included in this study were selected from hospitals participating in both projects between 2007 to 2018. Patients signed the informed consent to participate in one of the two projects, which were approved by the ethical committees of all participating centres.

Procedures and measures

All participants completed a simplified food frequency questionnaire developed by experts from the National DNA Bank of Salamanca for evaluating regular dietary intake (0, 1-2, 3-5 or 6-7 days per week) of main food groups: fresh fruit, meat, fish, pasta/rice/potatoes, bread/whole grain cereals, vegetables, legumes, processed meats, dairy products, eggs, and sweets.

Statistical analysis

In order to perform the comparative analysis, 0-2 days per week were defined as "low" intake and 3-7 days as "high" intake. For fresh fruit, bread/whole grains, and dairy products, 0-5 days per week was defined as "low" intake and 6-7 days as "high" intake (due to their very frequent intake in the general population). This classification is not related to any nutritional recommendations.

Table I. Baseline characteristics and weekly frequency of intake of main food groups in the three cohorts, fibromyalgia, healthy controls and rheumatoid arthritis.

Variables	HC (n=1983)	RA (n=1942)	FM (n=287)	*p*-value
Age (years), Mean (SD)	49.56 (7.02)	60.67 (12.66)	53.28 (9.81)	<0.0001
Women, n (%)	818 (41%)	1504 (78%)	265 (92%)	<0.0001
Obese, n (%)	373 (19.7%)	371 (19.7%)	86 (30.1%)	0.0001
Fresh fruit (days/week)				
0, Nn (%)	63 (3%)	39 (2%)	8 (3%)	
1-2, n (%)	274 (14%)	173 (9%)	44 (15%)	
3-5, n (%)	420 (21%)	230 (12%)	57 (20%)	
6-7, n (%)	1213 (62%)	1494 (77%)	178 (62%)	
Meat (days/week)				
0, n (%)	35 (2%)	71 (4%)	25 (9%)	
1-2, n (%)	701 (36%)	997 (52%)	111 (39%)	
3-5, n (%)	1080 (55%)	741 (38%)	125 (44%)	
6-7, n (%)	155 (8%)	121 (6%)	26 (9%)	
Fish (days/week)				
0, n (%)	78 (4%)	67 (3%)	38 (13%)	
1-2, n (%)	1103 (56%)	985 (51%)	150 (52%)	
3-5, n (%)	729 (37%)	787 (41%)	91 (32%)	
6-7, n (%)	54 (3%)	82 (4%)	8 (3%)	
Pasta/rice/potatoes (days/week)				
0, n (%)	44 (2%)	57 (3%)	20 (7%)	
1-2, n (%)	766 (39%)	728 (38%)	127 (44%)	
3-5, n (%)	879 (45%)	794 (41%)	116 (40%)	
6-7, n (%)	268 (14%)	356 (18%)	24 (8%)	
Bread/cereals (days/week)				
0, n (%)	63 (3%)	61 (3%)	25 (9%)	
1-2, n (%)	221 (11%)	154 (8%)	37 (13%)	
3-5, n (%)	246 (13%)	137 (7%)	47 (16%)	
6-7, n (%)	1432 (73%)	1576 (82%)	179 (62%)	
Vegetables (days/week)				
0, n (%)	38 (2%)	42 (2%)	8 (3%)	
1-2, n (%)	511 (26%)	468 (24%)	54 (19%)	
3-5, n (%)	763 (39%)	681 (35%)	101 (35%)	
6-7, n (%)	655 (33%)	737 (38%)	124 (43%)	
Legumes (days/week)				
0, n (%)	(11%)	140 (7%)	51 (18%)	
1-2, n (%)	1341 (68%)	1368 (71%)	170 (59%)	
3-5, n (%)	360 (18%)	353 (18%)	60 (21%)	
6-7, n (%)	45 (2%)	64 (3%)	6 (2%)	
Processed meats (days/week)				
0, n (%)	327 (17%)	678 (35%)	106 (37%)	
1-2, n (%)	948 (49%)	873 (46%)	109 (38%)	
3-5, n (%)	477 (25%)	257 (13%)	39 (14%)	
6-7, n (%)	174 (9%)	106 (6%)	33 (11%)	
Dairy products (days/week)				
0, n (%)	50 (3%)	46 (2%)	27 (9%)	
1-2, n (%)	163 (8%)	105 (5%)	50 (17%)	
3-5, n (%)	250 (13%)	139 (7%)	41 (14%)	
6-7, n (%)	1507 (76%)	1648 (85%)	169 (59%)	
Eggs (days/week)				
0, n (%)	110 (6%)	119 (6%)	24 (8%)	
1-2, n (%)	1450 (74%)	1447 (75%)	202 (70%)	
3-5, n (%)	360 (18%)	335 (17%)	48 (17%)	
6-7, n (%)	35 (2%)	20 (1%)	13 (5%)	
Sweets (days/week)				
0, n (%)	398 (20%)	480 (25%)	90 (31%)	
1-2, n (%)	763 (39%)	680 (35%)	80 (28%)	
3-5, n (%)	403 (21%)	301 (16%)	49 (17%)	
6-7, n (%)	391 (20%)	469 (24%)	68 (24%)	

FM: fibromyalgia; HC: healthy controls; RA: rheumatoid arthritis; N: number, SD: standard deviation.

The dietary habits of the three cohorts, FM, RA, and HC were compared using a multiple logistic regression model with the "high"/"low" intake of food groups as a response variable while adjusting for age, sex and body mass index (BMI). The measure of association used was the odds ratio (OR) for "high" intake of each food group as compared with HC (FM-HC) or RA (FM-RA). The univariate tests comparing the descriptive variables were performed using ANOVA for quantitative variables and Fisher's exact test for categorical variables. All statistical analyses were performed using R version 3.5.3.

Table II. Comparative analysis of the high intake of each food group between fibromyalgia, healthy controls, and rheumatoid arthritis.

	Comparison FM/HC		Comparison FM/RA	
	OR (95% IC)	*p*-value	OR (95% IC)	*p*-value
Fresh fruit*	0.66 (0.5-0.88)	**0.008**	0.57 (0.43-0.76)	**0.0002**
Meat	0.78 (0.59-1.01	0.12	1.22 (0.94-1.58)	0.24
Fish	0.64 (0.48-0.84)	**0.002**	0.61 (0.46-0.79)	**0.0005**
Pasta/rice/potatoes	0.8 (0.61-1.04)	0.18	0.72 (0.56-0.94)	**0.028**
Bread/whole grain cereals*	0.59 (0.45-0.79	**0.0006**	0.39 (0.3-0.52)	**<0.0001**
Vegetables	0.84 (0.61-1.17)	0.5	1.25 (0.91-1.71)	0.3
Legumes	1.32 (0.96-1.82)	0.16	1.15 (0.85-1.57)	0.58
Processed meats	1.02 (0.75-1.39)	0.99	1.21 (0.89-1.64)	0.38
Dairy products*	0.32 (0.24-0.42	**<0.0001**	0.28 (0.21-0.37)	**<0.0001**
Eggs	1.1 (0.79-1.53)	0.8	1.2 (0.87-1.64)	0.46
Sweets	1.09 (0.83-1.43)	0.76	1.02 (0.78-1.33)	0.98

*High intake defined as 6-7 days per week. For the rest, high intake defined as 3-7 days per week.
FM: fibromyalgia; HC: healthy controls; RA: rheumatoid arthritis; OR: odds ratio; CI: confidence interval.

Results

The dietary data of 287 patients with FM, 1,983 HC, and 1,942 patients with RA were compared. The FM patients had a mean age of 53.28±9.81 years, being significantly older than the HC and significantly younger than the RA patients. Significant differences were also observed in the proportion of women and obese (Table I). Accordingly, downstream analyses of food frequency consumption were adjusted for sex, age and BMI.

The comparative analyses between the three cohorts, indicated a significantly lower intake of dairy products (P_{FM-HC}<0.0001, OR=0.32 95%CI 0.24-0.42; P_{FM-RA}<0.0001, OR=0.28 95%CI 0.21-0.37), bread/whole grain cereals (P_{FM-HC}=0.0006, OR=0.59 95%CI 0.45-0.79; P_{FM-RA}<0.0001, OR=0.39 95%CI 0.3-0.52), fresh fruit (P_{FM-HC}=0.008, OR=0.66 95%CI 0.5-0.88; P_{FM-RA}=0.0002, OR=0.5 95%CI 0.43-0.76), and fish (P_{FM-HC}=0.002, OR=0.64 95%CI 0.48-0.84; P_{FM-RA}=0.0005, OR=0.61 95%CI 0.46-0.79) in FM patients compared to HC and RA patients. Additionally, a lower consumption of pasta, rice and/or potatoes was also observed in FM compared to RA (OR=0.72 95%CI 0.56-0.94, *p*=0.028).

No significant differences were found in the intake of meat, processed meat, vegetables, legumes, eggs, or sweets between FM patients and the other two cohorts (Table II).

Discussion

In our comparative study we find that FM patients are more obese and have a lower intake of dairy products, bread/whole grain cereals, fresh fruit, and fish than HC and RA patients.

Obesity is common in patients with FM and has been associated with worse symptoms, greater impact on the disease, worse quality of life, greater functional impact, and greater risk for anxiety and depression (6). Patient obesity could be related, among other factors, with their lower physical activity and dietary habits. In our study, a lower intake of fresh fruit and fish was observed in FM patients compared with HC and RA. The low intake of these products could negatively influence their nutritional status, their weight and their physical and mental health. In fact, a study conducted in Spain among 486 women with FM found an association between high consumption of fruit and vegetables and moderate consumption of fish with higher scores of mental health and lower levels of depression and high consumption of cured meat and sweetened beverages with higher levels of depression and lower levels of optimism (7).

It is remarkable that the most significant dietary difference was lower intake of dairy products in FM compared to HC and RA. According to Arranz *et al*. 7% of patients with FM reported food intolerances, in which lactose intolerance was the most frequent (5). According to López-Rodríguez *et al*. patients with FM showed more food avoidance than HC, with significant differences in lactose, vegetables, cereals, and caffeine (8). Although these data were self-reported by the patients, no well-designed studies have been published on the prevalence of lactose intolerance and the clinical response after a lactose-free diet (3).

Another group of foods which were consumed less among the FM group were bread/whole grain cereals. In the López-Rodríguez study, there was a greater avoidance of cereals in patients with FM compared to HC, and a significantly lower mean intake of cereals, fruits, sugars, alcohol, and soft drinks (8). Cereals are avoided by some patients with FM because of the controversial relationship between this disease and gluten-related disorders (3, 6) and because some studies have shown symptomatic improvement with a gluten-free diet (GFD). The benefits of a GFD among patients with FM remains unclear because the majority of symptomatic improvement has been among patients with intestinal lymphocytosis (6, 14). Other studies either observed no clinical response (3, 6) or similar benefits to other diets, such as a hypocaloric diet (15). Further research is required to determine the role of lactose and GFD among patients with FM because with current evidence, systematic avoidance of these products cannot be recommended.

The main limitation of the study was the relatively low sample size of the FM cohort. However, the large number of HC and RA individuals analysed

in this study, contributed to increase the statistical power of the analyses. Accordingly, multiple food groups were found to be consumed a very significantly different frequencies between FM and the other two cohorts. Another limitation was the use of a simplified food frequency questionnaire. While the main food groups are all represented in this questionnaire, it cannot reveal detailed associations with specific food types and or preparations. However, at these initial stages of characterisation of diet alteration, where little knowledge is available, we prioritised the ability to recruit a larger number of patients and better capture the presence of a global alteration.

Precisely, due to our priority of carrying out a comparative study of three cohorts with the maximum number of patients, we did not include the evaluation of variables that could influence dietary habits, such as socioeconomic status, education degree or comorbidities, as we did not have of all data. More studies are needed to evaluate the variables that can influence the dietary habits of patients with FM and RA in order to better act on them.

It was also not assessed whether patients modified their diet after diagnosis. If this were so, it would support the influence of avoidance behaviour and reflect on the need for both physicians and patients to become more aware of the dangers of following anecdotal evidence regarding dietary interventions.

In conclusion, this first study comparing the dietary habits of FM patients with RA and HC showed that these patients had a lower intake of multiple food groups. More studies are needed to show if this global reduction is due to intentional avoidance or by another factors. Our study underscores the need to study the diet in FM and support that action should be taken to prevent the long-term impact of nutritional deficiencies.

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