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A Case Study of Yoga-Controlled Symptom Remission in Fibromyalgia Syndrome: A Holistic Approach

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Background: In this peculiar case study, we extensively explored the effects of 6 weeks of supervised yoga on the endogenous pain modulatory system, autonomic profile, and corticomotor excitability.

Case Report: A 29-year-old woman diagnosed with fibromyalgia (FMS) was suggested 6 weeks of supervised yoga because the pharmaceutical treatments were ineffective. Assessment was done at baseline, 2 weeks, and post-6 weeks for pain, cognitive skills, sleep quality, anxiety, and depression status. An autonomic profile was done, followed by flexibility and corticomotor excitability assessments.

Conclusions: Reduction in pain and tender points. Improvements in sleep quality, flexibility, and cognitive skills were observed after 6 weeks. Pain perception and cortical plasticity showed improvement. Autonomic function test shows higher high frequency after intervention. This report supports the view that yoga, as a holistic approach alone, is effective in ameliorating pain and improving dysautonomia. Hence, it may be considered as a therapeutic intervention for FMS in rare cases.

Key words: Visual Analog Scale (VAS), quantitative sensory testing (QST), Montreal Cognitive Assessment (MOCA) test, Widespread Pain Index (WPI), Fibromyalgia Impact Questionnaire (FIQ), Composite Autonomic Symptom Score-31 (COMPASS-31), McGill Pain Questionnaire-Short Form (MPQ-SF), Wisconsin Card Sorting Test (WCST), Pittsburgh Sleep Quality Index (PSQI), Beck Depression Inventory-II (BDI-II), State-Trait Anxiety Inventory-II (STAI-II), Autonomic Function Test (AFT), corticomotor excitability (CME)

BACKGROUND

Fibromyalgia (FMS) is characterized by fatigue and extensive discomfort. The finding that FMS patients frequently experience other centrally mediated illnesses and mild cognitive symptoms lends credence to this strategy. As of the moment, the most widely recognized theory states that FMS is a central pain syndrome (1). Data indicating a dysfunctional endogenous pain modulatory system and increased neuronal activation in brain regions linked to pain processing under nonnoxious stimulation lend credence to this notion (2).

FMS in the general population has an overall prevalence of about 2% to 4%, due to the high prevalence of the condition as well as the high expense of health care resources; it is becoming a more severe issue in medical practice. However, the care of FMS is insufficient because there is no clear pathology. The National Institutes of Health classifies yoga as complementary and alternative medicine, acknowledging its recent recognition in medicine as a holistic approach to well-being. It has also shown promise in lowering pain and enhancing functional outcomes for people who experience FMS discomfort (3).

This unique case study was designed to determine the

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extent to which a 6-week program of supervised yoga, which included a particularly proposed yoga, could alleviate the pain, modify the patients' endogenous pain regulation, rectifying dysautonomia, and relieve other symptoms associated with FMS.

CASE

Ethical Clearance

This case report was given approval by the Institute Ethics Committee on February 22, 2022 (IECPG 58/27/01/2022, RT-22/02/2022). After ethical approval and informed consent, the patient was recruited. The unique case is a part of a study registered in clinical trial registry CTRI/2023/06/054333.

Patient Description

The patient is a 29-year-old Asian woman, high-level instruction.

Case History

This case report is written in view of the rarity of therapeutic intervention and the holistic approach of assessing sensory, autonomic, and cortical changes with intervention. The patient started experiencing lower back discomfort, restless feet, and morning stiffness 2 months after parturition. Initially, the symptoms were described as erratic and of minor severity, especially with regard to discomfort. Four months later, lower back pain and hip pain forced the patient to bed rest for a month. Nonsteroidal anti-inflammatory drugs (i.e., ibuprofen) and muscle relaxants (i.e., thiocolchicoside) were prescribed by the primary care clinician, and led to mild effects. Examinations with x-rays and magnetic resonance imaging (MRI) turned up no abnormalities or lesions. Two months later, the patient experienced another episode of tachycardia, shortness of breath, lower back discomfort, upper body pain, and stiffness that required bed rest for > 2 weeks. The prior course was ineffective and did not produce any noticeable improvement. Gabapentin partially reduced pain, but only slowly and with side effects of anxiety and disorientation. These episodes recurred 3-4 times a week, affecting life quality and mobility, and forcing the patient to bed. Intriguingly, the worst episodes appeared to correlate with decreasing temperatures in the autumn and increasing stress.

The symptoms became more intense, but they did so gradually and in a sporadic way. Upon awakening, morning stiffness took almost 40 minutes to ease. The main symptoms included fatigue that did not go away with rest, low back pain, migratory aches in the joints, musculoskeletal broad discomfort, short-term memory loss, difficulty focusing, and amnesia. While counseling and medication treatment showed some improvement, the patient's symptoms remained unpredictable, leaving her feeling uneasy and nervous. These significantly impacted social interaction and professional performance in day-to-day living. She looked healthy in comparison to others; being questioned due to the fact that her suffering was unseen had a detrimental effect on the patient's overall health.

Physical Examination Results and Differential Diagnosis

The patient's lower back discomfort and morning stiffness became extremely worse, eventually becoming incapacitating and necessitating bed rest for the patient with excruciating symptoms. For a full day, there was no break from what was characterized as a "torture with sharp shooting pain-like experience." The simultaneous beginning of this type of pain in the right shoulder and both hips prompted research into rheumatic disorders and the FMS theory. A rheumatology specialist evaluated the sore areas on the initial visit, and then blood tests were performed to check for rheumatoid factor, antinuclear antibodies, anti-nDNA antibodies, anti-extractable nuclear antigens antibodies, and anti-cyclic citrullinated peptide antibodies. All of these had negative blood test results. The values for erythrocyte sedimentation rate, creatine kinase, rheumatoid factor, and C-reactive protein were 18 mm/h (normal range: 2-20), 0.4 mg/dL (normal range: 0.0-0.5), and 5 IU/mL (normal range: 0-14). The total blood count was within the expected range. The Symptom Severity Score and the FMS tender points (14/19) were evaluated during a follow-up visit to the pain research and transcranial magnetic stimulation clinic referred from the rheumatology department. Based on these results, FMS was determined to be the differential diagnosis. This was based on the following: widespread chronic pain lasting > 3 months; tender point sensitivity (14/19); stiffness in the morning; nonrestorative sleep; anxiety, depression; leg and foot cramps; chest pain; tachycardia; nausea; shortness of breath; headaches; allergy; photosensitivity to bright light; hypersensitivity to cold; cognitive impairment manifested as forgetfulness and low concentration; irritable bowel syndrome-constipation; prickling

sensations at fingers and toes; and bloating (Table 1).

The patient was informed that pharmaceutical therapy was ineffective for treating FMS. In addition to being a nursing mother, the patient was advised to recess nursing for 2 months as she was suggested a selective serotonin-norepinephrine reuptake inhibitor, or duloxetine, due to the development of pharmaceutical addiction. The patient was usually concerned about side effects from medication therapies and was drawn to the new 6-week supervised yoga program for FMS symptom relief. Patient answered an open-ended question to determine ethnicity and race.

Results of Other Investigations

After taking detailed history and consent, the patient was assessed for subjective pain intensity using the Visual Analog Scale followed by quantitative sensory examination using thermal modalities at C6, C8 (left-hand dermatome), C4 (left and right dermatome), and pressure modalities at C6 and C4 was done using quantitative sensory testing followed by offset analgesia test at C8 (left forearm medial dermatome). The flexibility was assessed by the Sit and Reach and Stand and Reach tests. The impact of pain in daily life was assessed by using the Fibromyalgia Impact Questionnaire, McGill Pain Questionnaire-Short Form, and Pittsburgh Sleep Quality Index. The anxiety- and depression-related questionnaires, like Beck Depression Inventory-II and State-Trait Anxiety Inventory-II, were used. The cognitive impairment test was done using the Montreal Cognitive Assessment Test and the Wisconsin Card Sorting Test. Heart rate variability and autonomic reactivity tests followed Composite Autonomic Symptom Score assessment. This was followed by corticomotor excitability assessment for resting motor threshold, cortical silent period, and motor recruitment curves using transcranial magnetic stimulation at the motor hotspot of abductor pollicis brevis muscle (left hand) (Table 1).

Treatment Plan

Yoga therapy was given by a trained yoga instructor in the integrated health clinic. This is a comprehensive, yoga-based intervention program lasting for 6 weeks. It consists of an integrated and pretested intervention comprising counseling sessions, including motivation, group discussions, and practice sessions (4). It was ensured to maintain the quality of the program and to ensure that the patient gets enough time with the expert. A typical day in the program started with a set

Table 1. Table represents demographic details, flexibility test, questionnaires, and cognitive assessment done at baseline, 2 weeks, and 6 weeks.

Parameters	Baseline	At 2 weeks	Post-6 weeks
VAS	6	4.5	2
Weight (kg)	83.6	83.3	81.9
Height (m)	1.62		
SBP (mmHg)	111	109	114
DBP (mmHg)	83	87	84
HR (bpm)	95	84	79
Flexibility Assessment			
Sit and Reach Test (cm)	8.5	9.5	18
Stand Test (n)	3	5	
Pain, Depression, Anxiety, and Sleep Quality Assessment			
MPQ-SF	20 (Affective Score)	17 (Affective Score)	5 (Affective Score)
	4 (Present Pain Intensity)	3 (Present Pain Intensity)	1 (Present Pain Intensity)
WPI:			
Tender Points	14	12	4
Symptom Severity Score	10	10	3
FIQ	76.1	71.55	16.76
PSQI	11	10	7
BDI-II	28	26	19
STAI-II	40.18 (STAI-Y1)	34.06 (STAI-Y1)	31.74 (STAI-Y1)
	48.2 (STAI-Y1)	39.06 (STAI-Y1)	35.39 (STAI-Y1)
COMPASS-31	21.44		
Cognitive Assessment			
MOCA	17	17	22
WCST:			
(PEC) (%)	11	9	5
(NPEC) (%)	8	7	4
TOTAL (%)	19	16	9

Abbreviations: Visual Analog Scale (VAS), diastolic blood pressure (DBP), systolic blood pressure (SBP), heart rate (HR), McGill Pain Questionnaire-Short Form (MPQ-SF), Widespread Index (WPI), Fibromyalgia Impact Questionnaire (FIQ), Pittsburgh Sleep Quality Index (PSQI), State-Trait Anxiety Inventory-II (STAI-II), Beck Depression Inventory-II (BDI-II), Composite Autonomic Symptom Score-31 (COMPASS-31), Montreal Cognitive Assessment (MOCA) test, Wisconsin Card Sorting Test (WCST), perservative error count (PEC), nonperservative error count (NPEC).

of simple asanas (physical postures) and pranayamas (breathing exercises) for approximately 2 hours. Nutritional awareness programs are included; questions and unstructured group discussions were encouraged for the relaxation of the patient. Each day's program ended with relaxation through shavasana (a relaxation technique) or meditation. A total of 30 such sessions were administered with 5 sessions per week, for 6 weeks (Fig. 1).

Expected Outcome of the Treatment Plan

We expected to have symptomatic relief in morning stiffness and a decrease in anxiety after 30 days of supervised yoga asanas and pranayamas, which continued for 2 hours, including patient counseling after the session.

Actual Outcome

The descriptive results of the treatment included changes in sensory and autonomic profiles, along with cognitive improvement. The assessment of the outcome variables with validated self-reported questionnaires supported these descriptive results by showing that the scores of the patient improved in the expected direction, and this improvement continued during the 6 weeks of yoga sessions as shown in Tables 1-3.

Yoga therapy protocol	
Asana	**Frequency**
Loosening exercises/ SukshmaVyayama	
Griva ShaktiVikasaka /Neck Movement (Neck Rotation clockwise, anti-clockwise, up and down, sideways)	6 times each
BhujaValli ShaktiVikasaka Purna Bhuja ShaktiVikasaka/Shoulder Movement (Shoulder rotation clockwise, anti-clockwise, Elbows fold in and out, Rotate arms alternatively)	6 times each
Kati ShaktiVikasaka (I, II, III, IV, V)/Trunk Movement (Twist body at waist, Sideways bend-alternate sides)	6 times each
Jangha ShaktiVikasaka (Il-A&B)/Thigh Movement (chair pose, kick with alternate leg)	6 times each
Janu Shakti Yikasaka/Knee movement (Rotate knees clockwise, anti-clockwise)	6 times each
Pada-mula shaktiVikasaka/Ankle movement (Toes pointing outwards-up, down, sideways)	6 times each
Gulpha-pada-pristha-pada-tala shaktiVikasaka/Ankle movement (Rotate ankle clockwise and anti-clockwise)	6 times each
Standing Asanas	3 times each with regulated breathing
Tadasana Trikonasana Samkonasana	
Sitting Asanas	3 times each with regulated breathing
Shashakasana Marjariasana Ardha Ushtrasana	
Lying Asanas	3 times each with regulated breathing
Setubandhasana Bujangasana Shalabhasana	
Markatasana	
Deep relaxation/Shavasana	5 min
Pranayam	15 min
Bhramari	
AnulomVilom	
Turn to side and sit up, End with OM chanting in a mediative posture	For 5 min

Fig. 1. Yoga therapy protocol for each yoga session.

DISCUSSION

FMS is challenging as it affects day-to-day functioning severely. Patients' conditions may worsen as a result of the frequently delayed diagnosis. Regrettably, many patients have this disease. There is still no successful treatment, despite the numerous clinical trials and investigations, both pharmacological and nonpharmacological, conducted since the 1990s. Chronic pain affects the entire functioning of the brain. The persistent, painful sensations lead to cortical remodeling, which sensitizes the brain stem and peripheral nociceptors (5,6). Recently, the role of the insular cortex in the processing of painful sensations has emerged, as reported by Garcia-Larrea et al (7) in 2013. This suggests that the processing of pain occurs in the insula parallel to other brain regions. We applied the methodology of yoga in an attempt to manage the patient with FMS. The analgesic effect of yoga is supported by the studies (8,9) where release of endogenous opioids from the periaqueductal gray (PAG) in patients with chronic pain was observed. Functional MRI studies done after yogic intervention show increased blood-oxygen-level-dependent signals during relaxation in cortical areas like the medial prefrontal cortex, and dorsolateral prefrontal cortex; inferior frontal gyrus; anterior and posterior cingulate cortices; supplementary motor area; precentral gyrus; basal ganglia; inferior parietal lobule; precuneus; hippocampus; and PAG. Yoga, when given as an intervention, reduces corticomotor excitability as reported by Singh et al (10). It is believed that increased functional connectivity activation aids in the better control of stress and emotional reactions. The response to stress was reduced by yoga in this patient after 6 weeks of intervention.

CONCLUSIONS

This report shows a remarkable clinical improvement in FMS symptoms: remission of depression, pain, stiffness, chronic fatigue, and nonrestorative sleep after 6 weeks of yoga. This finding provides novel approaches to treating FMS and addresses the significant functional restrictions that patients have, while simulta-

Table 2. Results of the sensory assessment done using quantitative sensory testing (thermal and pressure thresholds, offset analgesia) at baseline, 2 weeks, and 6 weeks.

Thermal Thresholds	Baseline	At 2 weeks	Post-6 weeks
HDT (°C) at C6 Left	34.19	34.39	33.8
CDT (°C) at C6 Left	30	30.44	30.5
HPT (°C) at C6 Left	37.22	38.95	38.5
CPT (°C) at C6 Left	24.63	24.63	26.5
HPTT (°C) at C6 Left	46.32	43.65	41.9
CPTT (°C) at C6 Left	6.25	15.35	26.5
HDT (°C) at C8 Left	37.21	36.05	36.1
CDT (°C) at C8 Left	29.94	29.43	29.4
HPT (°C) at C8 Left	42.22	40.08	39.76
CPT (°C) at C8 Left	25.1	23.24	24.3
HPTT (°C) at C8 Left	45.87	46.2	48.8
CPTT (°C) at C8 Left	15.98	17.33	16.1
HDT (°C) at C4 Left	36.5	35	36.1
CDT (°C) at C4 Left	29.19	28.74	29.6
HPT (°C) at C4 Left	41.34	39.62	38.1
CPT (°C) at C4 Left	21.36	26.18	24.8
HPTT (°C) at C4 Left	47.56	44.1	45.4
CPTT (°C) at C4 Left	13.41	18.4	22.4
HDT (°C) at C4 Right	36.62	35.58	33.5
CDT (°C) at C4 Right	28.79	29.34	29.1
HDT (°C) at C4 Right	39.55	39.52	28.3
CDT (°C) at C4 Right	22.24	26.06	24.8
HPTT (°C) at C4 Right	48.46	44.03	44.6
CPTT (°C) at C4 Right	9.38	17.87	20.5
Pressure Thresholds			
PPT (KPa) at C6 Left	175.5	171	181
PPT (KPa) at C4 Left	117.6	111.6	196
PPT (KPa) at C4 Right	101.7	121	275.4
PPTT (KPa) at C6 Left	216.1	270	319.5
PPTT (KPa) at C4 Left	203.4	190.6	265.8
PPTT(KPa) at C4 Right	234	258.5	317.9

Table 2 cont. Results of the sensory assessment done using quantitative sensory testing (thermal and pressure thresholds, offset analgesia) at baseline, 2 weeks, and 6 weeks.

Paradigm: Offset Analgesia at C8 Left	Baseline	At 2 weeks	Post-6 weeks
Test Paradigm:			
VAS max	50	48	50
VAS min	55	45	35
Δ OA	-5	3	15
Latency	35	30	20
Index	-0.142	0.1	0.75
Constant Paradigm:			
VAS max	60	50	50
VAS min	15	20	20
Δ OA	45	30	30
Latency	10	10	2
Index	4.5	3	15
Control Paradigm:			
VAS max	50	55	48
VAS min	30	30	15
Δ OA	20	25	33

Abbreviations: hot detection threshold (HDT), cold detection threshold (CDT), hot pain threshold (HPT), cold pain threshold (CPT), hot pain tolerance threshold (HPTT), cold pain tolerance threshold (CPTT), pressure pain threshold (PPT), pressure pain tolerance threshold (PPTT), offset analgesia (OA), Visual Analog Scale (VAS), Δ OA (difference between VAS max and VAS min).

neously effectively removing the need for treatment-related costs. Given the prevalence of FMS, it might be a crucial point for health care systems to take into account. This method could be a practical and affordable way to lessen the burden of FMS, at the very least providing patients with some relief, due to its effectiveness in treating symptoms, lack of pharmacological side effects, and affordable price. This case study's limitation is its lack of follow-up evaluation.

Clinical trial registration number

CTRI/2023/06/054333

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Table 3.Results of the autonomic and corticomotor excitability assessment done at baseline, 2 weeks and 6 weeks.

Parameters	Baseline	At 2 weeks	Post-6 weeks
Autonomic Tone			
Time Domain:			
Mean HR (bpm)	75	76.56	84
SDNN (ms)	52.9	58.75	33.7
RMSSD (ms)	77.3	76.46	40.7
PNN 50%	42.51	47.23	16.14
Frequency Domain:			
VLF (Hz)	74	61.407	18
LF (Hz)	387	577.32	265
HF (Hz)	744	1835.8	633
LF/HF	0.52	0.314	0.418
Autonomic Reactivity			
Lying Standing Test:			
30:15	1.009	0.804	0.978
ΔSBP (Base-Fall) (mmHg)	0	-5	6
ΔDBP (Base-Fall) (mmHg)	-16	-18	-1
Deep Breathing Test:			
Max HR (bpm)	100.2	106.2	104.6
Min HR (bpm)	59.28	35.97	58.97
E:I	1.674	0.338	1.776
Cold Pressor Test:			
ΔDBP (Max-Base) (mmHg)	-1	4	12
Hand Grip Test:			
ΔDBP (Max- Base) (mmHg)	14	12	28

Table 3 cont. Results of the autonomic and corticomotor excitability assessment done at baseline, 2 weeks and 6 weeks.

Parameters	Baseline	At 2 weeks	Post-6 weeks
Corticomotor Excitability Parameters			
RMT			
% MSO	60	58	52
Amplitude	0.103	0.101	0.132
Latency	20.9	21.4	20.3
MEP			
Recruitment Curve			
90%	0.211	0.92	0.110
100%	0.460	0.241	0.189
110%	0.689	0.415	0.343
120%	1.80	0.962	1.14
CSP			
90%	168.3	154.3	206
100%	167.3	201.1	213.4
110%	214	212.4	221.3
120%	224	210.6	220.4

Abbreviations: diastolic blood pressure (ΔDBP), systolic blood pressure (ΔSBP), heart rate (HR), standard deviation of normal-normal intervals (SDNN), root mean square of successive relative risk interval differences (RMSSD), percentage of successive relative risk intervals that differ by > 50 ms (PNN 50%), very low frequency (VLF), low frequency (LF), high frequency (HF), resting motor threshold (RMT), maximum stimulatory output (% MSO), motor-evoked potential (MEP), cortical silent period (CSP).

REFERENCES

1. Bartkowska W, Samborski W, Mojs E. Cognitive functions, emotions and personality in woman with fibromyalgia. *Anthropol Anz* 2018; 75:271-277.
2. Desmeules JA, Cedraschi C, Rapiti E, et al. Neurophysiologic evidence for a central sensitization in patients with fibromyalgia. *Arthritis Rheum* 2003; 48:1420-1429.
3. Lazaridou A, Koulouris A, Dorado K, Chai P, Edwards RR, Schreiber KL. The impact of a daily yoga program for women with fibromyalgia. *Int J Yoga* 2019; 12:206-217.
4. Yadav RK, Sarvottam K, Magan D, Yadav R. A two-year follow-up case of chronic fatigue syndrome: Substantial improvement in personality following a yoga-based lifestyle intervention. *J Altern Complement Med* 2015; 2:246-249.
5. Hazra S, Venkataraman S, Handa G, et al. A cross-sectional study on central sensitization and autonomic changes in fibromyalgia. *Front Neurosci* 2020; 14:788.
6. Martins I, Carvalho P, de Vries MG, et al. Increased noradrenergic neurotransmission to a pain facilitatory area of the brain is implicated in facilitation of chronic pain. *Anesthesiology* 2015; 123:642-653.
7. Garcia-Larrea L, Peyron R. Pain matrices and neuropathic pain matrices: A review. *Pain* 2013; 154(suppl 1):S29-S43.
8. Lubejko ST, Graham RD, Livrizzi G, Schaefer R, Banghart MR, Creed MC. The role of endogenous opioid neuropeptides in neurostimulation-driven analgesia. *Front Syst Neurosci* 2022; 16:1044686.
9. Li T, Zhang S, Ikeda E, Kobinata H. Functional connectivity modulations during offset analgesia in chronic pain patients: An fMRI study. *Brain Imaging Behav* 2022; 16:1794-1802.
10. Singh P, Rao S. Effect of yogic practices in the management of fibromyalgia: A review. *Yoga Mimamsa* 2023; 55:100-106.