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Impact of Back Massage on Anxiety Levels in Patients Undergoing Orthopedic Surgery

Jasmine Soundharya S.[1,*]

Abstract

Objectives: *The purpose of the study was to examine the pre-test and post-test anxiety levels in patients who had orthopedic surgery in both the experimental and control groups. The study aimed to assess the effectiveness of back massage in reducing anxiety for those in the experimental group and to investigate the relationship between anxiety levels and specific demographic factors in these patients.* ***Research Approach:*** *The study aimed to evaluate how effective back massage is in reducing anxiety levels in patients who have undergone orthopedic surgery. Given the nature of the problem and to achieve the objectives, a quantitative evaluative approach was employed.* ***Findings:*** *The Chi-square value calculated for baseline variables indicated a significant association between the anxiety levels of patients who underwent orthopedic surgery and their selected demographic characteristics, as the value exceeded the table value. Thus, hypothesis H2 is supported, indicating a link between these variables and the level of anxiety.*

Keywords: Experimental and control groups, orthopedic surgery, level of anxiety, back massage, patients

INTRODUCTION

When health is compromised, wisdom loses its impact, creativity cannot flourish, and physical strength is ineffective. Wealth becomes meaningless, and logic is impotent. Many individuals who suffer from illnesses also struggle with anxiety, as both conditions often involve disruptions in brain chemistry. Disease is commonly used to describe any condition that causes pain, dysfunction, distress, anxiety, social issues, or even death for the affected individual as well as similar problems for those in close contact with the person. Illnesses can impact both the body and the mind, as being diagnosed with and living through a disease can alter a person's perspective on life. Musculoskeletal injuries involve pain or damage to the joints, ligaments, muscles, nerves, tendons, and other supportive structures of the limbs, neck, and back [1–4]. Musculoskeletal disorders (MSDs) are progressive inflammatory conditions that lead to pain and anxiety, hindering the ability to perform routine activities. These conditions can affect different areas of the body, such as the upper and lower back, neck, shoulders, and limbs. In orthopedic surgeries such as knee replacement, hip replacement, and hip fracture repair, managing anxiety during rehabilitation is crucial for promoting recovery and achieving the best possible outcomes. Postoperative anxiety can arise from a combination of physiological and psychological factors. Incision and retraction during surgery traumatize the skin and underlying tissues, which can contribute to anxiety. This anxiety may be compounded by a lack of information, highlighting the need for healthcare providers to provide clear instructions to patients undergoing orthopedic surgery. Studies have demonstrated that massage can decrease stress hormones and physical stress reactions by activating the parasympathetic nervous

***Author for Correspondence**
Jasmine Soundharya S.
E-mail: jasminejsp@gmail.com

[1]Assistant Professor, Department of Medical Surgical Nursing, Indian Academy Nursing College, Bengaluru, Karnataka, India.

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system. It not only eases nervous tension but also supports the balance of the vagus nerve and sympathetic nervous system activity, helping to manage stress and reduce anxiety. Healthcare professionals should provide straightforward and clear explanations to address patients' concerns and alleviate their anxiety. The State Anxiety Inventory was utilized to measure anxiety levels [5–8].

NEED FOR THE STUDY

"*Health and cheerfulness naturally beget each other.*"

—Joseph Addison

Nursing practice involves various roles and responsibilities to meet the healthcare needs of society. Nurses are frontline professionals who provide care to patients recovering from illness or injury, advocate for patient rights, educate them on informed decisions, and offer support during critical times. Comfort is central to nursing and is as subjective as anxiety is. The World Health Organization (WHO) highlights trauma, especially from road traffic accidents, as a significant global concern wasting human and financial resources. Annually, approximately five million people die in preventable accidents, with musculoskeletal injuries accounting for a large portion of work-related diseases globally. In India, 71% of two-wheeler users are at risk of severe musculoskeletal injuries, and deaths from road traffic accidents tripled from 2012 to 2014 [9–13].

A study on postoperative anxiety in Turkish orthopedic patients found that on the third postoperative day, the average anxiety intensity was 1.75 ± 1.02, with 78.7% experiencing intermittent anxiety. Severe anxiety averaged 4.55 ± 0.70. Statistically significant differences were found in the anxiety scores, highlighting the importance of nurses' understanding and effective management of postoperative anxiety. Massage therapy has shown promise in reducing diastolic blood pressure, respiration, psychological distress, and anxiety in orthopedic patients. Several studies have reported its effectiveness in alleviating anxiety in patients with various conditions including scapulocostal syndrome, stroke, hand pain, and constipation. In a study at Mumbai Hospital, 63 patients undergoing arthroscopic knee surgery were randomly divided into experimental and control groups. The experimental group received a back massage for 20 minutes, and anxiety was assessed using the modified State Anxiety Inventory Scale. The findings showed a notable decrease in anxiety ($p = 0.005$) within the experimental group. The investigator was motivated to conduct this study after observing orthopedic patients experiencing severe anxiety, which hindered their comfort and recovery. Anxiety symptoms such as tachycardia, palpitations, and increased blood pressure can negatively affect patient outcomes. This prompted the investigator to explore nursing interventions, such as back massage, to reduce anxiety and enhance patient comfort, ultimately accelerating the recovery process [14–17].

OBJECTIVES

The objectives of the study are:

- To assess the anxiety levels in orthopedic patients before and after surgery in both the experimental and control groups.
- To assess the impact of back massage on anxiety reduction in an experimental group of orthopedic patients.
- To explore the association between anxiety levels and specific demographic factors in both experimental and control groups.

HYPOTHESES

All hypotheses will be tested at a 0.05 significance level:

- *H1:* A notable difference was found between the pre-test and post-test anxiety levels in the experimental group of orthopedic surgery patients.
- *H2:* A significant association exists between anxiety levels and demographic variables in both experimental and control groups.

VARIABLES IN THE STUDY

- *Independent variable:* Back massage
- *Dependent variable:* Anxiety levels
- *Attribute variables:* age, gender, education, occupation, marital status, residence area, family type, vehicle type, physical activity, accident type, and habits.

REVIEW OF LITERATURE

A review of the literature examined various studies on the effectiveness of back massage in reducing anxiety among patients undergoing orthopedic surgery.

An experimental study in Pennsylvania assessed postoperative anxiety in 105 patients after hip and knee arthroplasties. The results showed that 58% of patients who underwent total knee replacement and 47% of those who underwent total hip replacement experienced moderate-to-severe anxiety on the first day after surgery. The study concluded that anxiety levels were high in patients undergoing orthopedic surgery [18].

A cross-sectional study in Turkey involving 60 patients found that 29% exhibited anxiety post-surgery, with a statistically significant difference in anxiety levels between different psychological characteristics. Similarly, a 2015 experimental study on 56 patients who underwent hip or knee arthroplasty showed that 50% developed anxiety before discharge, with females being more prone to anxiety than males.

A prospective cohort study comparing 179 surgical procedures indicated that patients with orthopedic issues had the highest anxiety scores on the first postoperative day, concluding that treatments to reduce postoperative anxiety are necessary [19].

A study in Brazil demonstrated that back massage significantly reduces the use of analgesics and decreases anxiety levels. In a 2015 quasi-experimental study, 25 patients who received both analgesics and back massage reported greater patient satisfaction and lower anxiety scores than those who received only analgesics [20].

Other studies across various countries, such as Taiwan and Turkey, have consistently shown that back massage effectively reduces anxiety among patients undergoing orthopedic procedures. For example, in a study at a Taiwanese hospital, patients receiving back massage experienced a statistically significant reduction in anxiety levels. Similarly, a study revealed that back massage significantly reduced anxiety among postoperative orthopedic patients [21]. Additionally, studies in hospitals in Taiwan and Turkey have affirmed that back massage significantly lowers anxiety levels, with results often showing a greater effect in male patients or those experiencing severe pain.

Overall, these studies demonstrate that back massage is a promising intervention for reducing anxiety in patients recovering from orthopedic surgery, with statistical evidence supporting its effectiveness in improving patient comfort and satisfaction [22–24].

RESEARCH METHODOLOGY

The objective of the present study was to assess the impact of back massage on reducing anxiety in patients who had undergone orthopedic surgery. Given the nature of the issue and objectives of the study, a quantitative evaluative approach was employed (Figure 1).

RESULTS

This article presents an analysis and interpretation of data from a study aimed at evaluating the effectiveness of back massage in reducing anxiety levels in patients who had orthopedic surgery at Dr. B.R. Ambedkar Medical College and Hospital in Bengaluru. The data were gathered based on the study's objectives and hypotheses.

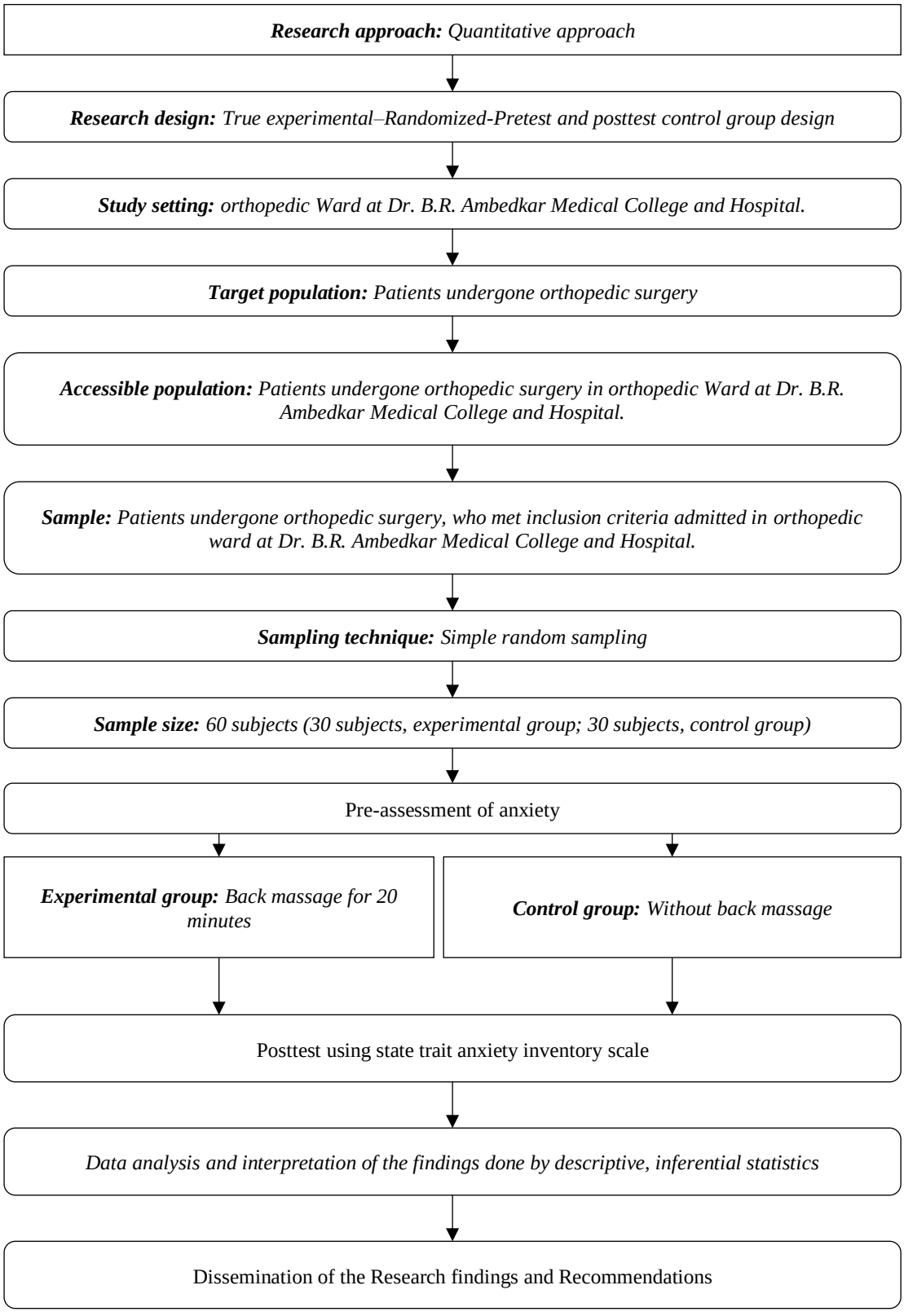

Figure 1. Detailed research methodology.

Analysis of the Data is Organized and Presented Under the Following Sections

- *Section 1:* Demographic characteristics of respondents.
- *Section 2(a):* Overall pre-test level and scores of patients who underwent orthopedic surgery.

- *Section 2(b):* Post-test anxiety scores of respondents, including both overall scores and scores for individual aspects of anxiety levels.
- *Section 2(c):* Pre-test and post-test anxiety scores, both overall and for specific aspects, among patients who underwent orthopedic surgery.
- *Section 3:* The relationship between demographic factors and pre-test anxiety levels in patients who underwent orthopedic surgery.

Table 1 and Figure 2 show that, in the experimental group, the largest group of participants (46.67%) was aged between 41 and 50 years. In addition, 40% of participants were aged over 50, while 13.33% were between 31 and 40 years old. In the control group, most participants (50%) were between 41 and 50 years old, 33.33% were over 50, and 16.67% were between 31 and 40 years old.

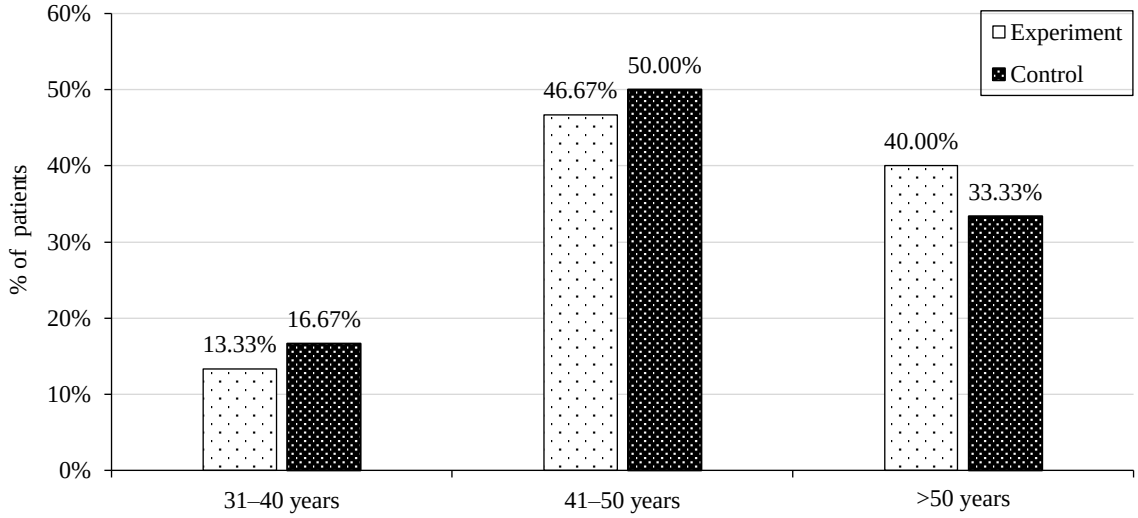

Figure 2. The multiple bar diagram shows the age distribution of patients undergone orthopedic surgery in the experimental and control groups.

Table 1. The distribution of socio-demographic variables, including their frequency and percentage, among patients who underwent orthopedic surgery (n=60).

Demographic variables		**Group**				**Chi-square test**
		Experiment (n=30)		***Control (n=30)***		
		n	*%*	*n*	*%*	
Age	31–40 years	4	13.33%	5	16.67%	$\chi 2=0.33$ p=0.85 DF=2(NS)
	41–50 years	14	46.67%	15	50.00%	
	>50 years	12	40.00%	10	33.33%	
Gender	Male	24	80.00%	23	76.67%	$\chi 2=0.10$ p=0.75 DF=1(NS)
	Female	6	20.00%	7	23.33%	
Religion	Hindu	21	70.00%	21	70.00%	$\chi 2=0.23$ p=0.89 DF=2(NS)
	Christian	6	20.00%	5	16.67%	
	Muslim	3	10.00%	4	13.33%	
Education status	No formal education	3	10.00%	4	13.33%	$\chi 2=0.63$ p=0.88 DF=3(NS)
	Primary education	13	43.33%	11	36.67%	
	Higher secondary education	10	33.33%	12	40.00%	
	Graduation	4	13.34%	3	10.00%	
Occupation status	Unemployed/housewife	9	30.00%	10	33.32%	$\chi 2=0.30$ p=0.99 DF=4(NS)
	Agriculture	6	20.00%	5	16.67%	
	Self-employed	6	20.00%	5	16.67%	

Demographic variables		**Group**				**Chi-square test**
		Experiment (n=30)		***Control (n=30)***		
		n	*%*	*n*	*%*	
	Government employee	2	6.67%	2	6.67%	
	Business	7	23.33%	8	26.67%	
Family monthly income	<Rs.5000	8	26.67%	9	30.00%	$\chi 2=0.84$ p=0.84 DF=3(NS)
	Rs.5000–10000	11	36.66%	10	33.34%	
	Rs.10000–20000	5	16.67%	7	23.33%	
	>Rs.20000	6	20.00%	4	13.33%	
Marital status	Married	30	100.00%	30	100.00%	$\chi 2=0.00$ p=1.00 DF=1(NS)
	Unmarried	0	0.00%	0	0.00%	
Type of family	Nuclear family	18	60.00%	21	70.00%	$\chi 2=0.66$ p=0.42 DF=1(NS)
	Joint family	12	40.00%	9	30.00%	
Dietary pattern	Vegetarian	6	20.00%	7	23.33%	$\chi 2=0.10$ p=0.75 DF=1(NS)
	Non-vegetarian	24	80.00%	23	76.67%	
Activity	Sedentary	4	13.33%	7	23.34%	$\chi 2=1.10$ p=0.58 DF=2(NS)
	Moderate	17	56.67%	16	53.33%	
	Heavy	9	30.00%	7	23.33%	
Habits	Smoking	12	40.00%	10	33.33%	$\chi 2=0.82$ p=0.85 DF=3(NS)
	Alcohol	7	23.33%	6	20.00%	
	Tobacco	3	10.00%	5	16.67%	
	Others	8	26.67%	9	30.00%	

p>0.05 not significant DF = Degrees of Freedom NS = not significant

Figure 3 is related to sex; the majority of the study participants (n = 24, 80%) were male and 6 (20%) were female. In the control group, the majority of the study participants 23 (76.67%) were male and 7 (23.33%) were female.

In terms of religion, most participants in the experimental group were Hindus, with 21 individuals (70.00%), followed by 6 (20%) who were Christians, and 3 (10.00%) who identified as Muslims. In the control group, 21 (70.00%) subjects belonged to the Hindu religion, 5 (16.67%) belonged to Christians, and 4 (13.3%) belonged to Muslims (Figure 4).

Regarding educational background, the experimental group consisted mainly of participants with a primary education, accounting for 43.33% (13 individuals). Following this, 33.33% (10 individuals) had completed higher secondary education, 13.33% (4 individuals) had a degree, and 10% (3 individuals) had a non-formal education. In the control group, the majority (40%) had completed higher secondary education, 36.67% (11 individuals) had primary education, 10% (3 individuals) had a degree, and 13.33% (4 individuals) had a non-formal education (Figure 5).

Regarding occupation, in the experimental group, 9 participants (30.00%) were unemployed or housewives, 6 (20.00%) worked in agriculture as farmers, 6 (20.00%) were self-employed, 2 (6.7%) were government employees, and the remaining 7 (23.3%) ran their own businesses. In the control group, subjects 10 (33.33%) were unemployed or housewives, 5 (16.67%) were farmers engaged in agriculture, 5 (16.67%) were entrepreneurs, 2 (6.67%) were government employees, and the remaining 8 (26.67%) were doing their own business (Figure 6).

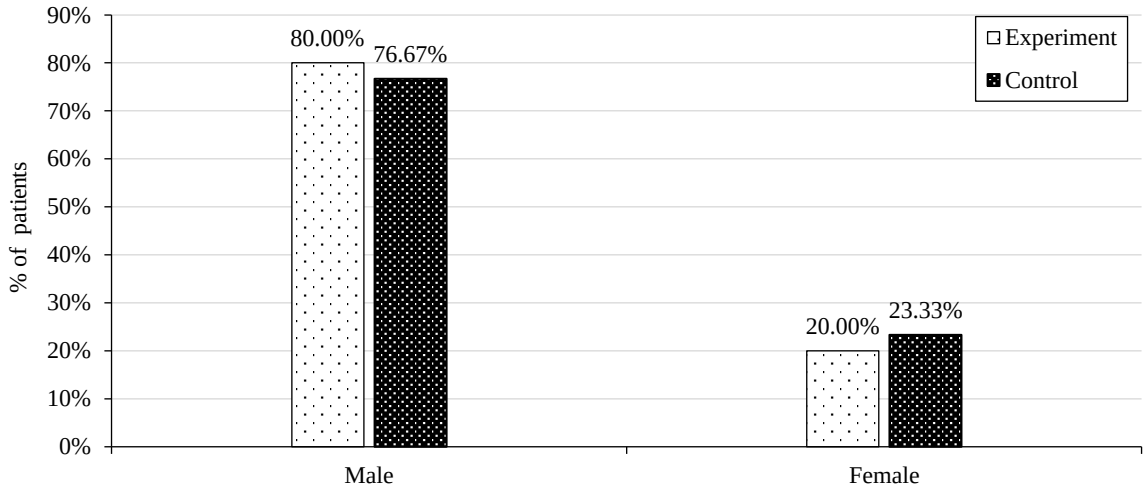

Figure 3. The multiple bar diagram shows the gender distribution of patients undergone orthopedic surgery in experimental and control groups.

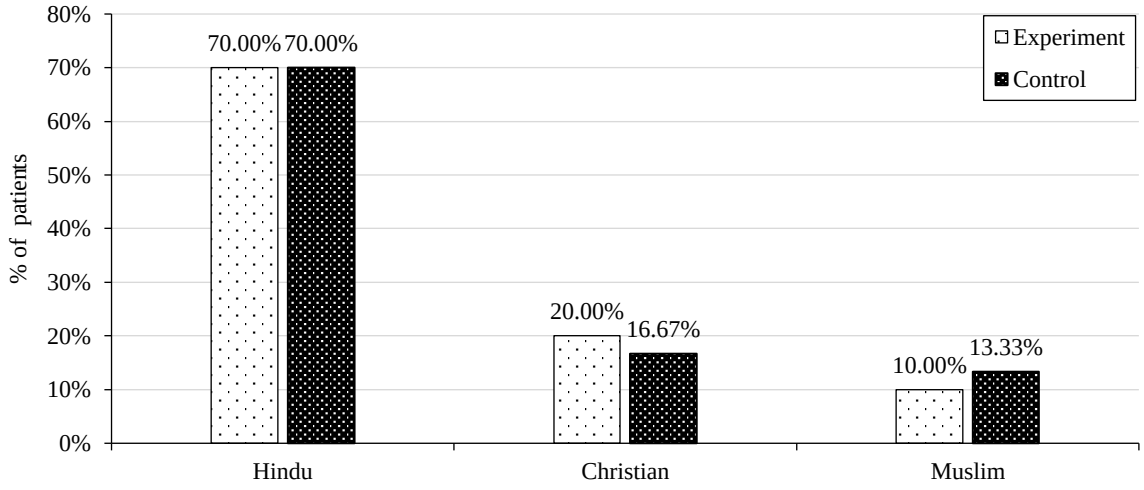

Figure 4. The multiple bar diagram shows the religious status of patients undergone orthopedic surgery in the experimental and control groups.

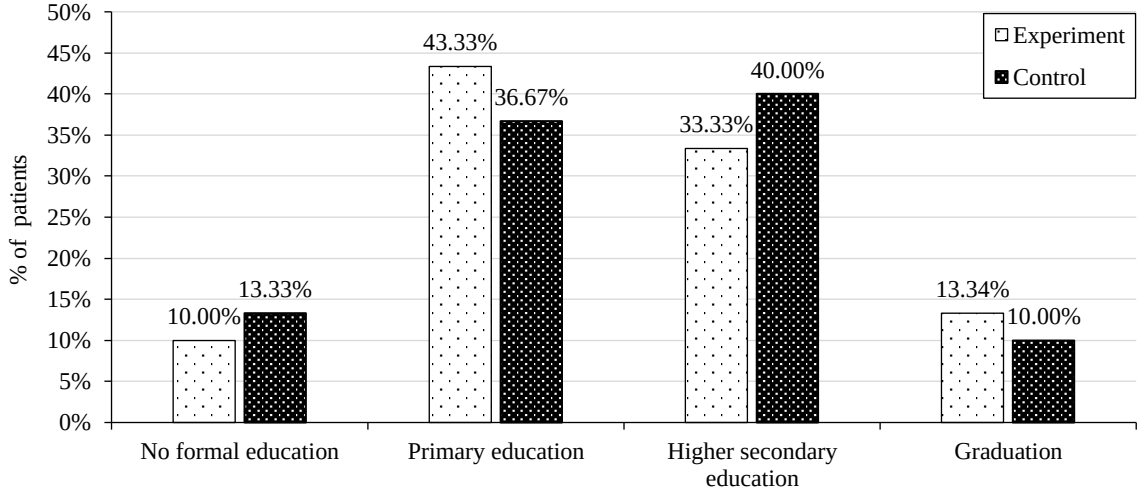

Figure 5. The multiple bar diagram shows the education status of patients undergone orthopedic surgery in the experimental and control groups.

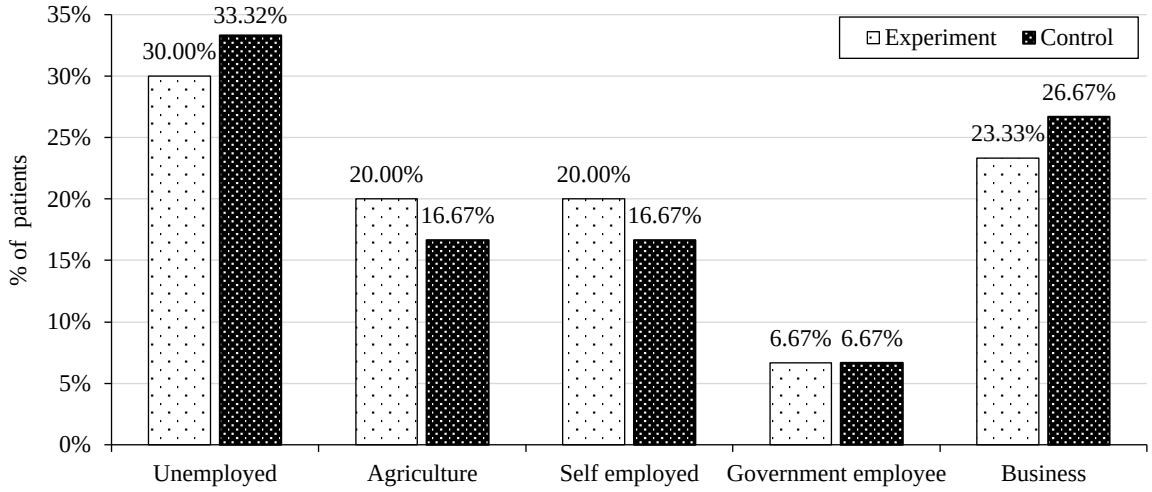

Figure 6. The multiple bar diagram shows the occupation status of patients undergone orthopedic surgery in experimental and control groups.

In terms of monthly family income, in the experimental group, 8 participants (26.67%) earned less than Rs. 5000, 11 (36.67%) earned between Rs. 5000 and Rs. 10000, 5 (16.67%) earned between Rs. 10000 and Rs. 20000, and 5 (16.67%) earned above Rs. 20000. In the control group, 9 participants (30.00%) earned less than Rs. 5000, 10 (33.33%) earned between Rs. 5000 and Rs. 10000, 7 (23.33%) earned between Rs. 10000 and Rs. 20000, and 4 (13.33%) earned more than Rs. 20000. (Figure 7).

Aspect of marital status, all study participants 30 (100%) in the experimental group were married. In the control group, 30 (100%) participants were married (Figure 8).

According to the type of family system, 18 (60.00%) in the experimental group were between nuclear families and 12 (40.00%) were between joint families. In the control group, 21 (70%) were between the joint families and 9 (30%) were between the joint families (Figure 9).

Regarding dietary habits, 24 participants (80.00%) in the experimental group were non-vegetarian, while 6 (20.00%) followed a vegetarian diet. In the control group, 23 participants (76.67%) were non-vegetarian, and 7 (23.33%) were vegetarian. (Figure 10).

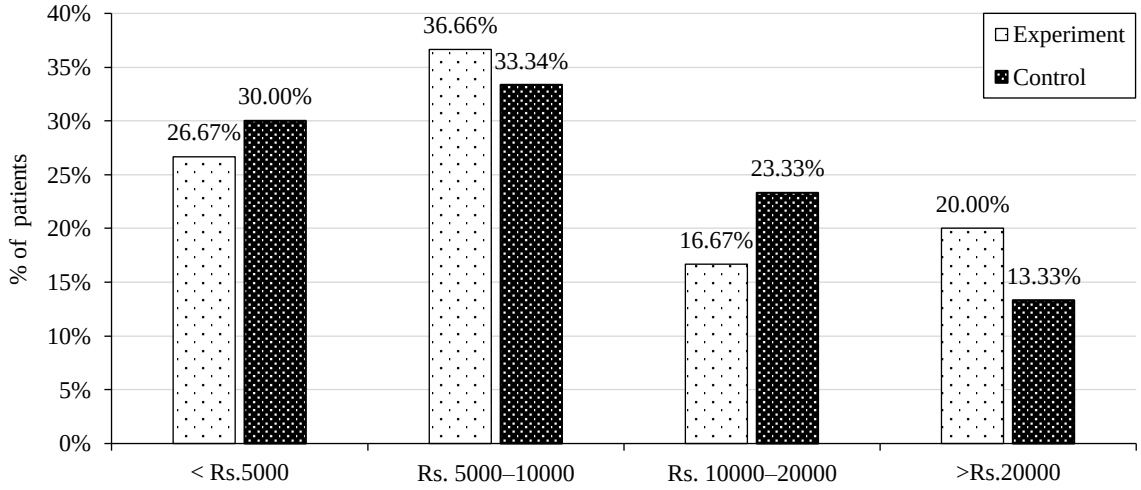

Figure 7. The multiple bar diagram shows the monthly family income of patients undergone orthopedic surgery in the experimental and control groups.

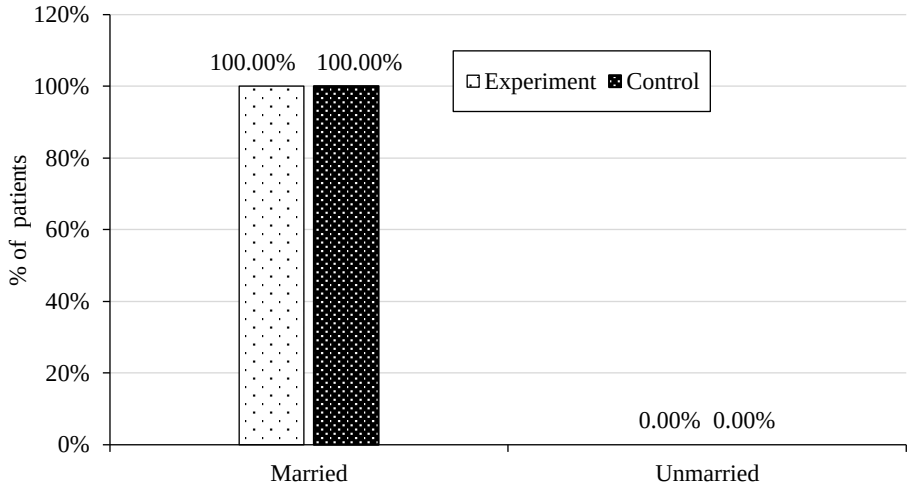

Figure 8. The multiple bar diagram shows the Marital status of patients undergone orthopedic surgery in the experimental and control groups.

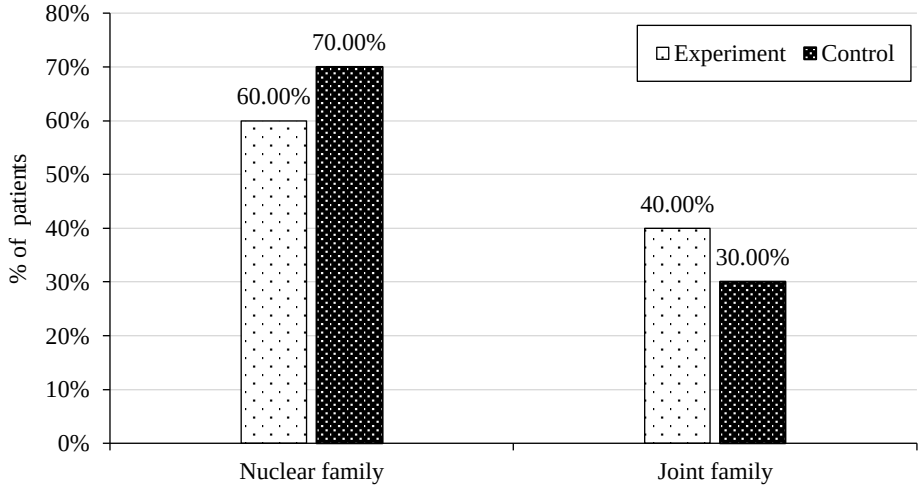

Figure 9. The multiple bar diagram shows the Family type of patients undergone orthopedic surgery in the experimental and control groups.

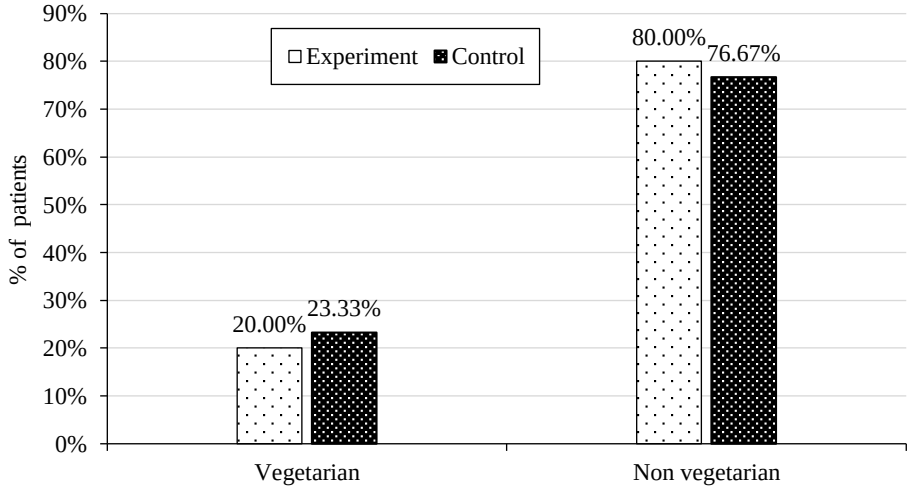

Figure 10. The multiple bar diagram shows the diet pattern of patients undergone orthopedic surgery in the experimental and control groups.

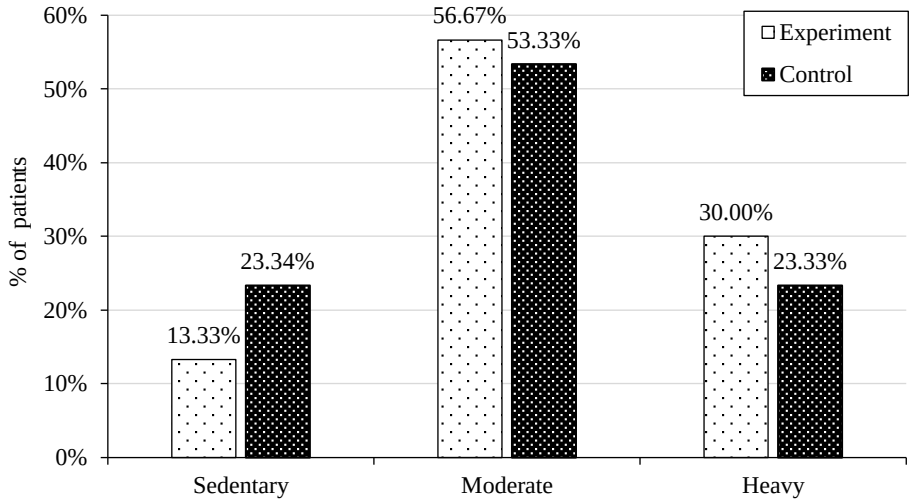

Figure 11. The multiple bar diagram shows the activity of patients undergone orthopedic surgery in the experimental and control groups.

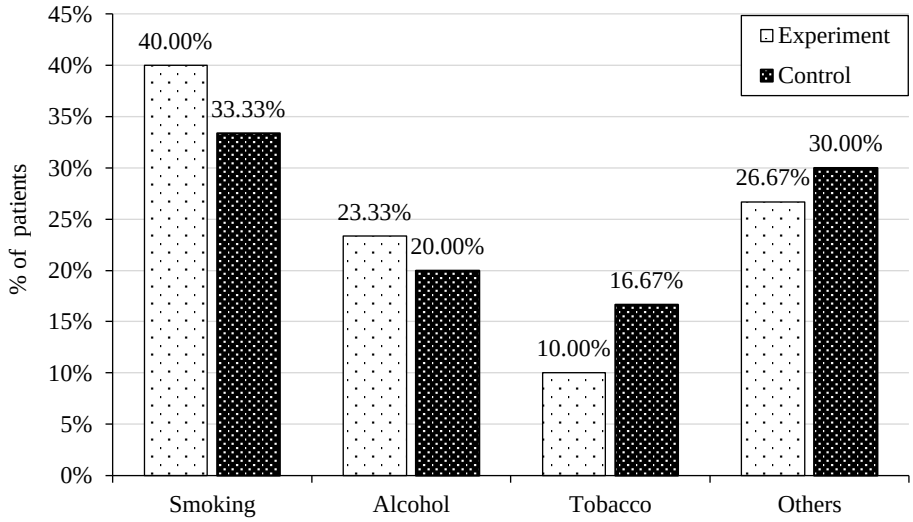

Figure 12. The multiple bar diagram shows the personal habits of patients undergone orthopedic surgery in the experimental and control groups.

In terms of activity levels, the majority of participants in the experimental group were moderate workers (17 individuals, 56.67%), followed by 9 (30%) who were heavy workers, and 4 (13.3%) who engaged in sedentary activities. In the control group, 16 participants (53.33%) were moderate workers, 7 (23.33%) were heavy workers, and 7 (23.33%) were involved in sedentary activities. (Figure 11).

Majority of the study participants' habits, In the experimental group, 12 participants (40.00%) were smokers, 7 (23.33%) were alcohol users, 3 (10.00%) chewed tobacco, and 8 (26.67%) fell into the "other" category. In the control group, 10 participants (33.33%) smoked, 6 (20.00%) consumed alcohol, 5 (16.67%) smoked tobacco, and 9 (30.00%) were categorized under "other." (Figure 12).

As shown in Table 2 in the experiment group, in the pre-test, none of the patients had mild anxiety, 10 (33.33%) had moderate anxiety, and 20 (66.7%) had severe anxiety. In the control group, the pre-test findings revealed that none of the patients experienced severe anxiety, while 9 (30.0%) had moderate anxiety and 21 (70.0%) had mild anxiety. The Chi-squared test was used to assess statistical significance.

Table 2. Comparison of pre-test level of anxiety score among patients undergone orthopedic surgery (n=60).

Level of anxiety	Group				Chi-square test
	Experiment		*Control*		
	n	*%*	*n*	*%*	
Mild	0	0.00%	0	0.00%	$\chi 2=0.08$ p=0.78 DF=1(NS)
Moderate	10	33.33%	9	30.00%	
Severe	20	66.67%	21	70.00%	
Total	30	100.00%	30	100.00%	

P>0.05 not significant DF= Degrees of Freedom

State anxiety inventory scale: This is a 4-point Likert scale composed of 20 items used to determine how the patient feels at a given time and under determined conditions. Total points of 21–40 mild anxiety, 41–60 moderate anxiety, 60–79 severe anxiety, and >60 indicate that the patient needs professional help (The Cronbach alpha value was calculated to be 0.94. In the present study, the mean Cronbach alpha value was calculated to be 0.86.) (Table 3 and Figure 13).

Table 4 presents a comparison of the mean pre-test anxiety scores between the experimental and control groups of patients who had undergone orthopedic surgery. The experimental group had an average score of 61.60, while the control group scored 62.40, indicating a difference of 0.80 points. This difference was minor and did not reach statistical significance. Significance was assessed using the Student's independent t-test.

Table 5 provides an overview of the anxiety levels in both the experimental and control groups post-intervention. In the experimental group, 46.67% (14 participants) exhibited mild anxiety, 53.33% (16 participants) had moderate anxiety, and none had severe anxiety. In contrast, none of the participants in the control group had mild anxiety, 40% (12 participants) had moderate anxiety, and 60% (18 participants) had severe anxiety. The statistical significance was evaluated using the Chi-squared test (Figure 14).

Table 3. Anxiety score interpretation.

S.N.	Level of anxiety score	Score
1.	Mild	21–40
2.	Moderate	41–60
3.	Severe	61–80

(Min.=1, Max.=4, Total questions=20, Maximum marks= 80)

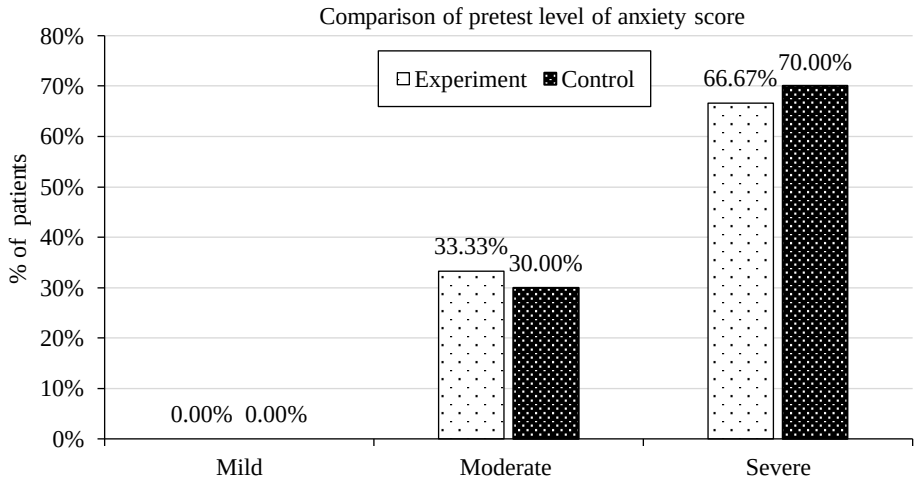

Figure 13. The multiple bar diagram compares the pre-test level of anxiety score among patients undergone orthopedic surgery.

Table 4. Comparison of mean pre-test anxiety score.

Group	N	Mean score	Std. deviation	Mean difference	Student's independent t-test
Experiment	30	61.60	7.17	0.80	t=0.44 p=0.69 DF=58, not significant
Control	30	62.40	6.78		

p>0.05 not significant DF=Degrees of Freedom

Table 5. Comparison of post-test level of anxiety among patients undergone orthopedic surgery (n=60).

Level of anxiety	Group				Chi-square test
	Experiment		*Control*		
	n	*%*	*n*	*%*	
Mild	14	46.67%	0	0.00%	$\chi 2$=32.57 p=0.001*** DF=2(S)
Moderate	16	53.33%	12	40.00%	
Severe	0	0.00%	18	60.00%	
Total	30	100.00%	30	100.00%	

****p≤<0.001 very high significant DF= Degrees of Freedom*

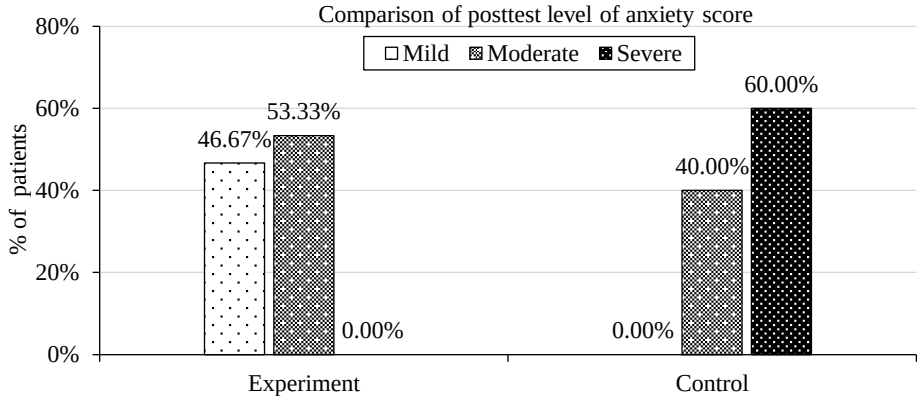

Figure 14. The multiple bar diagram compares the post-test level of anxiety score among patients undergone orthopedic surgery.

Table 6. Comparison of mean post-test anxiety score.

Group	N	Mean score	Std. deviation	Mean difference	Student's independent t-test
Experiment	30	42.70	4.45	19.30	t=13.34 p=0.001*** DF=58, significant
Control	30	62.00	6.55		

****p≤<0.001 significant DF= Degrees of Freedom*

Table 6 shows a comparison of the mean pre-test anxiety scores between the experimental and control groups of patients who underwent orthopedic surgery. The experimental group had an average score of 42.70, while the control group scored 62.00, showing a difference of 19.30 points. This difference was statistically significant, as confirmed by the independent t-test.

Table 7 shows the anxiety levels of patients in the experimental group both prior to and following orthopedic surgery. In the pretest, no patients exhibited mild anxiety, 33.33% (10 participants) had moderate anxiety, and 66.67% (20 participants) experienced severe anxiety. By the post-test, 46.67% (14 participants) reported mild anxiety, 53.33% (16 participants) had moderate anxiety, and none had severe

anxiety. The statistical significance of the pre-test and post-test anxiety levels was determined using the Extended McNemar's Chi-square test (Figure 15).

Table 7. Comparison of pre-test and post-test levels of anxiety among patients undergone orthopedic surgery in the experiment group (n=60).

Level of anxiety	Group				Extended McNemar's test
	Pre-test		*Post-test*		
	n	*%*	*n*	*%*	
Mild	0	0.00%	14	46.67%	*χ^2=32.57 p=0.001*** DF=4(S)*
Moderate	10	33.33%	16	53.33%	
Severe	20	66.67%	0	0.00%	
Total	30	100.00%	30	100.00%	

****p≤<0.001 significant DF= Degrees of Freedom*

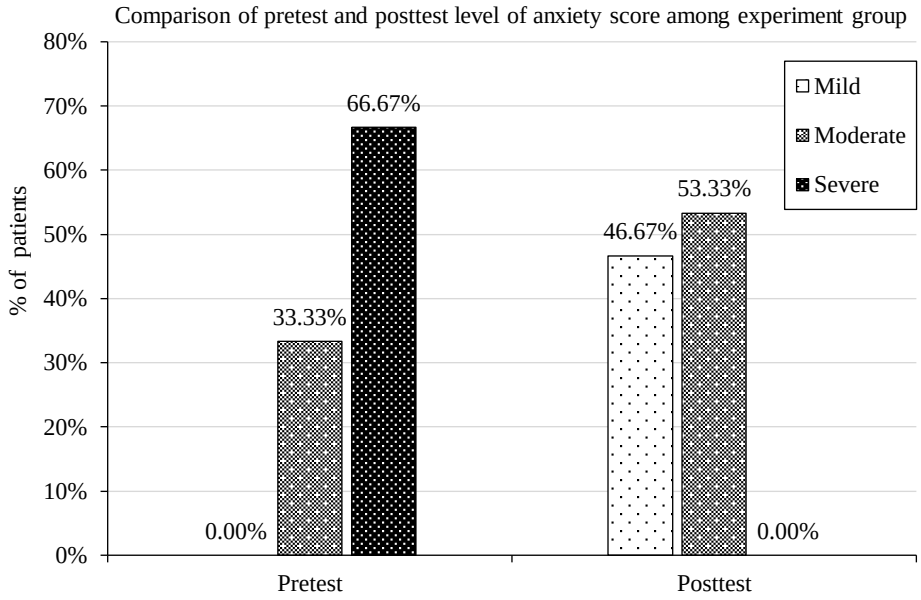

Figure 15. The multiple bar diagram compares the pre-test and post-test levels of anxiety among patients undergone orthopedic surgery in the experiment group.

Table 8. Comparison of pre-test and post-test levels of anxiety among patients undergone orthopedic surgery in the control group (n=60).

Level of anxiety	Group				Extended McNemar's test
	Pre-test		*Post-test*		
	n	*%*	*n*	*%*	
Mild	0	0.00%	0	0.00%	χ2=2.50 p=0.11 DF=1(NS)
Moderate	9	30.00%	12	40.00%	
Severe	21	70.00%	18	60.00%	
Total	30	100.00%	30	100.00%	

p>0.05 not significant DF= Degrees of Freedom

Table 8 presents the anxiety levels of patients in the control group before and after undergoing orthopedic surgery. In the pre-test, none of the patients reported mild anxiety, 30% (9 participants) had moderate anxiety, and 70% (21 participants) experienced severe anxiety. In the post-test, no patients had mild anxiety, 40% (12 participants) had moderate anxiety, and 60% (18 participants) had severe

anxiety. The statistical significance of the pre-test and post-test anxiety levels was evaluated using the Extended McNemar's Chi-square test (Figure 16).

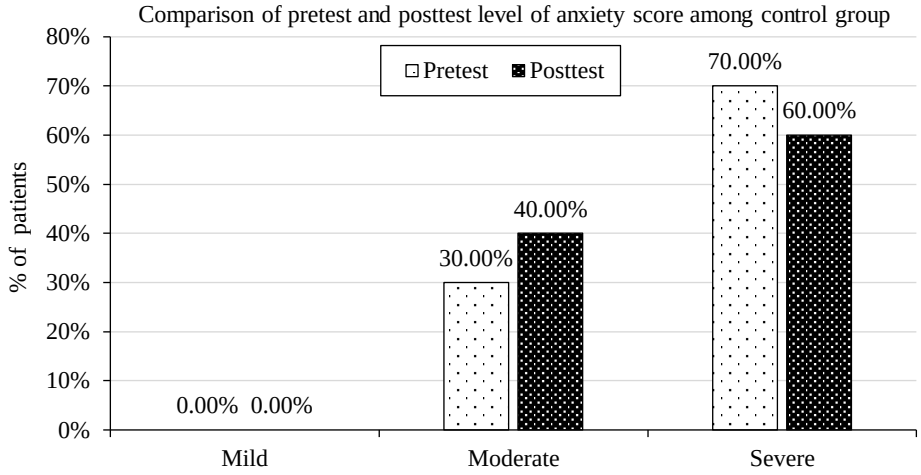

Figure 16. Comparison of pre-test and post-test levels of anxiety score among control group.

Table 9. Comparison of mean pre-test and post-test anxiety score (experiment).

Group	N	Mean score	Std. deviation	Mean difference	Student's independent t-test
Pre-test	30	61.60	7.17	18.90	*t=13.50* *p=0.001**** *DF=58, significant*
Post-test	30	42.70	4.45		

****p≤<0.001 significant DF= Degrees of Freedom*

Table 9 displays a comparison of the average pre-test and post-test anxiety scores for patients in the experimental group who underwent orthopedic surgery. On average, the experimental group had a pre-test score of 61.60, which decreased to 42.70 in the post-test, resulting in a difference of 18.90 points. This difference was determined to be statistically significant, as evaluated through the Student's independent t-test (Figure 17).

Table 10 displays the impact of back massage on anxiety levels in patients from the experimental group who underwent orthopedic surgery. Table 11 compares the mean pre-test and post-test anxiety scores of patients in the control group who underwent orthopedic surgery. On average, the control group had a pre-test score of 62.40, which slightly decreased to 62.00 in the post-test, resulting in a minimal difference of 0.40 points. This change was minimal and did not reach statistical significance. Statistical significance was assessed using the Student's independent t-test (Figure 18).

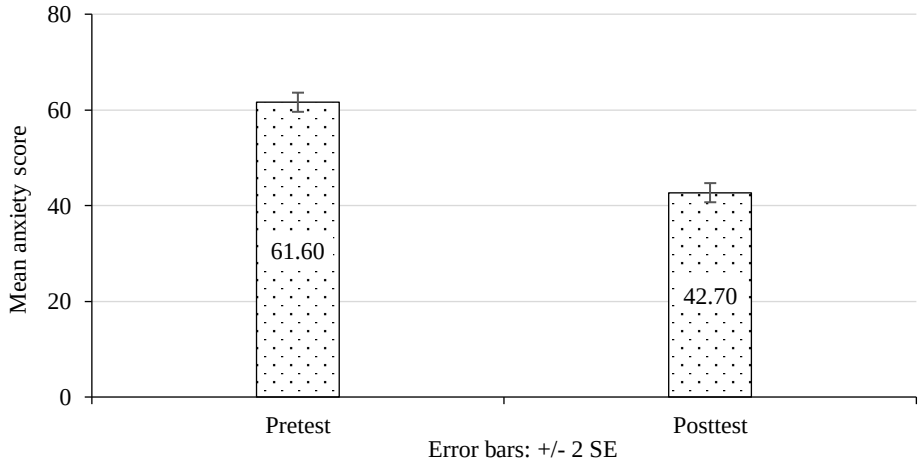

Figure 17. A simple bar with a 2 standard error diagram compares the mean pre-test and post-test mean anxiety scores among experimental group patients.

Table 10. Effectiveness of back massage on the level of anxiety among patients undergone orthopedic surgery in the experimental group.

Test	Maximum score	Mean score	% of mean score	Mean difference of anxiety reduction score with 95% confidence interval	Percentage difference of anxiety reduction score with 95% confidence interval
Pre-test	80	61.60	77.00 %	18.90 (16.04–21.76)	23.63% (20.25%–27.20%)
Post-test	80	42.70	53.75 %		

Table 11. Comparison of mean pre-test and post-test anxiety score (control).

Group	N	Mean score	Std. deviation	Mean difference	Student's independent t-test
Pre-test	30	62.40	6.78	0.40	t=1.87 p=0.07 DF=29, not significant
Post-test	30	62.00	6.55		

****p≤<0.001 significant DF= Degrees of Freedom*

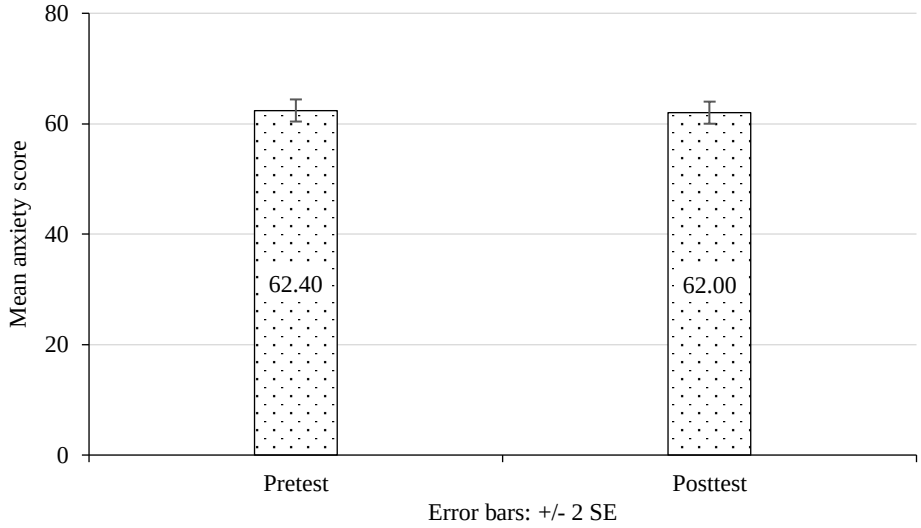

Figure 18. A simple bar with 2 standard error diagrams compares the mean pre-test and post-test mean anxiety scores among control group patients.

Table 12. Effectiveness of back massage on the level of anxiety among patients undergone orthopedic surgery in the control group.

Test	Maximum score	Mean score	% of mean score	Mean difference of anxiety reduction score with 95% confidence interval	Percentage difference of anxiety reduction score with 95% confidence interval
Pre-test	80	62.40	78.00%	0.50 (-0.03 – 0.83)	0.63% (-0.03% – 1.03%)
Post-test	80	62.00	77.50%		

Table 12 illustrates the effectiveness of back massage in lowering anxiety levels among patients in the experimental group who had orthopedic surgery. After the back massage intervention, the experimental group showed a 0.63% reduction in anxiety scores. The differences in anxiety reduction

between the pre-test and post-test scores were analyzed using the mean difference with a 95% confidence interval (CI) and the proportion with a 95% CI.

Table 13 presents the relationship between the pre-test anxiety scores and demographic variables of the patients in the experimental group who underwent orthopedic surgery. None of the demographic variables showed a significant association with pre-test anxiety levels. This was confirmed using the Chi-squared test.

Table 13. The connection between pre-test anxiety scores and the demographic factors of patients who underwent orthopedic surgery in the experimental group.

Demographic variables		**Pre-test level of anxiety**						**n**	**Chi-square test**
		Mild		***Moderate***		***Severe***			
		n	*%*	*n*	*%*	*n*	*%*		
Age	31–40 years	0	0.00%	2	50.00%	2	50.00%	4	$\chi2$=2.57 p=0.27 DF=2(NS)
	41–50 years	0	0.00%	6	42.86%	8	57.14%	14	
	>50 years	0	0.00%	2	16.67%	10	83.33%	12	
Gender	Male	0	0.00%	7	29.17%	17	70.83%	24	$\chi2$=0.94 p=0.33 DF=1(NS)
	Female	0	0.00%	3	50.00%	3	50.00%	6	
Religion	Hindu	0	0.00%	5	23.81%	16	76.19%	21	$\chi2$=3.86 p=0.14 DF=2(NS)
	Christian	0	0.00%	4	66.67%	2	33.33%	6	
	Muslim	0	0.00%	1	33.33%	2	66.67%	3	
Education status	No formal education	0	0.00%	2	66.67%	1	33.33%	3	$\chi2$=4.08 p=0.25 DF=2(NS)
	Primary education	0	0.00%	2	15.38%	11	84.62%	13	
	Higher secondary education	0	0.00%	4	40.00%	6	60.00%	10	
	Graduation	0	0.00%	2	50.00%	2	50.00%	4	
Occupation status	Unemployed	0	0.00%	1	11.11%	8	88.89%	9	$\chi2$=9.08 p=0.08 DF=4(NS)
	Agriculture	0	0.00%	4	66.67%	2	33.33%	6	
	Self-employed	0	0.00%	2	33.33%	4	66.67%	6	
	Government employee	0	0.00%	2	100.00%	0	0.00%	2	
	Business	0	0.00%	1	14.29%	6	85.71%	7	
Family monthly income	< Rs.5000	0	0.00%	4	50.00%	4	50.00%	8	$\chi2$=4.98 p=0.14 DF=3(NS)
	Rs.5000–10000	0	0.00%	5	45.45%	6	54.55%	11	
	Rs.10000–20000	0	0.00%	0	0.00%	5	100.00%	5	
	>Rs.20000	0	0.00%	1	16.67%	5	83.33%	6	
Marital status	Married	0	0.00%	10	33.33%	20	66.67%	30	$\chi2$=0.00 p=1.00 DF=1(NS)
	Unmarried	0	0.00%	0	0.00%	0	0.00%	0	
Type of family	Nuclear family	0	0.00%	5	27.78%	13	72.22%	18	$\chi2$=0.62 p=0.42 DF=1(NS)
	Joint family	0	0.00%	5	41.67%	7	58.33%	12	
Dietary pattern	Vegetarian	0	0.00%	2	33.33%	4	66.67%	24	$\chi2$=0.00 p=1.00 DF=1(NS)
	Non-vegetarian	0	0.00%	8	33.33%	16	66.67%	4	
Activity	Sedentary	0	0.00%	2	50.00%	2	50.00%	17	$\chi2$=1.73 p=0.42 DF=2(NS)
	Moderate	0	0.00%	4	23.53%	13	76.47%	9	
	Heavy	0	0.00%	4	44.44%	5	55.56%	12	
Habits	Smoking	0	0.00%	5	41.67%	7	58.33%	7	$\chi2$=2.41 p=0.49 DF=3(NS)
	Alcohol	0	0.00%	3	42.86%	4	57.14%	3	
	Tobacco	0	0.00%	0	0.00%	3	100.00%	8	
	Others	0	0.00%	2	25.00%	6	75.00%	4	

p>0.05 not significant DF= Degrees of Freedom NS= not significant

Table 14 shows the association between the pre-test level of anxiety scores and demographic variables of patients who underwent orthopedic surgery in the control group. No significant association was found between demographic variables and anxiety levels, as confirmed by the Chi-squared test.

Figures 19–22 and Table 15 illustrate the relationship between post-test anxiety scores and the demographic variables of patients in the experimental group who underwent orthopedic surgery. Younger patients, more educated patients, joint family patients, and employed patients had milder anxiety than others. This was confirmed using the Chi-squared test.

Table 14. The relationship between pre-test anxiety scores and demographic factors of patients who underwent orthopedic surgery in the control group.

Demographic variables		**Pre-test level of Anxiety**						**n**	**Chi-square test**
		Mild		***Moderate***		***Severe***			
		n	*%*	*n*	*%*	*n*	*%*		
Age	31–40 years	0	0.00%	3	60.00%	2	40.00%	5	$\chi2$=2.70 p=0.26 DF=2(NS)
	41–50 years	0	0.00%	4	26.67%	11	73.33%	15	
	>50 years	0	0.00%	2	20.00%	8	80.00%	10	
Gender	Male	0	0.00%	7	30.43%	16	69.57%	23	$\chi2$=0.01 p=0.93 DF=1(NS)
	Female	0	0.00%	2	28.57%	5	71.43%	7	
Religion	Hindu	0	0.00%	9	42.86%	12	57.14%	21	$\chi2$=5.51 p=0.06 DF=2(NS)
	Christian	0	0.00%	0	0.00%	5	100.00%	5	
	Muslim	0	0.00%	0	0.00%	4	100.00%	4	
Education status	No formal education	0	0.00%	1	25.00%	3	75.00%	4	$\chi2$=5.48 p=0.14 DF=3(NS)
	Primary education	0	0.00%	6	54.55%	5	45.45%	11	
	Higher secondary education	0	0.00%	2	16.67%	10	83.33%	12	
	Graduation	0	0.00%	0	0.00%	3	100.00%	3	
Occupation status	Unemployed	0	0.00%	4	40.00%	6	60.00%	10	$\chi2$=2.98 p=0.56 DF=4(NS)
	Agriculture	0	0.00%	2	40.00%	3	60.00%	5	
	Self-employed	0	0.00%	2	40.00%	3	60.00%	5	
	Government employee	0	0.00%	0	0.00%	2	100.00%	2	
	Business	0	0.00%	1	12.50%	7	87.50%	8	
Family monthly income	< Rs.5000	0	0.00%	4	44.44%	5	55.56%	9	$\chi2$=3.40 p=0.33 DF=3(NS)
	Rs.5000–10000	0	0.00%	1	10.00%	9	90.00%	10	
	Rs.10000–20000	0	0.00%	3	42.86%	4	57.14%	7	
	>Rs.20000	0	0.00%	1	25.00%	3	75.00%	4	
Marital status	Married	0	0.00%	9	30.00%	21	70.00%	30	$\chi2$=0.00 p=1.00 DF=1(NS)
	Unmarried	0	0.00%	0	0.00%	0	0.00%	0	
Type of family	Nuclear family	0	0.00%	7	33.33%	14	66.67%	21	$\chi2$=0.37 p=0.54 DF=2(NS)
	Joint family	0	0.00%	2	22.22%	7	77.78%	9	
Dietary pattern	Vegetarian	0	0.00%	0	0.00%	7	100.00%	7	$\chi2$=2.27 p=0.13 DF=1(NS)
	Non-vegetarian	0	0.00%	9	39.13%	14	60.87%	23	
Activity	Sedentary	0	0.00%	0	0.00%	7	100.00%	7	$\chi2$=4.45 p=0.13 DF=2(NS)
	Moderate	0	0.00%	7	43.75%	9	56.25%	16	
	Heavy	0	0.00%	2	28.57%	5	71.43%	7	
Habits	Smoking	0	0.00%	2	20.00%	8	80.00%	10	

	Alcohol	0	0.00%	2	33.33%	4	66.67%	6	χ2=5.45 p=0.14 DF=3(NS)
	Tobacco	0	0.00%	0	0.00%	5	100.00%	5	
	Others	0	0.00%	5	55.56%	4	44.44%	9	

p>0.05 not significant DF= Degrees of Freedom NS= not significant

Table 15. The relationship between post-test anxiety scores and the demographic characteristics of patients who underwent orthopedic surgery in the experimental group.

Demographic variables		**Post-test level of Anxiety**						**n**	**Chi-square test**
		Mild		***Moderate***		***Severe***			
		N	*%*	*n*	*%*	*n*	*%*		
Age	31–40 years	3	75.00%	1	25.00%	0	0.00%	4	*χ2=7.37 p=0.03* DF=2(S)*
	41–50 years	9	64.29%	5	35.71%	0	0.00%	14	
	>50 years	2	16.67%	10	83.33%	0	0.00%	12	
Gender	Male	11	45.83%	13	54.17%	0	0.00%	24	χ2=0.03 p=0.86 DF=1(NS)
	Female	3	50.00%	3	50.00%	0	0.00%	6	
Religion	Hindu	7	33.33%	14	66.67%	0	0.00%	21	χ2=5.22 p=0.07 DF=2(NS)
	Christian	5	83.33%	1	16.67%	0	0.00%	6	
	Muslim	2	66.67%	1	33.33%	0	0.00%	3	
Education status	No formal education	2	66.67%	1	33.33%	0	0.00%	3	*χ2=10.88 p=0.01** DF=2(S)*
	Primary education	2	15.38%	11	84.62%	0	0.00%	13	
	Higher secondary education	6	60.00%	4	40.00%	0	0.00%	10	
	Graduation	4	100.00%	0	0.00%	0	0.00%	4	
Occupation status	Unemployed	1	11.11%	8	88.89%	0	0.00%	9	*χ2=11.98 p=0.01** DF=4(S)*
	Agriculture	4	66.67%	2	33.33%	0	0.00%	6	
	Self-employed	5	83.33%	1	16.67%	0	0.00%	6	
	Government employee	2	100.00%	0	0.00%	0	0.00%	2	
	Business	2	28.57%	5	71.43%	0	0.00%	7	
Family monthly income	<Rs.5000	4	50.00%	4	50.00%	0	0.00%	8	χ2=3.16 p=0.37 DF=3(NS)
	Rs.5000–10000	7	63.64%	4	36.36%	0	0.00%	11	
	Rs.10000–20000	1	20.00%	4	80.00%	0	0.00%	5	
	>Rs.20000	2	33.33%	4	66.67%	0	0.00%	6	
Marital status	Married	14	46.67%	16	53.33%	0	0.00%	30	χ2=0.00 p=1.00 DF=1(NS)
	Unmarried	0	0.00%	0	0.00%	0	0.00%	0	
Type of family	Nuclear family	5	27.78%	13	72.22%	0	0.00%	18	*χ2=6.45 p=0.01** DF=1(S)*
	Joint family	9	75.00%	3	25.00%	0	0.00%	12	
Dietary pattern	Vegetarian	3	50.00%	3	50.00%	0	0.00%	24	χ2=0.03p=0.95 DF=1(NS)
	Non-vegetarian	11	45.83%	13	54.17%	0	0.00%	4	
Activity	Sedentary	2	50.00%	2	50.00%	0	0.00%	17	χ2=2.35 p=0.32 DF=2(NS)
	Moderate	6	35.29%	11	64.71%	0	0.00%	9	
	Heavy	6	66.67%	3	33.33%	0	0.00%	12	
Habits	Smoking	8	66.67%	4	33.33%	0	0.00%	7	χ2=6.37 p=0.10 DF=3(NS)
	Alcohol	4	57.14%	3	42.86%	0	0.00%	3	
	Tobacco	0	0.00%	3	100.00%	0	0.00%	8	
	Others	2	25.00%	6	75.00%	0	0.00%	4	

*p>0.05 not significant * p≤0.05 significant ** p≤0.01 highly significant DF= Degrees of Freedom NS= not significant S= significant*

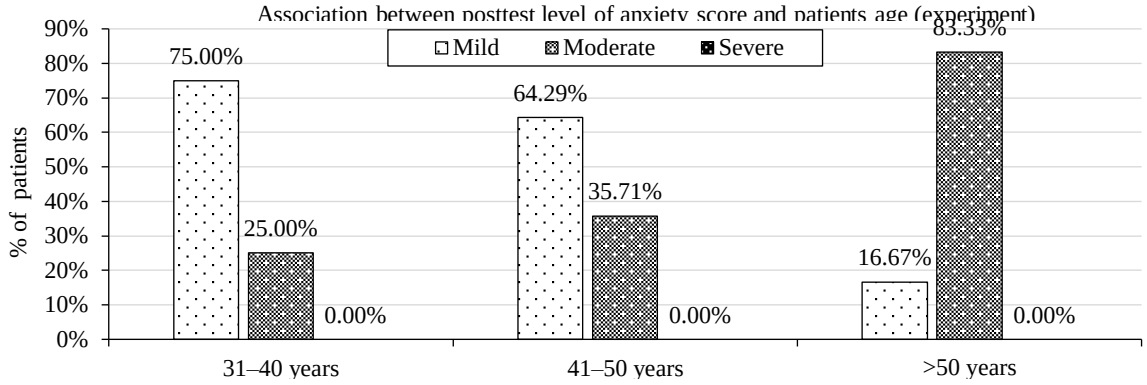

Figure 19. The multiple bar diagram shows the association between the post-test level of anxiety score and patients' age in the experiment group.

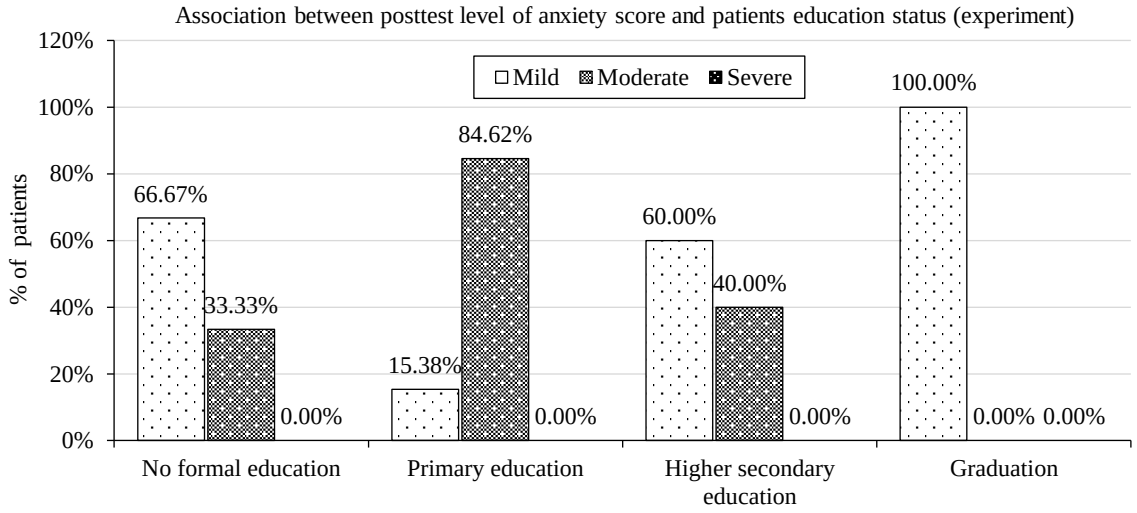

Figure 20. The multiple bar diagram shows the association between the post-test level of anxiety score and patients' education status in the experiment group.

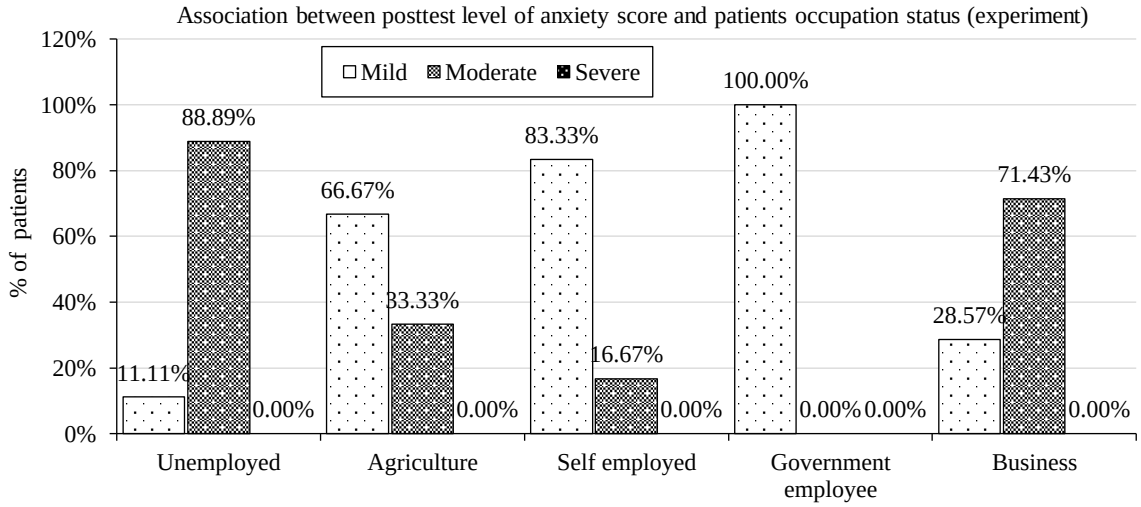

Figure 21. The multiple bar diagram shows the association between the post-test level of anxiety score and patients' occupation status in the experiment group.

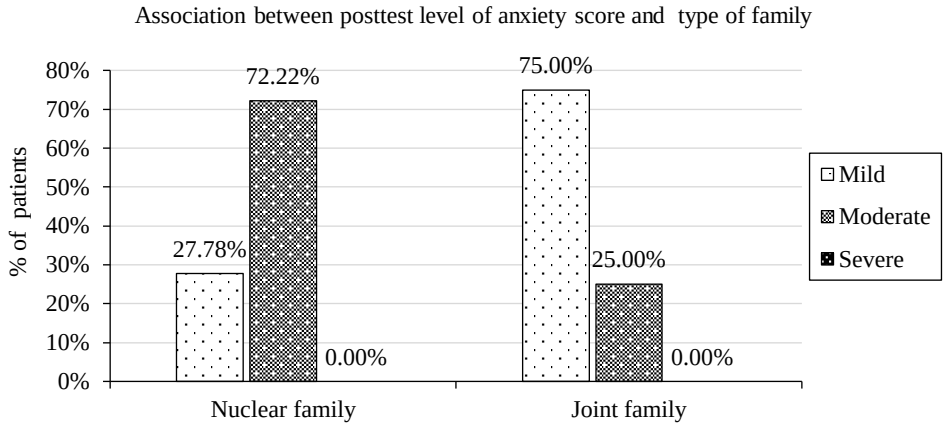

Figure 22. The multiple bar diagram shows the association between the post-test level of anxiety score and the patient type of family system in the experiment group.

DISCUSSION

This article provides an analysis of the results and explores the study's findings. The main goal of the research was to assess the effect of back massage on anxiety levels in patients who had undergone orthopedic surgery. A true experimental design was used, employing a one-group pre-test and post-test approach. Sixty patients who had orthopedic surgery were selected randomly through a simple random sampling method (lottery technique). Each participant received a 30-minute back massage, and their anxiety levels were measured both before and after the intervention [26–29]. The gathered data were examined using both descriptive and inferential statistical methods.

Demographic Characteristics of Patients Undergone Orthopedic Surgery

Age of Patients Undergone Orthopedic Surgery

In the present study, out of the 60 clients in the group, the majority of 41–50 (46.67%) patients who underwent orthopedic surgery belonged to the age group who underwent orthopedic surgery.

Level of Anxiety Among Patients Undergone Orthopedic Surgery Before Back Massage

Before the back massage intervention, an assessment of anxiety levels among the 60 patients who had undergone orthopedic surgery showed that the majority (42 patients, or 70%) experienced high levels of anxiety. Eighteen patients (30%) had moderate anxiety levels, and none of them reported low levels of anxiety. The present study revealed a high level of anxiety in patients undergoing orthopedic surgery. Therefore, a back massage was administered.

Level of Anxiety Among Patients Undergone Orthopedic Surgery After Back Massage

After back massage, an assessment of anxiety levels among the 60 patients who underwent orthopedic surgery showed that none of the patients experienced high levels of anxiety. Of the patients, 41 (68.3%) had low anxiety levels, and 19 (31.7%) had moderate anxiety levels.

Level of Anxiety Among Patients Undergone Orthopedic Surgery Before and After Back Massage

An assessment of anxiety levels among patients who underwent orthopedic surgery, both before and after receiving a back massage, showed that, prior to the intervention, 42 patients (70%) experienced high levels of anxiety, 18 patients (30%) had moderate anxiety, and none had low anxiety. None of the patients reported high levels of anxiety following the intervention. In contrast, 41 patients (68.3%) had low levels of anxiety, whereas 19 patients (31.7%) experienced moderate anxiety.

Effects of Back Massage on Anxiety Among Patients Undergone Orthopedic Surgery

The overall mean post-test anxiety score was 25.17 (48.4%), which was lower than the pre-test anxiety score of 42 (80.8%). The improvement in the mean anxiety score was 16.83 (32.4%), with a 't' value of 45.63, which was statistically significant at the $p<0.05$ level. These results suggest a significant reduction in anxiety levels following back massage in patients who underwent orthopedic surgery.

The Relationship Between Anxiety Levels and Selected Demographic and Clinical Characteristics of Patients Who Underwent Orthopedic Surgery

The relationship between anxiety levels and various demographic and clinical characteristics of patients who underwent orthopedic surgery was assessed using the Chi-squared test. A significant association was found between anxiety levels and certain demographic factors, such as age ($\chi^2 = 5.89$), sex ($\chi^2 = 4.13$), and educational status ($\chi^2 = 3.39$), all at a significance level of 0.01. However, no significant association was identified between anxiety levels and other factors, including occupational status ($\chi^2 = 2.36$), type of family ($\chi^2 = 1.21$), type of vehicle ($\chi^2 = 0.68$), and physical activity ($\chi^2 = 1.60$).

Therefore, the research hypothesis H2, which proposed a significant association between anxiety levels and selected socio-demographic characteristics, was partially supported.

Testing Hypothesis

A comparison of the pre-test and post-test anxiety levels in patients who underwent orthopedic surgery showed a significant 't' value of 45.63, which was statistically significant at the 5% level. As a result, the hypothesis—"the mean post-test anxiety scores will be significantly lower than the mean pre-test anxiety scores at the 0.05 significance level"—was accepted. This finding supports the conclusion that back massage effectively reduces anxiety levels in patients after orthopedic surgery.

CONCLUSION

This article outlines the study's findings, recommendations, and implications for nursing education, practice, administration, and research. The main aim of the research was to assess the impact of back massage on anxiety levels in patients who had undergone orthopedic surgery at Dr. B. R. Ambedkar Medical College and Hospital in Bengaluru. A quasi-experimental design with pre-test and post-test assessments was used for the study. The theoretical foundation was grounded in Wiedenbach's Helping Art in Clinical Nursing Theory (1964). Anxiety levels were assessed using the Modified State-Trait Anxiety Inventory Scale. Simple random sampling was used to select 60 patients who had undergone orthopedic surgery. After obtaining informed consent, the experimental group received a 20-minute back massage. A post-test was conducted 20 minutes after the intervention in both groups. Data analysis was carried out using both descriptive and inferential statistical methods.

Implications

The findings of this study hold important implications for several areas, such as nursing practice, management, education, and research. These implications can be examined across four key areas.

Nursing Practice

- Complementary therapies offer an effective, cost-efficient, noninvasive, and non-pharmacological addition to traditional medical treatments.
- In this study, back massage, a form of touch therapy, was shown to effectively reduce postoperative anxiety in patients undergoing orthopedic surgery.
- Nurses can incorporate simple interventions such as back massage when providing care to postoperative orthopedic patients.
- As demonstrated in this study, back massage can be integrated into clinical practice, thereby promoting evidence-based nursing interventions.

Nursing Administration

- Nurse administrators can organize seminars and workshops to educate both student and staff nurses on effective anxiety management for patients who have undergone orthopedic surgery.

- The results of this study will assist nurse administrators in planning and implementing various in-service programs, such as educational sessions and workshops focusing on back massage and its benefits for postoperative orthopedic patients.
- The study encourages critical thinking on anxiety management within orthopedic surgical units.
- Nurse administrators can take a central role in creating guidelines for incorporating back massages into patient care protocols.

Nursing Education

- The findings of this study offer important perspectives for nursing education.
- The nursing curriculum should be updated to reflect the latest trends and evolving needs of society, which are essential for the advancement of nursing education.
- Practical training hours focused on complementary and alternative therapies such as yoga, massage, and reflexology should be incorporated into the nursing curriculum to enhance students' skills and expertise.

Nursing Research

- This study encourages nursing professionals to pursue further research in this area.
- Future research should explore the effectiveness of various non-pharmacological methods in managing anxiety in patients who have undergone orthopedic surgery.

Limitations

- This study will focus on patients who have undergone orthopedic surgery in the orthopedic ward at Dr. B.R. Ambedkar Medical College and Hospital, Bengaluru.
- The duration of the study will range from 4 to 6 weeks.

Recommendations

- Future studies could involve a larger sample size to enhance the generalizability of the findings.
- A comparative study could be conducted to evaluate the effectiveness of different interventions.
- Nurses should be provided with training programs on complementary therapies to enhance their skills and knowledge.
- Research can be conducted to assess nurses' understanding and attitudes towards using back massage as a method to alleviate anxiety in patients who have undergone orthopedic surgery.

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