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ROLE OF PROGRESSIVE MUSCLE RELAXATION TECHNIQUE ON ANXIETY AND PHYSIOLOGICAL PARAMETERS AMONG WOMEN AFTER TOTAL ABDOMINAL HYSTERECTOMY

Farah Yousaf Gil[1*], Hajra Sarwer[2], Madiha Mukhtar[3]

[1*]MSN Student at Lahore School of Nursing, The University of Lahore
[2]Assistant Professor at Lahore School of Nursing, The University of Lahore
[3]Assistant Professor at Lahore School of Nursing, The University of Lahore

***Corresponding Author:** Farah Yousaf Gil
*MSN Student at Lahore School of Nursing, The University of Lahore**,**
Gmail: 70124658@student.uol.edu.pk

Abstract

Background: A total abdominal hysterectomy is a surgical process that entails the extraction of the uterus through an incision in the abdomen. This procedure is frequently conducted to address conditions like uterine cancer, fibroids, or persistent pelvic pain. Progressive Muscle Relaxation Technique (PMRT) induces deep relaxation by systematically tensing and releasing muscle groups. The objective of this study was to evaluate the impact of the Progressive Muscle Relaxation Technique on anxiety levels and physiological parameters among women who have undergone a total abdominal hysterectomy.

Methodology: The study employed a quasi-experimental research design. The research took place in the Gynecological wards of Allied Hospital Faisalabad. About 84 female patients undergoing open abdominal hysterectomy were recruited. The State-Trait Anxiety Inventory Scale was utilized to assess the anxiety levels of the patients, and the data analysis was carried out using SPSS Version 25.

Results: The result of study revealed that majority of women 62(73.8%) were married with age range of 25 to 45 years and majority 34(40.5%) had Secondary school education. Pre-Intervention Statistically significant differences in anxiety were observed at Post-Intervention, Follow-up 1, Follow-up 2, and Follow-up 3. Regarding physiological parameters, there was a significant difference in Blood Pressure at Post-Intervention, Follow-up 1, Follow-up 2, and Follow-up 3. However, no significant differences were found in other physiological parameters at these time points.

Conclusion: The study concluded that there was a statistically significant difference in anxiety levels at Post-Intervention, Follow-up 1, Follow-up 2, and Follow-up 3 after the application of PMRT. However, no significant differences were observed in physiological parameters at Post-Intervention, Follow-up 1, Follow-up 2, and Follow-up 3.

Keywords: Progressive Muscle Relaxation Technique, Total Abdominal Hysterectomy, Anxiety, Physiological Parameter9

Introduction

In the realm of women's health, the experience of undergoing a total abdominal hysterectomy (TAH) marks a critical juncture, often accompanied by emotional and physiological challenges. Anxiety is a prevalent concern during the postoperative period, and its implications on both mental well-being and physical recovery are substantial (Elsaqaa et al., 2021). This research delves into the profound effects of PMRT on anxiety levels and physiological parameters among women recovering from TAH, shedding light on its potential as a therapeutic modality in postoperative care (Elsayed Rady et al., 2020).

Total abdominal hysterectomy is a surgical procedure where the uterus is removed through an abdominal incision. This common procedure is typically performed to address conditions like uterine cancer, fibroids, or persistent pelvic pain (Ibrahim et al., 2021).

Anxiety, a frequent companion in this recovery journey, can exacerbate pain perception, hinder rehabilitation, and compromise overall well-being (Avci & Oskay, 2023). Hospitalization for such surgical procedures is inherently linked with heightened anxiety levels (Tanrıverdi & Kılıç, 2023).

Anxiety, a pervasive and complex emotion, has profound effects across various domains, encompassing physiological, social, and psychological aspects, significantly impacting the satisfaction of human needs. Physiologically, anxiety can lead to the escalation of blood pressure and heart rate, triggering postoperative complications such as increased oxygen intake and metabolism. A direct correlation has been established between anxiety and postoperative pain, where intense postoperative anxiety can potentially develop into chronic postsurgical pain (Shendre & Taksande, 2021).

Progressive Muscle Relaxation Technique **(**PMRT), developed by Edmund Jacobson in the early 20th century. The technique harnesses the mind-body connection, encouraging individuals to become more aware of tension within their muscles and subsequently learn to release it (Ellinides et al., 2022). PMRT stands as a century-old testament to the transformative potential of intentional relaxation in fostering holistic well-being and aiding in the recovery process (Noble & Hochman, 2019).

Regular sessions of PMRT empower individuals, particularly women recuperating from procedures like Total Abdominal Hysterectomy (TAH), to cultivate a heightened sense of self-awareness (Madueke-Laveaux et al., 2021).

For women navigating the intricate challenges of recovery after TAH, where emotional resilience is paramount, the potential of PMRT to alleviate anxiety emerges as a crucial aspect of research. Beyond its immediate impact on emotional well-being, the anxiety-alleviating effects of PMRT can have cascading benefits on other aspects of recovery. Reduced anxiety has been linked to improved pain tolerance, better sleep quality, and overall enhanced quality of life during the postoperative period (Kamel Sadek Abd El Rahman et al., 2022).

At the core of PMRT's physiological impact is the induction of the relaxation response, a nuanced shift in the autonomic nervous system that holds far-reaching implications for overall well-being (Bhagdewani et al.).

The relaxation response triggered by PMRT is characterized by a notable decrease in sympathetic nervous system activity, responsible for the body's "fight or flight" response, coupled with an increase in parasympathetic nervous system activity, which governs the body's relaxation and restoration processes. This intricate balance contributes to a physiological recalibration with implications for cardiovascular health and stress hormone regulation (Zidan et al., 2022).

In the context of postoperative care for women after TAH, the physiological changes orchestrated by PMRT are of particular significance. The reduction in sympathetic nervous system activity translates into a lowered heart rate, easing the cardiovascular load on the body. This cardiovascular modulation is pivotal, especially in a postoperative setting where the heart's workload may be influenced by surgical stress and the body's recovery demands (Güler & Mete, 2023).

Lowered blood pressure not only contributes to cardiovascular well-being but also aids in minimizing the strain on internal organs, facilitating a smoother recovery process (Dubey et al., 2023).

Progressive Muscle Relaxation (PMR) stands out as an economical, safe, and easily applicable non-

pharmacologic technique. This self-induced method has become easily accessible to patients and is now an integral part of nursing care in recent years. Employed as a systematic process, PMR effectively reduces stress, anxiety, pain levels, and muscle tension while promoting better sleep (Mohamed et al., 2022).

Objectives

1. To determine the effect of Progressive Muscle Relaxation Technique on anxiety among women after total abdominal hysterectomy
2. To assess the effect of Progressive Muscle Relaxation Technique on physiological parameters among women after total abdominal hysterectomy

Methodology

The study utilized a quasi-experimental research design and was conducted in the Gynecological wards of Allied Hospital, Faisalabad. The study population consists on female patients undergoing open abdominal hysterectomy. The study subjects were chosen through purposive sampling technique. The calculated sample size for the study is 84. Women who were undergo total abdominal hysterectomy, aged between 25 to 45 years, and free from associated post- operative complications were included in study. Patient with genital neoplasia, mental disorder or impaired cognation, generalized anxiety disorder, and patient with cardiovascular or chronic respiratory disorders were excluded from study. State Trait Anxiety Inventory Scale (STAI-S) was used to measured anxiety (Hiramatsu, 2019). After getting ethical approval from Research Ethical Committee of University of Lahore and written permission from study setting, data were collected from patients. Data was collected at four points: pre-intervention, post-intervention, follow-up 1, follow-up 2, and follow-up 3. After the pre-test assessment, participants were individually instructed in the Progressive Muscle Relaxation Technique (PMRT) by the researcher. The researcher provided a detailed demonstration of the technique, including all steps, their frequency, and duration. Participants were then asked to replicate the technique, and they continued practicing until they felt confident in performing it independently post-surgery. The assessment of post-test anxiety and physiological parameters occurred daily for three consecutive days following the completion of the second session. Each session, conducted under the supervision of the researcher, lasted 20-30 minutes. The researcher employed SPSS version 25.0 to conduct data analysis. Initially, frequencies and percentages of demographic data were calculated. The ANOVA test was used to compare means.

Results

Table 1: Socio Demographic Characteristics of participants

Socio Demographic Characteristics	Frequency	Percent
Age	Mean, Standard Deviation 36.14±4.63	
Marital Status		
Single	5	6
Married	62	73.8
Widow	4	4.8
Divorced	13	15.5
Education Level		
Illiterate	12	14.3
Read/Write	27	32.1
Secondary	34	40.5
University	11	13.1
Occupation		
House wife	55	65.5
Working	21	25.0
Business/ entrepreneur	8	9.5
Residence		
Urban	67	79.8
Rural	17	20.2

Menstrual History		
Menstruating	77	91.7
Menopause	7	8.3
History of previous surgery		
No	41	48.8
Yes	43	51.2
Reason		
Fibroids	41	48.8
Prolapse	23	27.4
Accretes	11	13.1
Uterine CA	6	7.1
Other Cause	3	3.6
Type of Surgery	24	28.6
Emergency	60	71.4
Elective		
Type of anesthesia		
General	65	77.4
Spinal	19	22.6

Table 2: Comparison of Anxiety level at different time of study

Anxiety					p-value
Pre-Intervention	Post Intervention	Follow up 1	Follow up 2	Follow up 3	
41.57±4.83	51.20±3.35	48.54±4.07	47.99±5.10	53.02±3.38	<0.001

Repeated measure ANOVA
There was statistically significant difference between Anxiety level of women (p-value <0.001)

Table 3: Comparison of Heart rate level at different time of study

Heart Rate				p-value
Post Intervention	Follow up 1	Follow up 2	Follow up 3	
79.18±5.53	79.52±4.63	78.20±5.81	79.64±4.93	0.295

Repeated measure ANOVA
Heart rate at the time of post intervention was 79.18±5.53, at follow up 1 was 79.52±4.6, at follow up 2 was 78.20±5.81 and at follow up 3 was 79.64±4.93 beats per min. There was no statistically significant difference between Heart rate of women at different time of study (p-value 0.295)

Table 4: Comparison of blood pressure at different time of study

Blood Pressure				p-value
Post Intervention	Follow up 1	Follow up 2	Follow up 3	
80.50±3.85	81.33±3.14	81.30±3.05	81.73±3.60	0.044

Repeated measure ANOVA
Blood pressure at the time of post intervention was 80.50±3.85 at the time of follow up 1 was 81.33±3.14, at the time of follow up 2 was 81.30±3.05 and follow up 3 was 81.73±3.60. There was statistically significant difference between blood pressures of women (p-value 0.044)

Table 5: Multiple comparison tests between respiratory rates at different time of study

Respiratory Rate				p-value
Post Intervention	Follow up 1	Follow up 2	Follow up 3	
20.58±1.87	20.32±1.65	20.07±1.93	20.46±1.67	0.263

Repeated measure ANOVA
The mean respiratory rate at post-operative time was 20.58±1.87, at follow-up 1 was 20.32±1.65, at

follow-up 2 was 20.07±1.93, and at follow-up 3 was 20.46±1.67. There was no statistically significant difference in respiratory rates among women at different times in the study (p-value 0.263).

Table 6: Multiple comparison tests between temperature levels at different time of study

Temperature				p-value
Post Intervention	Follow up 1	Follow up 2	Follow up 3	
97.90±0.57	97.84±0.60	97.86±0.59	97.79±0.54	0.637

Repeated measure ANOVA

The mean temperature at post-operative time was 97.90±0.57, at follow-up 1 was 97.84±0.60, at follow-up 2 was 97.86±0.59, and at follow-up 3 was 97.79±0.54 degrees Fahrenheit. There was no statistically significant difference in temperatures among women at different times in the study (p-value 0.637).

Table 7: Multiple comparison tests between Saturation levels at different time of study

Saturation				p-value
Post Intervention	Follow up 1	Follow up 2	Follow up 3	
97.88±0.63	97.86±0.58	97.89±0.60	97.82±0.54	0.623

Repeated measure ANOVA

The mean saturation level at post-operative time was 97.88±0.63, at follow-up 1 was 97.86±0.58, at follow-up 2 was 97.89±0.60, and at follow-up 3 was 97.82±0.54. There was no statistically significant difference in saturation levels among women at different times in the study (p-value 0.623).

Discussion

In terms of demographic characteristics, the current study reveals that the mean age of women was 36.14±4.63 years. This aligns with findings from other studies, where the mean age of participants undergoing hysterectomy was reported as 40.6 years (Abdel-Halim et al., 2023). More than half of the participants had education up to the secondary level, implying that hysterectomy was more prevalent among individuals with lower educational attainment. This observation aligns with the findings of (Patil et al., 2017) who similarly reported a majority of women undergoing hysterectomy had a secondary level of education. On the contrary, a study by (Essa et al., 2017) found that the majority of participants had primary level education. Additionally, regarding occupation, three-quarters of the women in the current study were reported as housewives. Moreover, occupation showed that three-quarters of women were housewife. These findings were consistent with the findings of a study conducted by (Elsaqaa et al., 2021) who reported that about that three-quarters women were housewife (Elsayed Rady et al., 2020) also reported that majority of participants were housewife. The majority of patients in the study hailed from rural areas, with a smaller representation from urban backgrounds. This observation is consistent with findings from other studies, highlighting a higher prevalence of hysterectomy preference among women in rural and suburban areas. (Raza et al., 2015). This discrepancy is attributed to their limited treatment options. In these areas, a hysterectomy might emerge as the sole feasible solution for addressing gynecological issues, primarily due to the constrained accessibility to alternative treatment choices that urban women may have at their disposal. Most of the participants were in menstruating category. This finding was similar to the other study conducted by (Avci & Oskay, 2023) who reported same findings. Among the study participants, majority women were undergone elective treatment. (Abdel-Halim et al., 2023) also reported same findings.

In terms of anxiety levels after total abdominal hysterectomy, the current study found a statistically significant difference in anxiety levels across various stages of the intervention. Pre-intervention anxiety showed statistical significance compared to post-intervention, follow-up 1, follow-up 2, and follow-up 3. These results suggest that Progressive Muscle Relaxation Technique (PMRT) is effective

in reducing anxiety and, consequently, stress hormones. PMRT may contribute to the secretion of endogenous endorphins, reduce adrenal hormone secretion, and improve blood circulation. Additionally, it may influence the hypothalamus by focusing on the positive sensation of deep relaxation during the intervention, leading to a decrease or inhibition of stress impulses from the hypothalamus. These findings are consistent with a study conducted by (Essa et al., 2017) who reported that stress, anxiety and depression were statistically significantly decreased among the study group after the intervention.

Likewise, (Elsaqaa et al., 2021) reported a significant difference between the experimental and control groups concerning average pain levels and anxiety scores after reflexology. (Öztürk et al., 2018) also supported these findings. A study conducted by (Avci & Oskay, 2023) also have consistent findings as reported that reflexology is effective in reducing anxiety among women after total abdomen hysterectomy.

Upon evaluating the impact of progressive muscle relaxation on physiological parameters in post-hysterectomized women, the current study revealed highly significant differences within the study group before and after the intervention, emphasizing the notable influence of progressive muscle relaxation on post-hysterectomy physiological parameters. Regarding heart rate, the present study found no statistically significant difference between the heart rate of women at different times during the study. In contrast, a Brazilian study by Paula et al. (2019) reported that Progressive Muscle Relaxation Technique (PMRT) significantly affected vital parameters, including pulse rate, respiratory rate, systolic blood pressure, and diastolic blood pressure. Post-PMRT, mean values for these physiological parameters were lower compared to pre-intervention, showing highly significant differences within the study group before and after the intervention.

The present study found a statistically significant difference in blood pressures of women after Progressive Muscle Relaxation Technique (PMRT). This aligns with a study conducted in Bangalore, India, which identified highly statistically significant differences between the study and control groups after PMRT. Within the study group, significant differences were observed before and after the intervention, with a notable decrease in blood pressure values, pulse rate, and respiratory rate post-intervention compared to pre-intervention, particularly on the first and second post-operative days (Suthahar, 2020). Similar findings were reported by Devi & Saharia (2019), indicating a decrease in mean postoperative vital signs within the study group compared to the control group. Furthermore, highly statistically significant differences were noted within the study group after engaging in PMR exercises, revealing a decrease in mean arterial blood pressure values, heart rate, and respiratory rates between 0 to 3 days post-operative. Jebha (2021) also concluded that PMRT led to a decrease in mean postoperative vital signs, including blood pressure, pulse, and respiration, within the study group as compared to the control group, with a significant difference observed among post-caesarean women who received PMRT.

The current study indicated no significant effect of Progressive Muscle Relaxation Technique (PMRT) on respiratory rate, as there was no statistically significant difference in respiratory rates among women at different times during the study. These findings are consistent with a study conducted by Ko and Lin (2019) in Taipei, which concluded that relaxation significantly reduced anxiety levels and vital signs associated with anxiety in patients undergoing major abdominal surgery. Although the mean respiratory rate did not show significant changes, other vital signs related to anxiety were notably affected by the relaxation intervention.

Regarding temperature, the current study found no statistically significant difference in saturation levels among women at different times during the study. However, these results differ from a study conducted by Yilmaz & Bulut (2020) in Turkey, where they concluded that vital signs (systolic blood pressure, diastolic blood pressure, pulse rate, temperature, and respiration rate) in the experimental group were lower than those in the control group during the postoperative period following abdominal surgery.

In terms of the correlation between anxiety levels and various physiological variables across different time points in the study, the present study demonstrated a significant relationship between anxiety

and physiological responses throughout the study period. This result is consistent with the findings of Solehati et al. (2018), who conducted a study on the reduction of anxiety levels and vital signs with Benson Relaxation at Cibabat Cimahi Hospital. Their study revealed a significant decrease in anxiety state and vital signs after the intervention (p = .00), leading to the conclusion that anxiety and physiological parameters are correlated with each other.

Conclusion

The study revealed that majority of the participants were married housewife with age range of 25 to 45 years, and secondary level education. Majority of them were living in urban areas and had menstruating cycle and history of previous surgery. Majority of participants had fibroids and were undergone elective treatment. Majority of them were undergone general anesthesia using NSAID. In addition, after surgery, majority of participants were administered analgesics 12 hourly and were conscious after surgery and majority of them did not reported complications and irritability after surgery. Following the implementation of an intervention protocol, there was statistically significant difference between Anxiety levels of women. Pre-Intervention Anxiety was statistically significant from Post Intervention, Follow up 1, Follow up 2 and Follow up 3. In term of physiological parameters, there was no significant difference from Post Intervention, Follow up 1, Follow up 2 and Follow up 3.

Limitations of study

Following are the limitations of current study

- Conducting the study in a single-center setting may reduce the diversity of the sample, potentially impacting the external validity of the results.
- Additionally, the study's design, a quasi-experimental, single-group pre-posttest, might lack the rigor and control of a randomized controlled trial, which could introduce confounding variables.
- The short follow-up period post-intervention might not capture the long-term effects of the educational intervention on patient outcomes.

References

1. Abdel-Halim, S., Ramadan, S., Salama, A., & Araby, O. (2023). Effect of Benson's Relaxation Technique on Postoperative Pain and Quality of Sleeping among Women Undergoing Hysterectomy. *Benha Journal of Applied Sciences, 8*(4), 331-346.
2. Avci, N., & Oskay, U. (2023). Effect of reflexology on decreasing postoperative pain and anxiety after total abdominal hysterectomy. *Holistic Nursing Practice, 37*(2), 78-89.
3. Bhagdewani, N. N., Fating, T. B., Deshpande, S., Phansopkar, P., Wadhokar, O. C., Kulkarni, C. A., & Naqvi, W. M. A CASE STUDY ON THE TRAINING OF PELVIC FLOOR MUSCLE FOLLOWING HYSTERECTOMY TO IMPROVE THE QUALITY OF LIFE.
4. Dubey, K. R., Telang, P. A., & Patel, L. (2023). Effect of Integrated Yoga Program Along With Pilates in Abdominal Hysterectomy Patients: A Case Report. *Cureus, 15*(10).
5. Ellinides, A., Manolopoulos, P. P., Hajymiri, M., Sergentanis, T. N., Trompoukis, P., & Ntourakis, D. (2022). Outpatient hysterectomy versus inpatient hysterectomy: a systematic review and meta-analysis. *Journal of Minimally Invasive Gynecology, 29*(1), 23-40. e27.
6. Elsaqaa, H. S., Sobhy, S. I., & Zaki, N. H. (2021). Effect of Progressive Muscle Relaxation Technique on Pain Intensity and Physiological Parameters among Post Hysterectomized Women. *International Journal of Novel Research in Healthcare and Nursing, 8*(1), 11-24.
7. Elsayed Rady, S., El-Deeb, A. E.-M., & Abdou, H. (2020). Effect of progressive muscle relaxation technique on post-operative pain and quality of recovery among patients with abdominal surgeries. *Egyptian Journal of Health Care, 11*(4), 566-581.
8. Essa, R. M., Ismail, N., & Hassan, N. I. (2017). Effect of progressive muscle relaxation technique on stress, anxiety, and depression after hysterectomy. *Journal of Nursing Education and Practice, 7*(7), 77.

9. Güler, B., & Mete, S. (2023). Effects of Relaxation-Focused Nursing Program in Women with Ovarian Cancer: A Randomized Controlled Trial. *Pain Management Nursing*.
10. Hiramatsu, Y. (2019). Basic standard procedure of abdominal hysterectomy: part 1. *The Surgery Journal, 5*(S 01), S2-S10.
11. Ibrahim, H. A.-F., Elgzar, W. T., & Hablas, R. M. (2021). The effect of Jacobson's progressive relaxation technique on postoperative pain, activity tolerance, and sleeping quality in patients undergoing gynecological surgery. *Iranian Journal of Nursing and Midwifery Research, 26*(4), 295.
12. Kamel Sadek Abd El Rahman, W., A Ahmed, A., & Mohamed El-Sayed Atwa, A. (2022). Effect of Benson Relaxation Therapy on Post-Operative Pain and Stress among Nulliparus Women undergoing Cesarean Section. *Egyptian Journal of Health Care, 13*(3), 2053-2064.
13. Madueke-Laveaux, O. S., Elsharoud, A., & Al-Hendy, A. (2021). What we know about the long-term risks of hysterectomy for benign indication—a systematic review. *Journal of clinical medicine, 10*(22), 5335.
14. Mohamed, N. S., Elsayed, N. M., & Bakr, M. F. H. E. (2022). Effect of Benson Relaxation Technique on Shoulder Pain Intensity and Anxiety Level among Women Undergoing Gynecological Laparoscopy. *NeuroQuantology, 20*(9), 6455.
15. Noble, D. J., & Hochman, S. (2019). Hypothesis: pulmonary afferent activity patterns during slow, deep breathing contribute to the neural induction of physiological relaxation. *Frontiers in physiology, 10*, 1176.
16. Öztürk, R., Sevil, Ü., Sargin, A., & Yücebilgin, M. S. (2018). The effects of reflexology on anxiety and pain in patients after abdominal hysterectomy: A randomised controlled trial. *Complementary therapies in medicine, 36*, 107-112.
17. Patil, K., Faye, A., Gawande, S., Tadke, R., Bhave, S., & Kirpekar, V. (2017). Correlates of anxiety in patients posted for hysterectomy. *Panacea Journal of Medical Sciences, 7*, 40-44.
18. Raza, N., Waqas, A., & Jamal, M. (2015). Post-operative anxiety, depression and psychiatric support in patients undergoing hysterectomy: a cross sectional survey. *J Pak Med Assoc, 65*(4), 443-445.
19. Shendre, V., & Taksande, V. (2021). Effect of Benson's Relaxation Technique on Post-operative Stress and Pain among Women Undergone Abdominal Hysterectomy. *Journal of Pharmaceutical Research International, 33*(60B), 1055-1062.
20. Tanrıverdi, S., & Kılıç, S. P. (2023). The effect of progressive muscle relaxation on abdominal pain and distension in colonoscopy patients. *Journal of PeriAnesthesia Nursing, 38*(2), 224-231.
21. Zidan, S., Belal, S., Aljaber, N., Al Khamees, M., Mahmoud, W. M. A., & Ahme, W. M. E. (2022). Effect of Benson Muscle Relaxation Technique on Incisional Pain, Fatigue, and Anxiety Levels among Patients Post Abdominal Surgery. *NeuroQuantology, 20*(19), 1030.
22. Elsaqaa, H. S., Sobhy, S. I., & Zaki, N. H. (2021). Effect of Progressive Muscle Relaxation Technique on Pain Intensity and Physiological Parameters among Post Hysterectomized Women. *International Journal of Novel Research in Healthcare and Nursing, 8*(1), 11-24
23. Loh, E. W., Shih, H. F., Lin, C. K., & Huang, T. W. (2022). Effect of progressive muscle relaxation on postoperative pain, fatigue, and vital signs in patients with head and neck cancers: A randomized controlled trial. *Patient Education and Counseling, 105*(7), 2151-2157.
24. Sahin, G., & Basak, T. (2020). The effects of intraoperative progressive muscle relaxation and virtual reality application on anxiety, vital signs, and satisfaction: A randomized controlled trial. *Journal of PeriAnesthesia Nursing, 35*(3), 269-276.
25. Essa, R. M., Ismail, N. I. A. A., & Hassan, N. I. (2017). Effect of progressive muscle relaxation technique on stress, anxiety, and depression after hysterectomy. *Journal of Nursing Education and Practice, 7*(7), 77-86
26. Devmurari, D., & Nagrale, S. (2018). Effectiveness of Jacobson's progressive muscle relaxation technique for pain management in post-cesaerean women. *Indian J Obstet Gynecol Res, 5*, 228-232.

27. Devi, R., & Saharia, K (2019). Effect of progressive muscle relaxation on post-operative analgesia. Int J Med Res Rev. 2019: 5(2), 113-118
28. Ozhanli, Y., & Akyuz, N. (2020). The effect of progressive relaxation exercise on physiological parameters, pain and anxiety levels of patients undergoing colorectal cancer surgery: a randomized controlled study. *Journal of PeriAnesthesia Nursing*, *37*(2), 238-246.
29. Kısaarslan, M., & Aksoy, N. (2020). Effect of progressive muscle relaxation exercise on postoperative pain level in patients undergoing open renal surgery: a nonrandomized evaluation. *Journal of PeriAnesthesia Nursing*, *35*(4), 389-396.
30. Suthahar N. (2020), a study to assess the effectiveness of progressive muscle relaxation technique on pain and physiological parameters among patients who are subjected to abdominal surgery in selected hospital at Bangalore 9(2),112-118.
31. Çınar, H., & Çam, R. (2018). The effects of progressive relaxation method on the patients applied total knee arthroplasty. *Medical Science and Discovery*, *5*(12), 380-389.
32. Kömürkara, S., & Cengiz, Z. (2022). Effects of Progressive Relaxation Exercises on Vital Signs and Fatigue in Liver Transplant Patients: A Randomized Controlled Trial. *Clinical Nursing Research*, *31*(3), 497-508.
33. Ko yi, Lin pi (2019). The effect of using a relaxation tape on pulse, respiration, blood pressure and anxiety levels of surgical patients. Journal of Clinical Nursing. 2019; 21, 689–697
34. Toussaint, L., Nguyen, Q. A., Roettger, C., Dixon, K., Offenbächer, M., Kohls, N., ... & Sirois, F. (2021). Effectiveness of progressive muscle relaxation, deep breathing, and guided imagery in promoting psychological and physiological states of relaxation. *Evidence-Based Complementary and Alternative Medicine*, *2021*.
35. Shekhar C, Paswan B, Singh A: Prevalence, sociodemographic determinants and self-reported reasons for hysterectomy in India. Reprod Health. 2019, 16:118. 10.1186/s12978-019-0780-z
36. Shahid, R., Abbas, H., Mumtaz, S., Perveen, F., Bari, M. F., Raja, T., ... & Dawani, K. (2020). Hysterectomy and Oophorectomy in Reproductive Age: A Cross-Sectional Study from a Tertiary Care Hospital. *Cureus*, *12*(5).
37. Solehati T, Rustina Y. The Reduction of Anxiety Level with Benson Relaxation at Cibabat Cimahi Hospital. Journal of Nursing and Health Care (JNHC). 2018; 1(2): 167-171.
38. Chegeni, P. S., Gholami, M., Azargoon, A., Pour, A. H. H., Birjandi, M., & Norollahi, H. (2018). The effect of progressive muscle relaxation on the management of fatigue and quality of sleep in patients with chronic obstructive pulmonary disease: A randomized controlled clinical trial. *Complementary therapies in clinical practice*, *31*, 64-70.
39. Naseeb, S., Dossal, A., & Rashid, S. (2021). An Audit of Hysterectomy at Jinnah Postgraduate Medical Centre, Karachi. *Journal of The Society of Obstetricians and Gynaecologists of Pakistan*, *11*(2), 95-100.
40. Taksande, V., & Shendre, V. (2021). Effect of Benson's Relaxation Technique on Post-operative Stress and Pain among Women Undergone Abdominal Hysterectomy. *Journal of Pharmaceutical Research International*, 1055-1062.
41. Thorn, H., & Uhrenfeldt, L. (2020). The effectiveness of preoperative individual information on reducing anxiety and pain after hysterectomy: A randomized controlled trial. *Journal of Nursing Education and Practice*, *10*(1).
42. Ali, S. A., Farahat, M. M., & ElShafei, M. A. M. (2019). Surgical approach to hysterectomy for benign gynecological diseases. *The Egyptian Journal of Hospital Medicine*, *77*(3), 5279-5286.
43. Odynets, T., Briskin, Y., Todorova, V., Pasichna, T., & Yefremova, A. (2021). Effectiveness of yoga intervention enhanced by progressive muscular relaxation on pain in women after breast cancer surgery. *Physiotherapy Quarterly*, *28*(4), 25-29.
44. İbrahimoğlu, Ö., & Kanan, N. (2017). The effect of progressive muscle relaxation exercises after endotracheal extubation on vital signs and anxiety level in open heart surgery patients. *Türk Yogun Bakim Dergisi*, *15*(3), 98-106.
45. Paula AAD, Carvalho EC, Santos CB (2019). The use of the "progressive muscle relaxation"

technique for pain relief in gynecology and obstetrics. Rev Latino-am Enfermagem 2019 setembro-outubro; 10(5):654-9.

46. Rajeswari, S., & Sanjeeva Reddy,N.(2020). Efficacy of progressive muscles relaxation on pregnancy outcome among anxious indian primi mothers. *Indian journal of nursing and midwifery research*, 25(1),23.
47. Sharma,S., & Kaur, B. (2020). Effect of Progressive Muscles Relaxation on Anxiety among Antenatal opd mothers attending antenatal OPD of GGSMC & Hospital,Farid kot ,Punjab. *Amarjeet kaus sandhu* 12 (1), 79.
48. Javaherforooshzadeh, F., Amirpour, I., Janatmakan, F., & Soltanzadeh, M. (2018). Comparison of effects of melatonin and gabapentin on post operative anxiety and pain in lumbar spine surgery: A randomized clinical trial. *Anesthesiology and pain medicine*, *8*(3).
49. Kausar, R., Khan, N., Rasool, F., Yusuf, S., & Spielberger, C. D. (2018). Translation and Adaptation of State Trait Anxiety Inventory (STAIY) in Urdu. *Journal of Behavioural Sciences*, *22*(3).
50. Patil, K., Faye, A., Gawande, S., Tadke, R., Bhave, S., & Kirpekar, V. (2017). Correlates of anxiety in patients posted for hysterectomy. *Panacea Journal of Medical Sciences*, *7*, 40-44.
51. YilmazM; Bulut Y. The Effect of Progressive Breathing Relaxation Training on Preoperative Anxiety and Surgical Stress Response. International Journal of Caring Sciences. 2020; 13 (2): 1287-1296.