

Effect of Non Pharmacological Intervention on Sleep Quality Improvement of Institutionalized Elders

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Abstract: *The prevalence of sleep problem in adulthood increases with age. While not all sleep changes are non pathological in later life, severe disturbances may lead to depression, cognitive impairments, deterioration of quality of life. The most common treatment for insomnia is pharmacological. Physical exercise may promote relaxation and raise core body temperature in ways that are beneficial to initiating and maintaining sleep. Objectives were to assess the quality of sleep before and after introduction of non pharmacological intervention, controlled exercises among the elders and also to find out the association between the qualities of sleep with selected demographic variables. A pre-experimental, one group pre test post test design was used. The sample consisting of 30 elders were selected by purposive sampling. Tools used were baseline Primary insomnia screening tool, Pittsburgh Sleep Quality Index (PSQI) for quality of sleep, Richards-Campbell sleep questionnaire for quality of sleep. Sleep onset latency improved slightly for both men and women. Total sleep duration, sleep onset latency, sleep efficiency and scores on a scale of global sleep quality and Richards-Campbell sleep questionnaire showed significant improvement. Negative result showed in the improvement of sleep quality after 30days and positive only in primary insomnia.*

Keywords: Insomnia, Non-pharmacological treatments, Sleep quality, Elders

1. Introduction

Sleep is a state of rest that occurs for sustained periods. The reduced consciousness during sleep provides time for the repair and recovery of body systems. A sleeping person reduces interaction with the environment. Sleep restores a person's energy and feeling of well being. [1]

„World Sleep Day“ is celebrated on every march 18th. In the 21st century, with a new technological era, people's health awareness is higher than ever before, a healthy life style starts from a good night's sleep. But some people think that „sleeping“ is a waste of time, On the contrary sleep disorders have negative impact on the quality of life greatly and they became the threat to the world population. International Foundation for Mental Health and Neuroscience has sponsored a „Global Sleep and Health Program“ on 2008. The theme of the World Sleep Day was „Good sleep is a reachable dream“. [2]

The aging process leads to changes in sleep with a negative impact on the quality of life. These factors may exhibit verities of symptoms among that insomnia is one of the major problem. A recent epidemiologic review indicates that between 30% and 48% of adults complain of insomnia symptoms, and nearly 6% of adults experience an insomnia complaint that is important enough to warrant an insomnia diagnosis. [3]

In India about 125 millions are suffering from insomnia. Sleep epidemiology in the future will be strengthened by recent methodological developments in the assessment of sleep. A limitation common to most studies of sleep duration is reliance on self-report measures, in which response categories are frequently hourly intervals and which, in general, do not ask respondents to differentiate time asleep from time in bed. Obtaining data using polysomnography (a

comprehensive recording of the biophysiological changes that occur during sleep) is expensive and time consuming and therefore has not yet been considered feasible in large-scale epidemiologic studies. [4] This study will help to find out the self help therapy for insomnia. Sleep is particularly relevant to medicine because sleep disturbances occur in virtually all illnesses and are frequently a part of the diagnostic criteria for specific disorders.

Sleep has always been a research topic of interest, because nearly 1/3 of people's lives is spent in the sleep and sleep can be restored & the lifting up the spirit of fatigue. Sleep for the brain health is extremely important. The average daily amount of sleep varies considerably among adults. Most adults in the age group of 20 to 50 have average 6 to 8 ½ hours of sleep. However 5% 2 o 10% of this age group sleeps more than 9 hours and 2% to 5% sleep less than 6 hours without difficulty. [3]

Several physical and psychological changes are known to occur with normal ageing; however, adjustment to changes in sleep quantity and quality can be among the most difficult. Although sleep disturbance is a common complaint among patients of all ages. [5]

Prevention and promotion measures are very essential for elderly peoples. Most of the time sleep medicines are commonly used which also have side effects and harmful effects. Primary insomnia, the predominant symptom according to the *DSM-IV-TR* is difficulty initiating or maintaining sleep, or suffering from non restorative sleep, for at least 1 month. Home based preventive management techniques like exercises are important on health of the elders. Exercises are effective in reducing clinical disorders in the risk elderly [6]

2. Literature Survey

The effects of short naps and exercise on the sleep quality and mental health of elderly people was investigated. 'Interventions' by short naps after lunch and exercise of moderate intensity in the evening were carried out for 4 weeks. After the 'intervention', awake time after sleep onset decreased significantly and sleep efficiency increased significantly, demonstrating that sleep quality had improved. Also, the frequency of nodding in the evening decreased significantly. These results demonstrate that proper awakening maintenance in the evening was effective in improving sleep quality. After the 'intervention', mental health and volition and physical health had also improved with improving sleep quality. [7]

Elderly people (60) whose mean age was 64.8 years were randomly assigned into two groups of 30 each. The patients in the case group participated in exercise trainings consisted of 3 one-hour sessions per week for 12 consecutive weeks. Sleep quality and quantity in the participants was evaluated before and after intervention using Pittsburgh Sleep Quality Index (PSQI). Sleep quality score was improved by 44.46% in the case group ($p < 0.0001$). Sleep duration was improved by 98/16% ($p = 0.038$) and sleep latency was improved by 76/6% in the case group; while, the difference between the two groups regarding the changes in the sleep latency was not statistically significant ($p = 0.089$). [8]

At 4-year follow-up ($n = 577$), higher walking levels at baseline significantly predicted a lower likelihood of reporting sleep onset ($OR = 0.64$ (95% $CI = 0.42-0.97$ $p < 0.05$) or sleep maintenance ($OR = 0.63$ (95% $CI = 0.41-0.95$ $p < 0.05$) problems. Aged 65+ ($n = 926$), cross-sectional regressions controlling for appropriate confounders showed that walking at or above the internationally recommended threshold of ≥ 150 minutes per week was significantly associated with a lower likelihood of reporting insomnia symptoms ($OR = 0.67$ (95% $CI = 0.45 - 0.91$) $p < 0.05$). [9].

A two-armed parallel randomized controlled trial ($N = 41$; 30 females) was designed to assess whether increasing physical activity to the level recommended in public health guidelines can improve sleep quality among inactive adults meeting research diagnostic criteria for insomnia. The intervention consisted of a monitored program of ≥ 150 min of moderate-to vigorous-intensity physical activity per week, for 6 months. The principal end-point was the Insomnia Severity Index at 6 months post-baseline. Activity and light exposure were monitored throughout the trial using accelerometer and actigraphy. At 6 months post-baseline, the physical activity group showed significantly reduced insomnia symptom severity ($F(8,26) = 5.16$, $P = 0.03$), with an average reduction of four points on the Insomnia Severity Index; and significantly reduced depression and anxiety scores ($F(6,28) = 5.61$, $P = 0.02$; and $F(6,28) = 4.41$, $P = 0.05$, respectively). [10]

This prospective study assessed the effects of a 12-wk. exercise program based on the Pilates method (2 one-hr. sessions per week) on 99 sedentary middle-aged volunteers (M age = 47.6 yr., $SD = 0.8$), using an accelerometry, the Pittsburgh Sleep Quality Index, and the SF-36 questionnaire

to measure changes in physical activity, quality of life, sleep latency, and quantity. The variables (quality of life, sleep latency, and quantity) were compared before and after applying the Pilates program. All of the physical and emotional components of the SF-36 questionnaire showed significant improvement, and the latency and sleep quantity also showed significant increases. [11]

The aim of this study was to evaluate the effects of moderate aerobic exercise training on sleep, depression, cortisol, and markers of immune function in patients with chronic primary insomnia. Twenty-one sedentary participants (16 women aged 44.7 ± 9 years) with chronic primary insomnia completed a 4-month intervention of moderate aerobic exercise. Compared with baseline, polysomnographic data showed improvements following exercise training. Also observed were reductions in depression symptoms and plasma cortisol. Immunologic assays revealed a significant increase in plasma apolipoprotein. Decreases in cortisol were significantly correlated with increases in total sleep time ($r = -0.51$) and REM sleep ($r = -0.52$). [12]

Self-reported sleep disorders are common in older adults, resulting in serious consequences. Non-pharmacological measures are important complementary interventions, among which Taichi exercise is a popular alternative. Five randomized controlled studies met inclusion criteria. All suffered from some methodological flaws. The results showed that Taichi has large beneficial effect on sleep quality in older people, as indicated by decreases in the global Pittsburgh Sleep Quality Index score of subjective latency, sleep duration, habitua l sleep efficiency, sleep disturbance and daytime dysfunction. Daytime sleepiness improvement was also observed. [13]

The research team aimed to (1) examine the efficacy of a yoga intervention (YI) for the treatment of insomnia in older adults, (2) determine the ability of yoga to enhance the QoL of older adults, and (3) establish the applicability of yoga practice for older people in a Western cultural setting. Compared with controls, the YI group showed significant improvements in a range of subjective factors, including overall sleep quality; sleep efficiency; sleep latency and duration; self-assessed sleep quality; fatigue; general well-being; depression; anxiety; stress; tension; anger; vitality; and function in physical, emotional, and social roles. [14]

3. Problem Definition

In this study, **control exercise** is an alternative treatment modality for elders who have difficulty to fall fast asleep. They are made to do 5 minutes warm up exercises, 10 minutes walking and 5 minutes ramp waking exercises for 15 days with or without using sleep medications.

In this study **effectiveness** refers to those exercises (walking, ramp walking) are having ability to produce a desired amount of the effect, or success in achieving desired quality of sleep in elders, which is to be Measured by Quality of sleep scale.

Institutionalized In this study, it refers to geriatric long-term care facilities which provide supervision and assistance in activities of daily living with medical and nursing services

when required. In this study it refers to Saint Anthony Poor Homes providing the geriatric care to destitute.

Quality of sleep:

In this study, it refers to increase in the self reported sleep satisfaction, sleep latency, sleep duration, decrease of sleep disturbance, day time dysfunction & no use of sleep medication.

Primary insomnia is sleeplessness that is not attributable to a medical, psychiatric, or environmental cause as assessed by PSQI and **elders** refers to all adults who are 60 years and above.

4. Methodology/Approach

A pre-experimental one group pre test post test approach was adopted.

4.1 Objectives

- 1) To assess the quality of sleep before and after introduction of controlled exercises among the institutionalized elders.
- 2) To find out the effectiveness of exercises on the quality of sleep among the elders.
- 3) To find out the association between the quality of sleep with selected demographic variables among the elders

4.2 Hypotheses

H1: The mean post test score will be significantly higher than the mean pre test score of the quality of sleep among the institutionalized elders.H2: There will be significant association between quality of sleep and selected Variables.

4.3 Inclusion Criteria for elders

Those who screened as primary insomnia. ie; (it is not attributable to a medical, psychiatric, or environmental cause)

- 1) Elders in the age group of 60years and above.
- 2) Those who are able to perform the exercises.

4.4 Exclusion Criteria

- 1) Elders with secondary insomnia (due to any disease condition or undergone any surgical procedure).
- 2) Those who are physically handicapped and bedridden

4.5 Data Collection Instruments

Tool 1: Primary insomnia screened by Pittsburgh Sleep Quality index and the physical fitness was found by the screening tool, PSQI and Richards-Campbell sleep questionnaire was used to assess the quality of sleep among the Elders. Modified Pittsburgh Sleep Quality index (PSQI) for quality of sleep consisted of seven areas; subjective sleep quality-1 (5.2%), sleep latency-2 (10.5%) ,sleep duration -1 (5.2%), habitual sleep efficiency- 3 (15.5%), sleep -9 (47.3%),

Tool 2: Richards-Campbell sleep questionnaire for quality of sleep for quality of sleep consisted of 5 areas like Quality of sleep-1 (20%), Sleep latency-1 (20%), Sleep disturbance - 1 (20%), Habitual sleep efficiency-1 (20%), Subjective sleep quality-1 (20%).Reliability of the tools 0.84 and 0.76 respectively.

4.6 Sample Size & Sampling techniques

There are two institution in a area of one kilometers occupied by 300 elders throughout the year. One was selected by sealed envelope techniques permissions was obtained by the authorities. Informed consents were obtained from elders after explanation of study .Around 33% elders express their inabilities. Another 50% were on regular sleep medication or tranquilizers. Sample size was 30 those who fulfill inclusion criteria and screened as suffering primary insomnia.

4.7 Data Collection Procedure

This study was conducted in the Saint Antony Poor Homes Mangalore, which was founded in1958.Physical fitness, was assessed by baseline proforma. A brief introduction about exercise was given orally (Informal discussions) by their mother tongue to the subjects. The investigator encouraged, motivated and guided the participants for exercise. The structured exercise program intervention was administered to each subject for 30 days for 20 minutes in the evening around 4-6pm investigator taken each exercise. End of 10th, 20th and 30th days of intervention quality of sleep was measured using Richards-Campbell sleep questionnaire. And the overall quality of sleep was measured by Pittsburg quality of sleep index at the 16th day morning 9-10am

5. Results & Discussion

Table 1: Frequency and Percentage Distribution of Subjects According To Baseline Characteristics.

<i>Variable</i>	<i>Frequency (f)</i>	<i>Percentage (%)</i>
Age in years		
60-70	24	80
70-80	6	20
Gender		
Male	25	83
Female	5	17
Religion		
Hindu	0	
Christian	30	100
Islam	0	
Other		
Marital status		
Married	0	40
Unmarried	12	43
Widow/widower	13	17
d. Divorced	05	
Type of family		
Nuclear	6	53
Joint	8	27
Extended	6	20

Family income (Rs./ month) <1,000 . 1,000-2,000 . 3,000	15 11 04	50 37 13
Education No formal ducation Primary (1 – 4) Secondary (5 – 10) Higher secondary Graduate Post graduate	10 11 9 0 0 0	33 37 30 0 0 0
Attended stress management program. a. Yes b. No	0 30	- 100
Diet Vegetarian Non vegetarian	0 30	- 100
Specific history of illness DM HTN Cardiac disease Joint pain Any other illness, specify.....	7 7 5 11 -	23 23 17 37 -
Satisfaction related to family life a. More satisfy b. Satisfy c. Least satisfy d. No satisfy	4 7 10 9	13 23 33 31
Are you interested to have regular exercises? Yes No	30 -	100 -
If yes, what type of exercises. Walking Deep breathing Jogging Any other specify.....	12 8 7 3	40 27 23 10

Table 2: Distribution of Subjects According to Grading of Pre-Test and Post Test Quality of Sleep by Global PSQI Score.
N=30

Quality of sleep Score	Pre Test	Post Test
	f Mean ± SD %	f Mean ±SD %
Good Sleep (0-5)	0 0	02 7
Poor Sleep <5	30 16.7± 1.64 100	28 7.2±1.10 93

Mean Deference =9.5, t -value 30.72 P value<0.0001
t₍₂₉₎=2.04

Table 3: Distribution of Subjects According to Grading of Pre-test and Post test Quality of Sleep by Richards-Campbell SQ

Quality of Sleep	Pre Exercise	Post Exercise 15 days	Post Exercise 30 days
Adequate (0-12)	17	28	3
Fairly Adequate (13-24)	13	2	26
Inadequate (25-37)	0	0	1
Poor (38-50)	0	0	0

Table 5: Area-wise Mean, Mean difference and “t” value of pre and post test quality of sleep by PSQI score.

Component	Pre Test	Post Test	Mean deference	t value	P-value
	Mean	Mean			
Subjective sleep quality	2.4	1.2	1.2	8.29*	<0.0001
Sleep latency	3	1.3	1.7	14.52*	<0.0001
Sleep duration	2.86	0.96	1.7	13.16*	<0.0001
Habitual sleep efficiency	2.83	1.1	1.73	13.04	<0.0001
Sleep disturbances	2.23	1.2	1.03	6.76*	<0.0001
Use of sleep medications	0.83	0.3	0.53	3.62*	<0.0001
Daytime dysfunction	2.53	1.16	1.37	8.54*	<0.0001

t₂₉ = 2.04 , N = 30
Maximum score =21

Table 6: Mean, Median, Standard Deviation and F-value (ANOVA) of Pre-test and Post-test of Exercise on Quality of Sleep in elders by Richard Campbell Sleep Questionnaire, N=30

	Range	Mean	Median	SD	F value
Pre Test	19-30	23.83	24	2.88	24.54*
Post Test (15 Days)	15-26	19.4	19	3.7	
Post Test 30 days	11-26	17.9	16.5	3.58	

F_(2,87) = 3.022, p < 0.0001

Maximum number of elders participated in the study were male (83.3%) in the age group of 60-75years. Majority was lower income group Christians and never attended any stress reduction program. All the elders were either unmarried or widow/widower and divorced. Majority belonged to nuclear family.

To simultaneously explore the associations between mortality and insomnia, sleep duration, and the use of hypnotics in older adults. The study cohort was established in the Shih-Pai area of Taipei, Taiwan. Eligible participants were identified from the government household registration system. According to, 4,064 subjects completed the interview process between 1999 and 2002. The response rate was 56.8%. The average age of the study cohort at baseline assessment was 73.8 (SD 5.7) years.[15] Study used Pittsburgh Sleep Quality Index like present study to assess primary insomnia

Meditative movement interventions (MMIs), a new category of exercise integrating physical activity and meditation (e.g., t'ai chi, yoga, and qigong), may benefit older people with sleep problems. This systematic review synthesized the evidence on the effect of MMIs on older people's quality of sleep by PSQI index. The current review demonstrated that MMI had a moderate effect on improving the quality of

sleep for older people with sleep complaints. [16] This study also supported findings of present study.

Sleep-wake behaviors were evaluated using the Insomnia Severity Index (ISI) (≥ 8 defined insomnia), Epworth Sleepiness Scale (ESS) (≥ 10 defined daytime drowsiness), and Pittsburgh Sleep Quality Index (PSQI) (> 5 defined poor sleep quality) administered at baseline and 6, 18, and 30 months. Randomized trial of moderate-intensity physical activity versus health education, with sleep-wake behaviors pre-specified as a tertiary outcome. Structured physical activity resulted in a lower likelihood of developing poor sleep quality (PSQI > 5) over the intervention period than health education but had no effect on prevalent cases of poor sleep quality or on sleep-wake behaviors evaluated using the ISI or ESS. These results suggest that the benefit of physical activity in this sample was preventive and limited to sleep-wake behaviors evaluated using the PSQI. [17] These findings supported following findings of present study. The mean post-test quality of sleep (7.2) was lower than the mean pre-test quality of sleep scores (16.7). The computed "t" value (30.72) is higher than the tabled value ($t_{29} = 2.04$, $p < 0.01$) this indicates that exercise was effectively increases the quality of sleep among the senior citizens.

A quasi-experimental with pre-test and post-test design with 45 volunteer elderly men with age range of 60-70 years-old that divided randomly in two experimental groups with 30 (aerobic exercise with low and moderate intensity) and one control group with 15 elders. All subjects in pre-test and post-test stages completed the PSQI. In pre-test stage, results showed that there were no significant differences between control and experimental groups in sleep quality and its components ($P > 0.05$). Also, the Tukey Post Hoc showed that the moderate intensity group scores in total sleep quality and its components were better than other groups ($P < 0.05$). Finally, the low intensity group scores in total sleep quality and its components were better than control group ($P < 0.05$). [18] This experimental study supported present study where exercise were very low intensity and physical check-up completed prior to continue exercise.

Present study showed first post test after 15 days sleep quality improved but after 30 days exercise quality score changed to „fairly adequate“ and even one elder gone to inadequate sleep. A control trial of two physical activity programs to determine if two physical activity programs of varying intensity would result in improved sleep among incontinent and physically restrained nursing home residents. The first physical activity program involved sit-to-stand repetitions and/or transferring and walking or wheelchair propulsion. These activities were performed every 2 hours during the daytime, 5 days per week for 9 weeks. The second, less frequent physical activity program involved rowing in a wheelchair-accessible rowing machine plus walking or wheelchair propulsion once per day three times per week for 9 weeks. Nighttime sleep measures included total time asleep, percent sleep, average duration of sleep, and peak duration of sleep. Marked sleep disruption occur despite documented improvements in physical function with activity, no improvements in sleep in the intervention versus control groups. [19] These results suggest that increasing daytime physical activity alone is not

adequate to improve sleep in impaired NH residents.

6. Conclusion

The present study is an attempt to assess the effectiveness of low impact (ramp walking) exercises in treating only the primary insomnia in elders. Elderlies are off and switching from primary to secondary insomnia due their age and physical issues. There is a great need of Nursing Research in the areas of sleep disorders in older adults and non pharmacological nursing interventions like deferent types of exercises because of the prevalence of insomnia and its relationship with significant morbidity and also mortality rate of elders.

7. Future Scope

Increasing awareness of these problems may be beneficial particularly as increased sleep improves day time alertness of elders. The scope for detailed exploration in this field is immense. Extensive research into the importance of preparation of staff nurses in other non-pharmacological interventions for sleep disorders may be selected and further studied. This controlled exercise therapy is economic in terms of its utilization of health care, manpower, money involved, materials required method of administration and time spent. The findings of the study could be used by all nursing and non-nursing personnel, psychologists, psychosocial workers, community health workers and consultants.

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