Effect of aerobic exercises on depressive symptoms, anxiety, self-esteem, and quality of life among adults with depression

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ABSTRACT

Depression impacts on daily living activities of depressive patients. Patients suffering with mental disorders also show impairment in their Quality of life.

Objective: To evaluate the effectiveness of aerobic exercises on depressive symptoms, anxiety, self-esteem, and quality of life among adults suffering from depression.

Methods: Participants (N = 80) were assigned to the experimental group (40), received the aerobic exercises along with medication and control group (40), received the medication only. The intervention was carried out over a period of 8 weeks with the intervention group performing the exercise for 3 days a week.

Results: The mean age of the experimental group 40.0 ± 10.18 and control group is 43.63 ± 11.86 respectively. Significant reduction was seen in the depressive symptoms and anxiety when in intervention group when compared to control group using independent *t*-test. The study also showed improvement in the self-esteem and overall quality of life scores and specifically significant improvement was seen in the area of psychological, social and environmental domain as measured by WHO QOL scale.

Conclusion: The study concludes that exercise had definitely helped in reducing the depressive symptoms, anxiety and improved the self-esteem and quality of life of patients with depression. The study was found to be cost-effective and feasible to be made as a routine intervention along with medication for patients to manage depressive symptoms.

1. Introduction

Prevalence of depression and anxiety symptoms among adults is alarming. It seeks the immediate preventive measures, with the access of suitable and appropriate services for the adult age group.¹ Depressive disorder has high risk factor and poor prognostic outcomes among mentally ill patients who were not line with medical consultation and adhere to medications. Anxiety and depression always reports poor health condition and predominantly decline the quality of life over a period of time among people suffering with depressive disorder. Depression impacts on daily living activities of depressive patients and they fail to access health care facilities for adequate treatment.²

More than 300 million people are affected by depression in the world. Depression can interfere with individual's daily life but it is different from other mood disorders. Severity of depression was moderate or severe concern of clinically significant and seeks prompt

medical attention. Depression can cause poor work, sleep disturbance and irritability among affected people.³

Patients suffering with mental disorders also show impairment in their quality of life. Poor quality of life associated with various mental conditions are major depressive disorder (63%) chronic depression (85%), dysthymic disorder (56%), panic disorder (20%), obsessive-compulsive disorder (26%), social phobic disorder (31%) and post-traumatic stress disorder (59%). These disorders significantly associated with quality of life scores.⁴

Low self-esteem is always associated with a wide range of mental health problems such as depressive symptoms, suicidal ideas, anxiety disorder and eating disorders. Low self-esteem can also associate with social problems like violence and substance abuse.⁵ Physical exercises are more effective in treatment of older adults to improve depressive symptoms, enhance self-esteem and quality of life. Well designed and effective use of physical exercise programs for older adults are the best

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Fig. 1. Schematic representation of study design.

intervention for prevention and treatment of mental health problems.⁶ Exercises are safe and effective treatment in reducing depression among elder people and have shown health benefits, it is considered as an alternative intervention in treatment of elder people experiencing mood disorder.⁷

Daily physical exercises showed positive benefits in cognitive, emotional and motor aspects with reduction in distress and negative effect. A physical exercise plays a preventive role in depression and anxiety disorder and promotes psychological well-being in all age groups.⁸ Hence this study aimed to determine the effectiveness of aerobic exercises in patients with depression to minimize their anxiety, depressive symptoms enhance self-esteem and improve quality of life.

2. Methods

2.1. Study design and participants

A quasi experimental pretest-posttest control design was adopted to evaluate the effect of aerobic exercise on depressive symptoms, anxiety self-esteem and quality of life among patients diagnosed with depression at the out-patient department of postgraduate institute of medical and behavioural sciences (PGIMBAS). A total of eighty samples between the ages of 21–65 years diagnosed with depression who full filled the inclusion criteria were assigned into the experimental (40) and control group (40). The sample size was calculated using the formula of mean

difference and standard deviation with intraclass correlation for repeated measures. With $\alpha = 1.96$ and $\beta = 1.28$ with a power of 90% with 20% attrition.⁹

$$n = \frac{2 \left[Z_{1-\frac{\alpha}{2}} + Z_{1-\beta} \right]^2 \sigma^2 [1 + (m-1)\rho]}{m(d)^2}$$

$Z_{1-\alpha/2} = 1.96$ for $\alpha = 5\%$; $Z_{1-\beta} = 1.28$; 90% power; $\rho = 0.3$; $d = 3$

(σ^2 – standard deviation, d – clinically significant difference, m – number of measures, ρ – intra class correlation of repeated measures.)

Inclusion criteria for study participants were: 1) adults who were diagnosed to have depression and were treated with medication attending outpatient department of selected psychiatric hospital in Raipur. 2) who were willing to participate and be committed to perform the aerobic exercise program for 3 days a week for eight weeks. 3) who spoke English and hindi. The participants who had medical illness and were unfit to perform the aerobic exercises were excluded from the study (Fig. 1).

2.2. Data collection instruments

Valid and reliable tools were used for data collection. The standardized tools of English version were translated to Hindi with the help

Table 1

Frequency (f) and Percentage (%) Distribution of Demographic Variables in the Experimental and Control group N = 80.

Demographic variable	Experimental group (N = 40)		Control group (N = 40)	
	f	%	f	%
Age^a (Total mean 41.81 ± 11.13)	40.0	10.18	43.63	11.86
Sex				
Male	30	75	23	57.5
Female	10	25	17	42.5
Religion				
Hindu	37	92.5	39	97.5
Christian	1	2.5	0	0
Muslim	2	5	1	2.5
Education				
None at all	2	5	11	27.5
Primary	3	7.5	5	12.5
Secondary	6	15	16	40
Higher	29	72.5	8	20
Marital status				
Married	33	82.5	34	85
Single	3	7.5	1	2.5
Divorced	1	2.5	0	0.0
Widowed	1	2.5	5	12.5
Separated	2	5	0	0
Employment				
Self-employment	6	15	3	7.5
Labour work	9	22.5	20	50
Office work	17	42.5	2	5
Unemployment	8	20	15	37.5
Duration of illness				
0–6 months	7	17.5	8	20
7–12 months	3	7.5	1	2.5
12 months above	30	75	31	77.5
Medication				
SSRIs	22	55	23	57.5
SNRIs	4	10	4	10
TCAs	14	35	12	30
MAOIs	0	0	1	2.5

Note.

^a Age presented in Mean (SD). SSRIs = Selective Serotonin-Reuptake Inhibitors; SNRIs = Serotonin and Norepinephrine Reuptake Inhibitors; TCAs = Tricyclic Antidepressants; MAOIs = Monoamine Oxidase Inhibitors.

Table 2

Mean SD, Minimum and Maximum score of Overall QOL and General Health of depressive patients. N = 80.

WHOQOL-BREF items	Minimum score	Maximum score	Mean	SD
Overall QOL	1	5	3.41	.95
General Health	1	5	3.15	1.13

of language experts and retranslation was done to ensure the language validity. Internal consistency of the scales was calculated using Cronbach's alpha. The data were collected using the socio-demographic proforma; Beck Depression Inventory (BDI $r = 0.77$); Hamilton Anxiety rating scale (HAM-A, $r = 0.71$); Rosenberg self-esteem scale ($r = 0.72$) and WHOQOLBREF ($r = 0.82$). The study was approved by the Institutional Research Committee and Ethics committee of the institution.

2.3. Data collection procedure

The intervention group received the aerobic exercises i.e. walking, stair climbing, and aerobic dance for 35 min. A total of three sessions a week with average of twenty-four sessions in the eight weeks was given and followed up through telephonic calls and reminders to do the exercises. Only those who could attend the training program. The

intervention was given in the OPD by the investigator. The investigator had a training to administer the intervention. The intervention group received walking for 10 min, step climbing for 5 min and aerobic dance for 20 min. Video was given to them to practice at home. The control group received only the medication prescribed by the doctor. The study adopted a quasi-experimental design since randomization was not possible. The control group subjects were selected prior to the selection of intervention group to avoid contamination. The informed written consent, participant information sheet, and baseline assessment were done on the first day of selection, and then posttest was taken in the eighth week when intervention was completed. The data analysis was done using SPSS20.

2.4. Ethical considerations

The present study fits into the principles defined in the Declaration of Helsinki¹⁰ (World Medical Association, 2013). The study was reviewed and approved by the Institutional Review and Ethics Committee. The study protocol was registered in CTIRI. A subject information sheet was provided with clear explanation to each study participants and written informed consent was obtained before including them in the study.

3. Results

3.1. Baseline information

Demographics: The mean age of the study participants was 41.81 ± 11.13 . Majority of the patients were male (75%) in the experimental group and 57.5% in the control group. Most of the patients belonged to hindu religion in the experimental 92.5% and control group 97.5%. Regarding education, the majority of them 72.5% were in higher education group in the experimental and 40% were having secondary education in the control group. With regard to marital status, most of them were married i.e. 82.5% in experimental and 85% in the control group. Majority of them 42.5% were doing office work in experimental and 50% were doing labour work in the control group. With regard to duration of illness, 75% in the experimental and 77.5% in the control group reported to have been diagnosed with depression for more than 12 months. Most of them 55% are taking selective serotonin reuptake Inhibitors (SSRIs) in experimental and 57.5% in the control group (Table 1).

Depressive symptoms: The severity of depressive symptoms was measured using a four-point rating scale. The scores were as follows: (0–9 minimal depression), (10–18 mild depression), 19–29 (moderate depression), and 30–63 (severe depression). In the experimental group 47.5% of the subjects reported to have the mild symptoms of depression whereas 35% of control group reported to have mild depression.

Anxiety scores: The severity of anxiety was categorized as follows: 0–13 (normal anxiety), 14–17 (mild anxiety), 18–24 (moderate anxiety), and 25 and above (severe anxiety). In the experimental group 37.5% reported to have severe anxiety. In control group 30% of them reported to have mild anxiety.

Self-esteem: The self-esteem was categorized as low self-esteem (Below 15), average self-esteem (15–25) and high self-esteem (25 and above). Seventy-five percent of the subjects in the experimental group and 70% of the subjects in the control group reported to have average self-esteem.

Quality of life: Quality of life scores among depressive patients was measured using WHOQOL scale. The overall QOL and domain wise was assessed. Mean and standard deviation of the overall QOL score was (3.41 ± 0.95) and general health score was (3.15 ± 1.13) respectively (Table 2). Most of them had poor QOL in physical health and social relationships (69.2%) domains. More than 50% reported to have poor quality of life in psychological health and environmental domain both in the experimental and control group. With regard to the various

Table 3

Correlation coefficient computed in the two overall questions and four domains of WHOQOL BREF among depressive patients N = 80.

WHOQOL-BREF Items and Domains	Overall QOL	General Health	Physical Health	Psychological Health	Social Relationship	Environment
Overall QOL	1	r = .574 p < 0.05	r = .530 p < 0.05	r = .456 p < 0.05	r = .313 p < 0.05	r = .130 p > 0.05
General Health		1	r = .504 p < 0.05	r = .589 p < 0.05	r = .286 p < 0.05	r = .228 p < 0.05
Physical Health			1	r = .689 p < 0.05	r = .426 p < 0.05	r = .350 p < 0.05
Psychological Health				1	r = .487 p < 0.05	r = .454 p < 0.05
Social Relationship					1	r = .599 p < 0.05
Environment						1

Table 4

Pretest and Posttest Mean, SD, t-value of Depressive Symptoms Scores, Anxiety scores, self-esteem scores and quality of life Scores among Depressive patients between Experimental and Control group. N = 63.

Variables	Experimental group (n = 30)		Control group (n = 33)		Mean difference	Standard error	t-value	p-value
	Pretest Mean ± SD	Posttest Mean ± SD	Pretest Mean ± SD	Posttest Mean ± SD				
Depressive symptoms Scores	16.47 ± 9.19	7.13 ± 5.53	14.48 ± 11.91	12.70 ± 9.99	7.54	1.69	4.45	.0001
Anxiety Scores	19.97 ± 8.97	11.63 ± 8.89	17.18 ± 8.30	14.24 ± 7.72	5.39	1.38	3.88	.0001
Self-esteem Scores	18.23 ± 3.17	22.73 ± 3.48	17.85 ± 3.70	20.61 ± 3.21	-1.74	0.99	-1.76	.08
Quality of life Scores								
Physical health	51.11 ± 12.52	57.13 ± 11.79	57.83 ± 18.53	55.55 ± 13.58	-9.12	3.52	-2.58	.01
Psychological health	57.02 ± 14.63	54.50 ± 9.04	64.83 ± 14.64	53.18 ± 8.60	-8.30	3.17	-2.61	.01
Social relationships	60.97 ± 15.95	72.57 ± 15.05	67.68 ± 16.50	69.30 ± 14.66	-9.96	4.06	-2.45	.01
Environment	59.0613.06	70.7314.01	58.6214.25	63.7013.56	-6.59	2.84	-2.31	.02

^a Mean difference of experimental and control group.

domains of quality of life moderate correlation was found in all domains i.e physical health and psychological health domain ($r = 0.689$) and social relationship and environmental domain ($r = 0.599$) (Table 3).

Effectiveness of aerobic exercises on depressive Symptoms, anxiety, self-esteem and quality of life among the depressive patients.

There was significant reduction in the depressive symptoms score among subjects in the experimental group i.e., 16.47 ± 9.19 in the pretest to 7.13 ± 5.53 in the posttest when compared to control group who had 14.48 ± 11.91 in pretest to 12.70 ± 9.99 in the posttest respectively. The experimental group subjects showed a significant reduction in the depressive symptoms. The mean difference of depressive symptoms scores between the experimental and control group was 7.54 with a standard error mean difference of 1.69. The computed t-test between the experimental and control groups was statistically significant ($t_{(61)} = 4.45$, $p < 0.05$). These results indicated that the aerobic exercises played a significant role in reducing the depressive symptoms.

The mean anxiety scores among patients diagnosed to have depression in the experimental group reduced from (19.97 ± 8.97) to (11.63 ± 8.89) whereas in control group there was only a slight decrease i.e. (17.18 ± 8.30) to (14.24 ± 7.72) respectively. The mean difference of 8.33 was found to be statistically significant ($t = 6.92$, $p < 0.05$). The results showed that the aerobic exercises were effective to reduce anxiety symptoms among depressive patients.

The aerobic exercise intervention program had a significant impact on the self-esteem scores. There was improvement in the mean self-esteem scores of the experimental group subjects from (18.23 ± 3.17) to (22.73 ± 3.48) with a mean difference of 4.5 whereas in control group from (17.85 ± 3.70) to (20.61 ± 3.21) with a mean difference of 2.75. The improvement of self-esteem scores was statistically

significant.

With regard to quality of life, both the experimental and control group subjects showed a slight decline in the quality of life in the physical domain. However, there was significant improvement in the psychological domain ($t = -2.61$, $p < 0.05$), social domain ($t = -2.45$, $p < 0.05$) and a minimal improvement in the environmental domain ($t = -2.31$, $p < 0.05$). Overall the aerobic exercise played a significant role in improving the quality of life of the patients with depression (Table 4).

4. Discussion

Exercise plays a significant role in improving the overall well-being of the individuals. The present study was carried out to determine the effectiveness of aerobic exercise program in reducing the depressive symptoms and anxiety, improving the self-esteem and overall quality of life. The study findings revealed that prior to intervention most of the patients reported to have mild depressive symptoms with 37.5% having severe anxiety. Majority of the subjects in both the groups reported to have average self-esteem. Similar findings were reported in a study by Olsson et al. (2000) in New York reported that patients between the age group of 46 and 60 years, 39.5% had major depressive disorder, 38.9% had generalized anxiety disorder.¹¹ Silverstone (2003) reported that depressive patients have lower self-esteem than other mental disorders.¹²

The present study findings are supported by the study conducted by Zeng, Xu, & Wang (2013) at Mainland, China which revealed that less than 5% of depressed patients reported good and very good QOL. Less than 3% were satisfied with general health.¹³ The current study findings reported to have a significant reduction in depressive symptoms in the intervention group who performed the aerobic exercise. These

findings are supported by the following studies published previously. A pilot study reveals that depression scores were significantly reduced at the end of the training program ($p = 0.002$).¹⁴ A randomized control trial carried out by Singh et al. (2001) concluded that depression scores significantly reduced in exercise group.¹⁵

The present study finding is supported by a meta-analysis which showed that exercises significantly decreased anxiety symptoms with moderate effect size of standard mean difference = -0.582 , 95% CI -1.0 to -0.76 , $p = 0.02$.¹⁶ The study findings strongly supported that exercises were effective in improving anxiety symptoms.

The study concludes that exercise has definitely helped in reducing the depressive symptoms, anxiety and improved the self-esteem and quality of life. Further study could be recommended to follow up the patients who are complying to the aerobic exercise and see the long term benefits in terms of bringing down the usage of drugs and managing the condition with exercise intervention.

4.1. Implications of the study

Exercise has been proven to have significant impact on the general and mental health wellbeing of individuals. Empirical evidence gives a strong foundation to implement exercise as a routine in care of patients with various mental health condition along with medication. This study has significantly contributed to the findings that aerobic exercise was effective in minimizing the depressive symptoms, minimizing the anxiety, enhancing the self-esteem and quality of life of patients.

4.2. Limitation

Quasi experimental study was planned as randomized control trial was not feasible during the pilot study. Particularly, the representation of a small number of patients included in the current study and data collection was conducted in a single setting. Generalization of this findings should be done with caution as it was a single setting study. It must be noted that the assessment of depressive symptoms, anxiety, self-esteem and quality of life was self-reported by the patients.

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Authorship

UTR conceptualized the study, contributed for protocol development, data collection, analysis and final writing of the report. JAN and KA were guide and coguide for the research finalized the study topic and protocol, supervised the study and corrected the draft of the article and

finalized for publication.

Ethical approval

The Institutional Ethics Committee of Kasturba Hospital, Manipal, issued an ethical clearance certificate (approval no. 790/2017).

Declaration of competing interest

The authors have significantly contributed to the research study from conception of the study to data collection and writing the report. There is no conflict of interest.

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