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Short Communication

A Comparative Study of Combined Aerobic Exercise Versus Walking on Sleep Quality of Individuals with Insomnia

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I N F O

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A B S T R A C T

Insomnia is a disorder which is caused by stress, anxiety, inadequate sleep practices, physical illnesses, mental health conditions, medication usage, and neurological abnormalities which reduce the duration of sleep and lead to difficulties in both initiating sleep and achieving restorative rest. The objective of the study was to evaluate the efficacy of combined aerobic exercise and walking on subjects suffering from insomnia. Thirty participants were selected by simple random sampling method and were divided into the following two groups: Group A (experimental group) consisting of 15 subjects who received combined aerobic exercises (static cycling, jogging, and Zumba dance - 15 minutes each), and Group B (control group) which consisted of 15 subjects who performed only walking for 45 minutes. Pre-test and post-test scores were recorded using the Insomnia Severity Index Scale and Pittsburgh Sleep Quality Index respectively. Statistics were analysed using paired t test and SPSS software. The experimental group and control group showed an increase in sleep hours and quality of life but there was a significantly higher increase in the experimental group in sleep hours as compared to the control group. Hence, this study concluded that combined aerobic exercises proved to be statistically significant in reducing the symptoms of insomnia as compared to walking.

Keywords: Aerobic Exercise, Insomnia Severity Index Scale, Anxiety, Sleep, Insomnia, Pittsburgh Sleep Quality Index, Visual Analogue Scale

Introduction

Insomnia is a sleep disorder characterised by reduced sleeping hours and difficulty falling asleep or having non-restorative sleep. This condition can be acute or chronic.[1] Stress, anxiety, poor sleep hygiene, physical diseases, mental health disorders, drugs and neurological lesions are typical causes and risk factors.[2] The symptoms include trouble falling asleep, numerous nighttime awakenings, waking up too early, feeling exhausted or unrefreshed after waking, daytime sleepiness, and poor concentration. Daily functioning, emotions, and general well-being can all be significantly impacted by insomnia.[3] Treatment options for insomnia include dietary changes, behavioural interventions (such as cognitive-behavioural therapy for insomnia), stress reduction strategies, sleep restriction therapy, and medications.

Any physical activity that persistently raises respiration and heart rate is referred to as aerobic exercise or cardio exercise. Exercises like jogging, cycling, swimming, dancing, and aerobics classes all feature rhythmic, continuous motions that work the body's major muscle groups.[4–6] Regular aerobic exercise has many health advantages, including an increase in cardiovascular circulation, reduction in blood pressure, regulation of blood sugar, prevention of the chances of chronic illness, and reduction in weight gain.[7] It can also enhance mental health by decreasing signs of anxiety and sadness, enhancing mood and cognitive function, and encouraging better sleep and weight control.[8–10] Walking tends to have a significant positive impact on the body's endocrine system and mood among working people without exercise routines.[11]

Materials and Methods

Thirty insomniac subjects, referred from the Department of Psychiatry, Chettinad Hospital and Research Institute, were selected using a simple random sampling method. All subjects satisfied the inclusion criteria. The study included people of both genders with ages ranging from 40 to 60 years, suffering from chronic insomnia for more than 6 months with a rating of 13–14 on the Borg Rating of Perceived Exertion Scale. Subjects with coronary artery disease, severe degenerative diseases and mentally retarded subjects were excluded from this comparative study. The participants were divided into two groups with 15 subjects in each group. Signed informed consent was obtained from all the subjects and they agreed to participate in this study voluntarily. This study was conducted at the Department of Physiotherapy, Chettinad Hospital and Research Institute and was approved by the Institutional Ethics Committee.

Procedure

The subjects were divided into two groups, Group A and Group B. There were 16 female subjects and 14 male subjects in this study. The sample size was calculated by G-Power Software. All the participants completed the study. There were no dropouts and no blinding was done in this study. Group A received aerobic exercises and Group B received walking with medications. The duration of the study was 4 weeks. The findings were recorded during the 2nd and 4th weeks using the parameters of the Insomnia Severity Index and Pittsburgh Sleep Quality Index.

Intervention

Group A (Experimental Group)

Frequency : 5 days/week

Duration : 45 min/session

Intensity : 13–14 on the Borg Rating of Perceived Exertion Scale

Exercise : Static cycling, jogging, Zumba dance

(15 minutes each with rest taken between each station)

Group B (Control Group)

Received walking alone for 45 minutes, 5 days a week

Parameters

Insomnia Severity Index (ISI)

This scale was designed to assess the nature, severity, and impact of insomnia and to monitor the treatment response in adults. It consists of seven questions rated from 0–4 with a maximum score of 28.[12]

Pittsburgh Sleep Quality Index (PSQI)

This is a self-reported questionnaire consisting of 19 questions rated from 0–3 with a maximum score of 21.[13]

Data Analysis

Both descriptive and inferential statistics were used to tabulate and analyse the acquired data. All the parameters were evaluated using SPSS version 24. Paired t test was used to determine statistical differences between groups and independent t test (Student's t test) was used to determine statistical differences within groups. Shapiro–Wilk test indicated that data were normally distributed ($p > 0.05$) with a significance level of p value less than 0.05 and a 95% confidence interval specified for each analysis.

Results

Table 1 shows the age distribution of all participants. The mean age of the participants was 50.53 years in Group A and 50.40 years in Group B. Figure 1 shows the percentage distribution of males and females included in the study. The sample included a slightly higher female population as compared to the male population.

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Table 1.Age of the Participants

Variables	N	Minimum	Maximum	Mean	SD	Skewness	
						Statistics	Error
Age (years)	30	40.00	59.00	50.46	5.46	-0.148	0.427
Group A	15	40.00	59.00	50.53	6.12	-0.319	0.580
Group B	15	42.00	59.00	50.40	4.93	0.133	0.580

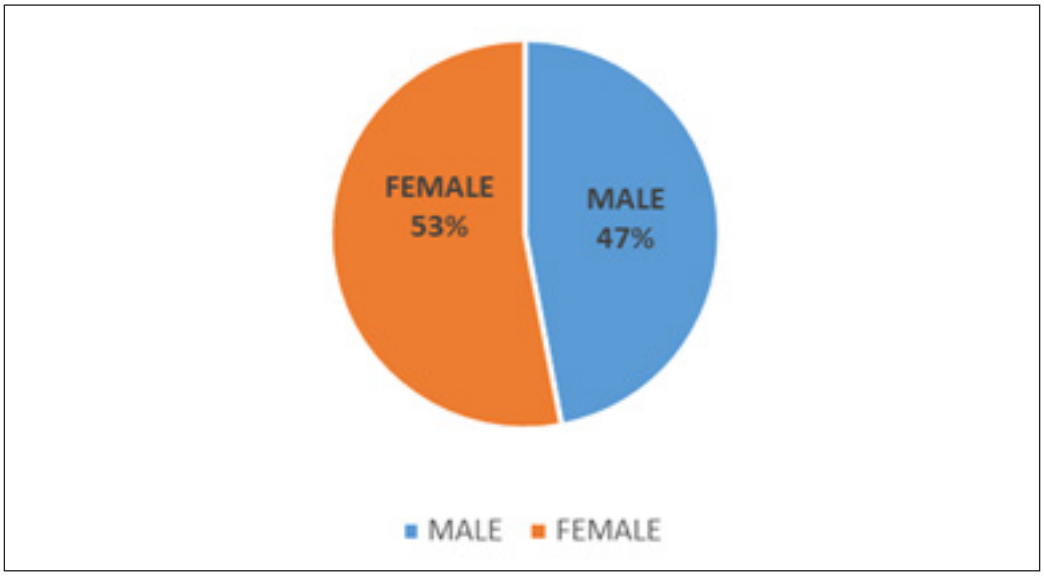

Figure 1.Gender Distribution Among the Participants

Table 2.Insomnia Severity Index Comparison Between Group A and Group B (Pre-Test and Post-Test)

Test	Group A		Group B		t Test	df	Significance
	Mean	SD	Mean	SD			
Pre-test	14.40	4.56	14.46	4.35	-0.041	28	0.968*
Post-test	4.33	2.66	9.60	4.30	-4.02	28	0.001**

*: $p > 0.05$ - Not significant, **: $p \leq 0.05$ - Significant

The mean, standard deviation (SD), t test, degree of freedom (df), and p values corresponding to Group A and Group B in the pre-test and post-test are shown in Table 2. This table demonstrates that with $p > 0.05$, there was no statistically significant difference between the pre-test results of Group A and Group B. The post-test values for Groups A and B were statistically significant at $p \leq 0.05$, as seen in Table 2.

The mean, SD, t test, df, and p values corresponding to Groups A and B in the pre-test and post-test are shown in Table 3. This table demonstrates that at $p > 0.05$, there was no statistically significant difference between the pre-test results of Groups A and B. The post-test values for Groups A and B differed statistically significantly, as seen in this table.

The mean, SD, t value and p values corresponding to the pre-test and post-test scores of Insomnia Severity Index of Groups A and B are shown in Table 4. There was a statistically significant difference between the pre-test and post-test values of Groups A and B at $p \leq 0.05$.

The mean, SD, t value and p values corresponding to the pre-test and post-test scores of Pittsburgh Quality Index of Groups A and B are shown in Table 5. There was a statistically significant difference between the pre-test and post-test values of Groups A and B at $p \leq 0.05$.

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Table 3.Pittsburgh Quality Index Comparison Between Groups A and B (Pre-Test and Post-Test)

Test	Group A		Group B		t Test	df	Significance
	Mean	SD	Mean	SD			
Pre-test	12.26	4.77	12.06	4.47	0.118	28	0.907*
Post-test	5.00	3.60	7.73	3.88	-1.99	28	0 .045**

*: p > 0.05 - Not significant, **: p ≤ 0.05 - Significant

Table 4.Inter Group Analysis of Pre-Test and Post-Test Insomnia Severity Index Between Groups A and B

Groups	Pre-Test		Post-Test		t Test	Significance
	Mean	SD	Mean	SD		
Group A	14.40	4.56	4.33	2.66	10.19	0.000**
Group B	14.46	4.35	9.60	4.30	4.77	0.000**

**: p ≤ 0.05 - Significant

Table 5.Inter Group Analysis of Pre-Test and Post-Test Pittsburgh Quality Index Between Groups A and B

Groups	Pre-Test		Post-Test		t Test	Significance
	Mean	SD	Mean	SD		
Group A	12.26	4.77	5.00	3.60	9.34	0.000**
Group B	12.06	4.47	7.73	3.88	12.01	0.000**

**: p ≤ 0.05 - Significant

Discussion

Insomnia is a common disorder characterised by reduced or substandard sleep quality associated with negative daytime outcomes such as fatigue, exhaustion, and possible mood and cognitive impairment.[14] The beneficial correlation between aerobic exercise and enhanced sleeplessness can be elucidated by the management of glucose levels and metabolic activity.[15] This management is linked to the circadian rhythm. As metabolic activity intensifies during physical activity, it continues to escalate even when at rest. The pulse quickens to transport blood and oxygen to the muscles for their recuperation. Such a mechanism, combined with considerable physical fatigue, has the capacity to ameliorate sleeplessness.[16]

Exercise increases body temperature, which activates the body's natural heat loss mechanisms. This lowers post-exercise temperature, which enhances circadian rhythm and sleep quality. Exercise raises adenosine levels in the body and influences the circadian rhythm favourably.[17,18] Aerobic exercise also helps with sleep because people with insomnia have higher amounts of hormonal imbalance leading to increased stress. The quality of sleep declines when stress hormone levels rise. Such hormones first increase during exercise, but they begin to decline several hours later.[19]

The mean values of the ISI scores of Group A and Group B showed a significant decrease in the post-test. However, Group A (aerobic exercises) showed a lower value (4.33 ± 2.66) than Group B (walking) (9.60 ± 4.30) with a mean difference of 5.27, t value of -4.02, and a p value of 0.001 indicating that aerobic exercises were more effective than walking. The mean values of the PSQI scores of Group A and Group B showed a significant decrease in the post-test. However, Group A (aerobic exercises) showed a lower value (5.00 ± 3.60) than Group B (walking) (7.73 ± 3.88) with a mean difference of 2.73, t value of -1.99, and a p value of 0.045. Thus, this scale also showed that aerobic exercises were more effective than walking.

A comparison of the pre-test and post-test ISI scores and PSQI scores of Group A and Group B showed significant differences in the mean values at p ≤ 0.05. There were significant differences in both PSQI and ISI scores but aerobic exercises led to a lower mean value (4.33 ± 2.66), making them more effective than walking (9.60 ± 4.30). They helped in increasing the quality of sleep and decreasing the severity of insomnia. The study's findings suggested that for some insomniacs, aerobic exercise may be beneficial as a therapeutic augmentation or alternative.

Limitations

This study used a small sample size. More studies can be

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conducted on a larger sample size. More exercises such as pranayama and yoga can be included. Studies should also be conducted to assess the effects of anaerobic exercises on insomnia.

Conclusion

This study showed that combined aerobic exercises as well as walking led to a substantial improvement in sleep quality and reduction in insomnia but combined aerobic exercises showed a significant increase in sleep hours and quality of life as compared to only walking. Thus, it is more beneficial to implement the combined form of aerobic exercises to get better sleep quality in people with insomnia.

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Conflict of Interest: None

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