The correlation between the ACR questionnaire and fitness for work of fibromyalgia patients

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ABSTRACT

Objective. *Fibromyalgia (FM) is a central pain syndrome characterised by widespread pain, fatigue, unrefreshing sleep, memory impairment and cognitive changes, predominantly in women, and is a cause for disability and frequent sick leave. So far, no assessment has been made of the use of the American College of Rheumatology (ACR) 2010 questionnaire in the fitness for work (FFW) assessment of FM patients. To assess the correlation between the severity of FM as measured by the ACR questionnaire and other parameters and FFW.*

Methods. *We conducted a retrospective cross-sectional study involving women with FM who had their FFW assessed at an occupational health clinic between 2014-2018. The ACR questionnaire was completed during the medical assessment.*

Results. *We examined 60 files of women, mean age 48.8 years. Absolute loss of working capacity (ALWC) was calculated in relation to a standard 8-hour workday, while relative loss of working capacity (RLWC) was based on the patient's actual appointment percentage before the examination. The average ALWC determined by the occupational physicians was 59% ± 33%. Age group correlated significantly with ALWC (correlation coefficient = 0.03, p<0.05). The Part 2b symptoms (0-41) also correlated significantly with ALWC (mean ± SD 21.8±5.6, correlation coefficient = 0.23, p<0.05). Medical treatment correlated significantly with RLWC (correlation coefficient = 0.02, p<0.05).*

The rate of disability was high compared to what was reported in other studies. The correlation between different parts of the ACR questionnaire and disability demonstrated that symptom severity is a predictor of loss of working capacity.

Conclusion. *When performing a FFW assessment of FM patients, physicians may use the ACR questionnaire, since FFW correlates with its score. We assume that patients who experience more pain visit their physicians more often and consume more analgesics.*

Introduction

Fibromyalgia (FM) is present in as much as 2-8% of the population (1). It is characterised by chronic musculoskeletal pain and tenderness. Beside the main symptom of widespread pain, the FM syndrome is manifested by neuropsychological symptoms such as fatigue, unrefreshing sleep, impaired memory and concentration, anxiety, and depression (2). The FM syndrome can have negative implications on one's personal and social life and lead to significant public expenses on healthcare and work leave (3).

The diagnostic criteria for FM were originally published in 1990 and included tenderness on pressure in at least 11 of 18 defined anatomic sites (tender points) with the presence of widespread pain (4). However, after a while it became clear that patients with FM have a broad complex of somatic symptoms as well as cognitive changes (1). Therefore, new diagnostic criteria were developed in 2010. Those criteria included additional symptoms and a symptom severity scale, and have been approved by the American College of Rheumatology (ACR). The diagnostic variables were Widespread Pain Index (WPI) and Symptom Severity Score (SSS) (5).

The main purpose of the fitness for work (FFW) evaluation is to assess the extent to which an employee's functional capacity, in light of his/her medical condition, meets the job requirements; in other words, to determine whether a patient is fit to perform their work duties without risk to themselves or others. Such a decision requires a detailed understanding of the nature of the patients' work and of their physical and mental condition. The medical assessment is comprised of an evaluation of functional abilities and a risk assessment of workplace exposure to hazards in view of the patient's medical history and underlying disorders. Detailed examination of comorbidities and pharmacological and complementary treatments is essential for FFW assessment (7, 8); in FM in particular, use of analgesics is very important and indicative of the severity of the condition. There are several groups of typical medications: duloxetine and pregabalin are effective treatments for pain in FM (6), but in severe cases they are not enough. When a patient combines opioids or cannabis, we see it as a sign that they seek stronger analgetic effect. Pregabalin alone is a mild treatment for minor cases.

Unlike other medical fields, which have many available methods and tools for assessing disease severity, one of the problems in assessing the severity of FM is the lack of an objective and accurate physiological index. For this reason, questionnaires are used to help assess the severity of a patient's condition. The decision is often difficult to make and includes ethical, economic, and legal considerations (7-9).

Determination of disability in FM depends on various clinical and non-clinical parameters such as pain, fatigue, decreased muscle strength, type of work and employer, etc. Some of the patients are suffering from severe pain, while some have major cognitive symptoms, and in others the disease manifests in the form of gastrointestinal problems or mood swings. The great variability of symptoms and manifestations make the awareness of FM low even among medical professionals, and it has not been recognised as a proper disease by most healthcare systems in the world (10). For these reasons, approximately 34% to 77% of FM patients continue to work even though their symptoms impair their working capacity (11-13).

The purpose of this study was to assess the correlation between the severity of FM as measured by the ACR questionnaire and the FFW evaluation performed by occupational physicians.

The study proposal was approved by the Maccabi Health Services Institutional Review Board on 11 March 2018, approval number 0116-117-BBL.

Methods

Study design

We performed a cross-sectional study which included women aged 18 and older with FM who had undergone FFW assessment at the Maccabi Health Services (MHS) occupational health clinics between 2014-2018. The ACR's 2010 FM Diagnostic Questionnaire (5) was completed by each patient as part of the medical visit and was available to the great variability of symptoms clinicians at the time of the FFW evaluation. Exclusion criteria were (i) patients who refused to complete the ACR questionnaire, and (ii) pregnant women. The main classification of FFW was completely unfit, partially fit, or fully fit for work.

Measurements

Baseline data included demographic, disease-related, and occupational information. Demographic information included gender and age. Vocational parameters included current work status (working/not working); occupational physical exertion level, estimated by metabolic equivalents (METs) units, *i.e.* unites that measure the level of exertion at work, with 1 meaning rest, 3-6 meaning moderate exertion and >6 meaning high exertion (14); and absolute and relative loss of working capacity.

Absolute loss of working capacity (ALWC) was calculated in relation to a standard 8-hour work day, while relative loss of working capacity (RLWC) was based on the patient's actual appointment percentage before the examination. Thus, if the patient previously used to work 4 hours a day, and the occupational physician determined she should not work more than 4 hours a day, the ALWC would be 50% (maximum 4 hours out of the standard 8), but the RLWC would be 0 (since the patient's actual appointment percentage would not have to be reduced).

Clinical variables included the diagnostic variables from the ACR questionnaire, which were reported in 3 parts according to the division of the questionnaire itself: Part 1 is the WPI (0 to 19 scale), which is a self-reported count of the painful areas out of the 19 specified in the Regional Pain Scale; Part 2a represents the severity score for 3 symptoms (fatigue, waking unrefreshed, and cognitive symptoms) (0 to 9 scale); and Part 2b includes 41 somatic symptoms which are scored on a 0 to 3 scale. The two categorical scores (2a and 2b) were summed to create the total Symptom Severity Score (SSS) (0 to 12 scale) (5). An example of the questionnaire is provided as an Appendix at the end of this paper. In addition, we counted the number of medical visits during the year before the FFW assessment. Pharmacological treatments included the type of drugs the patient was using, e.g. duloxetine, pregabalin, opioids etc. Comorbidities included BMI, psychiatric and rheumatologic diseases.

Statistical analysis

The first stage of statistical analysis included a description of the response variable (appointment percentage) and predictor variables using mean and SD for quantitative variables, and frequency and percentage for ordinal ones, as well as univariate analysis. The distribution of quantitative variables was examined using a histogram and the Kolmogorov-Smirnov test. Normally distributed variables were analysed using the t-test for two independent groups and One-Way ANOVA; variables that were not normally distributed were analysed using the Kruskal-Wallis and the Mann-Whitney U-tests. The correlation was examined using Pearson's correlation coefficient for normally distributed quantitative variables, and Spearman's correlation coefficient for non-normally distributed or ordinal variables.

The second stage of statistical analysis included multivariate analysis using multiple linear regression based on the distribution of the response variable (FFW). Statistical significance was assumed when the p-value was <0.05. The analyses were performed using SPSS v. 24 (SPSS inc., Chicago, IL, USA).

To confirm the hypothesis that the severity of the disease correlates with loss of working capacity, we assumed a 0.4 Pearson coefficient. A sample size of 50 subjects would give statistical power of 86% at a 5% significance level. The linear regression equation was created using the Stepwise method at 0.05 significance level.

Results

In the course of our study, we located 67 files of patients who had come to our occupational health clinic for FFW assessment. Four of the patients had been pregnant at the time of the assessment, and 3 were men, and they were excluded from the study. After that the final study cohort consisted of 60 women who met the study criteria. Out of those women, 37% (n=22) were found completely unfit for work, 58% (n=35) were found fit to work part time, and 5% (n=3) were found fit for full-time work.

The univariate analysis found no difference between the working and non-working groups (Table I). The average ALWC determined by the occupational physicians was 59% ± 33%. The meaning of 59% loss of working capacity is ability to work at no more than 41% full-time equivalent (*i.e.* less than half-time). In Table II we examined the correlation between various signs and symptoms of FM and absolute and relative loss of working capacity. Age group correlated significantly with ALWC (correlation coefficient = 0.03, $p<0.05$). The Part 2b symptoms (0-41) also correlated significantly with ALWC (mean ± SD 21.8±5.6, correlation coefficient = 0.23, $p<0.05$). The number of medical visits correlated significantly with both ALWC and RLWC (mean ± SD 18.2±6.9, correlation coefficient = 0.32, $p<0.05$, and 20.4±6.4, correlation coefficient = 0.31, $p<0.05$, respectively). Medical treatment (yes/no) correlated significantly with RLWC (correlation coefficient = 0.22, $p<0.05$).

We collected information about comorbidities: 29 patients (48%) did not have any comorbidities, 23 (38%) had psychiatric disorders, 6 (10%) suffered from rheumatologic diseases, and 2 patients (3%) had both. The only correlation that we could find was with psychiatric disease, because in the other groups the sample was too small. The rest of the correlations between other parameters (WPI, fatigue, waking unrefreshed, cognitive symptoms, SSS and METs) were not found to be statistically significant.

Table I. Differences between working and non-working groups. ACR and vocational parameters.

Variable	Working n=38 (63%) Mean ± SD	Non-working n=22 (37%) Mean ± SD	Total n=60 (100%) Mean ± SD	*p*
Age	47.9 ± 8.5	50.4 ± 9.1	48.8 ± 8.8	NS
BMI	**26.6 ± 4.9**	**26 ± 5.4**	**26.4 ± 5.1**	**NS**
WPI (0-19)	13.5 ± 3.6	14.9 ± 3.6	14 ± 3.6	NS
Waking unrefreshed (0-3)	2.6 ± 0.6	2.6 ± 0.6	2.6 ± 0.6	NS
Fatigue (0-3)	2.7 ± 0.5	2.8 ± 0.5	2.7 ± 0.5	NS
Cognitive symptoms (0-3)	2.1 ± 0.9	2.3 ± 0.9	2.2 ± 0.9	NS
SSS Part 2a (0-9)	7.6 ± 1.4	7.7 ± 1.9	7.6 ± 1.7	NS
SSS Part 2b (0-3)	2.2 ± 0.5	2.4 ± 0.6	2.2 ± 0.5	NS
SSS 2a+2b (0-12)	9.8 ± 1.6	10.1 ± 1.9	10.0 ± 1.8	NS
Part 2b – symptoms (0-41)	19.6 ± 6.8	21.8 ± 5.6	20.4 ± 6.4	NS
Working hours before examination	7.5 ± 1.6	6.9 ± 2.1	7.3 ± 1.8	NS
Medical treatment (%)				
None	**22 (57.9%)**	**13 (59.1%)**	**35 (58.3%)**	
First line	**16 (42.1%)**	**8 (36.4%)**	**24 (40%)**	**NS**
Third line	**- 1 (4.5%)**	**1 (1.7%)**		
Comorbidities (%)				
None	**18 (47.4%)**	**11 (50%)**	**29 (48.3%)**	
Rheumatologic	**4 (10.5%)**	**2 (9.1%)**	**6 (10%)**	**NS**
Psychiatric	**16 (42.1%)**	**7 (31.8%)**	**23 (38.3%)**	
Both	**- 2 (9.1%)**	**2 (3.3%)**		
METs (0-12)	2.9 ± 1.6	2.6 ± 1.1	2.8 ± 1.4	NS
Number of medical visits in the year before examination	17.5 ± 6.3	20.4 ± 8.3	18.2 ± 6.9	NS

ACR: American College of Rheumatology; WPI: Widespread Pain Index; SSS: Symptom Severity Score; METs: metabolic equivalents; NS: non-significant.

Table II. The correlation between loss of working capacity and various parameters based on the ACR questionnaire and vocational parameters.

Criterion	Correlation Coefficient (**ALWC**)	*p*	Correlation Coefficient (**RLWC**)	*p*
Age group	**0.03**	**<0.05**	**0.19**	**NS**
BMI	**-0.09**	**NS**	**-0.08**	**NS**
Fatigue (0-3)	-0.06	NS	0.028	NS
Waking unrefreshed (0-3)	0.02	NS	-0.095	NS
Cognitive symptoms (0-3)	0.06	NS	-0.024	NS
SS Score Part 2a (0-9)	0.02	NS	-0.05	NS
SS Score Part 2b (0-3)	0.19	NS	-0.1	NS
SS Score 2a+2b (0-12)	0.08	NS	0.05	NS
Part 2b – symptoms (0-41)	0.23	<0.05	NA	NA
METs (0-12)	-0.12	NS	0.15	NS
Number of visits to GP	0.32	<0.05	0.31	<0.01
Psychiatric comorbidity	**0.06**	**NS**	**0.17**	**NS**
Medical treatment	**0.02**	**NS**	**0.22**	**<0.05**

ALWC: absolute loss of working capacity; RLWC: relative loss of working capacity; WPI: widespread pain index; SS: symptom severity; METs: metabolic equivalents; NS: non-significant; NA: not available.

Discussion

In this study we examined 60 files of women at an average age of 48.8, all of whom had FM and had been referred for FFW assessment. Out of those women, 22 (37%) were found completely unfit for work, 35 (58%) were found fit to work part time, and 3 (5%) were found fit for full-time work. The average ALWC was 59%. Loss of working capacity correlated significantly with age, medical treatment, SSS Part 2b, and the number of medical visits in the year before the examination.

In this study we found a 95% rate of disability, much higher than ever reported before. There have been several studies about disability and handicap in FM. In a longitudinal multicentre survey of 1604 patients with FM by Wolfe *et al*., a total of 26.5% of the patients reported receiving disability benefits (15). In a study of work disability in Swedish women with FM (n=176), 15% of the subjects were working full time and 35% part time (16). In another study, which included 171 active workers with FM, 29 patients (17%) were working less than full time and 23 (13.5%) had been on sick leave sometime during the past 12 months (17). Canadian and US studies of work disability related to FM found that more than a quarter of surveyed subjects were receiving some sort of disability pension (26% and 27% in Canada and the US, respectively) (18, 19). An epidemiological survey of people with FM in Spain found that 11% were on sick leave at the time of the survey, and 23% were receiving a work disability pension due to FM (20). A community survey of Australians with FM found that 35% were receiving financial support due to their inability to work (21). Henriksson *et al*. discussed the question of disability in FM patients in a review article, and found that most women with FM are limited in their ability to work, yet despite such limitations, approximately 34-77% of the patients continue to work (11). Our sample was made up of women who had presented at the MHS occupational health clinic for FFW assessment, and that is why we had a higher rate of disability compared to other studies. The severity of symptoms was higher than the average for an FM patient, so the rate of eligibility for disability would therefore be higher than in the general population of FM patients.

Medical treatment correlated significantly with RLWC (correlation coefficient = 0.02, $p<0.05$). We assume that patients who experience more pain visit their physicians more often and consume more analgesics.

We found no differences between the group of patients who were fully or partially fit for work and those who were unfit for work regarding aerobic effort as evaluated by METs. Women with FM report difficulties in managing practical tasks that require muscle strength and muscular endurance. Commonly mentioned work tasks and activities include repetitive movements, static muscle work such as holding tools and other objects, and standing or sitting in the same position for long periods of time (21). In another study, heavy manual labour was found to predict work disability (18). However, in our study, the average MET in both groups (working and non-working) was around 2.8, which means most of our patients were initially administrative workers who were not doing heavy manual work; that is the most probable explanation as to why no difference was found.

Age correlated significantly with ALWC (correlation coefficient = 0.03, $p<0.05$). This makes sense because as patients get older, functional changes that may impact work ability take place. Similar results were reported in White's epidemiologic research. In women with chronic widespread pain, the odds of being disabled increased through ages 35-49 (middle age) and in ages 50–64 compared to the 18–34 age group (22). Age-associated changes occur also in cardiovascular function, the respiratory system, the skeletal system, etc. (23).

The number of medical visits and SSS Part 2b (on a scale of 0 to 41) correlated significantly with both ALWC and RLWC (mean ± SD 18.2±6.9, correlation coefficient = 0.32, $p<0.05$ and 20.4±6.4, correlation coefficient = 0.23, $p<0.05$, respectively). These results correlate with other studies, in which SSS was found to be a predictor of employment loss. The severity ratings of pain and fatigue were found to be lower in working compared to non-working women with FM (24). Pain is the primary factor in this condition and an important one when it comes to work status. Severe pain compromises work (25). Less pain means a greater chance of working (26, 27). Another study compared between workers with FM with and without temporary work disability, and found less severe symptom ratings in the group of workers with no temporary work disability (17).

There are some limitations to our study. First, the relatively small sample size, although similar studies had similar figures (24, 25). Second, the homogeneity of patients, since all had been referred for FFW evaluation. Third, we did not assess other employment characteristics that have been reported in other studies as factors that can influence FFW, like stress and difficulties at work, repetitive work, noisy conditions, career progression issues and lack of recognition of the disease by colleagues and supervisors (27, 28). Fourth, the ACR questionnaire was available during the FFW assessment, but only one parameter out of many was used for the evaluation, such as clinical impression, medical reports from other healthcare professionals, type of drug therapy, type of employment, etc.

There are some advantages in our study. First, as far as we know, this is the first study about FFW among FM patients. Other studies usually used less accurate definitions (disabled, not disabled, part-time worker, etc.) (18, 27). Second, we conducted accurate FFW evaluations based on the occupational physician's professional experience and comprehensive assessment of the patient's medical state and working conditions. Moreover, we calculated RLWC, which is a very accurate parameter. Third, we used the ACR questionnaire's different parts and compared them with the results of the FFW evaluation, so we could quantify more precisely the correlation between different parts of the questionnaire and FFW (ALWC and RLWC).

In conclusion, pain severity influences work ability and sick leave in patients with FM. Our quantitative study suggested that when performing FFW assessment, physicians should give much weight to the anamnesis as represented by the ACR questionnaire and pay attention to the number of medical visits in the year before the examination. We think that collecting an accurate and detailed anamnesis about every known symptom of FM is important for assessing FFW in those patients, although it is a time-consuming procedure. It appeared that most of our patients were office workers and were not doing heavy manual work, probably because physically demanding jobs are especially troublesome in FM patients. In order to better examine disability in FM patients, more research with larger samples and more heterogenic populations is needed.

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