ORIGINAL ARTICLE

Effect of Jacobson Progressive Muscle Relaxation Technique on Quality of Sleep among Hospitalized COPD Patients

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Abstract

Background: Chronic obstructive pulmonary disease (COPD) is defined as chronic respiratory inflammatory disease caused by smoking, an air pollutant that causes obstructed airflow from the lungs and is characterized by chronic cough with sputum, breathing difficulty. Sleep deprivation has profound effects on an individual's functioning abilities, whether they are in good or ill health. This study aims to examine the impact of Jacobson progressive muscle relaxation technique (JPMRT) on the sleep quality of hospitalized patients.

Materials and methods: This study's quasi-experimental pre-test-post-test control group design was used and included 30 COPD patients who met the research criteria in the experimental and another 30 patients in the control group. Pre-test was conducted on the first day with the demographical tools and Pittsburgh Sleep Quality Index (PSQI) questionnaire and same day JPMRT was initiated, used twice a day for a total of 25 minutes for 5 days. For the control group, usual routine care of the hospital was provided. After 5 days post-test was conducted for both the groups.

Results: It was found that JPMRT improved the quality of sleep in experimental group compared with control group.

Conclusion: In this study, it was found that JPMRT is effective in the improvement of sleep quality of COPD patient. Improving the health of hospitalized patients can be done with routine care of nursing and hospital procedures without incurring any financial costs.

Keywords: Chronic obstructive pulmonary disease, Progressive muscle relaxation technique, Sleep.

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Background

The definition of chronic obstructive pulmonary disease (COPD) is a chronic respiratory inflammatory disease primarily caused by smoking and air pollutants leading to obstructed lung airflow. It is characterized by symptoms, such as chronic cough with sputum, breathing difficulties, and wheezing.[1] Long-term exposure to irritating chemicals or particulate matter—most frequently from cigarette smoke—is usually the cause of it. Heart disease, lung cancer, and a variety of other ailments are more likely to strike those with COPD. The Jacobson progressive muscle relaxation technique (JPMRT), developed by Edmund Jacobson, is one of the most widely used methods for managing stress and anxiety. Jacobson proposed that tense muscles are the body's reaction to anxiety-inducing thoughts and situations. The subjective feeling of anxiousness is heightened by this physical tightness. Muscular relaxation lowers this physiology, or body tension, which in turn lowers anxiety. Rest and sleep are fundamental human requirements that are necessary for everyone's physical and mental health. In fact, approximately, one-third of our lives are spent sleeping and sleep plays a crucial in maintaining the overall health.[2]

Hospitalized patients often experience sleep disturbances, which can significantly affect their overall well-being and healing process. Edmund Jacobson developed the JPMRT in the early 20th century, and it has been acknowledged as a viable intervention aimed at improving sleep quality across various populations. This technique promotes both physical and mental relaxation by gradually tensing and relaxing various muscle groups. Although its efficacy has been examined in a variety of settings, its precise influence on hospitalized patients' sleep quality is still a subject of ongoing research.[3] Many research has highlighted the efficacy of relaxing methods, including JPMRT in enhancing the quality of sleep and minimizing sleep disruptions to it in a variety of demographics. For example, a 2019 study by Jain and Sinha found that in adults with insomnia, JPMRT dramatically reduced sleep latency and increased subjective sleep quality.

Similarly, a randomized controlled trial by Smith et al. demonstrated that JPMRT improved sleep quality and lessened sleep disturbances in pregnant women.[4] Additionally, an investigation was carried out on how progressive relaxation exercises affected the quality of sleep and fatigue in people with COPD. The questions were designed to identify the patients' medical and sociodemographic characteristics, level of fatigue, and sleep issues, and a total of 26 question items (closed-ended-16 and open-ended-10), were used to gather information about 68 patients

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who visited the Aksaray State Hospital Mustafa. The results showed a statistically significant difference in dyspnea levels between the intervention and control groups, as measured by the MRC Dyspnea Scale ($p < 0.05$). Moreover, after implementing JPMRT for 8 weeks, there was a significant reduction in COPD and Asthma Fatigue Scale (CAFS) scores ($p = 0.001$).[5]

The study explored the effectiveness of three commonly used stress relaxation techniques: progressive muscle relaxation, deep breathing, and guided imagery compared with control group. Sixty undergraduate participants were randomly assigned to one of the three interventions and each participant engaged in a 20 minutes session delivered through recorded audio instruction. Psychological relaxation states were assessed both at baseline and after the training, while physiological relaxation was continuously monitored using measures of electrodermal activity and heart rate. This study's results indicated that all three intervention groups showed significantly higher levels of relaxation after the training compared with the comparison group. These findings suggest that each of these techniques can effectively enhance relaxation. Future research could build on this by comparing multiple stress relaxation techniques within the same sample to further understand their relative effectiveness.[6]

Adler and Ostrove[7] Van Cauter and Spiegel[8] initially proposed that sleep might moderate the relationship between health and social status. Their findings indicated that factors, such as pre-sleep anxiety, sleep interruptions, sleep duration, and variability in sleep pattern play a role in the relationship between social class and physical and mental health.[9] Self-report, behavioral, physiological, circuit, cellular, and genetic levels of analysis can all be used to assess the characteristic of sleep. Personal satisfaction, appropriate timing and duration of sleep, high efficiency, and sustained alertness during waking hours are characteristics of good sleep health. The concept of sleep health is a multifaceted pattern of sleep-wakefulness that is tailored to meet individual, social, and environmental needs. It improves both physical and emotional well-being.[10]

Significance of the Study

The quality of life (QoL) can be severely impacted by sleep abnormalities, which are common in COPD patients and include insomnia, sleep fragmentation, and irregular breathing. For them addressing the sleep issues is essential for enhancing overall well-being and functional status.[11] Poor sleep quality in COPD patients has been linked to increased rates of exacerbations, hospitalizations, and mortality, making it crucial to understand the factors contributing to these disturbances to develop targeted interventions for better disease management.[12] Obstructive sleep apnea (OSA), cardiovascular conditions, and psychiatric problems are among the comorbidities that frequently occur with COPD and might worsen sleep disruptions. Investigating the interplay between COPD and sleep disorders can provide insights into comprehensive management strategies that address these comorbidities effectively.[13] Sleep disturbances may also affect the efficacy of both pharmacological and non-pharmacological treatments for COPD, including bronchodilators, corticosteroids, pulmonary rehabilitation, and supplemental oxygen therapy. Personalized therapeutic techniques that are suited to the specific needs of each patient can be designed using the understanding of how sleep affects treatment outcomes.[14] Patients with COPD who experience sleep-related problems use healthcare resources more frequently, which include frequent clinic visits, emergency department visits, frequent hospital admissions, and increased length of stay. By identifying and addressing modifiable risk factors for sleep disturbances, healthcare providers can implement proactive measures to reduce healthcare costs and improve resource allocation.[15] In light of these challenges, the researcher aims to assess the effect of JPMRT on quality of sleep of hospitalized COPD patients. This study could provide valuable insights into how relaxation techniques can be integrated into patient care to enhance sleep quality and reduce the burden on healthcare resources.

The Objectives of the Study are to:

- Assess the quality of sleep before and after JPMRT among hospitalized COPD patients in the experimental group.
- Assess the quality of sleep before and after among hospitalized patients in the control group.
- Evaluate the effectiveness of JPMRT in the experimental group of hospitalized COPD patients.
- Associate demographic profile with pre-test quality of sleep score in experimental and control in the hospitalized patients.

Hypotheses

- Ho: There is no significant change in the quality of sleep between pre- and post-Jacobson progressive muscle relaxation therapy among hospitalized patients in experimental group at 0.05 level of significance.
- H_1: There is a significant change in the quality of sleep between pre- and post-score of Jacobson progressive muscle relaxation therapy among hospitalized patients in the experimental group at 0.05 level of significance.
- H_2: There is a significant association between pre-test quality of sleep score among hospitalized patients with selected demographic variables in the control group at 0.05 level of significance.
- H_3: There is a significant association between pre-test quality of sleep score among hospitalized patients with selected demographic variables in the experimental group at 0.05 level of significance.

Materials and Methods

Quasi-experimental design with a pre-test-post-test control group was used in this study. This study was conducted at the Pulmonary Medicine ward of Bhopal Memorial Hospital and Research Centre (BMHRC) and data were collected from July 2021 to October 2021. The sample consists of 30 COPD patients in the experimental group who met the research criteria and 30 inpatients in the control group. Groups were selected using a non-probability convenient sampling technique.

The inclusive criteria of the study were follows:

- Patient admitted in patient in pulmonary medicine ward.
- Who were admitted in the pulmonary ward and stayed for 5–7 days.
- The age-group is between 20 and 60 years.
- Patients diagnosed with stable COPD/chronic obstructive lung disease (COLD).

Description of a Tool

Section (1): Demographic data were collected through a structured interview schedule. It contains 08 items, age, gender, marital status, food habits, habits of drinking, exercise, life style behavior, and occupation.

Section (2): The Pittsburgh Sleep Quality Index (PSQI) standardized was used after due permission from the concerned author to assess the quality of sleep. The 19 items are grouped into seven (7) categories of subjective sleep quality, such as sleep duration, sleep latency, habitual sleep efficiency, sleep disturbances, use of sleep medication, and day time dysfunction over the last month. The test administration time was an average of 5–10 minutes.

Study procedure: After enrollment into the experimental group, initially, the individual breathing exercise was performed and followed for five consecutive days. Jacobson progressive muscle relaxation technique was performed twice daily for a total of 25 minutes and the same procedure was repeated for a total of 30 COPD patients. After the data collection of the experimental group was completed, data collection was started for the control group. For the control group, usual routine care of the hospital was performed for 30 participants. Five days later, the post-test was conducted to both groups using the same tools and techniques. Throughout the data collection process for the groups, privacy, confidentiality, and a comfortable position were maintained (Table 1).

Data Analysis

The results were analyzed using both descriptive and inferential statistics methods. The descriptive statistics of frequency and percentage were done on the sociodemographic status of the study participants. The pre-test and post-test sleep quality scores of experimental and control groups were compared using inferential statistics methods including the mean, SD, and *t*-test. A Chi-square test was used to assess the association of pre-test sleep quality scores with demographic profile of both the experimental and control groups, respectively.

Data Analysis and Interpretation

Table 1 presents that the majority of the participants in the experimental group ($n = 30$) were between the age-group of 41–50 years 16 (53.33%) and 51–60 years. 25 (83%) male and 5 (17%) were female. More than half of them (63.33%) were vegetarian and 11 (36.67%) were non-vegetarian. And 26 (86.67%) participants drink tea, 15 (50%) practice exercise regularly, 15 (50%) do not exercise regularly. Seven (23.34%) were smokers, five (16.67%) chewed tobacco, 18 (60%) do not have any bad habits. Six (20%) were laborers, 12 (40%) were employed in business, 5 (16.67%) professional.

In the control group, Table 2 depicts that the majority, that is, 07 (23.33%) of the study subjects were in the age-groups of 41–50 years and 51–60 years 17 (56.67%). Twelve (40%) were female and 18 (60%) were male. Out of 30, 50% were vegetarians and the other 50% were not. And 20 (66.67%) drink tea, six (20%) drink coffee, and the majority of the participants 20 (66.66%) do not follow exercise regularly. Five (16.67%) smoked, eight (26.67%) chewed tobacco, 17 (56.67%) reported having no other habits. Six (20%) were laborers, 12 (40%) were in business, and 5 (16.67%) were professional (Table 2).

The data presented in Table 3 show that the control group, overall sleep quality score of mean and standard deviation (SD) score were 4.90 (SD = 2.023) on the pre-test, 4.80 (SD = 2. 091) on the post-test, respectively. In the experimental group, the mean score on the pre-test 10.80 with a SD = 3.72, mean score of 4.0 with

Table 1: Frequency and percentage distribution of patients according to their demographic variables (experimental group) $n = 30$

Demographic variables	*Criteria*	*Frequency (f)*	*Percentage (%)*
Age	20–30 years	0	0.00
	31–40 years	2	6.67
	41–50 years	16	53.33
	51–60 years	12	40.00
Sex	Male	25	83.33
	Female	5	16.67
Marital status	Married	30	100.00
	Unmarried	0	0.00
Food habits	Vegetarian	19	63.33
	Non-vegetarian	11	36.67
Habits of drinking	Tea	26	86.67
	Coffee	4	13.33
	Alcohol	0	0.00
	No habits of drink	0	0.00
Exercise (regular)	Yes	15	50.00
	No	15	50.00
Lifestyle behavior	Smoking (yes)	7	23.33
	Tobacco (yes)	5	16.67
	No bad habits	18	60
Occupation	Labor	5	16.67
	Business	17	56.67
	Professional	3	10
	Unemployed	5	16.67

Table 2: Frequency and percentage distribution of patients according to their demographic variables (control group) $n = 30$

Demographic variables	*Criteria*	*Frequency (f)*	*Percentage (%)*
Age	20–30 years	2	6.67
	31–40 years	4	13.33
	41–50 years	7	23.33
	51–60 years	17	56.67
Sex	Male	18	60.00
	Female	12	40.00
Marital status	Married	30	100.00
	Unmarried	0	0.00
Food habits	Vegetarian	15	50.00
	Non-vegetarian	15	50.00
Habits of drinking	Tea	20	66.67
	Coffee	6	20.00
	Alcohol	1	3.33
	No habits of drink	3	10.00
Exercise (regular)	Yes	10	33.33
	No	20	66.66
Lifestyle behavior	Smoking (Yes)	5	16.67
	Tobacco (Yes)	8	26.67
	No habits	17	56.67
Occupation	Labor	6	20
	Business	12	40
	Professional	5	16.67
	Unemployed	11	36.67

Table 3: Distribution of pre-test and post-test score of sleep quality to assess the effectiveness Jacobson progressive muscle relaxation technique between control and experimental group ($n = 30$)

Group	*Mean*	*Std. deviation*	*t-test value*	*df*	*p-value*	*Significance*
Pre-test control group	4.9000	2.023	1.795	29	0.083	NS
Post-test control group	4.8000	2.091				
Pre-test experimental group	10.8000	3.72	13.403	29	0.000	S*
Post-test experimental group	4.0000	1.72207				

*Significance level of $p < 0.05$

SD = 1.72 on post-test. The result revealed a significant difference between the experimental and control groups ($t = 13.4$, $df = 29$; $p = 0.00$). It shows that the study findings were statistically significant (H_0 was rejected and H_1 was accepted). Hence, the intervention (JPMRT) was effective in improving sleep quality in the experimental group compared with the control group (Table 3).

Chi-square analysis was used to examine the association between sleep quality score and selected demographic characteristics of participants in the control group. At 0.05 level of significance, a significant association was found between the pre-test sleep quality score with age ($\chi^2 = 9.862$, p-values –0.20, $df = 3$) and food habits ($\chi^2 = 3.968$, p-value = 0.046, $df = 1$) and no significant association was found with other demographic characteristics, such as gender, marital status, habits of drinking, occupation. Hence, the H_2 hypothesis was partially accepted (Table 4).

Chi-square analysis was used to examine the association between the sleep quality score and selected demographic characteristics of COPD patients in the experimental group. There was no significant association found at 0.05 level of significance between the pre-test score of quality of sleep with age, gender, marital status, and other demographic variables. Hence, H_3 hypothesis was not accepted (Table 5).

Discussion

Demographic characteristics of the study participants between the age-group of 41–50 years 16 (53.33%) and 51–60 years. And 25 (83%) male and 5 (17%) were female. More than half of them (63.33%) were vegetarian and 11 (36.67%) were non-vegetarians. About 26 (86.67%) participants drink tea, 15 (50%) practice exercise regularly, 15 (50%) do not exercise regularly. Seven (23.34%) were smokers, 5 (16.67%) chewed tobacco, 6 (20%) were laborers, 12 (40%) were employed in business, and 5 (16.67%) were professional.

Assess the quality of sleep before and after JPMRT in the experimental group in the hospitalized patients.

In the control group ($n = 30$), overall sleep quality score of mean and SD score were 4.90 (SD = 2.023) on the pre-test, 4.80 (SD = 2. 091)

Table 4: Assesses the association of sleep quality score with selected demographic variables (control group) $n = 30$

	Demographic variables	*Good sleep (0–5)*	*Moderate sleep (6–10)*	*Poor sleep (11–21)*	*Total*	*Chi square value*	*df*	*p-value*	*Significance*
1	Age								
	20–30 years	2	0	0	2	9.862	3	0.020	S*
	31–40 years	1	3	0	4				
	41–50 years	3	4	0	7				
	51–60 years	15	2	0	17				
2	Gender								
	Male	11	7	0	18	1.693	1	0.193	NS
	female	10	2	0	12				
3	Marital status								
	Married	21	9	0	30	–	–	–	–
	Unmarried			0					
4	Food habits								
	Vegetarian	13	2	0	15	3.968	1	0.046	S*
	Non-vegetarian	8	7	0	15				
5	Drink								
	Tea	16	4	0	20	4.444	3	0.217	NS
	Coffee	3	3	0	6				
	Alcohol	0	1	0	1				
	Others	2	1	0	3				
6	Exercise								
	Yes	9	1	0	10	2.857	1	0.091	NS
	No	12	8	0	20				
7	Lifestyle								
	Smoking	4	1	0	5	2.101	2	0.350	NS
	Tobacco	4	4	0	8				
	Others	13	4	0	17				
8	Occupation								
	Labor	3	3	0	6	2.327	3	0.507	NS
	Business	5	3	0	8				
	Job	4	1	0	5				
	Unemployed	9	2	0	11				

on the post-test, respectively. In the experimental group ($n = 30$), the mean score on the pre-test 10.80 with an SD = 3.72, mean score of 4.0 with SD = 1.72 on post-test. The difference between the experimental and control group was found significant ($t_{29} = 13.4$, $df = 29$; $p = 0.00$). The study finding shows that it was significant (H_0 was rejected and H_1 was accepted). Hence, the quality of sleep improved after the implementation of JPMRT, and it was effective in the experimental group compared with the control group.

The study's findings were corroborated by a quasi-experimental study that examined the effects of Jacobson Progressive Muscle Relaxation and deep breathing exercises on anxiety, psychological distress, and sleep quality in older adults. The tools used in this study are Geriatric anxiety inventory and PQSI, involving 60 hospitalized older adults (intervention-30, control-30) by using a convenience sampling technique. The results showed that the intervention group experienced significant improvements in sleep quality and at the same time, anxiety and psychological distress were reduced.[16] A quasi-experimental study conducted in Iran, examined the effect of Progressive Muscle Relaxation on the sleep quality of patients undergoing hemodialysis. The PSQI was used for the assessment of quality of sleep for 1 month for 39 subjects. The results showed that the mean sleep quality score after the relaxation intervention was significantly lower (indicating better sleep quality) than before the intervention ($p < 0.001$). This suggests that JPMRT has a favorable impact on sleep quality in patients undergoing hemodialysis.[17] Additionally, a meta-analysis by Wang et al. combined data from multiple randomized controlled trials and found that JPMRT significantly improved sleep outcomes, including sleep latency, duration, and efficiency, across various populations. Comparing these findings with research carried out in non-hospital settings can provide valuable insights into the generalizability of JPMRT as an intervention for sleep disturbances.[18] Furthermore, a study by Irwin et al. investigated a comprehensive sleep intervention program for elderly with insomnia that included JPMRT, CBT,

Table 5: Assesses the association sleep quality score with selected demographic variables in experimental group ($n = 30$)

	Demographic variables	*Good sleep (0–5)*	*Moderate sleep (6–10)*	*Poor sleep (11–21)*	*Total*	*Chi-square value*	*df*	*p-value*	*Significance*
1	Age								
	20–30 years	0	0	0	0	2.333	2	0.311	NS
	31–40 years	0	2	0	2				
	41–50 years	0	8	8	16				
	51–60 years	0	5	7	12				
2	Gender								
	Male	0	14	11	25	2.160	1	0.142	NS
	Female	0	1	4	5				
3	Marital status								
	Married	0	15	15	30	–	–	–	–
	Unmarried	0	0	0	0				
4	Food habits								
	Vegetarian	0	11	8	19	1.292	1	0.256	NS
	Non-vegetarian	0	4	7	11				
5	Habits of drinking								
	Tea	0	12	14	26	1.154	1	0.283	NS
	Coffee	0	3	1	4				
	Alcohol	0	0	0	0				
	Others	0	0	0	0				
6	Exercise								
	Yes	0	7	8	15	0.133	1	0.715	NS

and sleep hygiene education. The outcome showed significant improvements in daytime functioning and sleep quality The results of this study when compared with other studies that have used multimodal therapies can help build complete sleep interventions that are specifically designed to meet the needs of hospitalized patients.[19]

When associated the demographic profile with pre-test quality sleep score in the control group at 0.05 level of significance, there was significant association between the pre-test score of quality of sleep with age ($\chi^2 = 9.862$, *p*-values –0.20, $df = 3$) and food habits ($\chi^2 = 3.968$, *p*-value = 0.046, $df = 1$) and in the experimental group there was no significant association was found between selected demographic and pre-test quality of sleep score.

This was supported by an experimental study carried out in the United Kingdom that investigated the effectiveness of back massage on the sleep quality of elderly, who were admitted to hospitals and nursing homes. The participants' sleep was assessed using the Subjective Evaluation of Sleep tool and the Sleep Pattern Assessment Tool. In the experimental group ($n = 64$), participants received back massages for three consecutive days. According to the study's findings, half of the patients in the experimental group had sound sleep at night. The researchers concluded that a majority of the sample reported good sleep in the nursing care setting, highlighting the potential benefits of back massage for enhancing sleep among older adults.[20]

Limitation of the Study

- *Duration*: The 5-day intervention of JPMRT, which might not be long enough to assess the full benefits or potential long-term effects of the JPMRT on COPD patients' sleep quality.
- *Sleep quality:* The PSQI is the primary outcome measure of sleep quality, relying on the subjective' self-reported data. It is influenced by the patients' perceptions and reporting biases.
- *Other influencing factors:* It is possible that the study overlooked additional variables that could have an impact on sleep quality, such as medication use, coexisting medical conditions, over the course of hospital stay and/or psychological variables like anxiety and depression.

Conclusion

Sleep is a naturally recurring state of mind and body, almost all voluntary muscles are blocked during rapid eye movement (REM) sleep. It is characterized by altered consciousness, relatively inhibited sensory activity, reduced muscle activity, as well as decreased interaction with the surroundings. In this study, it was found that JPMRT is effective in the improvement of sleep quality of COPD patients. By elucidating the potential benefits of JPMRT in this population, healthcare providers can integrate this simple and cost-effective intervention into routine care protocols, ultimately improving patient outcomes and enhancing the overall quality of healthcare delivery.

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Ethical Approval

The investigator obtained permission from Institute Ethical Committee IEC/21/Nursing College/19/2021 and administrative approval to conduct this study. Initially, the investigator was introduced, and the purpose of the study was clearly explained. Participants' willingness to participate in the study was ascertained to get their cooperation and confidentiality. Written consent was then obtained from those who met the research inclusion criteria. On the first day of admission, individual baseline data were collected from participants of both experimental and control group, that is, demographic data and quality of sleep were assessed by using the PSQI questionnaire.

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