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Case Report

Fibromyalgia and Dysfunction of Autonomic Nervous System - a

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ABSTRACT

Fibromyalgia syndrome (FMS) has a strong clinical and social impact affecting the personal, family and working life of the sufferer. The first controlled study of FMS was published by Yunus et al. In Europe, FMS has been estimated to affect approximately 4.7% of the general population. We report a case of 52 year old woman suffered from chronic fatigue for 2 years with widespread pain. Physical examination reveals fibromyalgia syndrome. Complementary tests rule out other etiology. She was treated for her physical abnormality with a significant improvement in her quality of life and had a relief from pain. This study may bring the FMS to clinical consciousness.

Keywords: Autonomic nervous system; Fibromyalgia; Parasympathetic nervous system; Sympathetic nervous system; Treatment

INTRODUCTION

Fibromyalgia syndrome (FMS) as a disorder has more than one sign or symptom, and has the unfortunate misconception among physicians who either believe in the reality of this disorder or not. FMS is characterized by chronic widespread musculoskeletal pain, stiffness and tenderness to palpation at specific tender points [1]. There is no universal known cause, although numerous overlapping risk factors have been identified. Disorder of the autonomic nervous system (ANS) represents one such overlapping risk factor. The first controlled study of FMS was published by Yunus et al. [2]. In Europe, FMS has been estimated to affect approximately 4.7% of the general population [3].

CASE REPORTS

Patient

A 52 year old woman had a history of rheumatoid arthritis treated by Salazopirine, and hypothyroidism treated with the substitutive hormone. She was referred to our unit of ANS by rheumatologist. The patient suffers from chronic fatigue with a widespread pain, stiffness and non-refreshing sleep for at least 2 years. Physical examination revealed the following results: blood pressure while sitting was 127/68 mmHg, decreasing to 94/52 mmHg in standing position; heart rate: 66 beats/min; tenderness in palpation revealed pain on both sides of the body, below and above joint articulation, and along the axial skeleton.

The heart sound was normal. Electrocardiogram showed regular sinus rhythm. Finding of chest radiography was normal. Transthoracic echocardiography was normal. The laboratory investigations on admission were normal. The thyroid hormones were normal. The electrolytes found no stigmata of adrenal insufficiency. Blood count was normal.

METHODS

The Autonomic Nervous System ANS was performed, In front of the evocative clinical symptoms of fibromyalgia, showing a dysautonomia nervous system.

Cardiovascular autonomic testing

Patients were initially lied in bed in a quiet room for at least 30 min. Then monitoring of the BP, using a Dynamap (Critikon, 1846 SXP) and the Heart Rate (HR) (screen of posting LCD CS 503 E, HELLIGE, EK 512 E) was done. All the tests were carried out in the morning, at fasting and under no treatment during at least 48 hours. The basal systolic BP (SBP) and HR were measured in both arms at rest of at least 10 min, and then Ewing cardiovascular autonomic tests were performed.

Tests Description:

- **The Deep Breathing Test (DB)**

This test analyzes the vagal response [4, 5]. The respiratory frequency has an influence on the variation of RR interval on the

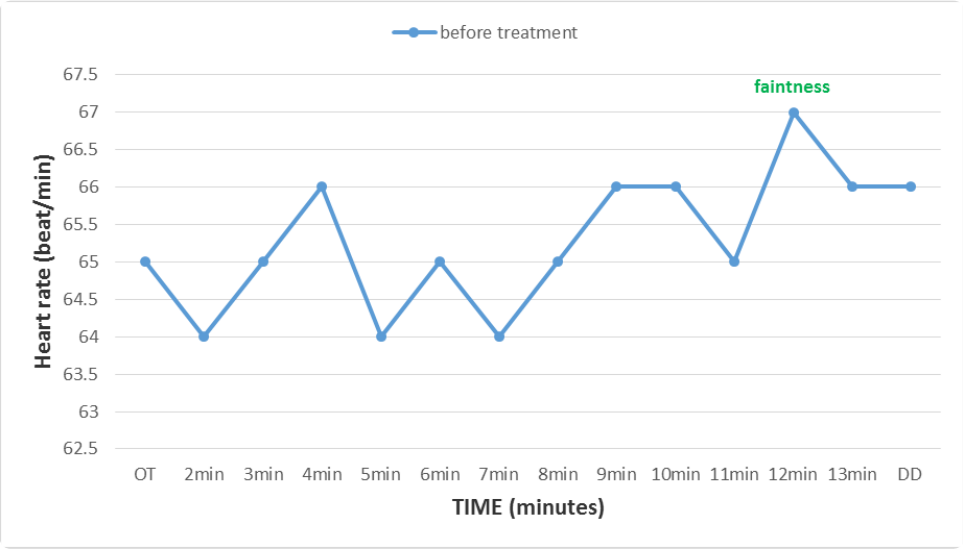


Figure 1: Heart rate During the postural orthostatic test performed on 06-08-2012 (Before treatment with fludro-cortisone), reflecting a beta peripheral adrenergic deficiency.

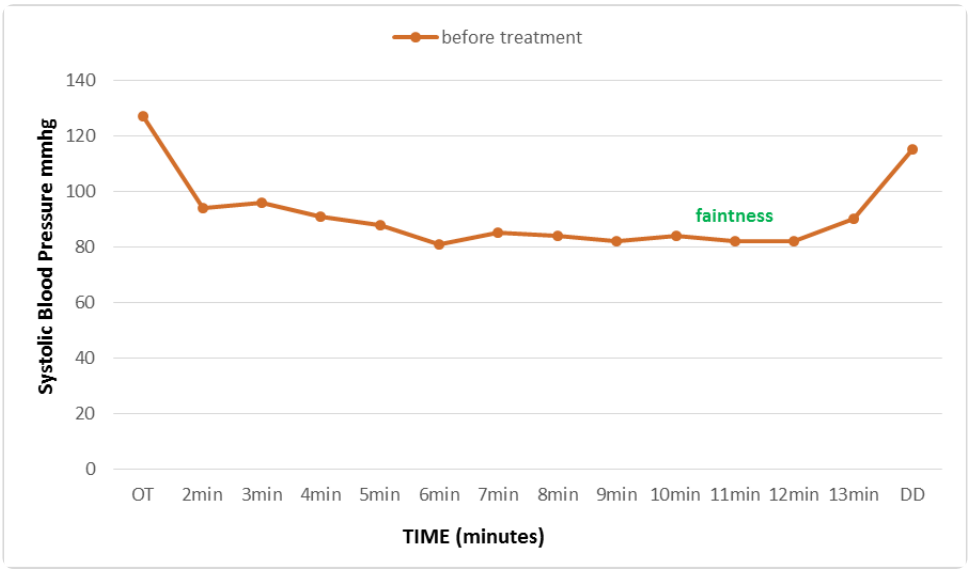


Figure 2: Evolution of blood pressure during the postural orthostatic test performed on 06-08-2012 (Before treatment with fludro-cortisone), reflecting peripheral sympathetic adrenergic alpha deficiency explained by s orthostatic hypotension.

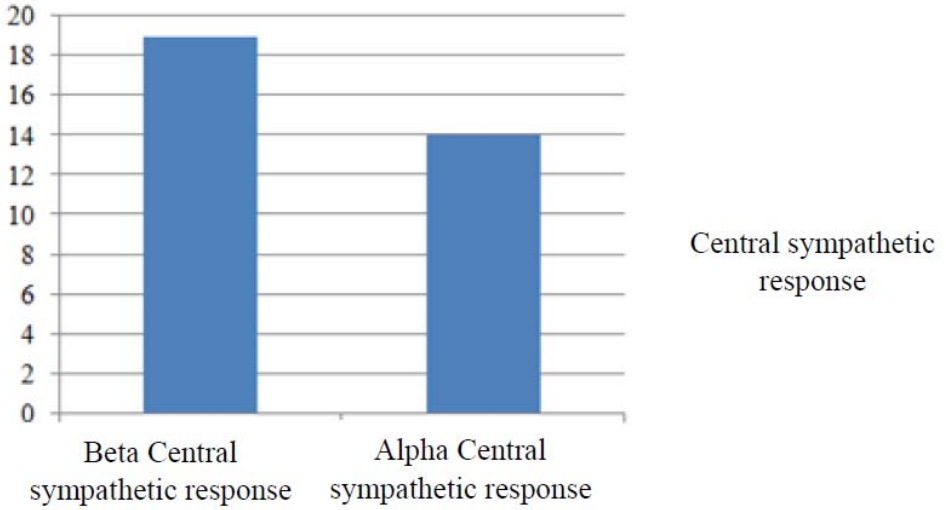


Figure 3: Alpha and beta Central sympathetic response during mental stress test performed on 06-08-2012(Before treatment with fludro-cortisone).

electrocardiogram (EKG). The procedure was as the following: the patient breathes deeply at a frequency of six breaths/minute [6]. It makes it possible to evaluate the vagal activity which is expressed as a percentage:

$(RR_{maximal} - RR_{minimal}/RR_{minimal}) \times 100.$

- **The Isometric Contraction or Hand Grip Test (HG)**

During three minutes the patient performs a manual pressure of 50% of the maximum with assistance of a dynamometer. The muscular contraction involves a rise in BP related to an increase of sympathetic nerve activity at the muscular level that is effort-dependent and time-dependent [7, 8]. The peripheral alpha sympathetic nerve response is given by the increase degree of the BP.

Alpha peripheral sympathetic response (alpha PS):

$= (BP_{after\ the\ test} - BP_{before\ the\ test}/ BP_{before\ the\ test}) \times 100.$

- **The Mental Stress Test (SM)**

The patient performs mental arithmetic calculations by removing the number 7 successively from 200. The result is an increase in BP and in HR by activation of the central sympathetic nerve [6]. In mental stress, the central sympathetic nerves activities "α" was evaluated by measuring the variations of BP as showing in the following formula [7, 8]:

Alpha central sympathetic response (alpha SC):

$= (BP_{after\ stimulation} - BP_{before\ stimulation}/BP_{before\ stimulation}) \times 100.$

The "β" central sympathetic nerves activities was evaluated by measuring the variations of HR as showing in the following formula [7, 8] :

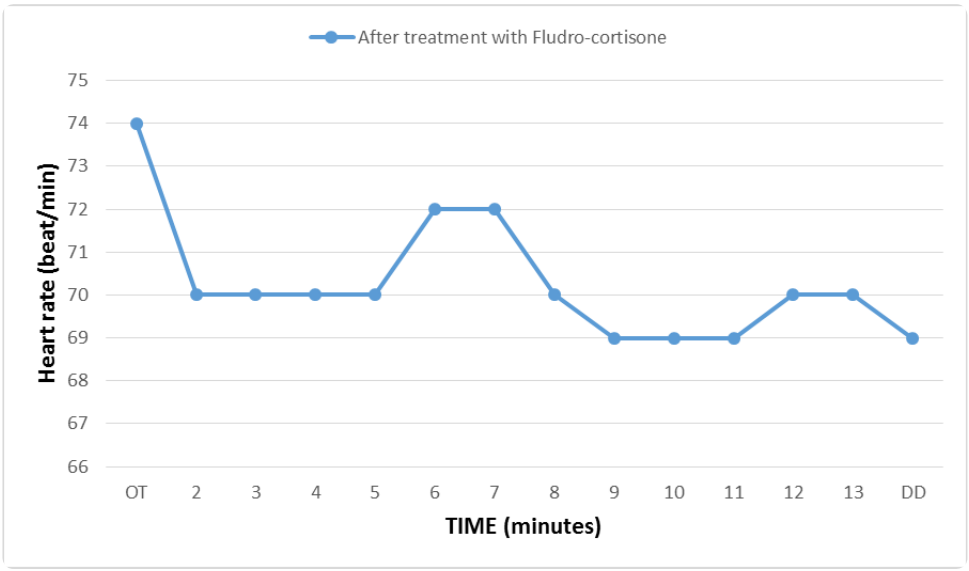


Figure 4: Heart rate during the postural orthostatic test done after 7 months of treatment with fludro-cortisone, reflecting an improvement in beta peripheral adrenergic response.

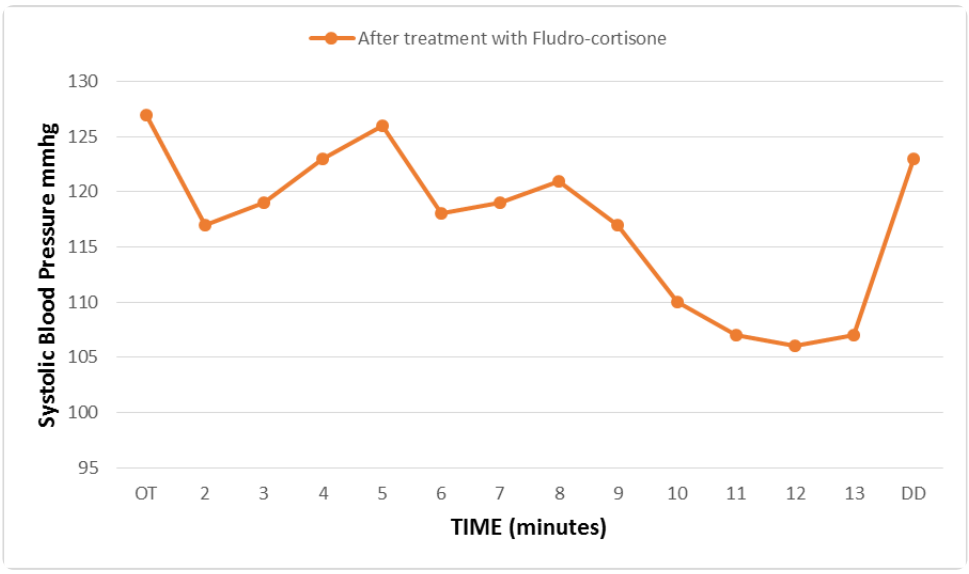


Figure 5: Evolution of blood pressure during the postural orthostatic test done after 7 months of treatment with fludro-cortisone, reflecting an improvement in the sympathetic alpha adrenergic response (late onset of orthostatic hypotension).

Beta central sympathetic response (beta SC):

$= (HR_{\text{after stimulation}} - HR_{\text{before stimulation}}/HR_{\text{before stimulation}}) \times 100.$

- **The Orthostatic Test (OT)**

The OT is a simple, non invasive and reproducible test included among the cardiovascular ANS tests, involving the measurement of the BP and the HR variation during the upright posture [9]. The basal SBP and HR were measured in both arms after a rest of at least 10 minutes in supine position. Then we proceeded to the OT. Orthostatic SBP (ortho SBP) was recorded for 10 minutes at the rhythm of 3 measurements per minute.

The alpha peripheral adrenergic sympathetic response (Alpha PAS) obtained during OT was evaluated by measuring the variations of BP as showing in the following formula:

Alpha peripheral adrenergic sympathetic response (alpha PS):

$= (BP\ orthostatic - BP\ supine\ position/BP\ supine\ position) \times 100.$

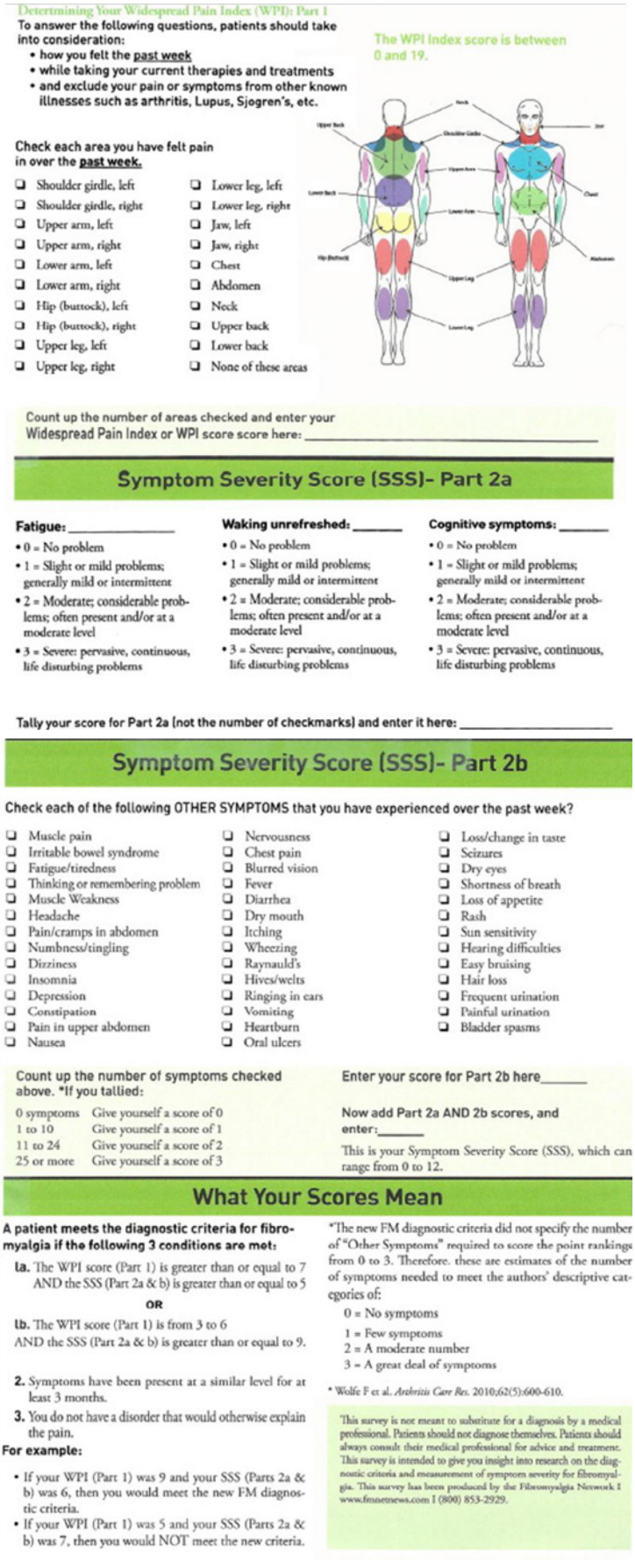
RESULTS

The patient was put under vienotonic with low peripheral venous contention, fludrocortisone and Maprotiline an inhibitor of serotonin and dopamine.

Verification carried 04 months and 07 months after treatment showed a significant improvement on the quality of life with correction of postural hypotension.

DISCUSSION

FMS is a chronic disease that is relatively new on the medical



Determining Your Widespread Pain Index (WPI): Part 1

To answer the following questions, patients should take into consideration:

- how you felt the past week
- while taking your current therapies and treatments
- and exclude your pain or symptoms from other known illnesses such as arthritis, Lupus, Sjogren's, etc.

The WPI Index score is between 0 and 19.

Check each area you have felt pain in over the past week.

- ❑ Shoulder girdle, left
- ❑ Shoulder girdle, right
- ❑ Upper arm, left
- ❑ Upper arm, right
- ❑ Lower arm, left
- ❑ Lower arm, right
- ❑ Hip (buttock), left
- ❑ Hip (buttock), right
- ❑ Upper leg, left
- ❑ Upper leg, right
- ❑ Lower leg, left
- ❑ Lower leg, right
- ❑ Jaw, left
- ❑ Jaw, right
- ❑ Chest
- ❑ Abdomen
- ❑ Neck
- ❑ Upper back
- ❑ Lower back
- ❑ None of these areas

Count up the number of areas checked and enter your Widespread Pain Index or WPI score score here: _____

Symptom Severity Score (SSS)- Part 2a

Fatigue: _____

- 0 = No problem
- 1 = Slight or mild problems; generally mild or intermittent
- 2 = Moderate; considerable problems; often present and/or at a moderate level
- 3 = Severe: pervasive, continuous, life disturbing problems

Waking unrefreshed: _____

- 0 = No problem
- 1 = Slight or mild problems; generally mild or intermittent
- 2 = Moderate; considerable problems; often present and/or at a moderate level
- 3 = Severe: pervasive, continuous, life disturbing problems

Cognitive symptoms: _____

- 0 = No problem
- 1 = Slight or mild problems; generally mild or intermittent
- 2 = Moderate; considerable problems; often present and/or at a moderate level
- 3 = Severe: pervasive, continuous, life disturbing problems

Tally your score for Part 2a (not the number of checkmarks) and enter it here: _____

Symptom Severity Score (SSS)- Part 2b

Check each of the following OTHER SYMPTOMS that you have experienced over the past week?

- ❑ Muscle pain
- ❑ Irritable bowel syndrome
- ❑ Fatigue/tiredness
- ❑ Thinking or remembering problem
- ❑ Muscle Weakness
- ❑ Headache
- ❑ Pain/cramps in abdomen
- ❑ Numbness/tingling
- ❑ Dizziness
- ❑ Insomnia
- ❑ Depression
- ❑ Constipation
- ❑ Pain in upper abdomen
- ❑ Nausea
- ❑ Nervousness
- ❑ Chest pain
- ❑ Blurred vision
- ❑ Fever
- ❑ Diarrhea
- ❑ Dry mouth
- ❑ Itching
- ❑ Wheezing
- ❑ Raynauld's
- ❑ Hives/welts
- ❑ Ringing in ears
- ❑ Vomiting
- ❑ Heartburn
- ❑ Oral ulcers
- ❑ Loss/change in taste
- ❑ Seizures
- ❑ Dry eyes
- ❑ Shortness of breath
- ❑ Loss of appetite
- ❑ Rash
- ❑ Sun sensitivity
- ❑ Hearing difficulties
- ❑ Easy bruising
- ❑ Hair loss
- ❑ Frequent urination
- ❑ Painful urination
- ❑ Bladder spasms

Count up the number of symptoms checked above. *If you tallied:

0 symptoms	Give yourself a score of 0
1 to 10	Give yourself a score of 1
11 to 24	Give yourself a score of 2
25 or more	Give yourself a score of 3

Enter your score for Part 2b here_____

Now add Part 2a AND 2b scores, and enter:_____

This is your Symptom Severity Score (SSS), which can range from 0 to 12.

What Your Scores Mean

A patient meets the diagnostic criteria for fibromyalgia if the following 3 conditions are met:

1a. The WPI score (Part 1) is greater than or equal to 7 AND the SSS (Part 2a & b) is greater than or equal to 5

OR

1b. The WPI score (Part 1) is from 3 to 6 AND the SSS (Part 2a & b) is greater than or equal to 9.

2. Symptoms have been present at a similar level for at least 3 months.

3. You do not have a disorder that would otherwise explain the pain.

For example:

- If your WPI (Part 1) was 9 and your SSS (Parts 2a & b) was 6, then you would meet the new FM diagnostic criteria.
- If your WPI (Part 1) was 5 and your SSS (Parts 2a & b) was 7, then you would NOT meet the new criteria.

*The new FM diagnostic criteria did not specify the number of "Other Symptoms" required to score the point rankings from 0 to 3. Therefore. these are estimates of the number of symptoms needed to meet the authors' descriptive categories of:

0 = No symptoms
1 = Few symptoms
2 = A moderate number
3 = A great deal of symptoms

* Wolfe F et al. *Arthritis Care Res.* 2010;62(5):600-610.

This survey is not meant to substitute for a diagnosis by a medical professional. Patients should not diagnose themselves. Patients should always consult their medical professional for advice and treatment. This survey is intended to give you insight into research on the diagnostic criteria and measurement of symptom severity for fibromyalgia. This survey has been produced by the Fibromyalgia Network I www.fmnetnews.com I (800) 853-2929.

Figure 6: New clinical fibromyalgia diagnostic criteria [25].

scene [1]. In Europe, FMS has been estimated to affect approximately 4.7% of the general population [3] with a high prevalence in females, sex ratio 10:1 [10, 11]. FMS is a disabling condition with patients experiencing high levels of widespread persistent pain, fatigue and sleep disturbance that makes it difficult to engage in everyday activities [11]. FMS has been classified as primary and concomitant [12]. Primary FMS indicates that there is no underlying or concomitant medical condition that might have contributed to a patient's pain. FMS is considered concomitant if another condition such as osteoarthritis, rheumatoid arthritis, systemic lupus erythematosus or hypothyroidism is present, and, in turn contributes to a patient's pain. However, there are no specific differences that exist between primary FMS and concomitant. The diagnosis criteria of FMS has been refined over 21 years. The basic symptoms of FMS include persistent (≥ 3 months) widespread pain, along with stiffness, fatigue and many other unexplained symptoms. FMS is commonly associated with significant disability [13]. These pain criteria were developed by the American college of rheumatology ACR in their determination of the diagnostic classification of FMS table N°1. An example of the current diagnosis questions/criteria taken from the fibromyalgia Network is found in figure 6.

FMS still a diagnosis of exclusion. The pathophysiology of FMS remains to be "central nervous system hypersensitivity". There are a number of abnormalities that have been found to be associated with this disorder. But the main problem is central in origin. It is the trigger. The 2 branches of ANS have antagonistic effects. ANS is under tonic inhibitory control of the parasympathetic branch via the myelinated vague nerve. Parasympathetic maintenance promotes calm engagement, whereas vagal withdrawal facilitates quick escape from danger [14]. FMS are linked to higher baseline sympathetic activity or predominance [14-17], and lower baseline parasympathetic activity [17]. Exaggerated parasympathetic decline in response to safe stimuli is associated with hypersensitivity to environmental danger and various reactive emotional disorders such as poorer general physical and mental functioning, poorer sleep and greater chronic pain. The severity of symptoms is depending on individual difference [18].

The treatment plan of FMS must be individualized and flexible, and it is considered long-term management. In general, non-medication treatment may be helpful, but many patients may not stick to them. Currently, three drugs pregabalin, duloxetine and milnacipran have been approved by the FDA for the treatment of FMS. The goal of pharmacological treatment is symptom amelioration, and medications should be started "low and slow", with small doses increased gradually. Tramadol appears to inhibit reuptake of norepinephrine and serotonin, and it is also a receptor agonist. Tramadol has been shown to provide pain relief that is superior to placebo [19]. Beneficial effects for multidisciplinary treatment are found for those patients compared to monodisciplinary treatment programs [20]. Multimodal treatment based on light physical exercise, cognitive behavioral therapy, patient education, biofeedback relaxation and medication, are recommended [21, 22]. However, there is a clear need for continued research into both the diagnostic and therapeutic approach in FMS.

CONCLUSION

Still, FMS may be a diagnosis of exclusion, and other etiology must be ruled out. However, it is a frequent disorder that affects typically young women. A variety of treatment strategies are available for patients with FMS, ranging from monotherapy to multidisciplinary treatment. The multidisciplinary approach remains recommended.

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