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Enhancing Postoperative Recovery Through Progressive Muscle Relaxation: A Systematic Review of Its Impact on Pain, Anxiety, and Physiological Parameters After Abdominal Surgery

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Abstract

Postoperative care is critical in enhancing recovery outcomes for surgical patients, particularly in managing pain, anxiety, and vital signs. Despite advancements in medical care, patients continue to report significant postoperative discomfort. Progressive Muscle Relaxation (PMR) has emerged as a non-pharmacological intervention that may improve recovery. This review aimed to assess the effectiveness of PMR in managing postoperative symptoms among abdominal surgery patients. A literature review of 52 sources was conducted, categorized into four areas: abdominal surgery, PMR techniques, general effects of PMR, and PMR in abdominal surgery patients. Evidence consistently indicates that PMR significantly reduces pain, anxiety, and improves vital parameters such as blood pressure and respiratory rate. Studies support PMR as a cost-effective, simple, and efficient adjunct to standard postoperative care. The findings advocate for integrating PMR into nursing practice to enhance patient outcomes and recovery in abdominal surgical settings.

Keywords: Progressive Muscle Relaxation, postoperative pain, abdominal surgery, anxiety, vital signs, non-pharmacological intervention.

1. INTRODUCTION

Patients undergoing surgery require care as per the phases they are in, like, preoperative, intra operative and post-operative period, collectively called perioperative care. Good perioperative care is the key to the successful outcome of this operation. Proper management of pain is necessary to help patients recover quickly during postoperative care. Failure to promptly assess and manage pain could lead to increased anxiety, length of hospitalization, chronic post-surgical pain, and overall poor health outcomes for the patients. Nurses play crucial roles in assessing postoperative pain, however, despite advances in nursing care, there is evidence from a range of research which suggests that patients still suffer considerable levels of postoperative pain[1]. In general, pain is defined “an unpleasant, subjective sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage”.[2] The Gate Control Theory of Pain is one of the oldest theories that clearly explain the human thoughts and emotions can be affected by pain perception. Each time an input is received by either the small or large

nerve fibers, then the projection neurons will automatically open and send signals to the brain; and vice versa.[3]. Many authors agree with the idea that the Gate Control Theory in pain is a complex phenomenon involving physiology, cognition, social and emotional complexes. Pain perception of each patient is unique as it is highly dependent on multidimensional factors such as age, gender, medications, previous pain and culture.[4]

To study the same research the researcher reviewed the many literatures and it was finding the several sources such as books, printed material as well as electronic which included MEDLINE (Medical Literature Analysis & Retrieval system Online), CINHAL (Cumulative Index to Nursing & Allied Health Nursing Literature), PubMed, Google Scholar.

2. MATERIAL AND METHOD AND FINDINGS

The study is mainly headed on assess the effectiveness of Progressive muscle relaxation technique on pain, anxiety and selected physiological parameters among patients with abdominal surgery". By reviewing around 52 literature researchers divided them into 4 categories as mentioned.

1. Literature related to abdominal surgery.
2. Literature related to Progressive Muscle Relaxation Technique.
3. Literature related to effect of Progressive Muscle Relaxation technique
4. Literature related to effect of Progressive Muscle Relaxation technique on abdominal surgery patients.

Literature related to abdominal surgery

Fadime Kutluk et al. (2023) studied 12 patients with intestinal endometriosis who underwent emergency surgery for acute abdomen. Most presented with intestinal obstruction or suspected appendicitis. Various bowel resections were performed, and 25% experienced complications, mainly in older patients ($p<0.007$). Histopathology confirmed benign full-thickness endometriosis. No recurrences were reported during the 50.6-month follow-up. The study emphasizes considering intestinal endometriosis in reproductive-aged women with acute abdomen and recommends a multidisciplinary approach for management.[5]

Sabrina L. M. Zwetsloot et al. (2024) conducted a systematic review to develop a Core Outcome Set (COS) for patients with intact abdominal aortic aneurysms (AAAs) not undergoing repair. Out of 5,611 screened articles, 380 studies were included, identifying 264 unique outcomes. The most reported were death, myocardial infarction, and re-intervention. These were refined into 77 standardised outcomes to guide future research and consensus development.[6]

Ana Belén Hernandez-Ferriz et al. (2024) conducted a systematic review to evaluate delayed gastric emptying (DGE) following distal pancreatectomy (DP)—an area with limited existing research. Out of 121 articles, only 4 were relevant, covering 2,549 patients, with a DGE incidence of 8.9%. The most consistently associated factor across all studies was postoperative pancreatic fistula. Other possible factors included abdominal collections, older age, multivisceral resections, and tumor vascular involvement. The study suggests that DGE should be routinely assessed after DP and calls for further research to better understand and prevent it.[7]

Michele M. Loor et al. (2024) conducted a systematic review to assess the impact of physical activity on fascial healing and recovery after abdominal surgery, aiming to address the risk of incisional hernias, which occur in up to 30% of cases. The review included 7 basic science and 22 clinical studies, revealing

limited evidence on optimal activity levels post-surgery. While some animal studies showed benefits of early activity, clinical studies were mostly qualitative, with only 3 randomized controlled trials. No clear link was found between physical activity and post-surgical complications. The authors emphasize the need for more RCTs to guide safe recovery practices.[8]

Literature related to Progressive Muscle Relaxation Technique.

Abubeker Alebachew Seid et al. (2022) conducted a systematic review of four studies involving 227 COVID-19 patients to assess the effectiveness of Progressive Muscle Relaxation (PMR). The findings showed that PMR significantly improved anxiety, depression, sleep quality, disease severity, and quality of life. While short-term benefits were observed, evidence on long-term safety and outcomes remains limited. PMR appears to be a promising supportive therapy for mild to moderate COVID-19 patients.[9]

Andry Sartika et al. (2022) conducted an experimental study to compare the effectiveness of Progressive Muscle Relaxation (PMR) and Slow Deep Breathing Exercise (SDBE) in hypertensive patients. The findings showed a reduction in both systolic and diastolic blood pressure across all groups, with the greatest systolic BP decrease observed on day 3. No significant difference was found between the relaxation techniques, suggesting that both PMR and SDBE are effective in managing hypertension.[10]

Yajiao Wang et al. (2023) conducted a meta-analysis of 12 RCTs with 1,047 cancer patients to assess the effect of progressive muscle relaxation (PMR). PMR significantly improved fatigue, anxiety, depression, and sleep quality, but showed no significant effect on quality of life. Compared to PMR, progressive resistance exercise was more effective in reducing fatigue. The study highlights low to very low certainty of evidence, recommending further high-quality research.[11]

Syazwina Muhammad Khir et al. (2023) conducted a systematic review of 46 studies involving over 3,400 adults from 16 countries to assess the effectiveness of Progressive Muscle Relaxation (PMR). The findings confirmed that PMR significantly reduces stress, anxiety, and depression, especially when combined with other interventions. The study highlights PMR as a promising and accessible mental health tool for adults globally.[12]

Literature related to effect of Progressive Muscle Relaxation technique

Gabriella Paparella et al. (2020) conducted a retrospective study to assess the effects of botulinum toxin type A (BoNT-A) combined with intensive physiotherapy in patients with Hereditary Spastic Paraplegia (HSP). The results showed significant improvement in muscle tone, gait, pain, and quality of life. The combination therapy proved effective in managing spasticity and functional limitations in HSP.[13]

Armando Di Ludovico et al. (2023) conducted a narrative review on the effectiveness of physical therapy (PT) interventions for patients with Hereditary Spastic Paraplegia (HSP). After screening major databases, 7 studies were included. The findings suggest that techniques such as electrostimulation, hydrotherapy, magnetotherapy, balance rehab, and robot-assisted gait training may help reduce spasticity, improve muscle strength, balance, mobility, and enhance quality of life in HSP patients.[14]

Armando Di Ludovico et al. (2023) conducted a literature review to evaluate the role of physiotherapy (PT) in managing Juvenile Idiopathic Arthritis (JIA). Following a comprehensive search of 952 PubMed and 108 Scopus articles, 18 relevant studies were included. The review found that targeted PT

interventions can enhance muscle strength, posture, aerobic capacity, gait, and functional mobility, while also helping to reduce pain in children with JIA. Overall, PT appears to play a significant role in improving quality of life and supporting long-term outcomes in this population.[15]

Stephanie Py et al. (2023) designed the ATHLETIQUE project, a clinical trial to assess the impact of Adapted Physical Activity (APA) and pedometer use on children with Juvenile Idiopathic Arthritis (JIA). The study aims to improve disease activity, physical function, and quality of life. Results may guide future rehabilitation programs for JIA patients.[16]

Silvia Faccioli et al. (2023) conducted a systematic review to explore gait patterns and interventions in Hereditary Spastic Paraplegia (HSP). Gait abnormalities resembled those seen in cerebral palsy (in youth) and stroke (in adults), with reduced joint range of motion and knee hyperextension. Botulinum toxin, intensive physical therapy, and functional electrical stimulation showed some benefits in improving gait, though reducing spasticity sometimes revealed underlying muscle weakness.[17]

Literature related to effect of Progressive Muscle Relaxation technique on abdominal surgery patients

Saada Elsayed Rady, et al. (2020) conducted a study to assess the effect of Progressive Muscle Relaxation (PMR) on post-operative pain and recovery in abdominal surgery patients. PMR significantly reduced pain and improved recovery compared to the control group. Severe pain was absent in the PMR group but present in 42.5% of controls. The study recommends integrating PMR into post-operative nursing care.[18]

El-Wui Loh et al. (2020) conducted a study to assess the effect of Progressive Muscle Relaxation (PMR) on postoperative pain, fatigue, and vital signs in patients with head and neck cancers. Patients were randomly assigned to intervention or control groups. The PMR group showed significantly lower pain and muscle tightness ($p < 0.01$), reduced sleep disturbances, fatigue, anxiety, and depression ($p < 0.01$), along with decreased respiratory rate and diastolic blood pressure ($p < 0.01$). The study recommends incorporating PMR into postoperative care to enhance recovery with minimal cost and effort.[19]

Yasemin Ozhanli, et al. (2021) conducted a study to assess the effect of progressive relaxation exercises on pain, anxiety, and physiological parameters in colorectal cancer surgery patients. The PMR group showed significantly lower pain and anxiety levels ($p < 0.05$) and reduced opioid use compared to controls. The study recommends PMR as an effective method for managing postoperative discomfort.[20]

Wanxia Ju, et al. (2019) conducted a systematic review and meta-analysis to assess the efficacy of relaxation techniques, including Progressive Muscle Relaxation (PMR), for pain relief in abdominal surgery patients. Out of 12 studies reviewed, 10 showed significant pain reduction with relaxation therapy. The meta-analysis (n=846) revealed greater pain relief in the relaxation group (SMD = -1.15; 95% CI: -2.04 to -0.26; $p < 0.00001$). The study supports relaxation techniques as effective for immediate postoperative pain relief but calls for higher-quality RCTs.[21]

Haya Ibrahim Ali Abu Maloh, et al. (2024) conducted a systematic review to evaluate the effectiveness of Benson's Relaxation Technique in reducing stress and pain among patients undergoing maintenance hemodialysis. Four randomized controlled trials met the inclusion criteria and showed a significant reduction in stress and pain scores with the intervention. The study supports using Benson's technique in

nursing care, though it highlights the need for more robust RCTs with larger sample sizes and better adherence reporting.[22]

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