Associations between patterns of active commuting and socioeconomic factors in women with fibromyalgia: the al-Ándalus project

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ABSTRACT

Objective. *The aims of this study were to know whether active commuting behaviour differs between fibromyalgia patients and controls, and to test whether active commuting is associated with socioeconomic factors in this population.*

Methods. *This cross-sectional study included 459 women with fibromyalgia (52.2 years) and 214 female control participants (51.3 years) from Andalusia (southern Spain). Participants reported patterns of active commuting and socioeconomic factors (civil status, accompaniment at home, living with, educational level, and current occupational and professional status).*

Results. *On the age group <51 years, women with fibromyalgia revealed a significant higher percentage of active commuting for the variable active worker commuters than control group ($p<0.05$). On the age group ≥51 years, control group displayed a significant higher percentage of active commuting for commuting to local shops, supermarket and active commuters variables (all, $p<0.05$). Women with fibromyalgia who lived alone were more active commuters in comparison to either those living accompanied, or living with both partner and children, only partner and only children (all, $p<0.05$).*

Conclusion. *The prevalence of active commuting was similar in women with fibromyalgia and controls aged <51 years. However, fibromyalgia participants aged ≥51 years displayed differences: fibromyalgia women who lived alone were more active commuters than those living accompanied; family demands were inversely associated with commuting patterns. Policies focused on reducing family demands for fibromyalgia patients (i.e. social help on housework, childcare or overprotection) might facilitate the inclusion of daily active behaviours.*

Introduction

Fibromyalgia patients present a disorder in the regulation of pain (1, 2). This disorder is associated with a low functional capacity (3), which limits the patients' daily activities, deteriorates their quality of life and incurs considerable extra health care costs (4). Among non-pharmacological treatments, physical activity has beneficial effects on health and pain modulation in women with fibromyalgia (5, 6).

Walking for commuting purposes is a healthy behaviour easily incorporable in daily routines. The prevalence of active commuting is higher in European countries than in the United States, Australia or Canada (7). Walking may increase physical activity levels in adulthood, especially in women (8-10). For women with fibromyalgia, active commuting represents a potential way of increasing physical activity levels helping patients to reduce symptomatology effects (11, 12). However, a comprehensive characterisation of the patterns of active commuting in women with fibromyalgia is lacking in the literature.

Previous literature concluded that socioeconomic factors such as intrapersonal, interpersonal, institutional, community, and environmental factors are related to active commuting (13). Different studies have shown significant relationships between active commuting behaviour in adult women and marital status (13), living alone/accompanied (14, 15), educational level (13, 16) and employment (13, 14).

Women with fibromyalgia have shown to walk slower (17) and present impaired gait parameters (such as velocity, cadence, stride length, etc.) when comparing with healthy women (18). Cognitions might play a role in daily life of women with fibromyalgia. Higher levels of fear of movement are associated with more time needed to complete walking tasks like active commuting, and these tasks are perceived as more strenuous (19). As a result, both impaired gait and fear-related cognitions when practicing physical activity could explain the lower physical activity levels in women with fibromyalgia compared with healthy women.

Research on active commuting behaviour has still not been carried out in women with fibromyalgia. To improve understanding of factors influencing this chronic condition and to improve the management of the disease, it is of interest to assess whether active commuting differs between fibromyalgia patients and controls and to test whether this behaviour is associated with socio-economic factors in this population. Therefore, the aims of the current study were: (i) to compare the patterns of commuting between women with fibromyalgia and control women conducted separately in two age groups; (ii) to examine the associations between active commuting and socioeconomic factors in women with fibromyalgia.

Methods

Study participants and design

The sampling procedures undertaken to recruit a representative sample of women with fibromyalgia from southern Spain has been described elsewhere (20). Briefly, we contacted a total of 874 women. All the participants gave their written informed consent after receiving detailed information about the aims of the study and procedures involved. The inclusion criteria for fibromyalgia group were: a) to be previously diagnosed of fibromyalgia by a rheumatologist; b) to meet the 1990 American College of Rheumatology (ACR) Fibromyalgia criteria (21); c) not having severe or terminal illness nor severe cognitive impairment (Mini-Mental State Examination (MMSE) >10) (22). The inclusion criteria for control group were: a) not to meet the 1990 ACR Fibromyalgia criteria; b) not to have acute or terminal illness, and severe dementia (22). To achieve age-matched groups, participants <37 years or >65 years were not included in the current study.

This cross-sectional study was carried out between 2011 and 2013. All the participants attended a measurement session where tender points were assessed by trained researchers, the MMSE was interviewed, the anthropometric measurements were performed and self-reported questionnaires (socioeconomic and clinical factors and the mode of commuting questionnaire) were fulfilled by participants. This study was reviewed and approved by the Ethics Committee of the "Hospital Virgen de las Nieves" (Granada, Spain).

Inclusion criteria measurements

Tenderness. A standard pressure algometer (FPK 20; Wagner Instruments, Greenwich, CT, USA) was used to perform a tender points examination according to the 1990 ACR criteria for classification of fibromyalgia (21). A pressure threshold ≤4kg/cm^2 was considered a positive tender point. The total count of positive tender points was recorded for each participant.

Cognitive impairment. The MMSE was used to assess the presence of severe cognitive impairment for exclusion purposes (22). Five areas of cognitive functioning were assessed: orientation, immediate memory, attention/concentration, delayed recall and language.

Potential confounders

Clinical data. Age and years since clinical diagnosis in women with fibromyalgia (≤5 years and >5 years) were self-reported by the participants.

Anthropometric measurements. Weigh (kg) and body fat percentage were assessed using a valid and reliable (23, 24) portable electronic scale (InBody R20; Biospace, Seoul, Korea). Height (cm) was measured using a portable stadiometer (Seca 22, Hamburg, Germany).

Fatigue. The Spanish version of the Multidimensional Fatigue Inventory (MFI-S) was self-reported by the participants to measure fatigue severity. Five subscales compose this questionnaire: general fatigue, physical fatigue, mental fatigue, reduced activity, and reduced motivation (25); and general fatigue was used for analyses.

Fibromyalgia impact. Participants self-reported the Revised Fibromyalgia Impact Questionnaire (FIQR), comprising 21 individual questions with a rating scale of 0–10. These questions compose 3 different domains: function, overall impact, and symptoms score (26). We used the Symptom Impact Questionnaire with control participants. The SIQR (27) is a slightly modified version of the FIQR used with non-fibromyalgia patients (number of questions, domains, and scoring is the same as the FIQR). The FIQR total score and SIQR total score ranges from 0 to 100, with a higher score indicating greater effect of the condition on the person's life.

Socioeconomic factors measurements

Socioeconomic factors. Participants self-reported their civil status (*i.e.* married, single, separated, divorced or widowed), which was categorised as a binary variable (*i.e.* married and no married); accompaniment at home (*i.e.* accompanied and alone) and who they were living with (*i.e.* partner and children, partner, children and alone). Educational level (*i.e.* University degree, Secondary school/Professional training, Primary school and no studies), current occupational status (*i.e.* working/studying and unemployed/retired) and the professional status (*i.e.* high, medium and low qualification) were self-reported. Professional status was adapted from the Spanish National Health survey 2006.

Mode of commuting measurements

Mode of commuting. This is a reliable self-administered scale comprising four items about the mode of commuting to: local shops, supermarket, local services and study/work place (28). The mode of commuting to study/work place could only be answered if participants were students or workers. Each question has six response options (*i.e.* walking, riding a bike, by car, riding

a motorbike, by bus/metro/train and others) and only one of them can be chosen. All mode of commuting questions were recoded as binary variables (*i.e.* walking and riding a bike as active; and car, riding a motorbike and by bus/metro/train as passive). When participants answered the option "other", it was included as active or passive whether specified the transportation, but if it was not specified, this response was excluded from the analysis. Additionally, a binary variable active commuters was created by the sum of commuting to local shops, supermarket and local services. Moreover, a binary variable active worker commuters was created by the sum of commuting to local shops, supermarket, local services and study/work place. In both variables, none or one active response was recoded as passive commuters; and two or more active response were recoded as active commuters.

Statistical analysis

Descriptive characteristics were summarised as means ± standard deviation for continuous variables and as frequencies and percentage for categorical variables. Additionally, in order to identify possible cofounders, we performed Student's *t* test for Independent Samples to test the differences between fibromyalgia and controls in age, body fat percentage, tender points, fatigue and fibromyalgia impact. We followed the same procedure using Chi-square for categorical variables (*i.e.* years since clinical diagnosis, civil status, accompaniment at home, living with, educational level, current occupational status, professional status, active commuters, active worker commuters, modes of commuting to local shops, supermarket, local services and work). Chi-square was performed to compare the differences between fibromyalgia and control groups regarding the mode of commuting. Since we observed an age-effect on this association, the analysis were conducted separately in two age groups using the cut-off point of 51 years old (which is the middle age between the lower (*i.e.* 37y) and the older (*i.e.* 65y) age of the participants). The two groups were: <51 (those younger than 51 years old) and ≥51 (those similar or older than 51 years old). Associations between active commuting and socioeconomic factors were assessed using binary logistic regression. The socioeconomic factors were included as dependent variables in separate models, the active commuting variable was included as fixed factor and the variables of age, body fat percentage, tender points, fatigue and years since clinical diagnosis were included as confounders. An exploratory analysis of the associations between active commuting and socioeconomic factors in the control group was performed using binary

Table I. Socioeconomic, clinical and mode of commuting variables of the participants.

Variable	n	FM Group	n	Control Group	*p*
Age, mean (SD)	459	52.2 (7.1)	214	51.3 (7.0)	0.122
Body fat percentage, mean (SD)	449	40.1 (7.7)	210	37.1 (7.0)	**<0.001**
Tender points, mean (SD)	459	16.8 (1.9)	214	3.1 (3.0)	**<0.001**
Fatigue, mean (SD)	442	18.0 (2.5)	202	10.4 (4.7)	**<0.001**
Fibromyalgia impact	442	65.9 (14.9)	200	20.9 (13.2)	**<0.001**
Years since clinical diagnosis, n (%)	447		N.A.		N.A.
≤ 5 years		183 (40.4)		N.A.	
>5 years		264 (59.1)		N.A.	
Civil status, n (%)	459		213		0.331
Married		350 (76.3)		155 (72.8)	
No married		109 (23.7)		58 (27.2)	
Accompaniment at home	459		214		0.801
Accompanied		423 (92.2)		196 (91.6)	
Alone		36 (7.8)		18 (8.4)	
Living with…	443		201		0.247
Partner and children		265 (59.8)		130 (64.7)	
Partner		99 (22.3)		31 (15.4)	
Children		43 (9.7)		22 (10.9)	
Alone		36 (8.1)		18 (9.0)	
Educational level, n (%)	459		214		**0.006**
University degree		62 (13.5)		49 (23.0)	
Secondary school/Professional training		130 (28.4)		67 (31.1)	
Primary school		220 (47.9)		83 (38.9)	
Unfinished studies		47 (10.2)		15 (7.0)	
Current occupational status	459		214		**<0.001**
Working/Studying		122 (26.6)		92 (43.0)	
Unemployed/Retired		337 (73.4)		122 (57.0)	
Professional status, n (%)	459		214		**<0.001**
High qualification		33 (7.2)		43 (20.1)	
Medium qualification		50 (10.9)		28 (13.1)	
Low qualification		376 (81.9)		143 (66.8)	
Active commuters	432	298 (69.0)	201	146 (72.6)	0.350
Active workers commuters	141	100 (70.9)	98	66 (67.3)	0.555
Mode of commuting to local shops, n (%)	433		201		0.168
Walk		327 (75.5)		162 (80.6)	
Bicycle		1 (0.2)		3 (1.5)	
Car		96 (22.2)		35 (17.4)	
Bus /metro /train		6 (1.4)		1 (0.5)	
Mode of commuting to supermarket, n (%)	433		201		0.075
Walk		196 (45.3)		108 (53.7)	
Bicycle		4 (0.9)		5 (2.5)	
Car		225 (52.0)		88 (43.8)	
Bus /metro /train		6 (1.4)		0 (0.0)	
Mode of commuting to local facilities, n (%)	433		201		0.222
Walk		296 (68.4)		137 (68.2)	
Bicycle		2 (0.5)		4 (2.0)	
Car		111 (25.6)		55 (27.3)	
Bus /metro /train		20 (4.6)		5 (2.5)	
Mode of commuting to study/work place, n (%)	141		98		0.103
Walk		51 (36.2)		23 (23.5)	
Bicycle		0 (0.0)		1 (1.0)	
Car		74 (52.5)		66 (67.3)	
Bus /metro /train		15 (10.6)		8 (8.2)	

N.A.: not available; SD: standard deviation.

logistic regression to observe whether both fibromyalgia and control groups displayed similar associations.

All analyses were performed using SPSS version 18.0 for Windows (SPSS Inc., Chicago, IL, USA). The level of significance was set at $p<0.05$.

Results

A total of 617 women with fibromyalgia and 257 control women took part in the study. Among women with fibromyalgia, one had severe cognitive impairment, 38 were not previously diagnosed and 92 did not meet the 1990 ACR fibromyalgia criteria. Six control women met the 1990 ACR fibromyalgia criteria and were also excluded. Additionally, we excluded from the analyses 20 participants (n=14 and n=6 for fibromyalgia and control groups) who were older than 65 years and 44 participants (n=13 and n=31 for fibromyalgia and control groups) who were younger than 37 years old. Therefore, the final study sample comprised a total of 459 women with fibromyalgia and 214 control participants.

Table I presents the descriptive characteristics, socioeconomic and mode of commuting variables of the study groups. Fibromyalgia patients had significant higher body fat percentage, tender points, fatigue and fibromyalgia impact (all, $p<0.001$) than controls. Fibromyalgia patients also presented significantly lower educational level, higher current occupational status and lower professional status (all, $p<0.01$) than controls. There were no group differences for the mode of commuting ($p<0.07$).

The comparison of active commuters between fibromyalgia and control groups only displayed a significant difference between groups (data not shown). Women with fibromyalgia were less active commuters to supermarket than control women ($p<0.05$). Figure 1 presents the same analysis separately for age groups, in which the younger age group had 184 women with fibromyalgia and 100 control women (except for study/work place and active worker commuters variables in fibromyalgia and control group with 81 and 53 women respectively); and the older age group had 248 women with fibromyalgia and 101 control women (except for study/work place and active worker commuters variables in fibromyalgia and control group, with 60 and 45 respectively). In the younger age group (<51 years old) women with fibromyalgia revealed a significant higher percentage of active commuting for the variable active worker commuters than control group ($p<0.05$). Regarding the older age group (≥51 years old), control group displayed a significant higher percentage of active commuting for commuting to local shops, supermarket and active commuters variables (all, $p<0.05$).

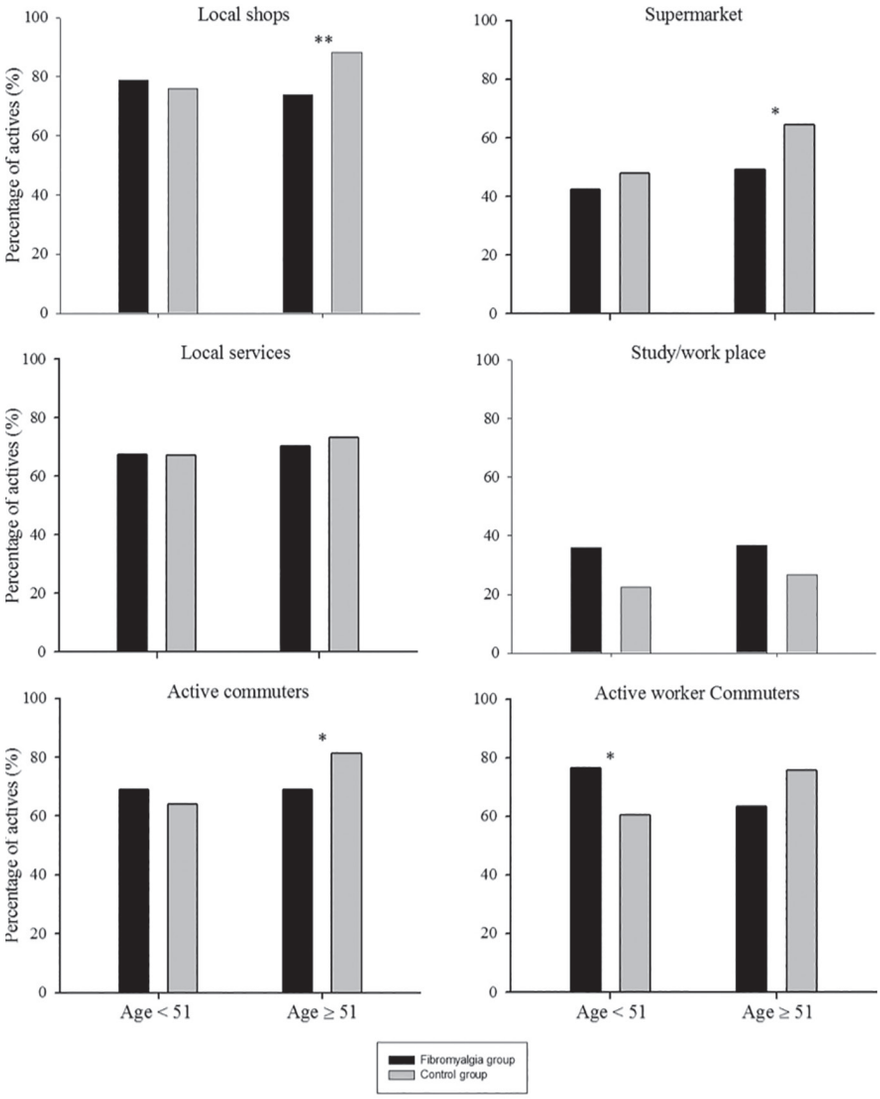

Fig. 1. Percentage and comparison of active commuters in both fibromyalgia and control groups. *: $p<0.05$; **: $p<0.01$.

Table II displays the associations between active commuting and socioeconomic factors in the fibromyalgia group. Women with fibromyalgia who lived alone were more active commuters in comparison to either those living accompanied (ORs: 4.39, 95% CI: 1.30 to 14.76, $p=0.017$), or living with both partner and children, only partner and only children (ORs: 3.19, 95% CI: 1.07 to 9.50, $p=0.037$). There were no significant differences between civil status, educational level, current occupational status or professional status and active commuting (all, $p>0.12$). No statistically significant associations between active commuting and socioeconomic factors were observed in the control group (data not shown).

Discussion

The main findings of the present study

Table II. Associations between active commuting and socioeconomic factors in participants with fibromyalgia.

	n	Commuting (active vs. passive) OR	95% CI	*p*
Civil status				
Married	322	1	Reference	
No married	99	1.02	0.62-1.67	0.954
Accompaniment at home				
Accompanied	390	1	Reference	
Alone	31	4.39	1.30-14.76	**0.017**
Living with…				
Partner and children	246	1	Reference	
Partner	88	0.83	0.48-1.44	0.503
Children	41	0.78	0.39-1.57	0.482
Alone	33	3.19	1.07-9.50	**0.037**
Educational level				
University degree	60	1	Reference	
Secondary school/Professional training	118	1.27	0.66-2.44	0.474
Primary school	203	1.62	0.88-2.99	0.124
Unfinished studies	40	1.42	0.58-3.45	0.440
Current occupational status				
Working/Studying	115	1	Reference	
Unemployed/Retired	306	0.81	0.50-1.32	0.397
Professional status				
High qualification	32	1	Reference	
Medium qualification	46	0.65	0.24-1.74	0.392
Low qualification	343	0.85	0.37-1.91	0.686

OR: odds ratio; CI: confidence interval.

indicate that older women with fibromyalgia (≥51 years old) were less active commuters than healthy women of the same age. Additionally, women with fibromyalgia who lived alone were more likely to be active commuters than those living accompanied.

Approximately, about 70% of the participants included in this study (both fibromyalgia and control groups) were active commuters in their daily life. Around 78% walked to local shops, 49% walked to supermarkets and 68% walked to local facilities. Comparing these result with a previous study (15) we found a higher percentage of active commuting in both fibromyalgia and healthy women. Healthy American adults who commute actively using walk mode ranged from 10% to 46% for different local facilities (*i.e.* recreation facilities, park, grocery store, fast-food restaurant and sit-down restaurant). However, we only found this study assessing commuting to similar destinations, which hampers further comparisons. A 36.2% of fibromyalgia and 23.5% of healthy women were active commuters to study/work place, which can be compared with previous studies. The results showed in the current study were lower than the 60% and 42% of commuters who walked to study/work place among Polish women (14) and English women (29). However, our results are similar than the 30% and 36% of Australian adults (30) and healthy Polish women (only for women with fibromyalgia) (31). The current study also showed slightly higher results than the 26% and 20% of active commuters to study/work place among English adults and American women (32-34). However, these comparisons should be done cautiously because of the different participants in every study and the specific-context influence for active commuting. In the current study, all participants were women and commuting by walking has been shown to be more prevalent in women than in men (8, 35).

From the current study emerged that active commuting between fibromyalgia and control groups was different for younger and older women. In the young group, the frequency of active commuters was similar between fibromyalgia and healthy women. In the older group, there was only one significant difference in the variable of worker commuters with higher percentage of activity for the fibromyalgia group. It is likely that younger fibromyalgia patients might cope better with the symptomatology of this health condition than older patients. The control group aged ≥51 years reported a higher percentage of active commuting to local shops and to supermarket in the control group compared to the fibromyalgia group. The symptoms of fibromyalgia seem to be more apparent in older women, and these sufferings might avoid the capacity to walk as a way of commuting for the daily duties. This is the first study assessing the relationship between socioeconomic factors and active commuting in women with fibromyalgia. Women with fibromyalgia who lived alone were more active commuters than those living accompanied, which is in agreement with a previous study where single women had more commuting activity than married or co-habiting women (14). Additionally, men and women that lived alone had a higher prevalence of walking as transport than those living in-partner and those with young children in the household (15). Likewise, participation in leisure time physical activity has been shown to be reduced in women with family demands (13). Therefore, it seems that women with more family demands might have less time for practicing leisure time physical activity and, similarly, for commuting to their daily duties. For instance, using passive transport like cars might help women with fibromyalgia when they have to do duties in different places or simply family might overprotect them taking to their duties.

In the present study, there was no association between educational level and pattern of active commuting. The relationship between educational level and active commuting is controversial since previous studies revealed that higher educational level was related with lower active commuting levels among Brazilian healthy adults (16) but with higher levels of active commuting among American healthy women (13). Our results suggest that current

occupational and professional statuses are not associated with active commuting behaviours in women with fibromyalgia. These findings disagree with studies conducted among American (13), English (32) and Polish healthy population (14) where they found higher levels of active commuting among people with lower socioeconomic status. These studies were focused on healthy participants and our results are focused on women with fibromyalgia. However, we obtained similar results when performing the same analysis with the control group, and we did not find any associations between active commuting and educational and professional levels.

A number of limitations of the present study should be considered. Firstly, its cross-sectional design does not allow establishing causal relationships. Second, the sample might be strongly influenced by their context and this study should be replicated in different contexts. Finally, the fibromyalgia group was only comprised of women, and further research among men with fibromyalgia is warranted. By contrast, the relatively large sample size and the standardised protocol are strengths of the current study. Furthermore, to our knowledge, this is a very first study analysing the relationship between socioeconomic factors and active commuting among women with fibromyalgia. Additionally, this study describes active commuting behaviours to other different destinations than the common study/work place, such as local shops, supermarket and local facilities.

Public health implications

The associations between active commuting and socioeconomic factors in women with fibromyalgia described in this study has a number of important implications for the development of public health policies to improve quality of life of these patients and, perhaps, to reduce health care cost. The prevalence of active commuting was similar in younger (<51 years old) fibromyalgia and healthy women. However, the prevalence of active commuting was lower in older (≥51 years old) women with fibromyalgia compared with healthy women. This implies that active commuting policies' in the general population could particularly be extended to older women with fibromyalgia. On the other hand, our findings suggest that women with fibromyalgia with family demands are less active commuters, so that strategies to improve these situations are needed. Policies focused on reducing family demands for fibromyalgia patients (*i.e.* social help on housework, childcare or overprotection) might facilitate the inclusion of daily active behaviours.

Conclusions

The findings of the present study indicate that fibromyalgia and control women have similar patterns of active commuting when they are <51 years old and there were some differences when they are ≥51 years old, with higher percentages of active commuting for the healthy women. Additionally, family demands are inversely associated with commuting patterns in women with fibromyalgia.

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