



## A Comparative Study on the Effect of Yoga and Strengthening Exercises on the Symptoms of Fibromyalgia in Women

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### ABSTRACT

*Fibromyalgia (FM) is condition characterised by wide spread pain, fatigue and sleep irregularities. It is more common in women than men. A number of pharmacological and non pharmacological treatments have been noted by researchers and efficacy of physiotherapy to relieve symptoms of Fibromyalgia has also been established previously. However, there is scope to identify an effective treatment for the same employing both conventional and contemporary modalities of therapy like strengthening exercises and yoga. Thus the objective of the study was to compare the effect of yoga and strengthening exercises on the symptoms of fibromyalgia in women. Data collection was done from educational institutions in Belagavi, India. Women between the age group of 18-45 years were screened using the Revised Fibromyalgia Criteria and were recruited for the study. Informed consent, demographic data and scores of Revised Fibromyalgia Impact Questionnaire were obtained and documented. Subjects were randomly assigned into two groups using envelope method. One group was given Yoga and other group was given strengthening exercises for 7 days. Post intervention data were obtained and analysed. There was statistical significance in both groups with yoga showing greater effect than strengthening exercises in the improvement of symptoms of fibromyalgia. This study concludes that yoga had better effect than strengthening exercises on the symptoms of fibromyalgia in women and must be practised by subjects with FM to reduce the symptoms as much as possible.*

**Keywords-** Fibromyalgia, Yoga, strengthening exercise, physiotherapy.

### INTRODUCTION

Fibromyalgia (FM) is a condition characterized by widespread musculoskeletal pain along with symptoms like tenderness, fatigue, sleep disturbance, cognition problems and psychological distress.<sup>1</sup> A prevalence of 2-7% has been noted in different countries, with an

average female to male ratio of 9:1.<sup>1</sup> The peak of symptoms being noted in the childbearing age of women i.e. 18-45 years.<sup>2</sup>

The exact aetiology of Fibromyalgia is still not known, although various studies suggest involvement of both genetic susceptibility as well as environmental trigger factors.<sup>3</sup> Evidence

suggests presence of a gene signature in the individuals with FM<sup>3</sup> while few other studies suggest there might be altered hypothalamic pituitary adrenal axis, abnormal processing of pain in central nervous system, and/or autonomic nervous dysfunction related to reduced levels of serotonin, nor epinephrine, and dopamine.<sup>4,5,6</sup> Other than this, triggering events that include persistent focal pain disorders, childhood abuse, injuries, depression, hypermobility, infection with hepatitis C, Sjögren's syndrome, systemic lupus erythematosus, HIV, early-onset migraine and post-traumatic stress disorder have been noted.<sup>3</sup> The diagnosis of this condition is mainly based on the Fibromyalgia Diagnostic Criteria (FDC) proposed by the American College of Rheumatology (ACR) in 1990,<sup>7</sup> which has been revised in 2010,<sup>8</sup> 2011<sup>9</sup> and then in 2016.<sup>10</sup>

There is no definite cure for FM, though current treatment options offer symptomatic management through both pharmacological and non-pharmacological therapies.<sup>11</sup> The nonpharmacological treatments proposed are acupuncture, biofeedback, capsaicin, chiropractic, cognitive behavioural therapies, exercise, hydrotherapy, spa therapy, hypnotherapy, massage, meditative movement (Quigong, yoga, tai chi), mindfulness/mind-body therapy, multicomponent therapy, S-adenosyl methionine and other complementary and alternative therapies.<sup>11</sup> Modern medicine like physical therapy aides with modalities like stretching, strengthening, aerobic training and endurance training to provide symptomatic relief for these subjects.<sup>12,13</sup> Of these, strengthening provides greater results in reducing symptoms like pain in subjects with fibromyalgia.<sup>14</sup> In a study conducted by J. Derek Kingsley et al, found that strengthening led to improvement of pain along with improvement in independence and quality of life in subjects with FM.<sup>15</sup>

Alternate therapies like yoga focus on body, mind and breathing of an individual through practice of breathing techniques (*pranayamas*),

physical poses (*asanas*) and meditation (*dhyana*).<sup>16</sup> Carson et al conducted a randomised clinical trial and found that Yoga had promising results in the symptoms of FM including pain, fatigue, emotional disturbances and other coping strategies.<sup>17</sup>

This study was undertaken to compare the effect of yoga and strengthening exercises on the symptoms of fibromyalgia in women.

## MATERIALS AND METHODS

Prior to the commencement of the study, approval was obtained from the Ethical Committee of the Institution Review Board. Criteria for participant enrolment included female subjects between the age group of 18-45 years, diagnosed as having FM using the Revised Fibromyalgia criteria, 2016 and not undergoing any other physiotherapeutic intervention. The exclusion criteria were pregnant/lactating women and subjects with associated co-morbidities. Over 220 females were screened from educational institutions in Belagavi, India for the study. Out of which, 33 women were diagnosed as having fibromyalgia as per the Revised Fibromyalgia Criteria, 2016 and 30 women were recruited for the study based on those willing to receive intervention for a duration of 7 days. The subjects were briefed about the nature of the study, their informed consent was taken and they were randomly allocated into two groups using the envelope method. The two groups consisted of yoga and strengthening exercises.

## INTERVENTION

The Yoga group performed warm up for 5 minutes, 13 *asanas* (physical poses) to be maintained for a total of 20 minutes, followed by 5 minutes of *pranayamas* (breathing exercise) and 20 minutes of *dhyana* (mindfulness meditation). Each *asanawas* maintained for 3 sets of 30 seconds for total of 1.5 minutes. The *asanas* were *Parvatasana* (mountain pose), *Tadasana* (mountain pose with sun arms),

*Veeerbhadrasana* (Warrior pose), *Utkatasana* (Chair pose), *Adhomukhasavasana* (Downward facing dog on chair pose), *Bhujangasana* (sphinx pose), *Shalabhasana* (Modified locust pose), *Balasana* (Child pose), *Suptakapotasana* (Supine pigeon pose), *Natrajasana* (Supine thoracic twist pose), *Setubandhsarvangasana* (bridge pose), *Pavanmuktasana* (Supine knee to chest pose) and *Shavasana* (Corpse pose). The *pranayamas* included practising *Nadishodhana* pranayama for 5 minutes and mindfulness meditation was practised after the *pranayamas* for 20 minutes with light classical music.

Strengthening exercises began with warm up for 5 minutes, followed by strengthening exercises for 40 minutes and cool down for 5 minutes. Strengthening exercises included shoulder flexors/extensors, abductors/adductors and elbow flexors/extensors and hip flexors/extensors, knee flexors/extensors, ankle plantar-flexors/dorsiflexors strengthening and core muscle strengthening. Strengthening for upper limb was done using dumbbell and for lower limb using weight cuff. The resistance to be offered for every muscle was calculated using 1 RM and noted and progression of the exercise was done using 8-10-12-12 repetition format. Core muscle strengthening began with static contractions for pelvic and lumbar

spine stabilisation followed by crunches and trunk extension exercises. Both the groups received treatment for 50 minutes per session.

### OUTCOME MEASURES

Scores of Revised Fibromyalgia Impact Questionnaire (FIQR) were collected pre and post intervention. FIQR consists of three domains. The first domain enquires about the difficulty in performing activities, the second domain consists of questions about overall impact of fibromyalgia and third domain consists of questions about intensity of fibromyalgia symptoms over the last 7 days. The scores of each question in every domain were calculated, and the score of first domain was divided by 3, score of second domain was divided by one and score of third domain was divided by 2. The score thus obtained from each domain was then added together and the total score was obtained.

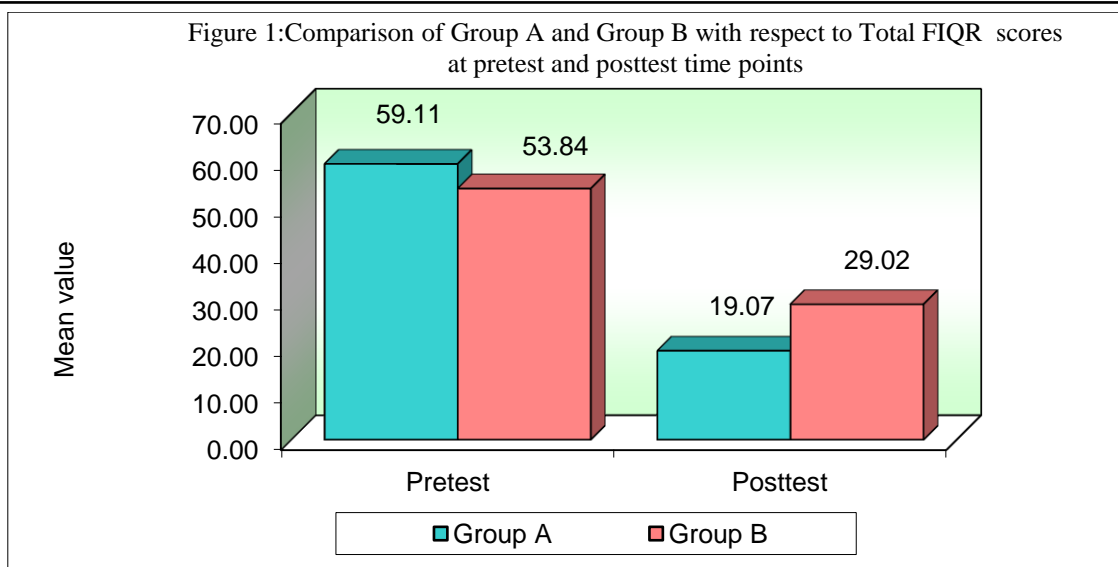
### RESULT

The pre-test mean of FIQR was 28.90 in group A and 26.97 in group B. The post-test mean of FIQR was 10.30 in group A and 14.53 in group B. Therefore, percentage change in group A was 64.36% and in group B was 46.11%. (Table I, Figure 1)

**Table I:** Comparison of Group A and Group B with respect to Total FIQR scores at pre test and post test time points by independent t test.

Groups	Pretest		Posttest		Changes	
	Mean	SD	Mean	SD	Mean	SD
Group A	59.11	15.20	19.07	7.88	40.04	10.71
Group B	53.84	12.85	29.02	12.13	24.82	12.31
% of change in group A					67.73%#, p=0.0001*	
% of change in group B					46.10%#, p=0.0001*	
t-value	1.0260		-2.6632		3.6119	
P-value	0.3137		0.0127*		0.0012*	

\*p<0.05, #applied dependent t test



## DISCUSSION

The present experimental study demonstrated that both the groups were beneficial, however, between the two groups; yoga was more effective than strengthening exercises to improve the symptoms of FM. Strengthening induces increase in maximum voluntary force from muscle fibres and area of muscle fibres which leads to increased motor unit firing pattern and hypertrophy of muscle, D. A. Jones et al (1986).<sup>(18)</sup> Strengthening acts on the mechanoreceptors of joints and muscles, which get stimulated after strength training, inhibit the local nociceptors and activate the descending pain inhibitory pathways such that the sensory cortex identifies peripheral stimulus as less painful, causing reduction in pain.<sup>(18)</sup> Another factor could be synthesis of endogenous opioids, which is stimulated post strength training, which may have alleviated pain in these subjects.<sup>(18)</sup> Several studies have favoured the present study result wherein with strengthening exercises there was improvement in the symptoms of FM. A study was done by J. Derek Kingsley et al, where strengthening had demonstrated to show improved components of functionality like the amount of weight carried in tasks, decreased time to achieve tasks and no significant change in cardiovascular values measured by heart rate in the different tasks compared with the control group using

Fibromyalgia Impact Questionnaire and Continuous-Scale Physical Functional Performance (CSPFP) to assess the physical function.<sup>(19)</sup> However, there were no significant changes in the upper body flexibility and balance.<sup>(19)</sup> A study done by Daniel S Rooks et al described strength training activities as safe, feasible and beneficial to improve muscle strength, walking distance, functional status and severity of symptoms in FM.<sup>(20)</sup> Kim Dupree Jones et al stated in their study that post strength training in females with FM improvement was seen in total myalgic score, number of tender points, VAS for pain, knee strength for extension and flexion, shoulder strength for internal and external rotation, hand to neck flexibility and hand to scapula flexibility, Beck Anxiety Inventory Questionnaire Score, Beck Depression Inventory Questionnaire Score, Quality of Life Questionnaire Score, Fibromyalgia Impact Questionnaire Score and Self-efficacy Scale Score.<sup>(21)</sup>

Yoga is comprised of 3 principles: *pranayama* (breathing techniques), *asanas* (posture) and *dhyana* (meditation).<sup>(16,22)</sup> Each of these has an effect on the neurobiological functioning.<sup>(22)</sup> Pranayama controls the breath and ultimately, the mind, it invigorates the entire body – mind system.<sup>(23)</sup> The respiratory and nervous systems are calmed and strengthened and all the cells receive the *prana* or

life force energy from the breathing.<sup>(23)</sup> Breathing exercises influence Autonomic Nervous System, leading to variability in heart rate and cardiac vagal tone.<sup>(24)</sup> Mind and emotions experience stillness. As the respiratory rates slow down, heart rate in relation becomes slower.<sup>(23)</sup> This in turn affects the entire Circulatory System and reduces the load on the heart, allowing it to rejuvenate. The Sympathetic Nervous System receives the message that 'It is okay to relax!' and thus the Parasympathetic Nervous System initiates the relaxation response.<sup>(23)</sup> This can be one of the vital reasons for reduction of the intensity of symptoms and reduction in the post intervention score of FIQR. Pushendra Kumar conducted a study, wherein he established that *asanas* redirect physical action and behaviour and stimulate various glands, muscles and parts of the body related to emotional reactivity. Different state of mind can be activated or soothed through *asanas*.<sup>(25)</sup> *Asanas* have been found to improve mood, depression, relieve stress and contribute to increase cortisol levels in the body.<sup>(26)</sup> Cortisol is a hormone associated with improved self-esteem, hardiness, and stability of mind and lower levels of anxiety, depression, and emotional instability.<sup>(26)</sup>

Regular practice of meditation or *Dhyaana* is found to increase thickness of cortical regions of brain related to somatosensory, auditory, visual and interoceptive processing and may also slow down the age-related thinning of the frontal cortex.<sup>(27)</sup> Thus influencing psychiatric, emotional activity and stress-related symptoms like anxiety, depression, chronic pain, immunity, high blood pressure, telomerase activity and cortisol level.<sup>(24,27)</sup> A study done by Shamini Jain et al, found that meditation attempts to cultivate non-judgmental, moment to moment awareness to inner as well as outer stimuli.<sup>(28)</sup> The development of this skill would result in the ability to shift and redirect attention to the present moment rather than thinking about past or future

experience or otherwise distracting oneself from the present moment.<sup>(28)</sup>

Strength training only seems to act on the musculoskeletal system of the body, whereas Yoga also acts on different levels, involving various somatic and psychological subsystems, which maybe the reason for greater improvement seen in yoga group in this study.<sup>(24)</sup>

The limitations of this study are that long term effects of the interventions were not observed and the domain wise analysis of FIQR was not done.

## CONCLUSION

The present study concludes that both Yoga and strengthening exercises are effective in the symptoms of fibromyalgia in women, however Yoga has greater effect than Strengthening exercises. Hence, FM subjects need to practise regular yoga to minimise the symptoms as much as possible.

## CONFLICT OF INTEREST- None

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