

# Effectiveness of Passive Range-of-motion Exercises on Quality of Sleep among Postoperative Orthopedic Patients

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## ABSTRACT

**Background:** Immobility refers to the inability to move about freely. The actual impact of immobilization causes various complications involving multiple systems in our body. The goals of orthopedic surgery are as follows: to improve the patient's body functions, to restore movement and stability, to relieve pain and disability, and to improve sleep.

**Aims and objectives:** (i) To assess the quality of sleep among postoperative orthopedic patients. (ii) To assess the effectiveness of passive range-of-motion exercises on quality of sleep among postoperative orthopedic patients. (iii) To associate the quality of sleep among postoperative orthopedic patients with their selected demographic variables.

**Materials and methods:** The study used a quantitative research approach and a pre-experimental (one-group, pre- and post-test) design. Thirty patients who had undergone major orthopedic surgery were chosen using a purposive sampling technique from the orthopedic and postoperative wards at MGMCRI in Puducherry. The Groningen Quality of Sleep Score (GOS, 17) scale was used to assess sleep quality in pre- and post-test orthopedic patients, along with passive range-of-motion exercises as an intervention.

**Results:** The mean sleep quality before and after the test was 9.63 and 3.33, respectively. The obtained  $p$ -value  $p < 0.001$  was highly significant. As a result, the results show that passive range-of-motion exercises were extremely effective in improving sleep quality in postoperative orthopedic patients.

**Conclusion:** The study findings revealed that passive range-of-motion exercises show empirical evidence of having improved quality of sleep among postoperative orthopedic patients. Thus, it is also highly effective and can be easily performed by all postoperative orthopedic patients.

**Keywords:** Effectiveness, Passive range-of-motion exercises, Postoperative orthopedic patients, Quality of sleep.

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## INTRODUCTION

Orthopedic surgery, often known as orthopedics, is a type of surgery that deals with problems involving the musculoskeletal system. Orthopedic surgery is a treatment that involves the removal of damaged and diseased tissue, the repair of damaged structures, and the removal of loose bodies from the bones, joints, and ligaments of the human body.<sup>1</sup> The goals of major orthopedic surgical operations are to improve a patient's physical function, mobility, and stability, as well as to relieve pain and impairment and promote sleep. Fractures, arthritis, soft tissue processes, malignancies, metabolic problems, and congenital and acquired conditions are only a few of the subspecialties or subdivisions.<sup>2</sup>

Sleep is a fundamental requirement for human survival. It is required by the majority of organisms. Life cannot last more than a few days without sleep, and people spend roughly one-third of their lives sleeping. A proper sleep pattern and cycle are necessary for physiological and mental functions to function normally.<sup>3</sup>

Swann et al. conducted a study in orthopedic trauma, sleep disturbance patients at a trauma center. They found that sleep disruption is both common (86%) and severe (54.6%) in patients recovering from traumatic orthopedic injuries. Mental health, body pain, and vitality were all independently associated with poor sleep quality. The sleep score of the average orthopedic trauma patient is comparable to that of patients with clinical sleep disorders and clinical depression. Since then, despite popular belief, trauma was not connected with the severity of sleep disturbance.<sup>4</sup>

Any physiological action that improves or promotes physical fitness and overall health and wellness is viewed as exercise. For

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those who are unable to exercise on their own, passive range-of-motion exercises provide a variety of benefits. It can aid in the improvement of joint function. These exercises are designed to promote range of motion while reducing discomfort, edema, and stiffness, as well as improving sleep. Exercises for the head and neck, shoulders and elbows, forearms and wrists, hand and finger exercises, hip and knee exercises, and ankle and foot exercises are all examples of range-of-motion exercises.<sup>5</sup>

Trzeciak et al. explored the effectiveness of continuing passive range-of-motion exercises following total knee replacement surgery. A total of 93 patients (101 knee joints) were divided into two groups for complete knee replacement. Continuous passive range of motion and active workouts were given to the experimental group. Traditional physical therapy was administered to a control group.

While the active group received just continuous passive range-of-motion exercises for 120 minutes on the first day following surgery, beginning with 0–40° range of motion activities and increasing as tolerated during the hospital stay. The Knee Society Score (KSS) was employed in this study. Continuous passive range-of-motion exercises have a positive effect on subjective pain levels, joint stiffness, and functional ability, according to the study, but there is no substantial benefit in terms of enhancing clinical measurements.<sup>6</sup>

However, the advantages of passive range-of-motion exercises improve better sleep and mood, and relieve stress. It can help to enhance circadian rhythms and increase alertness during the day,<sup>7</sup> the researcher felt the need for assessing the effectiveness of passive range-of-motion exercises on the quality of sleep among postoperative orthopedic patients.

## STATEMENT OF THE PROBLEM

A study to assess the effectiveness of passive range-of-motion exercises on quality of sleep among postoperative orthopedic patients in MGMCRI at Puducherry.

## OBJECTIVES OF THE STUDY

- To assess the quality of sleep among postoperative orthopedic patients.
- To assess the effectiveness of passive range-of-motion exercises on quality of sleep among postoperative orthopedic patients.
- To associate the quality of sleep among postoperative orthopedic patients with their selected demographic variables.

## HYPOTHESES

- H1: There is a significant difference in the quality of sleep among postoperative orthopedic patients before and after passive range-of-motion exercises.
- H2: There is a significant association in the quality of sleep among postoperative orthopedic patients with their selected demographic variable.

## MATERIALS AND METHODS

The study adopted a quantitative research design with a pre-experimental (one-group pre- and post-test) design. Thirty patients who had major orthopedic surgery were chosen by purposive sampling from the orthopedic and postoperative wards at MGMCRI in Puducherry from the third postoperative ward, and demographic variables were used to collect data. Sleep quality was assessed in pre- and post-tests using the Groningen Quality of Sleep Score (GOS, 17) scale, with passive range-of-motion exercises as an intervention for postoperative orthopedic patients. The nature and purpose of the study were explained to the samples by the researchers. After obtaining their informed consent, the postoperative orthopedic patient's score of quality of sleep was measured. The data were analyzed using descriptive statistics (mean, median, standard deviation, frequency, and percentage) and inferential statistics (Pearson Chi-square and Wilcoxon signed-rank test). The findings were discussed in groups based on the study's objectives.

## CRITERIA FOR SAMPLE SELECTION

### Inclusion Criteria

- Patients from 3rd postoperative day were admitted in the orthopedic ward at MGMCRI.

**Table 1:** Assessment of quality of sleep before and after passive range-of-motion exercises among postoperative orthopedic patients

Sl. no.	Quality of sleep	Pre-test		Post-test	
		Frequency N	Percentage %	Frequency N	Percentage %
1	Poor	15	50	2	6.7
2	Fair	13	43.3	0	0
3	Good	2	6.7	28	93.3

**Table 2:** Comparison of the mean pre- and post-test on quality of sleep of postoperative orthopedic patients

Sleeping pattern	Mean	Standard deviation	t test	p-value
Pre-test	9.63	2.442	13.614	<0.001*
Post-test	3.33	1.561		

\*Highly statistically significant,  $p < 0.001$

- Patients of both genders.
- Who are accepting to participate in this study.
- Patients who were not under pain killers and sleep medications.

## Exclusion Criteria

- Unconscious patients.
- Children who have undergone orthopedic surgery.
- Patients who are critically ill.
- History of patients with sleeping medication.
- Patients who were contra indicated for performing physiotherapy exercises.

## RESULTS

Quality of sleep among postoperative orthopedic patients was measured before and after the administration of range-of-motion exercises. Table 1 shows the before administration of range-of-motion exercises, 15 people (50%) had poor sleep quality, 13 (43.3%) were having a fair quality of sleep, and 2 (6.7%) reported having a good sleep, and shows that out of 30 samples, each patient had mild improvement of quality of sleep in the postoperative orthopedic patients after the administration of range-of-motion exercises when compared with pre-test scores. After the administration of range-of-motion exercises, 28 (93.3%) had good-quality sleep, while 2 (6.7%) had poor-quality sleep.

Table 2 shows the assessment of the pre- and post-test mean sleeping patterns of postoperative orthopedic patients. The mean value of the subject was 9.63 with a standard deviation of 2.442, whereas after passive range-of-motion exercises, the mean score was 3.33 with a standard deviation of 1.561. A paired t-test was used to test the improvement, which was highly statistically significant at the  $p < 0.001$  level. It appears that passive range-of-motion exercises were beneficial in improving sleep quality in orthopedic surgery patients. As a result, the stated hypothesis H1 was accepted.

The demographic variable like educational status is having significant association with the quality of sleep. Education level can improve the knowledge of the individual. So, they easily understood the benefits and importance of passive range-of-motion exercises and they were doing the exercises regularly that improve their quality of sleep. Hence, the stated hypothesis H2 was accepted. The demographic variables age, gender, type of work, marital status, occupational status, residential area, monthly family income, and current medication history had no significant correlation with

postoperative orthopedic patient quality of sleep. As a result, the stated hypothesis H2 was rejected.

## DISCUSSION

The study finding revealed that, among 30 study populations, 15 (50%) had poor sleep quality, 13 (43.3%) had fair sleep quality, and 2 (6.7%) had good sleep quality.

The second goal of the pre- and post-tests is to determine the sleeping patterns of postoperative orthopedic patients. The subject's mean value was 9.63 with a standard deviation of 2.442 before passive range-of-motion exercises, whereas after passive range-of-motion exercises, the mean score was 3.33 with standard deviation 1.561, and the improvement was statistically tested using a paired *t*-test, which was found to be highly statistically significant at the  $p < 0.001$  level, indicating that passive range-of-motion exercises were effective at promoting quality of sleep among postoperative orthopedic patients.

The third objective of the present study finding reveals that demographic variable like educational status has a significant correlation with the quality of sleep. The demographic variables age, sex, type of work, marital status, occupational status, residential area, income of the family per month, and present medication history did not have any significant association with quality of sleep among postoperative orthopedic patients.

This study contains implications that are of key importance in a diversity of nursing professions including service, education, administration, and research. In the field of nursing, a nurse working in a hospital setting may encourage patients to engage in passive range-of-motion exercises, which are simple to perform and can be incorporated into their nursing practice. In the field of nursing education, based on the findings of this study, nursing educators prefer nursing students to improve their knowledge in order to teach postoperative orthopedic patients about the range-of-motion exercises. To accomplish these goals, student nurses must participate in programs such as seminars and workshops. To take

an active role as a nurse administrator in organizing classes for staff nurses as well as patients to learn about range-of-motion exercises while increasing nursing standards and research-based clinical practice. For improved generalization, a larger sample size can be used to replicate the study. A comparable study among patients with poor sleep quality could be conducted in any procedure.

## CONCLUSION

Passive range-of-motion exercises are highly successful in improving sleep quality and have no negative effects. They are also simple to perform and are beneficial to all patients. The study findings show that the regular practice of passive range-of-motion exercises helps to improve the quality of sleep among postoperative orthopedic patients.

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