Health-related quality of life in fibromyalgia patients: a comparison with rheumatoid arthritis patients and the general population using the SF-36 health survey

F. Salaffi[1], P. Sarzi Puttini[2], R. Girolimetti[1], F. Atzeni[2], S. Gasparini[1], W. Grassi[1]

[1]*Department of Rheumatology, Polytechnic University of Marche, Ancona, Italy;*
[2]*Rheumatology Unit, L. Sacco Hospital, Milan, Italy.*

Fausto Salaffi, MD
Piercarlo Sarzi Puttini, MD
Rita Girolimetti, MD
Fabiola Atzeni, MD
Stefania Gasparini, MD
Walter Grassi, MD

Please address correspondence and reprint requests to:
Fausto Salaffi, MD,
Department of Rheumatology,
Polytechnic University of Marche
Medical School, Ospedale A. Murri,
Via dei Colli 52,
60035Jesi, Italy
E-mail: fsalaff@tin.it

Received on July 13, 2009; accepted in revised form on November 3, 2009.

Clin Exp Rheumatol 2009: 27 (Suppl. 56): S67-S74.

Key words: Fibromyalgia, rheumatoid arthritis, health-related quality of life, mental health, disability.

Competing interests: none declared.

ABSTRACT

Objective. *To compare health-related quality of life (HRQL) in fibromyalgia (FM) patients with that of patients with rheumatoid arthritis (RA) and the general population, and investigate if the factors are associated with the greater impact of FM.*

Methods. *This cross-sectional study involved 380 patients with FM, 693 patients with RA and 1579 healthy controls. HRQL was evaluated using the Medical Outcome Study Short-Form 36 (SF-36), and the measures included disease-related characteristics, demographic variables and comorbidities. S-scores were calculated for comparisons with the norm, and multivariate analyses were used to assess the relationships between HRQL and clinical and demographic variables.*

Results. *In comparison with the general population, the FM patients showed significant impairment in relation to all of the eight scales of the SF-36 ($p<0.0001$), as well as the physical and mental component summary scores (PCS and MCS) ($p<0.0001$). The mean PCS and MCS of the FM patients were 38.5 (SD=6.9) and 32.8 (SD=10.9), whereas those of the RA patients were 33.5 (SD=6.4) ($p<0.01$) and 40.2 (SD=11.9) ($p<0.001$). The dimensions typically affected by FM were vitality (s-score -1.61), mental health (s-score -1.46) and general health (s-score-1.47), whereas physical functioning (s-score-1.63) and role limitations due to physical function (s -score -0.94) were more impaired in the RA patients; the bodily pain scores were similar in the two groups. The PCS was lower than the MCS in the RA patients (s-scores -1.80 vs. -0.62), but the two scores were similar in the FM patients (s-scores -1.20 vs. -1.08). Multiple regression models showed that the physical component of the SF-36 was associated with widespread pain (the SAPS score) ($p<0.0001$), educational level ($p=0.0017$), and the body mass index ($p=0.007$), and the mental component was associated with the widespread pain ($p=0.0005$), sleep abnormalities ($p=0.0033$), physical function ($p=0.015$), fatigue ($p=0.029$), gender ($p=0.014$) and a low educational level ($p=0.0007$).*

Conclusion. *Patients with FM see the disease as having a worse health than RA patients and the general population, especially in terms of mental health.*

Introduction

Fibromyalgia (FM) is a chronic multi-symptom disease (1-3) that affects approximately 2-3% of the general population (more than 90% of the patients are female), and pain probably is its most important symptom (1, 4, 5). It consequently tends to have a profound impact on health-related quality of life (HRQL), and has been found to be associated with high rates of use of healthcare resource (5-9) and an increased risk of death due to cancer (10). Patients with FM report disabilities in daily living activities that are as severe as those reported by patients with rheumatoid arthritis (RA) (11), and more severe than those reported by patients with osteoarthritis (12) or other painful condition (13-16). Furthermore, their mental health is more severely affected than that of RA patients (17).

Traditional methods of evaluation focus on the locomotor system and measures of impairment, and may therefore fail to identify all of extensive multi-dimensional aspects of FM. The OMERACT (Outcome Measures in Rheumatology) Fibromyalgia Syndrome Workshop has recently ranked and prioritised the domains that should be consistently measured and which show reasonable effect sizes in clinical trials (3, 18). The

work of the OMERACT Fibromyalgia group is similar to that which have been done by chronic pain researchers and the IMMPACT group (Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials) (19, 20). The current consensus is that these domains should include pain, physical and emotional functioning, patient global satisfaction ratings, negative health states and adverse events.

Consideration of overall HRQL has become increasingly important to take decisions about resource allocation, and the pharmacological treatment of patients with disabling and chronic painful conditions (21). There are two main approaches to measuring patients' perceptions of HRQL: generic instruments and questionnaires that provide a broad picture, and specific instruments and questionnaires that focus on aspects relevant to a specific disease or patient group. It is acknowledged that HRQL questionnaires are an important source of scientific healthcare knowledge because, in clinical practice, they can identify a patient's needs and assess the effectiveness of an intervention (22). Generic instruments are not age-, disease- or treatment-specific, and include multiple aspects of HRQL, thus making them suitable for patients and the general population (22, 23); furthermore, population-based normal values can be calculated, which supports the interpretation of data relating to disease-specific groups (23).

The Short Form 36-item Health Survey Questionnaire (SF-36) is a generic instrument (24) that covers eight domains of HRQL, including physical and social functioning and mental health (24). It has been translated and validated in various countries, including Italy (25), and population norms have been calculated (25, 26). The SF-36 has been used in a wide range of studies of FM patients, including descriptive studies (9, 13-15, 17, 27) and clinical research trials (15), and has demonstrated good reliability and validity.

The aim of this study was to assess the impact of FM on patients' HRQL by comparing them with RA patients and the general population, and to verify the factors contributing to this impact.

Patients and methods

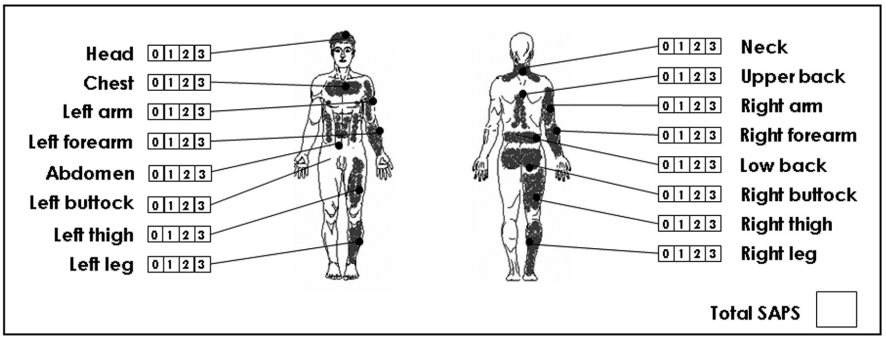
Study population

HRQL was studied in a cohort of 380 patients aged 20-75 years, attending the Rheumatology Clinic of the Polytechnic University of the Marche Region (Ancona, Italy), who met the 1990 American College of Rheumatology (ACR) criteria for FM (28). All of the patients gave their informed consent. Patients with other rheumatic or medical disorders such as pain due to traumatic injury or structural or regional rheumatic disease, inflammatory arthritis, or autoimmune disease; myocardial infarction, major neurological problems, unstable medical or psychiatric illness; a lifetime history of psychosis, hypomania, mania, epilepsy or dementia, and substance abuse in the previous six months, were excluded. For purposes of comparison, the study also included 693 patients fulfilling the ACR criteria for RA (29) attending two Italian Rheumatology Departments: the outpatient clinics of the Polytechnic University of the Marche, Ancona, and the Rheumatology Unit of L. Sacco Hospital, Milan, Italy. Patients with concomitant FM that contribuited to the symptoms of RA were excluded. The sample was randomly matched from RA patients involved in an ongoing longitudinal project measuring outcomes, and reflected the age- and gender-related stratification and distribution of the sample of FM patients. Like the FM patients, they underwent a complete clinical assessment. The study also made use of data collected from 1579 healthy controls, who were selected from the previous cross-sectional population-based, MArche Pain Prevalence INvestigation Group (MAPPING) study (4) and reflected the age- and gender-related stratification and distribution of the Italian population. A total of 3664 subjects was contacted by mail in 2004. For comparison, data from a previous cross-sectional population-based study, namely MAPPING (MArche Pain Prevalence INvestigation Group) Study will be used. This study design has been described in detail elsewhere (4). The sample reflects the age/sex related stratification/distribution of the Italian population. Briefly, the MAPPING study was conducted on 4000 subjects aged 18 years and over, selected from the practice lists of 16 general practitioner-GPs (total target adult population of 20882 individuals). These GPs were representative of the practices in Marche in terms of size of practice, geographical location, and socio-economic status of those attending. A total of 336 individuals were excluded through this procedure: 43 individuals have left the practice, 49 had dementia or mental illness, 31 were terminally ill, 114 had died, and 99 individuals had no reason given. The remaining 3664 individuals were sent a standardised self-completion postal questionnaire. Subjects who did not return their questionnaires within three weeks were sent another questionnaire to maximise the response rate. The patients were instructed to complete all the questionnaires at home and to return them in a prepaid envelope. To increase the response rate the nonresponders were contacted by telephone and encouraged to return the questionnaires. Of 3470 questionnaires delivered (194 participants could not be contacted because of unknown address or recent death, absent from the community during the survey, hospitalisation, etc.), 2155 were returned after two postal reminders, which gave a response rate of 62.1%. Of these 2155 people who completed the questionnaires, 576 subjects were diagnosed as having had rheumatic disease at the time of the study (4). The data collected from the remaining 1579 healthy controls were used in this study. The study was performed in accordance with the principles of the Declaration of Helsinki, and the protocols were approved by the institutes' Ethics Committees.

Measurements and instruments

The patients were administered a comprehensive questionnaire covering sociodemographic and disease-related variables. The background sociodemographic variables were age, gender, educational level, marital status, and the time since the onset of pain. Educational level was divided into three categories on the basis of the Italian school system: 1=primary school, 2=secondary school, and, 3=high school or uni-

versity. Marital status was recorded as 1=living with someone, and 0=living alone. The patients' body mass index (BMI) was calculated as weight in kilograms divided by the square of the height in metres (kg/m^2). The presence of comorbidities was assessed by considering nine specific conditions: hypertension, myocardial infarction, lower extremity arterial disease, major neurological problems, diabetes, irritable bowel syndrome or gastritis or reflux, chronic respiratory disease, kidney disease, and poor vision. The disease-related characteristics included the following parameters or variables: an 11-numbered circular VAS format for pain, fatigue, sleep disturbance and general health (GH); a tender point score (TPS) (30) and the Self-Assessment Pain Scale (SAPS). The VAS questions were "Please choose the number between 0 to 10 that best describes the average level of pain you have experienced in the past week (0=no pain; 10=pain as bad as it can be)"; "What number between 0 and 10 best describes the average level of fatigue you experienced last week (0=no fatigue; 10=fatigue as bad as it can be)?"; "Was a problem to sleep last week (0=no problem; 10=severe problem)?"; and "How would you describe your general health over last week (0=very good; 10=very bad)?". The tender point examination was carried out. The SAPS is derived from a self-reported pain extent score based on the modified list of the Regional Pain Scale (RPS) (31, 32) for non-articular sites. The SASP list cover the pain "experienced during last week" in 16 non-articular sites, with the patients being asked: "Please indicate below the amount of pain and/or tenderness you have experienced over the past seven days in each of the joints and body areas listed below. Please put an X in the box that best describes the pain or tenderness. Please be sure to mark both right and left sides separately." Below these instructions, a series of site descriptions were followed by 4 boxes labelled: 0=none, 1=mild, 2=moderate, and 3=severe. The scale scores range from 0 to 48 but, in order to integrate them into one scale, they are transformed into a scale of 0-10 (Fig. 1).



Nomogram

1=0.2 4=0.8 7=1.5 10=2.1 13=2.7 16=3.3 19=4.0 22=4.6 25=5.2 28=5.8 31=6.5 34=7.1 37=7.7 40=8.3 43=9.0 46=9.6
2=0.4 5=1.0 8=1.7 11=2.3 14=2.9 17=3.5 20=4.2 23=4.8 26=5.4 29=6.0 32=6.7 35=7.3 38=7.9 41=8.5 44=9.2 47=9.8
3=0.6 6=1.3 9=1.9 12=2.5 15=3.1 18=3.8 21=4.4 24=5.0 27=5.6 30=6.3 33=6.9 36=7.5 39=8.1 42=8.8 45=9.4 48=10

Fig. 1. The Self-Assessment Pain Scale (SAPS).

Questionnaires

We used the well-validated, self-administered SF-36 questionnaire to document the burden of FM and RA on HRQL. The SF-36 general health questionnaire is a generic instrument whose scores are based on the responses to individual questions divided into eight scales. The SF-36 has been validated for use in Italy (25) and can be completed within 15 minutes by most people. Its creators have also developed algorithms to calculate two psychometrically based summary measures: a physical and a mental component summary score (PCS and MCS) (33).

Statistical analysis

Descriptive statistics are given as mean values and standard deviations (SD), 95% confidence intervals (CIs) for the mean values of continuous data, and percentages for absolute counts. Between-group comparisons were made using chi-squared test for categorical variables and analysis of variance (ANOVA) for continuous variables. Standardised difference scores (the s-score or normal score) were also calculated by subtracting the mean scores of the patients from the mean scores of the general population, and dividing these deviations by each scale's standard deviation in the general population. The standardised s-scores are rescaled scores with a population average of 0 and a standard deviation of 1, and were interpreted using Cohen's effect size index in which 0.2 refers to a small difference, 0.5 a moderate difference, and 0.8 or more a large difference (34). A set of multivariable linear regression models were constructed to adjust for factors potentially associated with a poor HRQL in FM patients. The covariates chosen *a priori* included gender (0=male; 1=female); age (as a continuous variable); disease duration (years from disease onset as a continuous variable); BMI (as a continuous variable), educational level (years of education as a continuous variable); and the presence of the nine separate comorbid conditions. All of these factors were then entered simultaneously as covariates in multiple regression models in which the SF-36 PCS and MCS were dependent variables. As multiple comparisons increase the risk of type 1 errors, the level of statistical significance was set at 0.01. All of the data were processed and analysed using SPSS software (Windows release 11.0; SPSS Inc., Chicago, Illinois, USA), and MedCalc®, version 9.5.1 for Windows XP.

Results

Demographic and clinical data

Table I shows the demographic and disease characteristics of the patients and the general population. There was no significant difference in the distribution of age and gender between the FM and RA groups (mean age ±SD) 52.1±10.8 *vs*. 53.9±12.9 years). Mean symptom duration was longer in the FM group (10.5±9.7 years), but the difference was not significant (p=0.07). More than half of the patients in both groups reported comorbidities, the most prevalent of which were hypertension, heart diseases, gastrointestinal condi-

Table I. Demographic characteristics of patients with fibromyalgia syndrome (FM), rheumatoid arthritis (RA) and the general population.

	Fibromyalgia syndrome (n=380)	Rheumatoid arthritis (n=693)	General population (n=1579)
Women (%)	92.4	90.9	50.2
Age (years)			
mean (±SD)	52.1 (10.8)	53.9 (12.9)	55.2 (19.2)
Disease duration			
mean (±SD)	10.5 (9.7)	9.8 (8.2)	NA
Educational level, %			
primary school	41.2	51.2	58.8
secondary school	40.9	31.8	26.5
high school/university	17.9	17.0	14.7
No of comorbidities, %			
0	49.6	45.1	34.7
1	37.2	26.6	33.5
2	8.4	19.9	7.1
3	2.6	4.9	4.4
4	2.2	3.1	1.3

tions and chronic respiratory diseases. In comparison with the general population, there was a significantly higher prevalence of cardiovascular disorders ($p<0.01$), chronic pulmonary disease ($p<0.02$) and gastrointestinal diseases ($p<0.01$). The FM patients reported significantly greater levels of fatigue (7.4±4.3 *vs*. 4.3±2.2; $p<0.001$) and sleep disturbance (6.9±2.2 *vs*. 4.3±2.1; $p<0.001$) than the RA patients.

Self-reported health status

In comparison with the general population, the FM patients showed significant impairment in relation to all of the eight scales of the SF-36 ($p<0.0001$), as well as the physical and mental component summary scores (PCS and MCS) ($p<0.0001$) (Table II). Generally, they reported relatively greater deficits in the scales that primarily measure mental health (i.e. mental health, role limitations due to emotional health, social functioning, and vitality) than in those measuring functional disability (*i.e*. physical functioning, and role limitations due to physical function). There were significant differences between men and women only in the FM group, with women reporting worse health in relation to role limitations due to physical function ($p=0.01$), bodily pain ($p=0.022$) and general health ($p=0.03$); there were no differences in the remaining scales. The mean PCS and MCS of the FM patients were 38.5 (SD=6.9) and 32.8 (SD=10.9), whereas those of the RA patients were 33.5 (SD=6.4) ($p<0.01$) and 40.2 (SD=11.9) ($p<0.001$). Figure 2 shows the patients' quality of life patterns expressed as standardised s-scores (the difference in the number of standard deviations from the population mean). The dimensions typically affected by FM were vitality (s-score -1.61), mental health (s-score -1.46) and general health (s-score -1.47), whereas physical functioning (s -score -1.63) and role limitations due to physical function (s -score -0.94) were more impaired in the RA patients; the bodily pain scores were similar in the two groups (s - scores -2.12 and -1.91). Overall, the PCS was lower than the MCS in the RA patients (s -scores -1.80 *vs*. -0.62), but the two scores were similar in the FM patients (s -scores -1.20 *vs*. -1.08).

Factors associated with a poor health-related quality of life

Multiple regression models were constructed to adjust for the factors potentially associated with a poor HRQL in the FM group. The covariates chosen *a priori* included the background sociodemographic variables, disease-related characteristics, and the presence of comorbid conditions, all of which

Table II. Mean (SD) and 95% CI (confidence intervals) SF-36 scores in FM and RA patients and the general population*.

	Groups								
	Fibromyalgia (n=380)			Rheumatoid arthritis (n=693)			General population (n=1579)		
	Mean	SD	95% CI	Mean	SD	95% CI	Mean	SD	95% CI
PF	50.170	17.406	48.415 - 51.926	44.067	20.476	42.539 - 45.594	82.498	19.980	81.882 - 83.954
RP	38.400	17.050	36.680 - 40.120	31.827	16.834	30.572 - 33.083	73.126	36.740	71.343 - 74.910
BP	32.349	10.395	34.741 - 36.838	39.039	17.685	31.070 - 33.708	78.501	20.840	77.517 - 79.625
GH	35.973	11.326	34.830 - 37.115	44.807	19.544	43.349 - 46.265	60.132	18.109	59.268 - 60.975
MH	39.099	15.973	37.488 - 40.710	51.307	22.933	49.597 - 53.017	63.616	16.841	62.864 - 64.507
RE	39.205	26.440	36.537 - 41.872	40.538	40.953	37.484 - 43.593	72.110	38.122	70.166 - 73.954
VT	40.138	12.322	38.895 - 41.381	43.369	20.633	41.830 - 44.908	71.607	20.090	70.615 - 72.698
SF	40.407	13.367	39.058 - 41.755	47.534	21.153	45.957 - 49.112	56.829	15.401	56.167 - 57.710
SF-36 PCS	38.557	6.890	37.861 - 39.252	33.547	6.427	33.067 - 34.026	49.648	8.947	49.231 - 50.165
SF-36 MCS	32.835	10.861	30.220 - 35.411	40.191	11.914	39.302 - 41.079	45.610	8.427	43.144 - 46.157

*All differences between patients and the general population were significant at $p<0.0001$.

PF: physical functioning; RP: role function - physical aspect; BP: bodily bain; GHP: general health perception; MH: mental health; RE: role function - emotional aspect; VT: vitality; SF: social functioning; PCS: physical component summary scores; MCS: mental compomnent summary score.

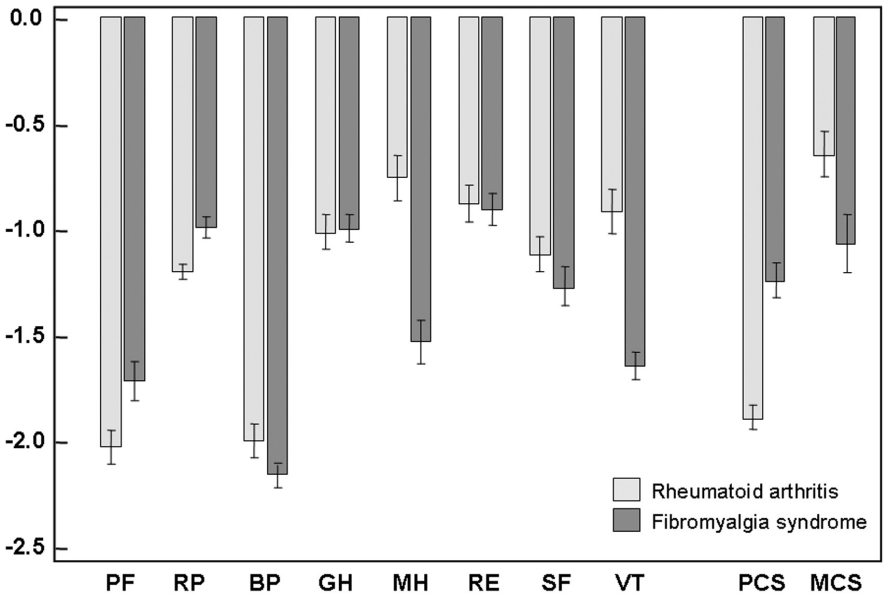


Fig. 2. Standard difference scores (s-scores) in fibromyalgia and rheumatoid arthritis patients. The values of the s-scores were interpreted using Cohen's effect size index, in which 0.2 refers to a small difference, 0.5 a moderate difference, and 0.8 or more a large difference. PF: physical functioning; RP: role function - physical aspect; BP: bodily pain; GH: general health perception; MH: mental health; RE: role function - emotional aspect; SF: social functioning; VT: vitality; PCS: physical component summary score; MCS: mental component summary score.

were entered as covariates in multiple regression models in which the SF-36 PCS and MCS (instead of the individual subscales) were the dependent variables. The physical component of the SF-36 was influenced by the widespread pain (the SAPS score) (p<0.0001), educational level (p=0.0017), and the BMI (p=0.007) (Table III), and the mental component was associated with the widespread pain (the SAPS score) (p=0.0005), sleep abnormalities (p=0.0033), physical function (p=0.015), fatigue (p=0.029), gender (p=0.014) and a low educational level (p=0.0007) (Table IV).

Table III. Factors influencing physical function (SF-36 PCS): a multiple regression model.

Independent variables	Coefficient	Std. error	t	*p*-value
(Constant)	36.1459			
Gender	-0.5362	0.3400	-1.577	0.1165
Age	-0.01589	0.05859	-0.271	0.7865
Body Mass Index (BMI)	-0.2539	0.09306	-2.729	0.0070
Educational level	-0.4465	0.1402	-3.185	0.0017
Disease duration	-0.1033	0.1079	-0.957	0.3398
Number of comorbidities	-0.5400	0.4505	-1.199	0.2321
Anxiety	0.1816	0.2971	0.611	0.5418
Depression	0.06175	0.2040	0.303	0.7624
Fatigue	-0.3994	0.2560	-1.560	0.1204
Sleep abnormality	0.3778	0.2203	1.715	0.0880
Widespread pain (by SAPS)	0.3935	0.04985	7.894	<0.0001

Analysis of variance

Source	DF	Sum of squares	Mean square
Regression	10	3875.7570	387.5757
Residual	184	5898.0379	32.0546
F-ratio			12.0911
Significance level			p<0.001

Discussion

Studies performed throughout the world have shown that people with FM have a remarkably consistent pattern of health impairment (5, 9, 12, 15, 35, 36). The main aims of this cross-sectional study were to compare self-reported HRQL in patients with FM with that in patients with RA and healthy subjects, investigate the associations between health status and clinical and sociodemographic factors in FM patients, and estimate the burden of FM by controlling for normal variations in health status in the general population.

Our working hypothesis was that the patients with FM would report worse health than the RA patients and the general population, especially in terms of mental health. The SF-36 has been advocated as a generic measure of HRQL that can be widely used in FM (9, 17, 37, 38). In order to provide a broader interpretative context for understanding the health burden of FM, we compared the SF-36 scores of FM patient with Italian norms (26) (Table II).

To the best of our knowledge, only three studies have compared the HRQL of RA and FM patients using the SF-36 (17, 39, 40). Our data confirm without exception that, in comparison with the general population, FM patients are significantly impaired in relation to all eight scales of the SF-36 and both component summary scores. The dimensions typically affected by FM were mental health, social functioning, vitality, pain and general health, a pattern that is consistent with the core features of FM (3, 18, 41), whereas physical functioning and role limitations due to physical function were more impaired in RA. Standardisation of the mean SF-36 scores revealed that the MCS of the FM patients was approximately 1 standard deviation (SD) below the mean of the general population, and the PCS was nearly 2 SD below. This resembles the pattern of restrictions generally found in patients with musculoskeletal disorders (13, 14, 26, 39-44) or other chronic conditions such as congestive heart failure, chronic obstructive pulmonary disease, hypertension, recent acute myocardial infarction, type II diabetes and malignancy (16, 45, 46). It

Table IV. Factors influencing mental function (SF-36 MCS): a multiple regression model.

Independent variables	Coefficient	Std. error	t	*p*-value
(Constant)	33.2801			
Sex	-0.2839	0.1096	-2.426	0.0145
Age	-0.06346	0.09623	-0.659	0.5104
Body Mass Index (BMI)	0.2242	0.1533	1.462	0.1454
Educational level	0.7835	0.2283	3.432	0.0007
Disease duration	0.2543	0.1745	1.457	0.1467
Number of comorbidities	1.0207	0.7397	1.380	0.1693
Physical function	-0.9857	0.4014	-2.456	0.0150
Fatigue	-0.8983	0.4081	-2.201	0.0290
Sleep abnormality	-1.0551	0.3540	-2.981	0.0033
Widespread pain (by SAPS)	0.8870	0.2574	3.608	0.0005

Analysis of variance

Source	DF	Sum of squares	Mean square
Regression	9	6846.6483	760.7387
Residual	185	16185.4556	87.4889
F-ratio			8.6953
Significance level			$p<0.001$

has been previously reported that mental health summary scores are lower in patients with FM than in patients with other painful musculoskeletal conditions (17). Most studies of psychological distress in FM and RA patients have reported higher somatisation rates in the former (17). Raphael *et al*. found that the risk of lifetime anxiety disorders (particularly obsessive compulsive disorder) seemed to be approximately five times higher in women with FM than in the general population (47). In addition, a number of studies have highlighted the important contribution of local pain and negative pain affect to clinical pain intensity, and this underlines the multidimensional nature of clinical pain intensity in FM patients (48, 49). Furthermore, negative mood also seems to contribute to the persistence of chronic widespread pain (50, 51).

We also evaluated the influence of the factors associated with a greater disease impact, the most important of which proved to be clinical rather than sociodemographic, which is in line with the biopsychosocial model (52). However, given the study's cross-sectional design, it is not possible to exclude reversed directionality and so no causative assumptions can be made.

Various models have been proposed to explain how the interaction of chronic pain and intrinsic or extrinsic factors may lead to chronic disability (49, 53, 54). FM patients consider widespread pain, fatigue and unrefreshing sleep to be the factors that most significantly limit work performance (3, 12, 13, 18), and our findings are consistent with those of previously published clinic studies (55). Multivariable analyses showed that widespread pain (the SAPS score) was the most useful predictor of self-reported disability and the psychosocial dimension. Pain is one of the most frequently reported, bothersome and disabling symptoms (the perceived pain may be more severe than in RA) (56), and pain behaviours are the most important predictors of treatment response and financial burden in developed countries (18, 55). In comparison with adults without frequent pain, patients are 2.6 times more likely to report poor overall health if they experience pain several times a week, and 11.8 times more likely to do so if pain is experienced every day (56). In addition to be the cardinal symptom of FM, pain is also one of the strongest predictors of fatigue, and daily increases in pain are related to daily increases in fatigue, including the following day (57). Fatigue is a subjective feeling of low vitality that disrupts daily functioning and, although complaints of fatigue are common to nearly every major chronic illness and especially prevalent in other rheumatic disorders (58), FM patients seem to have higher overall fatigue levels and experience greater daily variability than those in other pain groups (57). The findings of sleep studies suggest that 70-90% of FM patients complain of non-restorative sleep, which accentuates pain, musculoskeletal stiffness and fatigue (1, 2, 47, 57).

A number of studies have focused exclusively on the health of female patients with FM (38, 53, 57, 59), but findings of gender differences in FM patients are inconsistent: some studies have found that women experience poorer health than men (35), but others have not (36). We found slightly significant between-gender differences in role limitations due to physical function, bodily pain and general health, with women reporting worse health than men.

There are limited published data concerning the relationship between BMI and chronic pain. It has been found that an increased BMI is associated with impaired physical function and working capacity, pain, fatigue and a poor quality of life in the general population (60-64), but little is known about the effects of obesity on the functional and psychological measures of the quality of life in patients with FM. Yunus *et al*. (65) found a significant positive correlation between BMI and age, and a negative correlation between BMI and educational level. The Health Assessment Questionnaire (HAQ) score is significantly correlated with BMI, and there was a trend towards a correlation with fatigue and the number of tender points (65). In line with these findings, Neumann *et al*. (66) found that BMI negatively correlates with the HRQL and tenderness threshold of FM patients, and positively correlated with physical dysfunctioning and tender point counts. Our cross-sectional study confirmed these results, as the SF-36 physical functioning score was negatively associated with BMI.

Not surprisingly, we found that perceived mental and physical health was influenced by educational level. Despite its recognised importance in health outcomes, educational level has only infrequently been investigated as predictors of HRQL in FM (35, 53, 55). It has been reported that the number of years of formal education correlate with the presence of chronic pain in the community (67, 69).

We used a large database of FM patients routinely seen in outpatient rheumatology clinics and practices. The strength of this approach is that it allows direct comparisons between one of the most frequent inflammatory rheumatic diseases and healthy subjects, but one of the weaknesses is that the health status data were based on self-reports. However, as no objective clinical markers of FM are used in routine clinical practice, clinical decisions depend on the patients' self-reported symptoms, treatment side effects and their combined impact on health. The centrality of the patients' point of view has also been underlined by clinical research (14, 15, 22). Another weakness is that it was not possible to use specific questionnaires for the different diseases. Finally, the self-selected nature of the study participants limits the generalisability of the findings to the FM population as a whole as they may have been more motivated; however, our sample was representative of the FM population in terms of symptoms.

In conclusion, people with FM report that the disease has a considerable impact on their HRQL. Our findings indicate that the level of perceived HRQL in patients with FM seems to be explained more by their mental health than by their physical condition. Further research is needed to document the impact on the use of healthcare resources by patients diagnosed as having "fibromyalgia". In this respect, the FM-specific internet survey register developed by the Italian Fibromyalgia Network (IFN) (70) in conjunction with a task force of experts could help to identify long-term health status, function and health service use in such patients, thus providing a global perspective and enabling the more effective use of healthcare resources.

References

1. WOLFE F, ROSS K, ANDERSON J *et al.*: The prevalence and characteristics of fibromyalgia in the general population. *Arthritis Rheum* 1995; 38: 19-28.
2. MEASE P: Fibromyalgia syndrome: review of clinical presentation, pathogenesis, outcome measures, and treatment. *J Rheumatol* 2005; 32 (Suppl. 75): 6-21.
3. MEASE P, ARNOLD LM, BENNETT R *et al.*: Fibromyalgia syndrome. *J Rheumatol* 2007; 34: 1415-25.
4. SALAFFI F, DE ANGELIS R, GRASSI W, MArche Pain; Prevalence INvestigation Group (MAPPING) study: Prevalence of musculoskeletal conditions in an Italian population sample: results of a regional community-based study. I. The MAPPING study. *Clin Exp Rheumatol* 2005; 23: 819-28.
5. MAS AJ, CARMONA LM, VALVERDE M, AND THE EPISER STUDY GROUP: Prevalence and impact of fibromyalgia on function and quality of life in individuals from the general population: results from a nationwide study in Spain. *Clin Exp Rheumatol* 2008; 26: 519-26.
6. HUGHES G, MARTINEZ C, MYON E *et al.*: The impact of a diagnosis of fibromyalgia on health care resource use by primary care patients in the UK: an observational study based on clinical practice. *Arthtitis Rheum* 2006; 54: 177-83.
7. SARZI-PUTTINI P, ATZENI F, FIORINI T *et al.*: Validation of an Italian version of the Fibromyalgia Impact Questionnaire (FIQ-I). *Clin Exp Rheumatol* 2003; 21: 459-64.
8. KIVIMÄKI M, LEINO-ARJAS P, KAILA-KANGAS L *et al.*: Increased sickness absence among employees with fibromyalgia. *Ann Rheum Dis* 2007; 66: 65-9.
9. NEUMANN L, BERZACK A, BUSKILA D: Measuring health status in Israeli patients with fibromyalgia syndrome and widespread pain and healthy individuals: utility of the Short Form-36 Item Health Survey (SF-36). *Sem Arthritis Rheum* 2000: 29: 400-8.
10. MCBETH J, SYMMONS DP, SILMAN AJ *et al.*: Musculoskeletal pain is associated with a long-term increased risk of cancer and cardiovascular-related mortality. *Rheumatology* 2009;48:74-7.
11. OFLUOGLU D, BERKER N, GÜVEN Z *et al.*: Quality of life in patients with fibromyalgia syndrome and rheumatoid arthritis. *Clin Rheumatol* 2005; 24: 490-2.
12. HAWLEY DJ, WOLFE F: Pain, disability, and pain/disability relationships in seven rheumatic disorders: a study of 1,522 patients. *J Rheumatol* 1991; 18: 1552-7.
13. VERBUNT JA, PERNOT DHFM, SMEETS RJEM: Disability and quality of life in patients with fibromyalgia. *HQLO* 2008; 6: 8.
14. YILMAZ, F, SAHIN, F. ERGOZ E *et al.*: Quality of life assessments with SF 36 in different musculoskeletal diseases. *Clin Rheumatol* 2008; 27: 327-32.
15. HOFFMAN DL, DUKES EM: The health status burden of people with fibromyalgia: a review of studies that assessed health status with the SF-36 or the SF-12. *Int J Clin Pract* 2008; 62: 115-26.
16. LOZA E, ABÀSOLO L, JOVER JA, AND THE EPISER STUDY GROUP: Burden of disease across chronic diseases: a health survey that measured prevalence, function, and quality of life. *J Rheumatol* 2008; 35: 159-65.
17. BIRTANE M, KAAN UZUNCA K, TAŞTEKIN N *et al.*: The evaluation of quality of life in fibromyalgia syndrome: a comparison with rheumatoid arthritis by using SF-36 Health Survey. *Clin Rheumatol* 2007; 26: 679-84.
18. MEASE PJ, ARNOLD LM, BENNETT R *et al.*: Identifying the clinical domains of fibromyalgia: contributions from clinician and patient delphi exercises. *Arthritis Rheum* 2008; 15: 952-60.
19. RAO SG, BENNETT RM: Pharmacological therapies in fibromyalgia. *Best Pract Res Clin Rheumatol* 2003; 17: 611-27.
20. DWORKIN RH, TURK DC, WYRWICH KW *et al.*: Interpreting the clinical importance of treatment outcomes in chronic pain clinical trials: IMMPACT recommendations. *J Pain* 2008: 9: 105-21.
21. BERGER A, DUKES E MARTIN S, EDELSBERG J *et al.*: Characteristics and healthcare costs of patients with fibromyalgia syndrome. *Int J Clin Pract 2007: 61; 1498-1508*.
22. TESTA MA, SIMONSON DC: Assessment of quality of life outcomes. *N Engl J Med* 1996; 28: 835-40.
23. PATRICK DL. DEYO RA: Generic and disease specific measures in assessing health status and quality of life. *Med Care* 1989; 27: 217-232.
24. WARE J, SHERBOURNE CD: The MOS 36-item short form health survey (SF-36). 1. Conceptual frame-work and item selection. *Med Care* 1992; 30: 473-81.
25. APOLONE G, MOSCONI P: The Italian SF-36 Health Survey: translation, validation and norming. *J Clin Epidemiol* 1998; 51: 1025-36.
26. SALAFFI F, DE ANGELIS R, STANCATI A *et al.*: MArche Pain; Prevalence INvestigation Group (MAPPING) study: Health-related quality of life in multiple musculoskeletal conditions: a cross sectional population based epidemiological study. II. The MAPPING study. *Clin Exp Rheumatol* 2005; 23: 829-39.
27. SALAFFI F, CAROTTI M, STANCATI A *et al.*: Health-related quality of life in older adults with symptomatic hip and knee osteoarthritis: a comparison with matched healthy controls. *Aging Clin Exp Res* 2005; 17: 255-63.
28. WOLFE F, SMYTHE HA, YUNUS MB *et al.*: The American College of Rheumatology 1990 criteria for the classification of fibromyalgia. Report of the Multicenter Criteria Committee. *Arthritis Rheum* 1990; 33: 160-72.
29. ARNETT FC, EDWORTHY SM, BLOCH DA *et al.*: The American Rheumatism Association 1987 revised criteria for the classification of rheumatoid arthritis. *Arthritis Rheum* 1988; 31: 315-24.
30. SINCLAIR D, STARZ TW, TURK DC: The Manual Tender Point Survey. National Fibromyalgia Association Web site. (Internet). Available from http://fmaware.org/doctor/tenderpt.htm.
31. WOLFE F: Pain extent and diagnosis: development and validation of the Regional Pain Scale in 12,799 patients with rheumatic disease. *J Rheumatol* 2003; 30: 369-78.
32. SALAFFI F, SARZI-PUTTINI P, GIROLIMETTI R *et al.*: Development and validation of the self-administered Fibromyalgia Assessment Status: a disease-specific composite measure for evaluating treatment effect. *Arthritis Res Ther* 2009; 11: R125.
33. WARE J, KOSINSKI M, BAYLISS M *et al.*: Comparison of methods for the scoring and statistical analysis of SF-36 health profile

and summary measures: summary of results from the Medical Outcomes Study. *Med Care* 1995; 4: AS264-79.
34. ROSENNTHAL R: Parametric measures of effect size. *In* COOPER H, HEDGES LV (Eds.) *The Handbook of Research Synthesis*. Volume 16. Russel Sage Foundation, New York 1994: 231-44.
35. UBAGO LINARES MC, RUIZ-PÉREZ I *et al*.: Analysis of the impact of fibromyalgia on quality of life: associated factors. *Clin Rheumatol* 2008; 27: 613-9.
36. LOOS-AYAV C, CHAU N, RIANI C *et al*.: Functional disability in France and its relationship with health-related quality of life-a population-based prevalence study. *Clin Exp Rheumatol* 2007; 25: 701-8.
37. BUSKILA D, NEUMANN L, ALHOASHLE A *et al*.: Fibromyalgia syndrome in men. *Semin Arthritis Rheum* 2000; 30: 47-51.
38. REISINE S, FIFIELD J, WALSH S *et al*.: Employment and quality of life outcomes among women with fibromyalgia compared to healthy controls. *Women Health* 2004; 39: 1-19.
39. WALKER EA, KEEGAN D, GARDNER G *et al*.: Psychosocial factors in fibromyalgia compared with rheumatoid arthritis: psychiatric diagnoses and functional disability. *Psychosom Med* 1997; 59: 565-71.
40. STROMBECK B, EKDAHL C, MANTHORPE R *et al*.: Health-related quality of life in primary Sjögren's syndrome, rheumatoid arthritis and fibromyalgia compared to normal population data using SF-36. *Scand J Rheumatol* 2000; 29: 20-8.
41. BENNETT RM, JONES J, TURK DC *et al*.: An internet survey of 2,596 people with fibromyalgia. *BMC Musculoskeletal Disorders* 2007; 8 :27.
42. PICAVET HS, HOEYMANS N: Health related quality of life in multiple musculoskeletal diseases: SF-36 and EQ-5D in the DMC3 study. *Ann Rheum Dis* 2004; 63: 723-9.
43. LAPSLEY HM, MARCH LM, TRIBE KL *et al*.: Living with rheumatoid arthritis: expenditures, health status, and social impact on patients. *Ann Rheum Dis* 2002; 61: 818-21.
44. CHORUS AM, MIEDEMA HS, BOONEN A *et al*.: Quality of life and work in patients with rheumatoid arthritis and ankylosing spondylitis of working age. *Ann Rheum Dis* 2003; 62: 1178-84.
45. BURCKHARDT CS, CLARK SR, BENNETT RM: Fibromyalgia and quality of life: a comparative analysis. *J Rheumatol* 1993; 20: 475-9.
46. KAPLAN RM, SCHMIDT SM, CRONAN TA: Quality of well-being in patients with fibromyalgia. *J Rheumatol* 2000; 27: 785-9.
47. RAPHAEL KG, JANAL MN, NAYAK S *et al*.: Psychiatric comorbidities in a community sample of women with fibromyalgia. *Pain* 2006; 124: 117-25.
48. OFFENBACHER M, GLATZEDER K, ACKENHEIL M: Psychological distress and depression in male and female patients with fibromyalgia. *Arthritis Rheum* 1998; 41: 255.
49. GEISSER ME, ROTH RS, THEISEN ME *et al*.: Negative affect, self-report of depressive symptoms, and clinical depression: relation to the experience of chronic pain. *Clin J Pain* 2000; 16: 110-20.
50. MCBETH J, MACFARLANE GJ, BENJAMIN S *et al*.: Features of somatization predict the onset of chronic widespread pain: results of a large population-based study. *Arthritis Rheum* 2001; 44: 940-6.
51. NICASSIO PM, MOXHAM EG, SCHUMAN CE *et al*.: The contribution of pain, reported sleep quality, and depressive symptoms to fatigue in fibromyalgia. *Pain* 2002; 100: 271-9.
52. ENGEL GL: The need for a new medical model: a challenge for biomedicine. *Science* 1977; 196: 129-36.
53. RUTLEDGE DN, JONES K, JONES CJ: Predicting high physical function in people with fibromyalgia. *J Nurs Scholarship* 2007; 39: 319-24.
54. STAUD R, VIERCK CJ, ROBINSON ME *et al*.: Overall fibromyalgia pain is predicted by ratings of local pain and pain-related negative affect – possible role of peripheral tissues. *Rheumatology* 2006; 45: 1409-15.
55. WOLFE F, RASKER JJ: The Symptom Intensity Scale, fibromyalgia, and the meaning of fibromyalgia-like symptoms. *J Rheumatol 2006; 33: 2291-9*.
56. MANTYSELKA PT, TURUNEN JH, AHONEN RS *et al*.: Chronic pain and poor self-rated health. *JAMA* 2003; 290: 2435-42.
57. ZAUTRA AJ, FASMAN R, PARISH BP *et al*.: Daily fatigue in women with osteoarthritis, rheumatoid arthritis, and fibromyalgia. *Pain* 2007; 128: 128-35.
58. BELZA BL: Comparison of self-reported fatigue in rheumatoid arthritis and controls. *J Rheumatol* 1995; 22: 639-43.
59. PÖYHÏA R, DA COSTA D, FITZCHARLES M-A: Previous pain experience in women with fibromyalgia and inflammatory arthritis and nonpainful controls. *J Rheumatol* 2001; 28: 1888-91.
60. BUSKILA D, NEUMANN L, FRENKEL A *et al*.: Increased nonarticular tenderness in obese women. *Pain Clin* 2002; 13: 313-8.
61. COAKLEY EH, KAWACHI I, MANSON JE *et al*.: Decline in physical functioning with increasing body weight among middle-aged and older women. *Int J Obes Relat Metab Disord* 1998; 22: 958-65.
62. FINE JT, COLDITZ GA, COAKLEY EH *et al*.: A prospective study of weight change and health-related quality of life in women. *JAMA* 1999; 282: 2136-42.
63. NILSSON PM, KANDELL-COLLEN A, ANDERSSON HI: Blood pressure and metabolic factors in relation to chronic pain. *Blood Press* 1997; 6: 294-8.
64. PRADALIER A, WILLER JC, BOUREAU F *et al*.: Relationship between pain and obesity: an electrophysiological study. *Physiol Behav* 1981; 27: 961-4.
65. YUNUS MB, ARSLAN S, ALDAG JC: Relationship between body mass index and fibromyalgia features. *Scand J Rheumatol* 2002; 31: 27-31.
66. NEUMANN L, LERNER E, GLAZER Y *et al*.: A cross-sectional study of the relationship between body mass index and clinical characteristics, tenderness measures, quality of life, and physical functioning in fibromyalgia patients. *Clin Rheumatol* 2008; 27; 1543-7.
67. BLYTH FM, MARCH LM, BRNABIC AJ *et al*.: Chronic pain in Australia: a prevalence study. *Pain* 2001; 89: 127-34.
68. RUSTØEN T, WAHL AK, HANESTAD BR *et al*.: Prevalence and characteristics of chronic pain in the general Norwegian population. *Eur J Pain* 2004; 8: 555-65.
69. CALLAHAN LF, SMITH WJ, PINCUS T: Self-report questionnaires in five rheumatic diseases: comparisons of health status constructs and associations with formal education level. *Arthritis Care Res* 1989; 2: 122-31.
70. SARZI-PUTTINI P, ATZENI F, SALAFFI F *et al*., on behalf of the Italian Fibromyalgia network (IFINET): *Registro Nazionale AISF. www.registroaisf.it*.