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An Experimental Study to Assess the Effectiveness of Jacobson Muscle Relaxation Therapy on Fatigue after Cardiac Surgery among Patients Undergone Cardiac Surgeries in Selected Hospital in Delhi

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Abstract

The study aimed to assess the severity of fatigue in patients who have undergone cardiac surgery and to investigate the effectiveness of Jacobson Progressive Muscle Relaxation Therapy (JPMRT) in reducing post-operative fatigue. Key objectives included evaluating fatigue severity and determining associations with demographic and clinical variables. Conducted as an experimental study with control and experimental groups, patients undergoing open-heart surgery at a quaternary care hospital in Southwest Delhi were selected for the research. A sample size of 125 was chosen using simple random sampling, complemented by a pilot study with 15 samples to check the validity and feasibility of the research. Data collection occurred on the 2nd post-operative day (pretest), followed by JPMRT intervention—15 minutes of progressive muscular relaxation performed 12 times over six days—in addition to standard nursing care. Posttest data were collected on the 7th post-operative day using the Checklist Individual Strength Scale, a 20-point tool measuring subjective fatigue, concentration, motivation, and activity. Statistical analysis confirmed a significant reduction in fatigue levels in the experimental group. To confirm whether the two groups were similar in the level of fatigue after the intervention, the Independent's' test was used. The obtained value was -10.419 which was less than the p value .00001 which is highly significant at p level ($p < 0.05$). This infers that the fatigue level was reduced in experimental group.

Keywords: Fatigue, cardiac surgery, early recovery, jacobson muscle relaxation therapy.

1. Introduction

Fatigue remains a common complication for patients' post-cardiac surgery, affecting their quality of life and productivity. It is hypothesized that post-operative fatigue results from muscle weakening due to surgical trauma. Early fatigue detection can aid in faster patient recovery and complication prevention. Jacobson's relaxation technique, or Progressive Muscle Relaxation (PMR), involves systematically tensing and relaxing individual muscle groups to alleviate tension. Fatigue often peaks between 2 to 4 weeks post-surgery, making PMR a structured and effective method to address this issue. The aim of the study is to assess the severity of fatigue in patients' post-cardiac surgery and evaluate the effectiveness of Jacobson progressive muscle relaxation therapy in reducing fatigue.

Dr. Dima Ibrahim Abu Maloh (2021) aimed to evaluate the effectiveness of Jacobson's Progressive Muscle Relaxation Technique on patients with multiple sclerosis. A pre-post quasi-experimental design was conducted. A total of 120 participants were divided in to two groups; 60 participants in the intervention group and 60 participants in the control group. The intervention group received Jacobson's Progressive Muscle Relaxation Technique and was instructed to perform it two specific times a day for 10 minutes each time for 8 weeks. While the control group was subject to routine medication. Data were collected from July 2021 up to November 2021 using the Modified Fatigue Impact Scale. STROBE guidelines were followed in reporting the review. The pre-intervention and post-intervention levels of the physical, cognitive, psychosocial subscales and the total score of the Modified Fatigue Impact Scale for the intervention group and the control group were compared. Results revealed that there was a statistically significant reduction in the physical, cognitive, psychosocial subscales and the total score of the Modified Fatigue Impact Scale for the intervention group ($P<0.05$) and there was a non-statistically significant reductions for the control group ($P=>0.05$). Adding Jacobson's Progressive Muscle Relaxation Technique to therapeutic routine treatments as it is a cost-effective and useful complementary therapy to reduce fatigue level among patients with multiple sclerosis.

Statement of the Problem

An experimental study to assess the effectiveness of Jacobson muscle relaxation therapy on fatigue after cardiac surgery among patients undergone cardiac surgeries in selected hospital in Delhi

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Objectives of the Study

- To assess the severity of fatigue in patients after cardiac surgery.
- To evaluate the effectiveness of Jacobson Progressive Muscle Relaxation Therapy in reducing fatigue severity among these patients.
- To determine associations between fatigue severity and demographic/clinical variables.

Hypothesis

H_0: There is no significant difference in between progressive muscle relaxation exercises on severity of fatigue of the patients undergone cardiac surgery.

H_1: There is a significant difference in between Mean pre-test and post-test fatigue score in patients who have administered with progressive muscle relaxation exercise therapy after cardiac surgery at $p<0.05$.

H_2: There is a significant difference in between Mean post-test fatigue score between patients who undergone progressive muscle relaxation exercise therapy and patients who does not undergone progressive muscle relaxation exercises therapy after cardiac surgery at $p<0.05$.

H_3: There is a significant difference in the severity of fatigue and the selected demographic and clinical variables of patients undergone cardiac surgeries at $p< 0.05$.

2. Methodology

An experimental study design with one control group & one experimental group was carried out in a quaternary care hospital in Southwest Delhi. Sample size was125 patients.

Sampling technique: simple random sampling (chit method).

The Checklist Individual Strength Scale is a 20-point scale that was used to measure fatigue in terms of subjective fatigue, concentration, motivation, and activity. A pilot study with 15 samples validated the research tools and feasibility of the tool.

Progressive muscular relaxation therapy was administered for 15 minutes, 12 times per patient, over six days alongside standard nursing care.

Data Collection

- Pretest on the 2nd post-operative day.
- Posttest on the 7th post-operative day.

The Checklist Individual Strength Scale was used to measure fatigue in terms of subjective fatigue, concentration, motivation, and activity.

3. Results and Discussion

The aim of the study is to assess the severity of fatigue in patients after cardiac surgery and investigate the effectiveness of Jacobson Progressive Muscle Relaxation therapy (JPMRT) in reducing post-operative fatigue in patients who have gone through cardiac surgery. The objectives of the study was to assess the severity of fatigue in patients after cardiac surgery and to evaluate the effectiveness of Jacobson Progressive muscle relaxation therapy on severity of fatigue among patients undergone cardiac surgery. The study also determines the association of severity of fatigue after cardiac surgery in patients with selected demographic and clinical variables in patients who have undergone cardiac surgery.

Experimental Group Findings

- 5% exhibited normal fatigue.
- 25% exhibited elevated fatigue.
- 70% exhibited severe fatigue.

Control Group Findings

- 3% exhibited normal fatigue.
- 18% exhibited elevated fatigue.
- 79% exhibited severe fatigue.

Pre-Intervention Comparison:

The Independent 't' test revealed no significant difference in fatigue levels between control and experimental groups ($p > 0.05$).

Post-Intervention Comparison:

On the 7th post-operative day:

- 76% of experimental group patients exhibited normal fatigue.
- 14% exhibited elevated fatigue.
- 10% exhibited severe fatigue.

The paired 't' test indicated significant fatigue reduction post-intervention ($p < 0.05$).

Jacobson Progressive Muscle Relaxation Therapy significantly reduced fatigue levels in post-cardiac surgery patients. Early implementation of JPMRT could enhance recovery, minimize complications, and improve overall quality of life.

Table 1: Distribution of samples according to socio demographic and clinical variables (n = 125)

Demographic Variables		Experimental group N=63		Control group N=62		Total N=125	
		f	%	f	%	f	%
Ability to walk without support	Yes	24	38	27	44	51	41
	No	39	62	35	56	74	59
Ability to eat by self	Yes	26	41	28	45	54	43
	No	37	59	34	55	71	57
Ability to do spirometry	Yes	20	32	24	39	44	35
	No	43	68	38	61	81	65
Ability for self-care	Yes	34	54	30	48	64	51
	No	29	46	32	52	61	49
Ability to get out of bed without help	Yes	28	44	29	47	57	46
	No	35	56	33	53	68	54
Relapse of preoperative symptoms while doing activities	Yes	25	40	27	44	52	42
	No	38	60	35	56	73	58
Feeling of Anxiety about recovery	Yes	42	67	49	79	91	73

This section represents the examined data related to socio-demographic characteristics and clinical variables of patients who have undergone cardiac surgery, with suitable tables, visualization with interpretation and description of the key results. Table 1 & figure 1 denotes the percentage wise distribution of people who have had heart surgery based on the existence of co-morbidities. High blood pressure, cardiovascular disease, stroke, cerebrovascular accident, and arrhythmias were among the most common co-morbidities among those surveyed in both control and experimental groups, with 44(70%) and 38(61%) of those patients, respectively, experiencing these conditions. In the case study, there were 19 patients (30%) and 24 patients (39%) had no co morbidities. Research studies have shown that the presence of

co morbidities significantly increase the risk of death after cardiac surgeries.

Table 2: Effect of Jacobson's Progressive muscular relaxation therapy on fatigue among the patients in Experimental group after cardiac surgery.

Day	Mean	SD	Paired 't' test	P value
2nd POD	38.96	7.59	-9.289	<0.0001 (S)
7th POD	26.98	7.12		

Table 2 shows the score of the mean and SD of the post-cardiac-surgery fatigue levels in the study group.
On the second day after surgery, the average fatigue score was 38.96 with a normative deviation of 7.59; on the seventh day after surgery, the average score dropped to 26.98 with a conventional variance of 7.12. The data presented above shows that by the seventh day after surgery, the average score for weariness had decreased from 38.96 to 26.98. The statistically significant distinction was detected comparing the second and seventh aftercare days using the paired t-test. The statistical analysis indicates that there was a substantial decrease in fatigue levels between patients who had heart surgery after completing Jacobson's incremental muscular relaxation regimen ($p < 0.0001$). H1 is accepted and H0 is rejected

Pre-Intervention Comparison:
The Independent 't' test revealed no significant difference in fatigue levels between control and experimental groups ($p > 0.05$).

Post-Intervention Comparison:
On the 7th post-operative day:

- 76% of experimental group patients exhibited normal fatigue.
- 14% exhibited elevated fatigue.
- 10% exhibited severe fatigue.

The paired 't' test indicated significant fatigue reduction post-intervention ($p < 0.05$).
Jacobson Progressive Muscle Relaxation Therapy significantly reduced fatigue levels in post-cardiac surgery patients. Early implementation of JPMRT could enhance recovery, minimize complications, and improve overall quality of life.
The analyzed data revealed that in the experimental group, 05% had normal fatigue, 25% had elevated fatigue and 70% had severe fatigue. In the control group, 03% had normal fatigue, 18% had elevated fatigue and 79% had severe fatigue. In the experimental group, the fatigue mean score was found 38.96 with the standard deviation of 7.59 and in the control group the mean score was found 40.48 with the standard deviation of 6.90 To confirm whether the two groups were similar in the level of fatigue before the intervention, the Independent 't' test was used. The obtained value was -1.162 which was lesser than the p value .1237 which is not significant at p level ($p < 0.05$). This indicates that no significant difference existed in severity of fatigue between the experimental and control groups before undergoing the intervention.

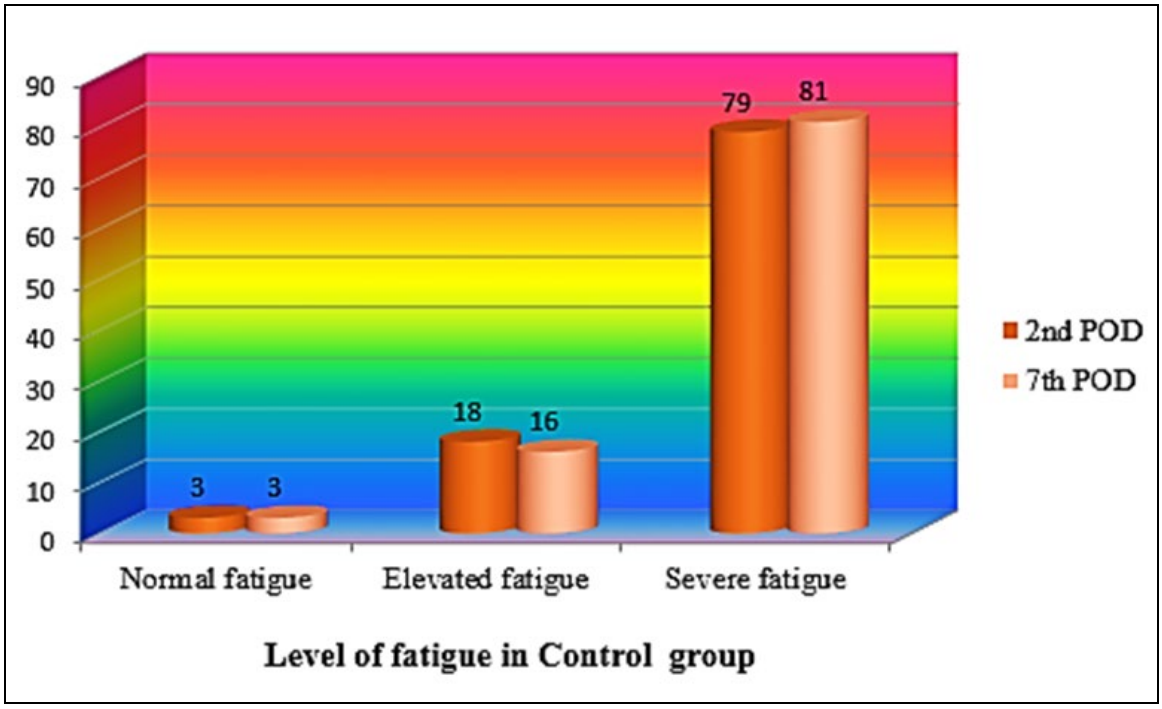

Fig 1: Bar diagram shows percentage distribution of patients on level of fatigue in control group on 2nd and 7th Post-operative day.

Table 3: Mean and SD level of fatigue on 2nd and 7th post-operative day in control group.

Day	Mean	SD	Paired 't' test	P value
2nd POD	40.48	6.90	-0.911	.3654 (NS)
7th POD	39.75	6.44		

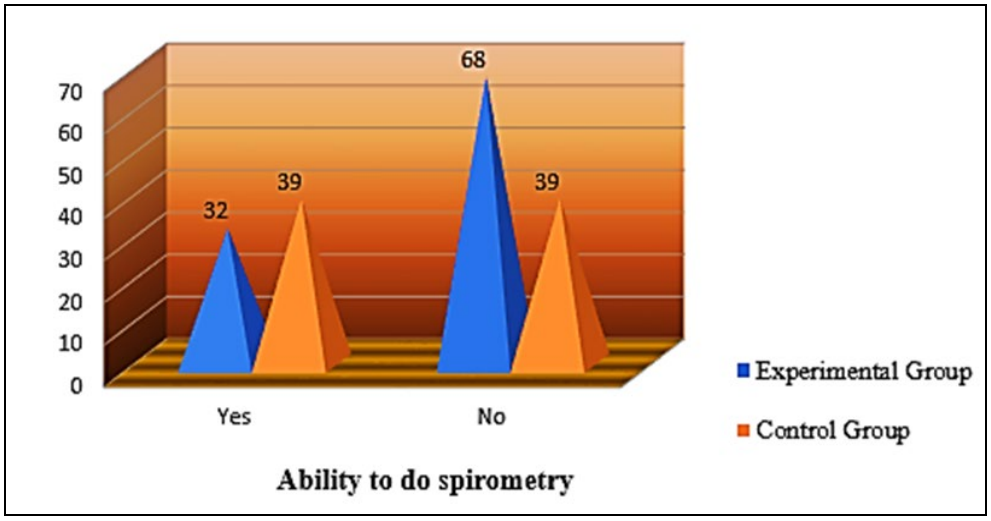

Fig 2: Core diagram showing percentage distribution of patients by the ability to do spirometry after cardiac surgery in experimental and control group.

The analyzed findings of Comparison of the level of fatigue among patients in experimental group between 2nd and 7th post-operative day reveals that on the 2nd post-operative day, 70%(44) of patients had severe fatigue, 25%(16) had elevated fatigue and 05%(03) had normal fatigue and on 7th post-operative day, 76%(48) had normal fatigue, 14%(09) had elevated fatigue and 10%(06) had severe fatigue. The above findings revel the fact that there was a reduction in level of fatigue form severe fatigue to normal fatigue on the 7th post-operative day in experimental group. The paired 't' test was carried out to find whether any difference existed between 2nd and 7th post-operative day. The obtained value was -9.289 and was found to be highly significant at p<0.05 level. It is inferred that the reduction in level of fatigue, after undergoing Jacobson's progressive muscular relaxation therapy, among the patients who have undergone cardiac surgery was statistically significant. To confirm whether the two groups were similar in the level of fatigue after the intervention, the Independent 't' test was used. The obtained value was -10.419 which was less than the p value .00001 which is highly significant at p level (p< 0.05). This infers that the fatigue level was reduced in experimental group. There was no significant association found between severity of fatigue in patients after cardiac surgery in experimental group with Age (p <0.05), Gender (p <0.05), occupation (p <0.05), type of surgery (p <0.05), No of post-operative day (p <0.05) and No 0f post-operative days on ventilator (p <0.05) where as significant association was found between the severity of fatigue in patients after cardiac surgery with presence of co morbidities (p <0.05), (chi square value=8.373) presence of post-operative complications (p <0.05), (chi square value= 11.33), ability to walk without support (p <0.05), (chi square value =10.32) ability to eat by self (p <0.05), (chi square value = 10.09) and ability to do spirometry (p <0.05), (chi square value = 4.32). Ability for self-care (p <0.05), (chi square value = 4.37), Ability to get out of bed without help (p <0.05), (chi square value = 4.83), relapse of pre-operative symptoms while doing activities (p <0.05), (chi square value = 5.42) and feeling of anxiety about recovery (p<0.05), (chi square value = 15.75) In control group there was no significant association found between severity of fatigue in patients after cardiac surgery with Age (p <0.05), Gender (p <0.05), occupation (p <0.05), type of surgery (p<0.05), No of post-operative day (p <0.05) and No 0f post-operative days on ventilator (p <0.05) where as significant association was found between the severity of fatigue in patients after cardiac surgery with presence of co morbidities (p <0.05), (chi square value =3.889) presence of post-operative complications (p <0.05), (chi square value = 4.658), ability to walk without support (p <0.05), (chi square value =9.661), ability to eat by self (p <0.05), (chi square value = 6.795) and ability to do spirometry (p <0.05), (chi square value = 4.050). Ability for self-care (p <0.05), (chi square value = 5.39), Ability to get out of bed without help (p <0.05), (chi square value = 4.60), relapse of pre-operative symptoms while doing activities (p <0.05), (chi square value = 4.80) and feeling of anxiety about recovery (p <0.05), (chi square value = 7.856).

The Hypotheses that are accepted and rejected are:

Accepted: H_1, H_2, H_3, H_4, H_5 partially accepted

Rejected: H_0, H_{0a}, H_{0b}

Partially Accepted: H_{0c} & H_{0d}

Archana JT, Ankita S (2021) studied and found that the majority of participants had moderate stress (81.66%), mild fatigue (81.66%), and poor sleep quality (55%). The study aimed to determine these factors among valvular cardiac patients and to identify any associations or correlations with demographic information and clinical elements. The results showed that there was a positive correlation of anxiety and weariness.

Noelle V Pavlovic (2020) the search yielded 1138 articles; 33 articles that met inclusion criteria were selected for extraction and synthesis. Biological and psychological factors associated with fatigue were New York Heart Association functional class, hemoglobin level, history of stroke, and depression. However, there are limited HF specific factors linked to fatigue. Social factors related to fatigue included social roles, relationship strain, and loneliness/isolation. Few non-pharmacologic interventions have been tested by show some promise for alleviating fatigue in HF. Studies show conflicting evidence related to the prognostic implications of fatigue.

4. Conclusion

Section I: Comparison of socio demographic and clinical variables of respondents are Seventy percent of the 125 subjects surveyed were 60 and over, while 26 percent were in the 50-59 yrs of age duration.

Section II: Severity of fatigue after cardiac surgery.

Objective 1: To assess the level of fatigue in patients who have undergone cardiac surgery. The data reveals that in the experimental group. (N =63) 05% had normal fatigue, 25% had elevated fatigue and 70% had severe fatigue while the normative deviation was and the tiredness score was 38.96 7.59. In the control group, (N = 62), 03% had normal fatigue, 18% had elevated fatigue and 79% had severe fatigue with the mean score was found 40.48 and standard deviation of 6.90. For the purpose of determining statistical significance, the Chi-square test was employed found among the groups. The non-significant p value ($p > 0.49$) indicates that the level of fatigue in the groups was similar before undergoing the intervention and the groups were comparable. The experimental as well as the placebo groups showed no differences in severity of fatigue as ascertained by the Independent 't' test value -1.162 and this was lower than the p-value. The value of 1237 is not statistically significant ($p < 0.05$). Thus, there was no statistically significant shift in the degree of exhaustion compared to the two subgroups before undergoing the intervention.

Section III: Comparison of severity of fatigue between 2nd Post-operative day (Pretest) and 7th the post-operative day (posttest). The Quantitative data of the analyzed study shows that on the 2 nd post-operative day, 70%(44) of patients had severe fatigue, 25%(16) had elevated fatigue and 05%(03) had normal fatigue and after undergoing Jacobson progressive muscular relaxation therapy exercises, on 7th post-operative day, 76%(48) had normal fatigue, 14%(09) had elevated fatigue and 10%(06) had severe fatigue. The above findings revel the fact that there was considerable reduction from severe fatigue to normal fatigue on the 7th post-operative in the control group on day one. The difference in severity of fatigue between 2nd and 7th post-operative day was ascertained by conducting "T" test for pairs. A slightly significant 't' value of -9.289 was determined at $p<0.05$ level.

Section IV: Findings of fatigue level on 7th post-operative day between the control and experimental classes of patients following heart surgery. On the seventh day after surgery, the experimental group's average fatigue score was 26.98 (requirements deviation: 7.12), while the control group's average fatigue score was 39.75 (the norm deviation: 6.44). Patient weariness was shown to be less severe in the treatment group following Jacobson's gradual relaxation exercises comparison to the control population that did not receive any sort of treatment, according to the findings.

Section V: Analyzed findings of severity level of fatigue in respondents after cardiac surgery in experimental and control group. The analysis shows that in the control group the range was 32 with the mean of 38.96, Mean % was 69.59, median score was 35 and standard deviation was 7.53. For the comparison group, the Range is 33 with the mean of 40.48, Mean % is 72.28, median score was 41 and standard deviation was 6.90.

Section VI: This part explains the association of fatigue in patients after cardiac surgery with demographic and clinical variables in experimental and control groups.

The analyzed data of demographic, social, and therapeutic factors with severity of fatigue in experimental group (n = 63), (Median = 39) and in control group (n = 62) (Median = 41) is as follows:

Age: The categories in age was classified into two categories,

- **Ist category:** ≤50 years
- **IInd category:** >50 years.

The data revealed that in experimental group 02 respondents from category I had a fatigue score ≤ median score (39) and 01 respondents from category I had a fatigue score > median score (39). from category II 18 respondents had a fatigue score ≤ median score (39) and 42 respondents from category II had a fatigue score > median score (39). At the 0.05 level of significance, the calculated chi-square value of 1.772 was insignificant. As a result, in the control group, there was no correlation between the degrees of exhaustion and participants' ages. According to the results of the monitoring group, 01 respondents from category I had a fatigue score ≤ median score (41) and 02 respondents from category I had a fatigue score > median score (41). from category II, 15 respondents had a fatigue score ≤ median score (41) and 44 respondents from category II had a fatigue score > median score (41). There was no correlation between age and the intensity of exhaustion in the unaffected group of patients following heart surgery, as the chi-square statistic of 0.093 was not deemed significant at the 0.05 level of significance.

In light of the investigation's aims, and the results of each part was discussed with other research work carried out in same field of interest to see the similarity and dissimilarity & compared the significant findings of present research study with the other research studies carried out worldwide. It is recommended that patients experiencing fatigue following heart surgery follow Jacobson's Progressive Muscle Relaxing integrated into cardiac rehabilitation programmer. Proper health education and demonstration of progressive muscular relaxation has to be done in pre-operative period so that the patients can apply this technique in post-operative period.

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