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Original Research Article

EFFECT OF AEROBIC EXERCISE ON FATIGUE AND DEPRESSION IN INDIVIDUALS WITH RHEUMATOID ARTHRITIS

Sanjeev Kumar Singh [1], Afsha Mulla [2], Farheen Farooque Khan [3], Ronika Agrawal [4].

[1] Associate Professor, M.A Rangoonwala College of Physiotherapy and Research, 2390-B, K.B. Hidayatullah Road, Azam Campus,Camp, Pune, Maharashtra, India.

[2] B.P.Th, M.A Rangoonwala College of Physiotherapy and Research, 2390-B, K.B. Hidayatullah Road, Azam Campus,Camp, Pune, Maharashtra, India.

[*3] B.P.Th, M.A Rangoonwala College of Physiotherapy and Research, 2390-B, K.B. Hidayatullah Road, Azam Campus,Camp, Pune, Maharashtra, India.

[4] Principal, M.A Rangoonwala College of Physiotherapy and Research, 2390-B, K.B. Hidayatullah Road, Azam Campus,Camp, Pune, Maharashtra, India.

ABSTRACT

Background: Rheumatoid arthritis (RA) is an autoimmune, systemic, inflammatory condition causing pain, disability, and psychological distress. It is the most common chronic inflammatory joint disease, affecting 0.1-1% of the population. Women are affected 3 times more than men. Because of its chronic, painful, and disabling character, RA tends to have a profound impact on health-related quality of life (HRQOL).

Materials and methods: In the present study a convenience sample of 30 individuals between 30 to 60 years of age group according to the inclusion and exclusion criteria. The exercise intervention was participation in aerobic exercise session 3 times weekly for 6 weeks. The session consisted of 3 phases –1)Warm-up phase 2).Aerobic period 3) Cool down phase.Subjects were given their target heart rate for 40% and 60% of their HRmax. They were instructed to start exercising at 40% and progress to 60% as tolerated given their subjective exertion using the Talk Test (being able to talk while exercising without being short of breath). Global Fatigue Index Of The Multidimensional Assessment Of Fatigue Questionnaire (GFI) and The Center for Epidemiologic Studies- Depression Scale (CES-D)were used as outcome measures for evaluating fatigue and severity of depression respectively in the subjects and the data was statistically analysed.

Results: Paired t-test was done for pre and post mean values for MAF-GFI scale. The results showed statistically significant values for both the outcome measures (p value < 0.05).

Conclusion: The present study concludes that 6 weeks of aerobic exercise showed significant effect in decreasing fatigue and depression in individuals with rheumatoid arthritis.

KEY WORDS: Rheumatoid Arthritis, Fatigue, Depression, Aerobic Exercise.

Address for correspondence: Dr.Farheen Farooque Khan, M.A Rangoonwala College of Physiotherapy and Research, 2390-B, K.B. Hidayatullah Road, Azam Campus,Camp, Pune, Maharashtra 411001, India. **E-Mail:** kfarheen450@gmail.com

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INTRODUCTION

Rheumatoid arthritis (RA) is an autoimmune, systemic, inflammatory condition causing pain, disability, and psychological distress [1]. It is the most common chronic inflammatory joint disease, affecting 0.1-1% of the population.

Women are affected 3 times more than men. Because of its chronic, painful, and disabling character, RA tends to have a profound impact on health-related quality of life (HRQOL). RA may hasten functional decline over and above that associated with aging. Fatigue, pain, and depression, hallmark symptoms of RA, may increase poor quality of life and functional decline [2].

Fatigue is a significant symptom experienced almost universally by patients with RA (88–98%), often on a daily basis, and patients rate the impact and importance of fatigue as similar to pain. The causality of RA fatigue is likely to be multidimensional, involving inflammation, pain, anemia, poor sleep, and psychosocial factors. Fatigue may also lead to a reduction in both the quality and the quantity of work output, predispose one to personal injury, and involve an increasing loss of usable time [3-10]. RA patients described fatigue as an "overall sense of tiredness and heaviness that was associated with a desire to sleep," and as "that kind of fatigue which one never recuperates from" [3-7]. Whereas fatigue is the most prominent symptom besides pain, it was observed that patients manage fatigue alone and accept that fatigue is part of the disease, not discussing fatigue explicitly at the outpatient clinic or asking for advice from specialized healthcare professionals. The consequences of fatigue intrude on every sphere of life and cause major disruption and distress [6,11].

The effects of an exercise intervention on self-reported fatigue in clients with RA have not been well assessed in previous works. 63% of 100 subjects with either RA or osteoarthritis were found to have poor or very poor levels of aerobic fitness. Data from several studies show that subjective feeling of "perceived exertion" following an exercise session can be reduced through regular participation in moderate aerobic exercise. Part of fatigue in patients with RA maybe due to a deconditioned state and regular aerobic exercise may decrease detrimental effects of fatigue [2].

Depression is considered an important potential sequel of RA. A diagnosis of RA given has physical, psychological and socioeconomic implications for the individual. From a psychological point of view, people with RA fear long-term pain, stiffness and fatigue. Most dread the development of joint deformities, especially of the hands. They have concerns about loss of function, work disability and the possible socio-economic effects of the disease. The potential toxicity of long-term treatment with disease modifying agents is also a worry [3].

In RA population, the prevalence of depression ranges from 13% to 20% based on psychiatric assessments and considerably higher when based on self-report assessments. Depressed RA patients view their condition as more serious, report more physical symptoms, and feel more helpless about their health outcomes even when controlling for RA severity. The sense of helplessness, negative illness beliefs, and use of maladaptive coping may influence health-seeking behavior and the use of medical services. Furthermore, it has been reported that depressed RA patients are less compliant with medication. Fifty percent of depressed patients experience significant physical changes (usually relating to joint deformation, weight gain/loss), and 61% experience significant changes in recreational activities [5].

Depression appears, therefore to be a highly prevalent condition in RA patients. Several researches support the notion that exercise has psychological benefits. One study found aerobic exercises to be as effective in reducing depressive symptoms as psychotherapy. In cases where aerobic exercises led to improvement in mood, it might be assumed that the mood improvement is due to improvement in aerobic capacity [3, 1].

METHOD AND METHODOLOGY

Study design and participants: This was an interventional study with convenient sampling. 30 individuals with confirmed diagnosis of RA according to ACR criteria between 30 to 60 years of age were included in the study. Inclusion criteria involved patients with confirmed diagnosis of RA according to ACR criteria, Functional Class 1 and 2 RA, able to ambulate independently, not engaged in performing >15 min of aerobic exercise 3 times

a week. Exclusion criteria comprised high disease activity, such that changing or starting a slow acting anti-rheumatic drug was considered necessary by the rheumatologist and inability to tolerate physical fitness training due to presence of serious cardiac, lung or any systemic condition.

Dependent Variables: Fatigue and Depression

Assessments:

Global Fatigue Index of the Multidimensional Assessment of Fatigue Questionnaire: The GFI consists of 15 out of 16 items from Belza et al.'s MAF instrument that assesses five dimensions of fatigue.The GFI scores range from 1 to 50 with higher scores indicating greater impairment from fatigue. Scoring of the GFI involves the sum of Items 1, 2, and 3 plus the average of Items 4 through 15.For internal consistency reliability, Belza et al. (1993) and Belza (1995) reported a Cronbach's alpha of .93 on the instrument as a whole.

Centre for Epidemiological Studies Depression Scale: The Center for Epidemiologic Studies-Depression Scale (CES-D) is a 20-item self-report scale designed to measure presence and severity of depressive symptomatology. CES-D is an appropriate instrument for use in an arthritis population. Frequency of occurrence of each symptom during an average week in the previous 3 months is rated on a scale of 0 (rarely or none of the time) to 3 (most or all of the time), and total scores range from 0 to 60. Scores above 16 are used to identify the depressed group, and the scale author reports high scale reliability of 0.85 for general and 0.90 for psychiatric population.

Methodology: In the present study 30 subjects were selected on the basis of inclusion criteria. All subjects signed the consent form after explanation of the protocol and then filled the questionnaires. Subjects were given demonstration of intervention procedure.

Intervention: The exercise intervention was participation in aerobic exercise session 3 times weekly for 6 weeks. The session consisted of 3 phases –

i)Warm-up phase- Active ROM exercises.

In sitting

a) Shoulder (flexion, abduction) x 10 reps each

b) Elbow (flexion, extension)x 10 reps each

c) Hip flexion x 10 reps

d) Knee extension x 10 reps

In standing

a) Hip Abduction x 10

b) Knee flexion x 10

c) Marching in place x 10

d) Heel raises x 10

ii) Aerobic period- Progressive walking.

iii) Cool-down exercises- Slow walking.

Intensity: 40-60% of HR max

Duration: 20-40 min

Distribution of minutes for each phase of exercise (warm-up, aerobic, cool-down) was as follows:

10, 5, 5 for week 1
10, 7, 5 for week 2
10, 10, 5 for week 3
10, 15, 5 for week 4
10, 20, 5 for week 5
10, 25, 5 for week 6

Subjects were given their target heart rate for 40% and 60% of their HRmax. They were instructed to start exercising at 40% and progress to 60% as tolerated given their subjective exertion using the Talk Test (being able to talk while exercising without being short of breath). Subjects were trained to take their pulse and recorded pulse rates after the aerobic portion of each session.

Statistical Analysis: Statistics were done using software Microsoft Excel 2007. Statistical analysis was done using paired t-test.

In the study we have studied the effects of aerobic exercise on fatigue and depression in individuals with rheumatoid arthritis aged 30-60 yrs.

RESULTS

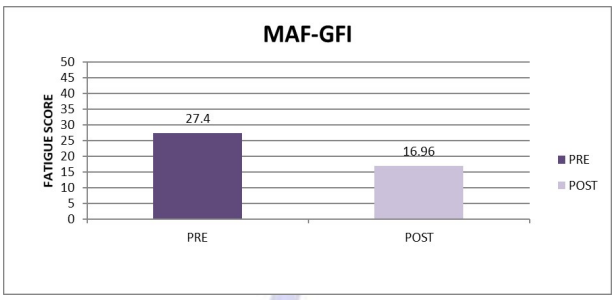
Demographic characteristics of the study:

Total 30 subjects were included in the study of which 27 were females and 3 were males.

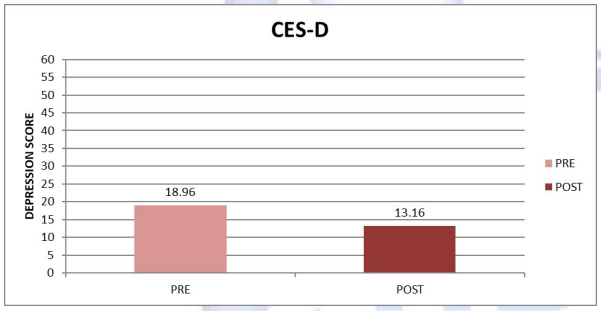
Table 1: Comparison of mean pre and post 6 weeks of intervention using paired t-test.

Variables	Mean Value		P value	T-value	Interpretation of Values
	PRE	POST			
MAFGFI	27.4	16.96	2.5 E-20	22.72	SIGNIFICANT
CES-D	18.96	13.16	3.51 E-17	17.38	SIGNIFICANT

The above table indicates that there was significant difference observed in both variables pre and post 6 weeks of intervention ($p < 0.05$)



Above graph shows comparison of mean value of MAF-GFI score pre and post 6 weeks of intervention.



Above graph shows comparison of mean value of CES-D score pre and post 6 weeks of intervention.

The experimental group comprised of 10% males and 90% females. Paired t-test was done for pre and post mean values for MAF-GFI scale. P value = 2.5 E-20 which is significant. Paired t-test was done for pre and post mean values for CES-D scale. P value = 3.51 E-17 which is significant.

DISCUSSION

The purpose of this study was to find out the effect of aerobic exercise on fatigue and depression in individual with Rheumatoid arthritis.

Fatigue is a significant problem for individual with RA. The aetiology of fatigue in RA is unknown but is intricately related to its other symptoms. Part of fatigue in people with RA may be due to a deconditioned state and hence regular aerobic can decrease detrimental effects of fatigue.

Depression in RA is also linked to other factors such as pain, disease activity, stress etc. Negative self-evaluation of coping efficacy is another factor related to depression. Depressed patients are likely to undervalue their capacity to cope effectively with disease and other stressful events. By doing so they may increase risk of further exacerbations thus contributing to vicious cycle of stress and disease progression. is another factor related to depression. Depressed patients are likely to undervalue their capacity to cope effectively with disease and other stressful events. By doing so they may increase risk of further exacerbations thus contributing to vicious cycle of stress and disease progression. Stress, including social stress affects the central nervous system, causing the eventual release of prolactin (PRL) and adrenal corticotrophin hormone (ACTH) from the pituitary gland and cortisol from the adrenal cortex. In the healthy individual, cortisol suppresses cellular immune function thus reducing inflammation, whereas PRL is stimulatory (Russell, 1989). These opposing actions, as well as the action of gonadal steroids, allow for modulation of the immune response around a homeostatic set point. However, because RA is a systemic autoimmune disorder, the homeostatic mechanisms that normally regulate immunity and inflammation may not be fully functional (Dorian & Garfinkel,1987). Dysregulation in this system suggests that RAs might be especially hormonally responsive to psychosocial stress, possibly leading to increased immune system activity and disease flare-ups. Immune activation in RA may also be augmented through other immune-stimulating hormones, such as estrogen. It is well known that regular exercising regulates hormonal imbalances.

Central monoamines especially serotonin have long been implicated in aetiology of depression. A deficit in the level of these neurotransmitters can lead to depression. It has been stated that cytokines like IL-1 and IL-6 increase in depression and correlate with severity of depression and cytokines IL-6 can affect the level on monoamines in the central nervous system. An increase has been established in IL-6 levels of RA cases with depression and it has been argued that IL-6 levels increase in response to stress activation periods during the clinical course of disease. Research has shown that exercise increases

basal free fatty acids and free tryptophan levels which could increase the rate of synthesis of serotonin by increasing the CNS availability of its amino acid precursor.

The role of â-endorphin, an endogenous opioid, in exercise treatment for depression has also been considered. It is well known that exercise leads to a surge of â-endorphin released into the blood stream to calm the sympathetic nervous system and provide analgesic relief from pain associated with strenuous exercise. Preliminary support for the hypothesis that β -endorphin surges mediate the antidepressant effects of exercise is provided by studies showing that post-exercise mood elevations are associated with increases in basal β -endorphin levels.

Imbalances in HPA axis functioning (a neuroendocrine to stress) have been linked to depression. Exercise training can lead to an attenuating of HPA axis response to stress thus reducing depression. Research also suggests that the exercise positively affects self-evaluation (self-esteem body image). This suggests that anti-depressant effect of exercise may be mediated by improved self-evaluations.

Exercise intervention of 6 weeks was given to the study population. Progression of exercise duration was done every week. Progression of HRmax was also done (starting from 40% till 60-70% of HRmax) as tolerated by the subjects. Statistical analysis showed significant improvement i.e. fatigue and depression scores reduced. This indicates that aerobic exercise has a significant effect in reducing fatigue and depression in RA patients.

CONCLUSION

The present study concludes that 6 weeks of aerobic exercise showed significant effect in decreasing fatigue and depression in individuals with rheumatoid arthritis.

Conflicts of interest: **None**

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