Effect of Aerobic Exercise and Progressive Resistance Exercise in Pittsburgh Sleep Quality Index Among Insomnia: A Comparative Study


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Abstract

Background: A general definition of insomnia is a lack of satisfaction with either the quality or quantity of sleep. This is typically accompanied by one or more of the following: difficulty falling asleep, difficulty staying asleep, difficulties awakening frequently or having trouble going back to sleep after awakening, and difficulty awakening in the early morning and having trouble going back to sleep.

Purpose: To compare the effect of aerobic and progressive resistance exercise in Pittsburgh sleep quality index among patients with insomnia.

Materials and Methods: This was an experimental study. The 30 subjects were taken from the srisaithajam old age home. The subjects were split into two distinct groups as Group A (15 Subjects) and Group B (15 subjects). All the 30 subjects were assessed with Trunk Impairment Scale. Group A received task oriented training and Group B received Swiss ball exercise along with conventional therapy given for both the groups. Exercise were given for 4 weeks, 5 days per week, 10 repetition * 3 sets. Pre test and post test values were calculated and tabulated. The intervention was given four weeks. The study period was from September 2022 to July 2023.

Results: The collected data was statistically analyzed using an unpaired t-test. When comparing the Aerobic group (Group A) to the progressive resistance group (Group B), the aerobic group indicates significant effects (p < 0.01) in Insomnia and improving the quality of life as assessed by the Pittsburgh Scale Quality Index among Insomnia.

Conclusion: According to the research Resistance exercise training is less effective than aerobic exercise training at reducing inflammation and improving sleep quality in subjects with insomnia.

Key Word: MCA Stroke, Trunk balance, Insomnia, PSQI questionnaire, Aerobic and Resistance exercise.

Introduction

A general definition of insomnia is a lack of satisfaction with either the quality or quantity of sleep. This is commonly accompanied by one or more of the following symptoms: trouble becoming asleep, trouble remaining asleep, trouble waking up often or having trouble falling back asleep after waking up, and trouble waking up in the early morning and
having trouble falling back asleep. What causes it is a delicate interplay between sleeplessness and altered circadian and homeostatic processes, psychological arousal, and cognitive arousal.

Insomnia may also be brought on by a decreased ability of the sleep-wake switch to work. The Rapid eye movement (REM) sleep cycles increasingly replace non-rapid eye movement (non-REM) sleep phases when we sleep. The AASM categorizes sleep into stages that progress in complexity. Wakefulness stage (Relaxed Wakefulness Level) phase (slight slumber) stage (slow-wave or deep slumber) (REM sleep, also known as dreaming).

A third of the general population at least occasionally exhibits signs of sleeplessness. Insomnia symptoms include difficulty falling asleep or having trouble falling back to sleep after waking up during the night or sooner than wanted or necessary. The terms “difficulty initiating sleep,” “difficulty maintaining sleep, and “early morning awakening,” respectively, refer to these problems. Patients who are terminally sick frequently have the uncomfortable condition of sleep disruption.

Poor sleep lowers quality of life and can make symptoms like pain, depression, or anxiety worse. Women were more likely than men to experience insomnia. The literature supports this; being a woman is recognized as a risk factor for the onset of insomnia. In terminally ill patients, insomnia is frequently brought on by a variety of circumstances, and both medical and psychological issues are thought to be significant etiological contributors.

Older persons with insomnia symptoms are far more likely to experience sadness, anxiety, and pain issues in addition to syndromal insomnia. In addition to delaying the onset of clinical insomnia in this vulnerable demographic, this target moderate sleep complaint has the potential to delay the onset of various morbidities in older persons. Sadly, resources that deliver cognitive behavioral treatment (such as highly qualified clinicians) may not be practicable or cost-effective in locations where conventional care is provided, particularly for older persons who have moderate sleep complaints caused by syndromal insomnia. Additionally, rather than focusing on disease treatment, older persons are increasingly looking for lifestyle treatments that are linked with health promotion.

Currently, there are four stages of sleep, which can be distinguished from one another by the electroencephalogram (EEG) waveforms and other physiological data. Non-rapid eye movement (NREM) are the first three phases, while rapid eye movement (REM) sleep is the fourth. NREM is the lightest stage, and it makes about 18% of the sleep period for older people. NREM, which makes up 48% of the total sleep duration, and NREM, which makes up 16% of the total sleep time in older people and is also known as slow-wave sleep (SWS) because of its slow, high-amplitude EEG signal, both contribute to the depth of sleep. Over the past 20 years, a great deal of research has been done on young adults to learn more about the connection between sleep and human cognitive functioning.

Aim

1. To find out the effect of aerobic exercise and Progressive resistance exercise on quality of Pittsburgh.

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Material and Methods

Materials: Dumbbell, ball, Chair, Yoga mat.

Total of 86 subjects were selected based on inclusion and exclusion criteria. Patients were completely explained the safety and simplicity procedure and informed consent was obtained from the patients. The subjects were divided into two groups based on concealed envelope method. Group A(n=43) were given Aerobic exercise and Group B were given progressive resistance exercise for 2 weeks, 5 days per week, 10 repetition* 3 sets. Aerobic exercises such as walking (10 mins), yoga (10 mins), ball game (10 mins). Progressive resistance exercises were Biceps curl(10 reps* 3 set), Squats(10 reps* 3 set), Deadlift dumbbell press (10 reps* 3 set). At the end of 4th week post outcome measures were analyzed using the Pittsburgh sleep quality index scale.

Inclusion criteria:

- Both men and women
• Age group of 50 above
• Significantly daytime impairment due to sleep difficulties.
• Subjects willing to participate in the study.
• Diagnosed with primary insomnia.
• Sleep efficiency (%) if <85

Exclusion criteria:
• Obese Patient with neurodegenerative disease
• Sleep disorder other than insomnia
• Patient with psychology problem
• Medication affecting sleep
• Tobacco use.
• History of cancer

Outcome measure: PSQI, or Pittsburgh Sleep Quality Index A 19-item questionnaire called the PSQI measures sleep disruptions and quality over the previous month. The first four items are open-ended questions, whereas items five through nineteen are scored using a Likert scale. Scores for individual elements provide 7 components. The sum of the 7 component scores yields a final score, with values ranging from 0 to 21. A score of more than five indicates poor sleep. The PSQI was chosen because it assesses a construct (sleep quality) relevant to insomnia but broader than the severity of the condition. Only the community sample received the administration.

Procedure

Total of 86 participants were selected according to the inclusion and exclusion criteria and the participants were explained about treatment safety and simplicity of the procedure and written consent was obtained.

Subjects willing to participate were randomly allocated into two groups: aerobic group and resistance group. All the subjects underwent pre-test measurement with PSQI questionnaire and the same repeated for post-test at the end of 2 weeks.

Group A (Aerobic exercise)

1. Walking
   Ask the patient to move along on foot walk straight for 10 mins

2. Yoga
   Place Ask the patient to seated forward bending hold onto your big tones. This technique is otherwise called as Paschimottanasana

3. Ball Game
   Ask the patient to hold the ball take upward to the head slowly put the ball down to the ground

Group B (Resistance exercise)

1. Biceps curl
   The patient is asked to stand and maintain a neutral position and take two dumbbells on the hand and flex elbow and return back to the normal position then slowly extend the neck into the back and return to the beginning stage. The patient should do the exercise 3 sets per day. Each set consisted of 10 repetitions and it is continued for 2 weeks.

2. Squats
   Ask the patient to place the feet shoulder-width apart while standing tall. Toes may point slightly outward or forward. For balance, either keep your arms out in front or hold onto your chair with both hands. Sit back as if you were in a chair, engage your core, and hinge (bend) at the hips. The patient should perform three sets of the workout each day. Five repetitions were performed in each set, which lasted for two weeks.

3. Dead Lift Dumbbell Press
   Ask the patient to Maintain their position, plant their heels, and contract their abs. Straighten their legs, stand up tall with your chest out, head forward, and shoulders back. Patients should bend at the waist and knees, lowering the weight until it almost touches the ground. Repeat the process for the next repetition. The patient should do the exercise 3 sets per day. Each set consisted of 5 repetitions and it continued for 2 weeks.

Data analysis

A statistical analysis made with quantitative data revealed a statistically significant difference between Aerobic exercise group and the resistance group which is also evaluated in the groups.
Results

A In Table 1, the statistical analysis of GROUP A by using Pittsburgh sleep quality index scale, pre-test and post-test Mean values of 16.10 ± 17.40; and SD values of 3.21± 1.58; T value of 13.67 with P value less than 0.0001; and In Table 2, the statistical analysis of GROUP B by using the Pittsburgh sleep quality index scale pre-test and post-test Mean values of 3.50 ± 8.60; and SD values of 0.97 ± 1.65; and T value of 13.61; with P value less than 0.0001; and In Table 3, the difference between the two groups a and b by using the pittsburgh sleep quality index scale were evaluated by post-test Mean values are 3.50 ± 8.60; and SD values of 0.96 ± 1.65; and and T value of 8.43 with P value less than 0.0001. These differences indicates that GROUP A which is provided with aerobic training was highly benefited compared to GROUP B that performed resistance exercise. Additionally, it could be employed as an inexpensive, longlasting, and side-effect free therapy technique for treating insomnia in older persons.

Discussion

The goal of the present study is to compare the effectiveness of Aerobic exercise and progressive resistance exercise in Pittsburgh scale quality index among insomnia. This comparison is demonstrated with duration of 4 weeks. The outcome results were measured by Pittsburgh scale quality index among insomnia. Before and after treatment. Beneficial effects were significantly greater in Aerobic Exercise compared to the progressive resistance exercise. When the response was compared between both groups, the result showed a significant difference in Aerobic group compared to the progressive resistance group. In Aerobic group pre-intervention mean of was 16.1. After treating the subject with Aerobic Exercise the mean value is decreased to 3.50 which shows statistically significant difference between the groups. In progressive resistance group the pre-Test value is 17.4, After treating the subject with progressive resistance Exercise the mean value is decreased to 8.06 which shows statistically significant difference between the groups. Based on the statistical PSQI analysis, both groups showed improvement. However, subjects who received Aerobic exercise showed better improvement in PSQI than the subjects in the progressive resistance group. Kathryn Reid, Kelly Glazer Baron, Brandon Lu, Erik Naylor, Lisa Wolfe, Phyllis C Zee at 202 In older persons with persistent insomnia, aerobic exercise combined with sleep hygiene instruction is an effective therapy strategy to enhance mood, quality of life, and sleep.

Ahmad Ali Akbari Kamrani, Amir Shams, Parvaneh Shamsipour Dehkordi, Robabeh Mohajeri,
In general, the results of the current study indicated that moderately intense aerobic exercise (60-70% MaxHR) had a favorable and significant impact on sleep quality and its constituent parts. As a result, it was suggested that older persons in the community engage in cardiovascular activity at a moderate level to enhance their sleep and its components. Naomi Takemura et al., 2020 Cancer patients who exercise can have improvements in their quality of life and reductions in sleep disorders. Both aerobic exercise (AE) and mind-body exercise (MBE) have several methods for enhancing sleep, although it is yet unknown if they are actually useful. This systematic review and meta-analysis is the first to investigate how well AE and MBE work for improving sleep outcomes, particularly for cancer patients who have sleep problems. MEZubia Veqarat 2021 For all age groups, exercise is a helpful behavioral modification technique that can improve the quality of sleep. In elderly populations, exercise can be quite beneficial for treating various illnesses as well as bettering sleep. While, there hasn’t been much research done, the ones that have been done aren’t very conclusive either. Acute workouts don’t seem to be very effective in enhancing sleep quality. The effects of long-term aerobic and weight training may improve the quality of sleep. It appears that exercise done right before bed has a detrimental impact on the quality of sleep. In 2015 Farkhondeh Sharif, conducted a study on the effect of aerobic exercise on quantity and quality of sleep among elderly people referring to health and aerobic exercise regimen may help the elderly get more and better quality sleep. Additionally, it could be employed as an inexpensive, long-lasting, and side-effect-free technique for treating insomnia in older persons 12.

In 2021 Ryo Miyazaki, conducted a study on the effects of light-to-moderate older adults who live in the community, three months of aerobic exercise increased the quality of their objectively evaluated sleep11. The degree of changes in sleep quality and quantity was not significantly influenced by baseline sleep conditions, may be met. These findings imply that, regardless of baseline sleep quality, light aerobic exercise can enhance sleep in older persons living in the effect.

**Conclusion**

According to the research, Resistance exercise training is less effective than aerobic exercise training at reducing inflammation and improving sleep quality in subjects with insomnia. In middle-aged and older persons, participating in a fitness training program had somewhat positive benefits on sleep quality. Exercise may serve as a substitute for or addition to current sleep disorder treatments. This study demonstrates that exercise can enhance patients’ sleep quality in addition to conventional insomnia therapies.

**Ethical clearance:** The ISRB committee of a private hospital and institution in Chennai has provided its clearance for the conduct of human research that complies with all applicable national laws, institutional regulations. (Application Number 03/029/2022/ISRB/SR/SCPT).

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**Conflict of interest:** The authors state that there is no conflict of interest.

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