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Effect of 12 Weeks Aerobic Exercises Verses Antidepressant Medication in Young Adult Males Diagnosed with Major Depressive Disorder

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Abstract

This study intends to compare the effectiveness of a combination of 12 weeks of aerobic exercises and antidepressant medication with 12 weeks of antidepressant medication alone. 100 young adult males between the age group 18-39, diagnosed with major depressive disorder under the ICD 10 criteria ,were recruited for the study.50 subjects each were randomly assigned into either an experimental or a control group ,after baseline data were procured using the 17- item Hamilton depression rating scale (HDRS17). The experimental group underwent 12 weeks of aerobic exercises along with their regular antidepressant medication and the control group had only antidepressant medication as intervention. Our objective was to investigate weather the mean change in (HDRS17) scores from baseline was greater after 12 weeks of aerobic exercise when compared with antidepressant medication alone. This study concluded that combination of aerobic exercise along with antidepressant medication is more effective than antidepressant medication alone in the treatment of major depressive disorders in young adult males.

Key words - major depressive disorder, aerobic exercise, antidepressants, 17- item Hamilton depression rating scale

1) Introduction

Depression is the leading cause of disability as measured by years lived with disability (YLDs) and the 4th leading contributor to the global burden of disease and disability adjusted life years (DALYs) in the year 2000. By the year 2020, depression is projected to reach 2nd place of the ranking of (DALYs) calculated for all ages, both sexes. Today, depression is already the 2nd cause of (DALYs) in the age category 15-44 years for both sexes combined. Depression is common, affecting about 121 million people worldwide. Fewer than 25 % of those affected have access to effective treatments ,in some countries fewer than 10 % receive such treatments (WHO).India is the depression capital of the world with 39.5% prevalance, this study conducted by the World Health Organization, World Mental Health Survey Initiative ,(WMH) in which data was collected across eighteen countries interviewing 90,000 samples (Bromet et al. 2011).The national institute for health and clinical excellence UK (NICE) guidelines (The British Psychological Society & The Royal College of Psychiatrists, 2010),the physical activity guidelines advisory committee (U.S. department of health and human services, 2008),both agencies recommend the role of regular exercise in the prevention of onset and decrease in the symptoms of depression. However exercise may be a neglected intervention in mental health care (callaghan P, 2004).Aerobic exercises has been prescribed for a wide range of medical disorders and tipped as a potential treatment for various psychiatric conditions, especially depression. Population studies have shown an inverse relationship between physical activity and depression, and there is evidence that active people who become inactive are more at risk of depression that those who remain active

(IsabelWalker, 2000) .The effectiveness of exercise in reducing symptoms of depression cannot be determined, because of a lack of good quality research on clinical populations with adequate follow up (Debbie A Lawlor and Stephen W Hopker, 2001). The 17- item Hamilton depression rating scale HDRS17 (Cnsforum) was the primary outcome measure which has shown remarkable endurance over a period of decades and is still the most widely used tool in evaluating intensity of depression in scientific research.(corruble e, 2005)(Bernard j,2005).

2) Objectives

1. To determine the effect of aerobic exercises (experimental group) on depression scores at 4, 8 and 12 weeks

2. To determine the effect of antidepressant medication (Control group) on depression scores at 4, 8 and 12 weeks

3. To compare the effectiveness of 12 week aerobic exercises vs. antidepressant medication at 12 weeks.

3) Hypothesis

There will be significant difference in depression scores between the experimental and the control group at 12 weeks.

4) Materials and methods

4.1) Study design

This was a 12 week randomized control trial, Pretest post test control group design was used .Randomization was done following baseline data assessment, by lottery method as illustrated in table no.1.

Table no. 1 : Schematic representation of research methodology

Total sample size 100 baseline data assessment (HAMD17)	**Randomization**	**4weeks**	**8 weeks**	**12 weeks**
		Experimental group Aerobic exercise + medication n= 50(HAMD17)	Experimental group Aerobic exercise + medication n= 50(HAMD17)	Experimental group, Aerobic exercise + medication n= 50(HAMD17)
		Control group Medication only n=50(HAMD17)	Control group Medication only n=50(HAMD17)	Control group Medication only n=50(HAMD17)

4.2) Study population

Young adult males in the age range 18-39 with a depression score of at least 13 on the Hamilton depression rating scale at study entry, where recruited from selected outpatient psychiatric departments of various hospitals in Dakshina kannada .Diagnosis of major depressive disorder was according to ICD 10 criteria . Subjects who were able to comprehend and understand English or Kannada only were eligible. Subjects who had no history of exercise participation for the previous 1 year were recruited. Patients diagnosed with associated psychiatric illness other than depression, Cardiac diseases, bones and joints pathology, alcohol or substance abuse, acute infectious diseases,

depressive patients with suicide risk were all excluded. All the 100 subjects in the study underwent a through medical checkup which included the cardiovascular, respiratory, and orthopedic examination by specialists in the respective fields.

4.3) Intervention

Subjects in the experimental group received medication and aerobic exercises for 12 weeks at a frequency of 3 sessions per week and intensity of 60%, 70% and 80% of heart rate progressively predetermined by Karvonenens formula. Duration of each session was 45 minutes which started with warm up, stretching of major muscles of the upper and the lower limbs which progressed to walking, jogging and running on a Commercial Motorized Treadmill WC 5100 cardio gym , following the exercise cool down and relaxation was implemented as mentioned in table no. 2 . All sessions were supervised by the principal investigator. Discussions about depression were minimized and all subjects in the group were advised to follow prescriptions of antidepressant medication by the psychiatrist. The control groups received antidepressant medications alone and were advised to follow prescription by the psychiatrist. Depression score were assessed at 4^{th}, 8^{th} and 12^{th} week in both the groups.

Table no.2.Exercise protocol (Experimental group): 1) warm up, 2) conditioning phase 3) cool down, 4) relaxation

Karvonenens formula = heart rate $_{rest}$ + 60-70 %(HR $_{max}$-HR $_{rest}$)

Warm up	**Conditioning phase Continuous training**				**Cool down / relaxation**
Walking at 20% of exercise HR 5mts	Intensity	Frequency	Mode	Duration	Active recovery progressive reduction in speed-for 5 mts
Stretching major muscles groups 5 mts	60% of exercise HR	3 times per week	Brisk walking	10 mts	
	70% of exercise HR max	3 times per week	jogging	10 mts	
	80% 0f exercise HR	3 times per week	running	10 mts	

4.4) Outcome measure

The primary outcome measure was the Hamilton depression rating scale (HAMD17) .Assessment of depression scores at baseline and at 4th, 8th and 12th week was done by a blinded assessor, a specialist in psychiatry.

3) Results

3.1) Table no: 3. Illustrates the effect of aerobic exercise on depression scores, mean and standard deviation

The mean depression scores on the Hamilton depression rating scale was (17.28) ± 2.7 at baseline and gradual reduction in mean values (15.76) ± 2.3 after 4 weeks (14.32) ± 2.2 after 8 weeks, and (12.74) 1.7 after 12 weeks of aerobic exercise in the experimental group . Whereas in the control group the mean depression scores at baseline were (17.20) ± 2.7, (16.34) ± 2.7 at 4 weeks, (15.76) ± 2.7 at 8 weeks and (15.10) ± 2.7 at 12 weeks following drug therapy only.

3.2) Table no: 4.shows F value, p value and two way ANOVA values of depression scores for repeated measure, its difference over period and difference between the experimental and control group.

By implementing two way ANOVA for repeated measures, its difference over a period and difference between the groups were estimated. In the experimental group, periodic evaluation at 4th, 8th and 12th weeks show decrement in depression scores as the weeks progressed, the F value is 338.390 and p value 0.000 at 0.05 level of significance, inferring that the reduction in depression scores over the weeks in the experimental group are highly significant which indicates that aerobic exercise in combination with drug therapy is more effective than drug therapy alone in the treatment of major depressive disorder in young adult males. When comparing the difference of the depression scores between the experimental and the control group F value (4.815) and p value was .031 at 0.05 level of significance,which was significant indicating that the experimental group which underwent aerobic exercise in combination with drug therapy is more effective than drug therapy alone in case of major depression.

3.3) Table no: 5 Describes the mean difference, p value for pair wise comparison which is performed by Bonferroni test followed by ANOVA significant over the period of time.

Following the significant results on testing by Anova, Bonferroni test was used for pair wise comparison of depression score over a period of time, baseline depression scores were compared with depression scores at 4th, 8th and 12th weeks, and a comparison of 4th week with 8th and 12th week, and 8th with 12th week, in both the group concluded that, reduction in Depression score were highly significant during all the comparisons, but higher reductions in depression scores were obtained in the experimental group than the control group over a period of time, indicating that aerobic exercise along with drug therapy is more effective than drug therapy alone as the weeks progressed.

3.4)Table no: 6 enumerates the mean difference and p value for pair wise comparison which is performed by Bonferroni test followed by ANOVA significant between the experimental and control group

Following the significant results on testing by Anova, pair wise comparison of depression score between experimental and control groups was performed by Bonferroni test .Depression scores at baseline were compared with scores at 4th, 8th and 12th weeks, and the weekly depression scores recorded were compared to the next corresponding weeks ,indicated that depression score obtained highly significant level of reduction in both the

group but experimental group showed higher reduction in depression scores when compared with the control group, thus indicating that aerobic exercise along with drug therapy is more effective than drug therapy alone as the weeks progressed.

4) Discussion

In this study both the experimental and the control group showed reduction in mean value of depression scores from baseline and when compared at 4th, 8th and 12th weeks. The improvement in depression scores in experimental group over the period of weeks and over the control group was highly significant. The limitation of the study include the inclusion of only males for a short duration of 12 weeks ,for generalization of results of this study the same study can be implemented on a large population of various ethnicity. Similar study could be undertaken to evaluate the effect of resisted exercise on major depressive disorders.

5) Conclusion

Both the experimental and the control group showed highly significant reduction in depression scores from baseline as well as over the period of weeks. But the experimental group showed higher reduction in depression scores from baseline and over the weeks than the control group, thus concluding that aerobic exercises in combination with drug therapy is more effective than drug therapy alone in the treatment of major depressive disorders in young adult males.

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Table no: 3) illustrates the effect of aerobic exercise on depression scores, mean and standard deviation

Group	Weeks	N	Minimum	Maximum	Mean	standard deviation	Median
Experimental	Baseline	50	13	22	17.28	2.718	17
	4 week	50	11	20	15.76	2.308	16
	8 weeks	50	10	20	14.32	2.236	14
	12 weeks	50	10	18	12.74	1.747	12.50
Control	Baseline	50	13	24	17.20	2.777	17
	4 week	50	12	23	16.34	2.789	16
	8 weeks	50	11	22	15.76	2.796	15
	12 weeks	50	11	21	15.10	2.735	15

Table no: 4) enumerates F value, p value and two way ANOVA values of depression scores for repeated measure, its difference over period and difference between the experimental and control group.

ANOVA values of depression scores for repeated measure	F value	Df	P value	Inference
Difference over a period	338.390	3, 294	0.000	HS
Difference between the experimental and control group	4.815	1, 98	.031	Sig

Table no: 5) describes the mean difference, p value for pair wise comparison which is performed by Bonferroni test followed by ANOVA significant over the period of time.

Group	**Weeks**		**Mean difference**	**Standard error**	**p value**	**Inference**
Experimental	Baseline	4 weeks	1.520	0.162	0.00	HS
		8 weeks	2.960	0.202	0.00	HS
		12 weeks	4.540	0.270	0.00	HS
	4 weeks	8 weeks	1.440	0.134	0.00	HS
		12 weeks	3.020	0.201	0.00	HS
	8 weeks	12 weeks	1.580	0.172	0.00	HS
Control	Baseline	4 weeks	0.860	0.086	0.00	HS
		8 weeks	1.440	0.118	0.00	HS
		12 weeks	2.100	0.112	0.00	HS
	4 weeks	8 weeks	0.580	0.081	0.00	HS
		12 weeks	1.240	0.093	0.00	HS
	8 weeks	12 weeks	0.660	0.089	0.00	HS

Table no: 6 describes the mean difference and p value for pair wise comparison which is performed by Bonferroni test followed by ANOVA significant between the experimental and control group.

Groups	Weeks	Mean difference	Standard error	p value	Inference
Between Experimental and control group	Baseline to 4 weeks	−0.660	0.184	0.01	HS
Between Experimental and control group	Baseline to 8 weeks	−1.520	0.234	0.00	HS
Between Experimental and control group	Baseline to 12 weeks	−2.440	0.294	0.00	HS
Between Experimental and control group	4^{th} to 8^{th} week	−0.860	0.157	0.00	HS
Between Experimental and control group	4^{th} to 12^{th} week	−1.780	0.221	0.00	HS
Between Experimental and control group	8^{th} to 12^{th} week	−0.920	0.193	0.00	HS