ORIGINAL ARTICLE

Multisensory Hypersensitivity in Women With Fibromyalgia: Implications for Well Being and Intervention

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ABSTRACT. Wilbarger JL, Cook DB. Multisensory hypersensitivity in women with fibromyalgia: implications for well being and intervention. Arch Phys Med Rehabil 2011;92: 653-6.

Objective: To document sensory sensitivities to nonnoxious sensory stimuli in daily life for participants with fibromyalgia (FM).

Design: Descriptive study of a convenience sample using a self-report survey of sensory processing.

Setting: Participants were recruited from the general community. The procedure took place in a research room at the University of Wisconsin-Madison.

Participants: Women with FM (n=27) were compared with women with rheumatoid arthritis (RA) (n=28) and healthy pain-free women (controls) (n=28) (N=83).

Interventions: Not applicable.

Main Outcome Measure: A self-report measure of sensory sensitivity to stimuli encountered in daily life. Items ask participants if they are sensitive to sensations that do not seem to bother other people or avoid common activities or environments because of sensory stimuli.

Results: The FM group reported significantly increased sensory sensitivities to both somatic (tactile) and nonsomatic (eg, auditory and olfactory) sensory stimuli compared with the RA and control groups. The RA and control groups did not differ in reported hypersensitivities.

Conclusions: Women with fibromyalgia reported increased sensitivities to stimuli in the environment and could experience more stress related to sensory conditions in daily life.

Key Words: Fibromyalgia; Pain; Rehabilitation; Sensation.

FIBROMYALGIA IS A baffling condition in which people, predominantly women, are inflicted with unexplained, chronic musculoskeletal pain. The disorder is also associated with increased fatigue, sleep disturbances, and higher levels of stress reactivity and anxiety. The etiology and underlying mechanisms of the disorder have not been well characterized. Recent research has highlighted the neurophysiologic underpinnings of the disorder. A key finding is a reduced threshold for the perception of discomfort or pain for somatic stimuli such as pressure and electric and thermal stimuli.[1-3] People with FM typically report discomfort or pain at lower levels of stimulus intensity than non-FM controls. Similar responses have been found for nonsomatic stimuli, such as sound,[1,4,5] although not all studies have found increased sensitivity to nonnoxious sensation. Peters et al[6] reported no differences in detection of nonnoxious electric or visual stimuli between FM and controls. Most studies of sensory responsiveness in FM have included both noxious and nonnoxious stimuli.[7] The inclusion of painful stimuli in the research protocols could have the generalized effect of priming or increasing responses to the nonnoxious stimuli, so it remains unclear whether people with FM are overresponsive to nonnoxious stimuli.

Increased sensitivity to and poor gating of somatosensory input are associated with differences in brain activity in people with FM compared with healthy controls as measured by magnetic resonance imaging and electroencephalographic muscle activity.[3,8,9] People with FM appear to demonstrate brain activity in key pain processing areas of the brain when exposed to both painful and nonpainful stimuli.[8] The affected areas of the brain include those that process or modulate responses to pain.[3,8] For example, Cook et al[8] found increased activity in the prefrontal cortex, supplemental motor cortex, anterior cingulate gyrus, and insula after exposure to nonpainful thermal stimuli and greater activity in the anterior insula for painful thermal stimuli in FM compared with controls. Further activation was found in key pain processing areas at a lower level of absolute stimulus intensity but perceptually equivalent pain ratings in the FM group.

The findings of augmentation of responses to sensory stimuli in both psychophysiologic and neural studies have contributed to multiple theories of FM, including poor central modulation of nociception, generalized hypervigilance to sensory stimuli, and general central nervous system sensitivity. The consistent finding of augmentation of responses to sensation is relevant to the daily lives of people with FM. Clinicians and patients frequently report the presence of sensory sensitivities to nonnoxious sensations like light touch, sounds, and smells encountered in everyday life. Reports of unusual sensory sensitivities commonly appear on FM informational websites and in chat rooms; however, there has been little or no empirical validation of these anecdotal reports in current research. The presence of such sensitivities may contribute to difficulties in function by creating an additional source of stress, anxiety, and fatigue as individuals with FM navigate through the sensations of daily life. The goal of the present study was to examine atypical sensory sensitivities to sensation in daily life in women with FM. In this study, women with FM were compared with

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List of Abbreviations

AASP	Adult and Adolescent Sensory Profile
ANOVA	analysis of variance
ASQ	Adult Sensory Questionnaire
FM	fibromyalgia
RA	rheumatoid arthritis
SD	sensory defensiveness

women with RA and women without clinical pain on a self-report measure of the impact and the presence of sensory sensitivities across multiple sensory modalities. The participants with RA were included as a comparison group to rule out the possibility that chronic pain alone may increase sensitivity to sensation. Most previous studies examining sensory processing in FM have included only a healthy control group.[1] It is hypothesized that the FM group will report more sensitivity to everyday sensations than either of the other 2 groups. Further, it is hypothesized that increased sensory sensitivities in the women with FM will be identified in more than the tactile or somatic modality.

METHODS

Responses on a self-report measure of sensory sensitivity were compared for sample of women in 3 groups: (1) FM (n=27), (2) RA (n=28), and (3) healthy control participants without pain syndrome (n=28) matched for age (targeted during recruiting ±3y). Participants ranged in age from 18 to 60 years with a mean of 44 years. Mean ± SD for the FM, RA, and healthy particpants without pain syndrome groups are, respectively, 42.4±11.7, 45.39±12.6, and 44.39±9.9 years. The groups' mean age did not differ ($P>.05$). Eighty-seven percent of participants were white, and the percentage did not differ significantly across groups. All participants were recruited as part of a larger study investigating brain responses to pain. Patients with FM and RA and healthy controls were recruited by newspaper advertisements, fliers in rheumatology clinics, and mass e-mail messages to female faculty, staff, and students at the University of Wisconsin-Madison. Participants in the FM group met the 1990 American College of Rheumatology criteria for FM,[10] and participants in the RA group met the American College of Rheumatology criteria for RA[11] and had pain in 3 of 4 body quadrants. Clinical diagnosis was confirmed by each subject's primary care physician. Any patient with FM or RA with a comorbid painful disorder (ie, arthritis for FM or FM for RA) and participants in any group who were taking analgesic (including opioids), cardiovascular, or high-dose antidepressant medications were also excluded from the study. Controls were all healthy women. Participants were free of Axis I psychiatric disorders as assessed by Structured Clinical Interview for DSM Disorders[12] by phone. Informed consent was obtained as approved by the University of Wisconsin-Madison institutional review board.

The 56-question sensory measure includes taste/smell, movement, sound, vision, and touch sections. Participants responded on a 7-point Likert-type scale with a response of 1 signifying "extremely untrue of me" and a 7 representing "extremely true of me." Higher scores indicate more sensory sensitivities. Questions ask the participants whether they are bothered by smells, sounds, or textures that do not seem to bother other people or avoid common activities or environments because of smells, tastes, sound, sights, movement challenges, or touch—for example, "I dislike being close to people who wear perfume or cologne," "I leave the room when others are watching TV or ask them to turn it down," or "I am bothered by turtleneck shirts, tight fitting clothes, elastic, nylons, or synthetic material in clothes."

The scale combined items from 2 questionnaires previously used in research on sensory sensitivity (AASP Sensory Sensitivity and Sensory Avoidance subscales,[13] ASQ[14]) and portions of a well known adult temperament questionnaire (Adult Temperament Questionnaire[15]). The AASP was standardized on approximately 900 adolescents and adults and has previously been used to examine sensory processing across the age spectrum and in individuals who had mental health or developmental disorders. The ASQ was standardized on over 300 adults and has been use in over a dozen research projects related to sensory sensitivities in typical adults and adults with various disorders including anxiety disorders and chronic fatigue syndrome.[16] The scales were combined because of limitations in each of the scales to address the specific research question posed by this study. First, none of the scales yielded a modality specific score. Second, across the 3 questionnaires, there were both redundant and unique items. Each of the 2 sensory questionnaires had a very limited number of questions in some areas such smell and visual sensitivities and had a large number of redundant questions related to tactile stimuli. The scales were combined to increase the number of items in each sensory area, especially in areas like smell that appear to be a very common source of aversion in FM. Redundant items were eliminated. Items from the AASP were chosen when there was significant redundancy.

Because this was a pilot study in the context of a larger study, it was critical to keep the overall length reasonable for participants. The resulting combined scale demonstrates good internal consistency based on analyzing the item responses from the participants in the current study. The Cronbach alpha, a measure of the intercorrelations between items, calculated for the total score was .94 and ranged from .78 to 0.9 for the modality-specific sections, indicating that the items as a whole and within each section measured a unified construct. The strong intercorrelations between items show that the scale of combined items retained internal reliability.

Data Analysis

The 3 groups' total and modality specific scores from the sensory questionnaire were analyzed with a series of univariate ANOVAs using PASW software version 17.[a] The significance level was set at .05. Post hoc analyses used the Bonferroni statistic or a Dunnett C in the case of unequal variances.

RESULTS

First, significant differences were found between groups using 1-way ANOVAs by group (FM, RA, healthy individuals without pain syndrome) for the total score of the sensory questionnaire. The analysis for the total score indicated a significant difference between groups at the level of P less than .001. Post hoc analysis showed that the FM group had a significantly higher total score than both the RA group and the control group. Higher scores indicate a report of more sensory sensitivities. Second, the groups' scores were compared for the 5 modality-specific sections. Correcting for multiple comparisons between the groups for the 5 sections, the significance value was set at .01. As seen in table 1, the FM group also had significantly higher mean scores than the RA group for taste/smell, auditory, and tactile sections and the control group on all but the auditory section. The mean scores of the RA and the control groups did not differ for the total score or any section scores.

DISCUSSION

The finding of significantly more self-reported sensory sensitivities in women with FM compared with women with RA or controls is consistent with increased sensory sensitivities found in previous psychophysiologic studies of FM.[1] The differences across groups cannot be attributed solely to the presence of a chronic pain syndrome. The FM and RA groups differed in both somatic (tactile) and nonsomatic (taste/smell and auditory) sensory sensitivity. The women in the RA group were considered to experience more than mild chronic pain because