

ORIGINAL ARTICLE



Effectiveness of progressive muscle relaxation therapy for stress reduction in patients with coronary artery disease

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ABSTRACT

Background

Health underpins exactly how much of a burden a long life is, even if medical progress has lifted the average length of a life. Lifestyle factors such as stress and strain due to the increasingly fast pace in today's culture may have severe impact on both physical and mental health of an individual. There's a growing body of proof that Progressive Muscle Relaxation Therapy (PMRT), a non-drug treatment for lower-stress problems, may benefit patients across the board. This notwithstanding, in a therapy setting, the stress treatment of patients with CAD still remains poorly treated.

Objectives

The study participants were patients with coronary arterioles' disease, and the objectives were to study whether PMR was helpful in reducing stress in them.

Methods

The evaluation study used a quasi-experimental design. We selected 30 CAD patients as the experimental group, and, similarly, 30 CAD patients as the control group, using convenience sampling. In this trial, half of the women received PMRT and the other half, who had similar factors, received the standard care. Data was analyzed in terms of descriptive statistics (mean, standard deviation, percentage and count) and inferential statistics (Chi-square test, paired t test and unpaired t test) on the basis of information acquired by a structured stress assessment scale.

Results

A considerable percentage of the experimental group experienced mild stress (12%), moderate stress (24%) and severe stress (64%) in their pretest. Notable decreases of mild (62%), moderate (30.4%), and severe (7.6%) stress were recorded after PMRT. The p-value of the paired t-test ($t = 10.353$) was less than the critical value of $p < 0.05$, suggesting the decrease of stress due to the program intervention was statistically significant. In contrast, after the test, 6.6% mild stress, 20% moderate stress, and 73.3% severe stress were reported in the control group. Another endpoint that was highly indicative of the efficacy of PMRT was the huge difference in stress experienced between both groups, which is also reflected in the unpaired t-test value ($t = 10.833$).

Conclusion

Progressive muscle relaxation therapy is among the most successful stress-reducing treatments for individuals with coronary artery disease. Enhanced psychosocial well-being of patients and enhancement of comprehensive disease care are two advantages of incorporating PMRT in the routine care of cardiology.

KEY WORDS

RNA therapeutics;
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Introduction

Coronary artery disease (CAD) is a major cause of morbidity, mortality, imposing suffering on affected people, families, and healthcare systems worldwide. WHO reports that 17.9 million people die around the globe every year from cardiovascular diseases (CVDs), representing 32% of all deaths, of which CAD is a major component [1]. Fast urbanization, inactive living habits, and dietary shift lead to high rates of CAD in India and other low-and middle-income countries [2]. In addition to physical pathology, CAD patients generally suffer from mental distress, worry, and depression, thus reducing quality of life, prognosis, and risk of further cardiac events [3].

Source of the problem: Stress, one of the identified sources, is stress, which may induce damage or exacerbate damage to coronary atherogenesis. There is abundant evidence that psychological stress is associated with the occurrence of coronary artery disease (CAD). For instance, chronic stress could elevate SNS activity and enhance catecholamine release,

being involved in endothelial dysfunction and atherosclerotic plaque formation [4]. Hence, stress management should be included effectively in comprehensive cardiac rehabilitation programs targeted towards secondary prevention. Patients with coronary artery disease (CAD) frequently use drugs to treat anxiety and depression, but patients may be concerned about the possible adverse effects of drugs and addiction to drugs [5]. Hence, interest in complementary treatments without medications to lower psychological distress and to improve overall well-being has been great in this population [6].

Topping the list for non-pharmacological interventions is research-supported Progressive Muscle Relaxation Therapy (PMRT), which by the end of the first part of the 20th century was conceptualized by Edmund Jacobson [7]. Progressive muscle relaxation therapy (PMRT) aims to bring about a condition of deep physical and mental relaxation through the

systematic tensing and relaxing of significant muscle groups in a specific sequence. In line with the basic principle [8], anxiety and autonomic arousal could be relieved through physical relaxation. Many researches have shown that PMRT could benefit patients with different diseases such as anxiety, hypertension, cancer, mental diseases, and psychological targets: HR, BP, etc [9,10]. However, its application and efficacy in patients with CADs are largely unexplored, especially in the Indian population, where characteristics of alternative medicine are influenced by cultural factors that might influence adherence and acceptance [11].

It's critical that cardiac rehabilitation be centred on whole-person care, so investigating the role of PMRT as an adjunct therapy is vital. By empowering people to address their stress, PMRT may result in better mental health outcomes, better adherence to medical plans, and perhaps even better heart health. The goal of this study is to see how well Progressive Muscle Relaxation Therapy (PMRT) works to reduce stress in individuals with a diagnosis of coronary artery disease. The study results should guide us in how to include easy, inexpensive, socially acceptable relaxation in routine heart care to improve healing and secondary prevention.

Statement

A study to assess the effect of progressive muscle relaxation on stress among coronary artery disease patients in a selected clinical setting, Rajkot.

Objectives

- To compare pretest anxiety status of the patients of coronary artery disease from experimental and control groups in Kotadiya Hospital, Dist.
- To determine the effectiveness of progressive muscle relaxation therapy in reducing stress of the CAD patients under the experimental group.
- To assess the changes in post-intervention stress scores in hundred and twenty patients with coronary artery disease in experimental and control groups.
- To explore the association of pretest stress levels with select demographic and clinical characteristics in patients with coronary artery disease.

Hypothesis

H1: The stress in the posttest of the coronary artery disease patients undergoing progressive muscle relaxation therapy is significantly lower than pretest scores.

H2: Subjects in the exercise group will have significantly lower levels of stress on the posttest compared to the controls.

H3: The before testing level of stress amongst patients with coronary artery disease will be significantly related to demographic characteristics.

Literature Review

Chaudhuri, Manna and Mandal explored anxiety and depression since PMR and studied coping exercises with corporal strength in East Calcutta coronary artery disease patients. Forty patients participated in video-taped PMR for 6 consecutive days. Twenty-five per cent had analyzed as "severe" sadness, and 55% "moderate" anxiety. A large t-value (6.68) was achieved, and severe depression (2.5%) and moderate anxiety (22.5%) decreased with the intervention. The study discovered PMR to be a successful nursing non-pharmacological intervention [12].

Farag EMR and Elfeky HA studied the impact of progressive

muscle relaxation (PMR) on the confidence and self-efficacy of patients with coronary artery disease in a quasi-experiment (78). 100 adult patients at the cardiology unit and the cardiology outpatient clinics of Ain Shams University Hospital were recruited for the study. The study group included half the patients, and the control group the remaining half. Data were collected with the Coopersmith Self-Esteem Inventory, cardiac exercise self-efficacy scale, structured interview questionnaire, and cardiac self-efficacy scale. Relaxation exercises of the muscles promoted self-worth and self-confidence in CVD patients. Such an intervention may potentially improve mental health status and further result in even better health status and more efficacy with regard to rehabilitation participation [13].

Calderone A and Marafioti G analyzed 2014-2024 papers in accordance with PRISMA guidelines (OSF 6HYG9) on the PMR-diaphragmatic breathing-Benson's relaxation-jaw relaxation in cardiovascular and hypertensive patients. These approaches boosted parasympathetic activity to lower stress, anxiety, blood pressure and enhance quality of life and heart health. Relaxation in cardiac rehab might have positive effects on blood pressure, heart rate, and psychological issues. Additional studies of high-quality will be required to determine the optimal procedures, duration, and frequency [2].

Methodology

Research design

This research utilized a quasi-experimental design featuring a control group with no treatment and an experimental group in order to evaluate the efficacy of Progressive Muscle Relaxation Therapy (PMRT) in alleviating stress among individuals with coronary artery disease.

Study setting

The study was performed at Kotadiya Hospital in Atkot, Rajkot District.

Target and accessible population

The target population consisted of people diagnosed with coronary artery disease. The accessible population comprised patients with coronary artery disease admitted to Kotadiya Hospital throughout the data collection period.

Sampling technique and sample size

A non-probability convenience sampling method was employed to find individuals. Sixty individuals were chosen and evenly assigned to two groups.

- **Experimental group:** 30 patients received PMRT
- **Control group:** 30 patients received standard care without PMRT

Procedure

1. **Pre-examination of stress:** Individuals in both the control and experimental groups completed an initial examination to evaluate their level of stress utilizing a predefined stress scale.
2. **Intervention:** The participants in the study underwent Progressive Muscle Relaxation Therapy as the intervention for a designated duration. The control group maintained standard care and did not go through PMRT.
3. **Post-assessment of stress:** After 15 days following the intervention, both groups participated in a post-test evaluation to assess alterations in stress levels.

Data analysis

The data collected were examined utilizing statistical methods such as descriptive statistics (frequency, percentage, mean, standard deviation) and inferential statistical techniques, comprising the Chi-square test, paired t-test, and unpaired t-test, to evaluate the study hypotheses. A p-value of < 0.05 was deemed statistically significant.

Outcome measurement

The primary result was the alteration in levels of stress pre- and post-intervention, enabling researchers to assess the efficacy of Progressive Muscle Relaxation Therapy in alleviating stress among individuals with coronary artery disease.

Results

Section I: Baseline data collection

This section focused on the distribution of demographic variables (age, gender, education, occupation, etc.) and clinical variables (comorbidities, lifestyle habits, etc.) of the respondents.

The demographic analysis indicates that the majority of participants in both the experimental and control groups are aged 41–50 years (37% and 40%, respectively), largely male (60% in the experimental group and 53% in the control group), and married (90% and 87%). The majority adhere to a non-vegetarian diet, including 93% in both cohorts. A considerable percentage is illiterate (43% in the experimental group, 53% in the control group), with merely 10%–7% attaining graduation status. Concerning behaviours, 53% of the experimental group and 57% of the control group reported abstinence from

substance use, whereas 37% and 33% participated in both smoking and alcohol consumption. Forty per cent of the experimental group was classified under the 'other' category, whereas forty per cent of the control group was engaged in business. The predominant earnings in both groups were from Rs 5,000 to Rs 10,000, including 37% in the experimental group and 50% in the control group, with a majority identifying as Hindu (77% in the experimental, 93% in the control). Significantly, 57% of the experimental group inhabited rural regions, whereas 87% of the control group originated from urban environments, underscoring a critical demographic disparity in residence location.

Section II: Pre-intervention assessment

This section assessed the baseline level of stress among patients diagnosed with coronary artery disease (CAD) in both the experimental and control groups at Kotadiya Hospital, Atkot, Rajkot district.

Pretest stress levels in patients with Coronary Artery Disease (CAD) throughout both the experimental and control groups. The experimental group had a higher mean stress score (24.0; 80.1%) than the control group (19.8; 66%). In the psychological domain, the experimental group achieved a mean score of 23.0 (76.6%), whereas the control group obtained a little lower score of 21.6 (72.22%). In the social dimension, the control group exhibited a greater stress level, with a mean score of 20.6 (68.6%), in contrast to the experimental group's score of 17.0 (56.6%). The experimental group exhibited greater stress in both physical and psychological dimensions, whereas the control group demonstrated elevated stress in the social dimension prior to the intervention.

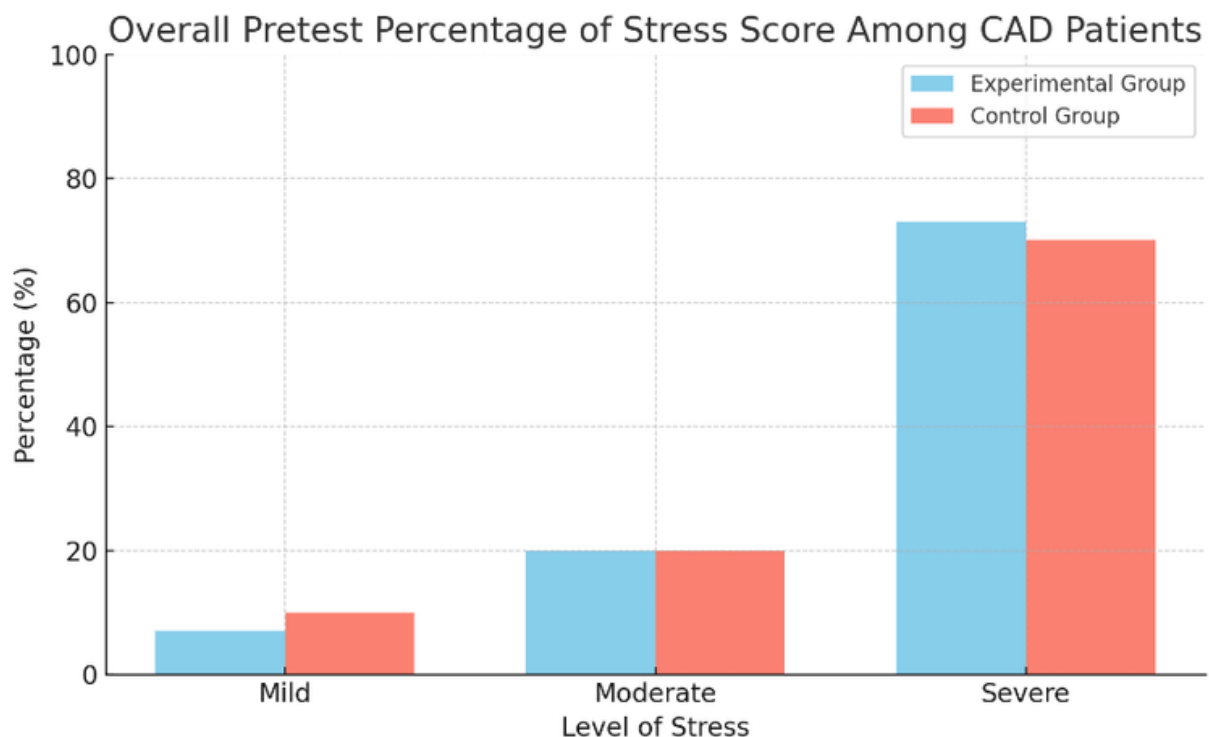


Figure 1. Percentage level of stress score among CAD patients in the experimental and control groups.

The graphic depicts the overall pretest stress levels of CAD patients in both the experimental and control groups (Figure 1). A predominant proportion of patients in both cohorts encountered significant stress, with 73% in the experimental group and 70% in the control group. Moderate stress was indicated by 20% of participants in each group. A minor fraction encountered mild stress, 7% in the experimental cohort and 10% in the control cohort. This distribution reveals that before any intervention, the majority of CAD patients experienced elevated stress levels, with negligible change across the two groups.

Section III: Post-intervention assessment

The experimental group received Progressive Muscle Relaxation (PMR) L Therapy, and the rest of the section dealt with the effect of PMR to reduce the stress level of the patients with CAD.

The post-test results represent a significant decrease in stress level in CAD patients of the experimental group compared to the control group. Among the experimental group, light stress climbed to 60% (7%), but severe stress dropped dramatically to 6.7% (73%). In the control group, on the other hand, there was relatively little change with severe stress persisting at 73.3%. The reduction of the stress levels of the experimental group was highly significant in all areas: physical stress was reduced to 42.0% (from 80.1%), psychological stress to 38.8% (from 76.6%), and social stress to 33.6% (from 56.6%). Comparison with pre- and post-test scores revealed that stress in the control group, in sharp contrast to the premeasurement, remained at a high level after treatment in all dimensions: 80.8% Phys, 78.3% Psy, 65.5% Soc, showing that the intervention for the experimental group resulted in a strong reduction of stress.

Section IV: Effectiveness of progressive muscle relaxation (PMR) therapy

This section involved a comparison of post-test stress levels between the experimental and control groups to measure the impact of the intervention.

Table 1. Overall mean score between post-test level of stress among cad patients in experimental and control groups.

Observation	Mean score	Mean difference	SD	t Value	Significance
Experimental Group	34.1	32.9	13	9.833	P<0.05 Highly Significant
Control Group	67				

The pooled results of the pretest and post-test measurement tests in CAD patients (Table 1) show that, after the intervention, the level of stress was significantly lower in the experimental group. At baseline, most patients in each group suffered from intense stress (73% and 70%, respectively). The results of the post-test indicated a significant increase in the experimental group, rising to 60% for mild stress and decreasing to 6.7% for severe stress, whereas the control group generally remained the same, with 73.3% experiencing severe stress. Stress scores in the experimental group also declined significantly in terms of aspects; physical stress decreased from 80.1% to 42%, psychological stress from 76.6% to 38.8%, and social stress from 56.6% to 33.6%, whereas the control group experienced a continual decline in all three dimensions. The pre-test mean

stress score of the experimental group was significantly different from that of the control group observed after application of the programme by evaluating separately the overall post-test mean stress score, which was 34.1 and 67.0, respectively, with a mean difference of 32.9, t-value 9.833, $P < 0.05$, which shows a high level of significance difference. These results provide further evidence of the efficacy of intervention in stress reduction of patients with CAD.

Section V: Association analysis

The association between pre-test anxiety levels and selected demographic/clinical variables in patients with CAD were explored in this section.

The correlation between demographic data and stress in patients with CAD is presented in tables. There was no significant association of occupation, monthly income, and religion with the stress level, depicted by higher chi-square values than 05. Living area, in particular rural versus urban area of residence, was related to stress ($P < 0.05$). Age and education had a mild effect, as education was significant in several groups, but age was not. Further, the results suggested that living area and education level are important determinants of stress perception, whereas occupation, income, and religion did not.

Discussions

The aim of the current investigation was to assess the efficacy of a guided relaxation intervention in decreasing stress among patients with CAD (Coronary Artery Disease). The results showed that there was a significant decrease, both in total and aspect-wise stress, in the experimental group as opposed to the control group remained on the higher side. Pre-test levels of severe stress were high for both groups (experimental: 73%; control: 70%). However, after the test, the severe stress level decreased to only 6.7% in the experimental group and the mild level reduced to 60%, but maintained 73.3% severe stress level in the control group.

In terms of the aspect, there were greater reductions in physical and psychological and social stress for the experimental group (from 80.1 to 42) (from 76.6 to 38.8) (from 56.6 to 33.6) than the control group, and it demonstrated a small reduction. This indicates beneficial effects on targeted stress-reducing interventions in CAD patients. These results are similar to the results in many previous reports. For example, Chittaro and Vianello describe that guided relaxation and breathing were effective in both reducing psychological stress and improving heart rate variability in patients with heart disease [14]. In a similar way, Świątkiewicz et al. (2021) reported that stress management training reduced the psychological distress and improved the coping process of cardiovascular disease patients [15].

The statistical analysis corroborates the effectiveness of the intervention. The experimental and control group post-test mean score are 34.1 and 67.0, respectively, and the mean difference is 32.9, and the t-value is 9.833 ($p < 0.05$), indicating a highly significant difference. The findings are in line with those of Gullette et al. (2004) that psychosocial therapies can have positive effects on stress biomarkers and also on CAD patients' general health status [16]. Therefore, structured educational and behavioural interventions may provide multidimensional effects and contribute to literally comprehensive care of the whole human heart and patient QoL.

The findings of this study that there was no significant relationship between occupation, level of income, and religion

with stress levels are consistent with the previous research. For instance, a paper by Grob et al. (2021) also reported that demographic variables such as occupation and income were not significantly associated with stress in a comparable sample of patients. They also speculated that how impactful stress was on a person psychologically could have more to do with the way individuals handled stress and the amount of social support, rather than something external like income or type of job [17]. Nevertheless, our result indicating a significant association between living area and stress level is consistent with other reports, such as the study from Nair et al. (2024), who found that rural living arrangements were commonly associated with more stressors, such as low health care access and low socio-economic resources [18]. Additionally, our finding that education level was strongly associated with stress is in agreement with Zou et al. (2021). They found that education levels lower than high school were linked to higher stress, which may be attributed to the lack of health resources and financial pressure [11]. Taken together, these studies suggest that the stress literature is inconsistent, with the effects of demographic variables being varied, but that location and education emerge as stronger predictors of stress than other life factors like occupation and religion.

Limitations

1. The research was conducted using a quasi-experimental approach rather than a randomisation method. Because of this, the findings cannot be generalised to a wider range of populations or populations.
2. It was not possible to administer randomisation because of the limits imposed by both practical and ethical considerations. For example, it was not possible to prevent certain participants from receiving a potentially beneficial intervention (PMRT).
3. The sample size of sixty patients, with thirty patients in each group, is a somewhat modest number. Both the statistical power and the capacity to generalise the findings to a larger population could be affected as a result of this consideration.
4. Although the research addressed the possibility of confounding factors, such as the difference between living in an urban or rural area and having a higher level of education, these variables were not thoroughly controlled, which was a factor that might have influenced the results.
5. The sample for the study comes from a single hospital (Kotadiya Hospital, Rajkot), which may restrict the diversity of the participants in terms of factors such as geography, socioeconomic status, and cultural background.
6. There was no long-term follow-up period included in the trial; therefore, it was not possible to determine whether the stress reduction that was achieved with PMRT was maintained over time.
7. The effects of PMRT on plasma biomarkers, such as Sirtuin 1, which are very important for the prevention of coronary artery disease, were not evaluated in this investigation. The levels of plasma Sirtuin 1 should be investigated in future studies to determine whether or not they increase during PMRT sessions. This could provide new insights into the molecular mechanisms that are responsible for the stress-reducing effects of PMRT as well as its potential for stimulating heart repair.

Conclusions

The current study emphasizes the critical role of PMRT in reducing stress among CAD patients. The values of the experimental group, parallel to the reduction of the values of the psychological, social and physical domains, were statistically significant after the intervention. In contrast, the control group showed minimal improvement, highlighting the role of PMRT as a nonpharmacological intervention for stress. These results are consistent with other research showing that relaxation methods can improve the psychological state and quality of life of cardiac patients. Furthermore, demographic factors, such as residence area and educational level, demonstrated the importance of predicting stress levels, and therefore stress management therapies had to be tailored based on the above features to maximise efficacy. Given the escalating burden of CAD, especially in low- and middle-income countries, the implementation of PMRT into conventional CAD rehabilitation programs might lead to better results, improvement of patient quality of life and enhanced compliance to treatment. Larger and more heterogeneous sample-based research studies are recommended to confirm and inform intervention alternatives with these findings.

Disclosure Statement

The authors declare that they have no competing interests.

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