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Effect of Progressive Muscle Relaxation Technique on Pain Intensity and Physiological Parameters among Post Hysterectomized Women

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Abstract: **Progressive muscle relaxation (PMR) is a simple, safe, inexpensive, available, self-induced by the patients as well as easily applicable non-pharmacologic method. It is an integral part of nursing care for gynecological postoperative patients because it is a systematic technique to reduce stress, anxiety, pain perception, muscle tension as well as contractions, and facilitates the sleep during postoperative period. Objective: Determine the effect of progressive muscle relaxation technique on pain intensity and physiological parameters among post-hysterectomized women. Setting: This study was conducted at gynecological wards of El-Shatby Maternity University Hospital in Alexandria Governorate. Subjects: A convenient sample of 80 post-hysterectomized women was recruited. They were sequentially divided into 2 equal groups; the first was the control groups which comprised 40 women and exposed to routine hospital care only, the second was the study group and comprised 40women and they received PMRT. Tools: Five tools were used Tool I: basic data structured interview schedule., Tool II: Visual analog scale (VAS), Tool III: a modified version of Johansson Pain - O- Meter scale (JPOM)., Tool IV: A modified version of Chamber Price pain rating scale (CPPRS)., Tool V: physical assessment sheet, Results: The study results revealed that pain intensity and physiological parameters were highly statistically significant among the study group before and after intervention in each of the 5 sessions of PMRT (P=0.000). Also highly statistically significant was found between the study and the control groups after intervention in each of the 5 sessions (P= 0.000). Conclusion: Progressive muscle relaxation technique has a significant effect in reducing intensity of post- hysterectomy pain. Also, it has a remarkable effect on maintaining physiological parameters within normal ranges after hysterectomy. Recommendations: Progressive muscle relaxation technique should be integrated as post- hysterectomy care into the routine nursing care plan to increase the efficiency and quality of nursing care.**

Keywords: **Progressive muscle relaxation technique, Hysterectomy, post-operative Pain, Physiological parameters.**

I. INTRODUCTION

Worldwide, women's reproductive health is an issue of vital importance and one that has wide spread implications on health, wellbeing and development of the entire population. Having reproductive disorders diminish the quality of life (QOL) for affected women &their families which are fundamentals for all human beings. So women seek to achieve their QOL through finding the best treatments for their reproductive problems. These treatments can range from simple procedures until reach major surgical removal of reproductive organ of femininity (uterus) which called hysterectomy.[1, 2]

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Hysterectomy is one of the most common gynecological procedures performed all over the world. The incidence rate of hysterectomy varies significantly across the globe, in the developed countries; the incidence is high and increasing; in the United Kingdom, it is estimated that about 20% of the women would have hysterectomy by the age of 50years mainly for menstrual disorders and uterine fibroids. Also, In the United States of America (USA) the rate was 650 per 100,000 woman; the statistics show that about one in three women in USA have had a hysterectomy by the age of 60 years. On the other hand, the prevalence of hysterectomy in developing countries is almost 20% of women by the age of 55 years; where the incidence rates are 7% in Asia and 5% in Africa. Worldwide 70% of hysterectomies are performed abdominally compared to 30% by the vaginal route.[3,4,5,6]

The term of hysterectomy comes from the two Greek words, first one is “hystera” which means uterus, and the second one is “ectomy” which means removal, so hysterectomy is the surgical operation of removing of the uterus which usually includes the cervix (neck of the uterus). The uterus, which is about the size of woman's fist, is a muscular pear-shaped organ that makes up part of the female reproductive system. The opening at the lower part of the uterus is called the cervix. Below the cervix is the vagina (birth canal). On both sides of the uterus a woman has an ovary, where specialized hormones such as estrogen& progesterone are produced, which regulate the creation and release of eggs (ovulation), and a fallopian tube, which carries the egg to the uterus.[2,7,8,9] (Ewalds, Donoghe ,essa, who)

Generally, the most Common indications for performing hysterectomy are benign diseases which include the following: uterine fibroids (leiomyomas), endometriosis, abnormal uterine bleeding, uterine prolapse (dropped uterus), chronic pelvic inflammatory diseases, tubo-ovarian abscess; damage to the ovaries from severe endometriosis and severe menstrual pain. According to **Neis et al (2016)** they were reported that the benign hysterectomy indications in Germany were as follows: uterine fibroids: 60.7%, prolapsed uterus: 27.9%, menstrual problems: 25.2%, hyperplasia and atypia of the endometrium or cervix: 2.9%, and endometriosis: 15.1% of cases. However, for benign diseases hysterectomy should be considered only when other treatment options fail. [4,5,6,10,11]

In spite of being a life-saving and safe intervention in many cases, hysterectomy is associated with risks and complications which can extend many years beyond the operation and affect the health of the woman as well as the quality of life for physical, mental, social and sexual function. These complications can result in mild to severe morbidity and even mortality. Although their incidence is low, it is important to be aware of the immediate and long-term complications to overcome them. [12, 13, 14, 15]

One of the most frequently problems and significant complaints experienced by women undergoing hysterectomy is pain in the postoperative period. Pain is a complex multifaceted phenomena, it is a subjective unique experience with sensory, affective and evaluative qualities that may be difficult to describe or explain and often difficult for others to recognize, understand and assess. According to the International Association for the Study of Pain (IASP) Pain is defined as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage". Despite advances in postoperative pain research, medications and different therapeutic modalities, the prevalence of acute postoperative pain is still challenging and high; its prevalence is approximately 80%; among them 86% are expressed as moderate, severe, or extreme pain. [15,16]

Pain after abdominal hysterectomy arises from several structures that are traumatized during surgery and has two components somatic and visceral pain. Somatic pain arising from nociceptors within the abdominal wound has both cutaneous and deep structures including muscle pain and peritoneal. Pain is transmitted within the anterior divisions of the spinal segmental nerves, usually T10-L1, which runs laterally in the abdominal wall between the layers of the transverses abdominis and internal oblique muscles. Visceral uterine nociceptive stimuli return via afferent nerve fibers that ascend through the inferior hypo gastric plexus and enter the spinal cord via the T10-L1 spinal nerves. These pains are somewhat different, somatic pain is well localized, while the visceral pain is sensed as more diffuse pain. Although the magnitude of pain from each component is difficult to define, pain from the incision site is often relatively mild in comparison with deeper pain from the muscles and peritoneum.[13, 17]

SO, effective pain control is best achieved through a combination of both pharmaceutical and non-pharmaceutical therapies. Non-pharmacological methods increase the individual control feeling, decrease the feeling of weakness, improve the activity level and functional capacity, and reduce the needed dosage of analgesic drugs thus decreasing the side effects of the treatment. Complementary therapy as an adjuvant therapy may have the potential to improve pain

management and palliate acute postoperative pain. Among non-pharmacologic pain control methods, transcutaneous nerve stimulation, application of hot and/or cold compresses, exercises, positioning, massage, distraction, hypnosis and relaxation. [18,21]

Progressive muscle relaxation (PMR) or Jacobson relaxation technique was developed by Dr. Edmund Jacobson in 1930, which was designed as a method to bring quiet to the nervous system and maintain a deep state of muscle relaxation, based on the theory that relaxation of muscles, would lead to relaxation of mind. According to Jacobson "an emotional state fails to exist in the presence of complete relaxation of the peripheral parts involved". Jacobson believed that such a state could reduce arousal in both the central nervous system and the autonomic nervous system and the result could restore or promote psychological and physiological wellbeing. [19, 20, 21]

PMR is a simple, safe, inexpensive, available, self-induced by the patient as well as easily applicable non-pharmacologic method. Also, it become an integral part of nursing care in recent years because it is a systematic technique to reduce stress, anxiety, depression, pain perception, muscle tension as well as contractions, and facilitates the sleep. In addition, a number of studies have found that PMR increases body's immunity and sense of well-being through endorphins release. Moreover, it increases the feeling of control, improves the ability to block inner talk, energize. Furthermore, it increase parasympathetic activities so it decreases the cardiac index, blood pressure, heart rate, breathing rate, enhance performance of physical activities and causing warm or cool body parts .Progressive muscle relaxation (PMR) is one the systematic techniques that could be utilized to obtain a deep state of relaxation.[22,23]

Therefore, this study will be conducted to determine the effect of progressive muscle relaxation technique on pain intensity and physiological parameters among post-hysterectomized women.

II. MATERIALS AND METHOD

MATERIALS

Research Design:

A Quasi experimental research design was utilized to fulfill the aim of this study.

Setting:

This study was conducted at gynecological wards of El-Shatby Maternity University Hospital in Alexandria Governorate. This hospital was particularly chosen because research is one of its main goals to improve the quality of care. In addition, hysterectomized women turnover is suitable for the study.

Subjects:

A convenient sample of 80 post-hysterectomized women was recruited from the previously mentioned setting according to the following criteria: Conscious, women who will undergo abdominal hysterectomy, free from any medical or mental diseases, free from genital neoplasia, free from associated post- operative complications and willing to participate in the study. The study sample was selected based on Epi info-7 program. The study subjects divided randomly into two equal groups; study and control group (40 for each group), the study group received PMRT and the control group exposed to post hysterectomy hospital routine care only for pain relief in the physical presence of the researcher.

❖ **Study Tools: -**

Five tools were used for data collection:

Tool I: ***Basic data structured interview schedule***

This was developed by the researcher and included the following:

Part one: socio-demographic characteristics such as age, level of education, occupation, type of work and current residence, ***Part two:*** Gynecological history *data*& ***Part three:*** current post-operative surgery *data*: type of hysterectomy, causes of hysterectomy, type of anesthesia used during the operation as well as analgesics used postoperatively as type & dose per day.

Tool II: Visual analog scale (VAS): It was originally developed by Melzack and Katz (1994). It was adopted and used by the researcher after translation to suit the Egyptian culture. It is a self-report device consisting of a horizontal line used for subjective estimation of patient's pain. It comprises 10 point numerical scale, corresponding to the degree of pain with zero representing no pain and 10 representing the worst degree of pain. In between these two opposite ends, words as mild, moderate, severe and very severe pain are assigned to each 2cm distance respectively.

Tool III: A modified version of Johansson Pain - O- Meter scale (JPOM): It was originally developed by Johansson, 1985 to measure the intensity of sensory and affective components of pain. This tool was adopted and used by the researcher after translation to Arabic language. It is composed of 12 sensory and 11 affective pain word descriptors. Sensory pain words are rated as follows: cutting (5), tearing (5), sharp (5), burning (4), cramping (4), pressing (4), aching (4), gnawing (3), pinching (3), stinging (2), pricking (2) and sore (1). Affective pain words are rated as follows: torturing (5), killing (5), suffocating (5), terrifying (5), dreadful (4), fearful (4), troublesome (3), tiring (3), irritating (2), nagging (1) and happy (0).

Tool IV: A modified version of Chamber Price pain rating scale (CPPRS): It was originally developed by Chambers Price; 1967 to measure the behavioral responses to pain. It was adopted and used by the researcher after translation to suit the Egyptian culture. It includes four dimensions: posture, gross motor activity, facial expression and verbalization. For each of these four major behavioral responses one of a three alternative choices was elicited by the researcher. For posture, the choice is between very relaxed, guarded and tense posture. For gross motor activity, the choice is between very restless, slightly restless and quiet. For facial expression, the choice is between no frowning, some frowning and constant frowning or grimacing. Finally, women's verbalization varies between normal no sound, groans/moans and cries/sobs. Each of the 12 alternatives was scored as (0, 1, and 2). The total score for the four dimensions ranged from 0-8.

Tool V: physical assessment sheet: it was developed and used by the researcher to collect data about physiological parameters as respiratory rate, pulse rate and blood pressure value.

METHOD

The study was accomplished as follows:

1. Written approval from ethical committee, faculty of nursing, Alexandria University was obtained. As well as official letter from the faculty was submitted to the responsible authorities of the study setting to obtain their permission for data collection after explanation of the research purpose.

2. Tool I &V was developed by the researcher after extensive review of recent, current &relevant literatures also, Tools II, III and IV were adopted and translated into Arabic language. The tools were submitted to five experts in the related field to assess its content validity then the necessary modifications were done.

3. **The reliability of tools** was accomplished to measure the internal consistency of their items by using Alpha Cronbach test. Reliability coefficient for JPOM scale (tool III) for sensory pain words was reliable (0.897) & for affective pain words was also reliable (0,780) and the total scale score=0.839. Reliability coefficient for CPPRS scale (tool IV) was reliable (0.883). **A pilot study** was conducted on 8 women who were excluded from the study sample from the previously mentioned settings in order to evaluate the clarity and applicability of the study tools. The data obtained from the pilot study were analyzed, and the final form of tools was reconstructed and ready for use.

4. Each woman in the both group was individually contracted and informed about the aim of the study in order to obtain her informed consent. Each of those who agreed to participate was assured about confidentiality, privacy and right to withdraw at any time.

5. The first 40 women who fulfill the criteria for inclusion in the study were recruited as the control group. They were received post hysterectomy hospital routine care for pain relief and the researcher started with them first to avoid contamination of data. Tool (I) (part one& two) was collected through interviewing the women during the day before the operation. Also, tool I (part three) current post-operative surgery used after operation and collected from hospital records after the hysterectomy operation.

6. Then the following 40 women who fulfill the same criteria for inclusion in the study were recruited as the study group. The researchers interviewed each woman individually on the day before the operation; the researcher introduced herself to the woman, and explained the purpose of the study, steps, frequency and duration of progressive muscle relaxation technique. Then tool I (part one& two) was collected through interviewing the women during the day before the operation. Also, tool I (part three) current post-operative surgery used after operation and collected from hospital records after the hysterectomy operation.

7. The technique was applied through the following phases:

A. Preparation phase: One day before the operation, the researcher training of each woman in the study group on progressive muscle relaxation technique then the woman was asked to re-demonstrate it until she mastered it to perform after operation. The researcher explained that each muscle group should be tensed for 5-7 seconds and then relaxed for 10 seconds, and that the muscles in the body are divided into groups, the muscles of the face, the biceps and triceps, the shoulders, the neck, the abdominal and the legs. Then the woman was asked to re-demonstrate it until she mastered it to perform after operation. **Before each session**: The researcher prepared the surrounding environment and the study group. The environment was quiet and free from any distraction as visitors& accompanying persons, well ventilated, cool, softly lighted, well cleaned and curtains were used to keep privacy. In addition, a comfortable bed with firm mattress and clean without wrinkled linen was used. On the other hand, the researcher was prepared the study group through: welcomed each woman, asked her to evacuate the urinary bladder, lose any tight clothing, and lie down or sit in a comfortable position with the legs uncrossed (according to the woman's preference), lightly close the eyes, focus on a spot in front of you, clear your thoughts and focus on your breath.

B. Implementation phase: Hysterectomized women performed five sessions of progressive muscle relaxation technique. Each session lasted for 15-20 minutes under the supervision of the researcher. It was applied when the pain intensity greater than 4 on visual analog scale (VAS). The first session was at 7:30 pm at the day of operation. The Second &third sessions were at 7:30 am & 7:30 pm respectively at the first postoperative day and forth &fifth sessions were at 7:30 am & 7:30 pm respectively at the second postoperative day respectively.

c. Evaluation phase: Tools II, III, IV (pain intensity) &tool V (physiological parameters) were used for the experimental group before and immediately after each session. While the same tools were be used for the control group before and after routine care for pain relief.

8. Collection of data consumed 6 months starting from September 2019 till the end of February 2020.

III. INDENTATIONS AND EQUATIONS

Statistical Analysis

After the data were collected, they were coded and transferred into special design formats, so as to be suitable for computer feeding. Following data entry, checking and verification processes were carried out to avoid errors. Data was computed and statistically analyzed using the Statistical Package for Social Sciences "SPSS" software version 20.

Descriptive statistics

- ✓ Count (numbers) and percentage, used for describing and summarizing qualitative data.
- ✓ Mean median and standard deviation, used for describing and summarizing quantitative data.
- ✓ Minimum- Maximum used for presenting non parametric quantitative data.

Analytical statistics

Data were fed to the computer and analyzed using IBM SPSS software package version 20.0**. (**Armonk, NY: IBM Corp**)** Qualitative data were described using number and percent. Quantitative data were described using range (minimum and maximum), mean, standard deviation. Significance of the obtained results was judged at the 5% level.

The used tests were

1 - Chi-square test: For categorical variables, to compare between different groups

2 - Fisher's Exact or Monte Carlo correction: Correction for chi-square when more than 20% of the cells have expected count less than 5

3 - Student t-test: For normally distributed quantitative variables, to compare between two studied groups

4 - ANOVA with repeated measures: For normally distributed quantitative variables, to compare between more than two periods or stages

5 - Friedman test: For abnormally distributed quantitative variables, to compare between more than two periods or stages

Graphical presentations: Graphs were done for data visualization of study and control findings using Microsoft Excel.

IV. RESULTS

Table (1): presents the number and percent distribution of participants according to their socio-demographic characteristics. Age demonstrated that 40% & 45% of the study group and 50% & 42.5% of the control group were 40-<50 & 50-60 years old respectively. In addition, level of education manifested that three-fifths (60%) of the former group had secondary and university or more levels, compared to less than two-fifths (35%) of the latter group. Moreover, occupation showed that three-quarters and more (75% & 77.5%) of the control and the study groups respectively were housewives. Meanwhile, 80% of working women of the former group was workers, compared to 44.44% of those of the latter group. Furthermore, current residence clarified that 55% & 45% of the study and the control groups respectively were urban dwellers.However, socio-demographic characteristics of both groups were more or less similar without any statistically significant differences.

Table (2): sheds light upon the number and percent distribution of the participants according to their previous gynecological history. It was observed that gynecological surgeries were reported by55% & 45% of the study and the control groups respectively. Meanwhile, the main surgery was Myomectomy as reported by 45.45% of the former group, compared to 66.67% of the latter group. However, Dilatation & Curettage were reported by 36.36% & 27.78% of the study and the control groups respectively. No statistically significant differences were observed among the two groups in relation to their previous gynecological history.

Table (3): elaborates the number and percent distribution of the participants according to their current gynecological surgery (hysterectomy). Cause of hysterectomy was mainly uterine fibroids as reported by 62.5% & 72.5% of the study and the control groups respectively. In addition, total hysterectomy was the main type performed for three-fifths and more (60% & 62.5%) of the study and the control groups respectively, while subtotal hysterectomy was carried out for two-fifths and less (40% & 37.5%) of the former and the latter groups respectively. The relationship was found to be not statistically significant between the two groups regarding current gynecological surgery.

Table (4): manifests the mean distribution of the participants according to their intensity of post-hysterectomy pain using VAS. Highly statistically significant differences were revealed among the study group before and after intervention in each of the 5 sessions (P=<0.0001); where mean pain intensity decreased after intervention. They were also found between the study and the control groups after intervention in each of the 5 sessions (P= <0.0001); where the mean pain intensity was 5.42 ± 1.647, compared to 9.25 ± 1.104 in the 1st session; 4.17 ± 1.083, compared to 8.75 ± 1.406 in the 2nd session; 3.03 ± 1.074, compared to 7.10 ± 1.280 in the 3rd session; 1.88 ± 0.853, compared to 6.13 ± 1.042 in the 4th session; and 1.50 ± 0.599, compared to 5.42 ± 0.911 in the 5th session. A statistically significant difference was also noticed between the study and the control groups before intervention in the 5thsessions (P=0.002); where the mean pain intensity was 5.00 ± 0.453, compared to 5.50 ± 0.452

Table (5): illustrates the number and percent distribution of the participants according to their intensity of post-hysterectomy pain using JPOM. The relationship was highly statistically significant among the study group before and after intervention in each of the 5 sessions (P=0.000). It was also highly statistically significant between the study and the control groups after intervention in each of the 5 sessions (P= 0.000).

In table 6-9: expounds the mean distribution of the participants according to their physiological parameters. There was highly statistically significant among the study group before and after intervention in each of the 5 sessions (P=0.000), where mean of systolic, diastolic blood pressure, pulse rate and respiration rate decreased after intervention.

V. DISCUSSION

Postoperative pain is one of the most significant factors that impact on the patient´s recovery from surgery. Uncontrolled pain promotes a "fight or flight reaction". This reaction tends to delay wound healing and increases the complications rate. Therefore it is important for all patients undergoing surgery to receive adequate pain management (Yang et al., 2019). The goal for postoperative pain management is to reduce or eliminate pain and discomfort with minimum side effects as cheaply as possible. For this reason, the nurses should be involved actively in the treatment of pain, diagnose the patient in the direction of a nursing model/theory and use the pharmacological and non-pharmacologic methods. [24]

Non-pharmacologic pain management includes a series of effective interventions aimed to reduce the intensity of pain after surgery and the level of anxiety and thereby prevent the occurrence of complications after surgery such as relaxation exercises. The use of relaxation exercises for postsurgical pain prevention can increase patient satisfaction with nursing care. Relaxation therapy can be considered as a method of post-operative pain management. Therefore, this study aimed to determine the effect of progressive muscle relaxation technique on pain intensity and physiological parameters among post-hysterectomized women. [25, 26]

The results of the current study demonstrated that a highly statistically significant differences between the control and study groups in relation to post hysterectomy pain intensity after intervention, they were also found among the study group before and after intervention. Where, the score of pain sharply declined among the experimental group unlike the control group. This result suggests a possible positive influence of progressive muscle relaxation technique–on reduction of pain intensity among women after hysterectomy. These results may be attributed to the fact that PMRT is effective in decreasing stress and consequently stress hormones (cortisol, epinephrine, catecholamines). Also, it may help the secretion of endogenous endorphins, decrease the secretion of adrenal hormones, and improve blood circulation. In addition, it manipulate the hypothalamus by concentration on the positive sensation of deep relaxation state during the intervention so, the stress impulses from the hypothalamus is decreased or even inhibited. [21]

The findings of the present study are in line with at least ***seven*** studies. The first, **Dehkordi et al., (2019)** [27] who conducted a study in **Iran** titled" **Effect of progressive muscle relaxation with analgesic on anxiety status and pain in surgical patients",** they concluded that PMR could increase the pain threshold, stress and anxiety tolerance and adaptation level in surgical patients. Therefore, using this technique could be an appropriate way to reduce analgesic drug consumption. They also added that a statistically significant difference was detected in the vital signs, pain intensity and anxiety between the two groups. The second, **Ju et al** (2019) [26] in China, who studied" **Efficacy of relaxation therapy as an effective nursing intervention for post-operative pain relief in patients undergoing abdominal surgery"** where it was discovered that 10 of included studies demonstrated statistically significant pain relief in the progressive muscle relaxation group as compared to the control groups. They concluded that patients undergoing abdominal surgery (included abdominal hysterectomy) had significantly greater pain relief following PMR therapy as compared to the control groups. The third, **Devi et al** (2017) [28] who studied " **Effect of PMR on post-operative analgesia" among patients with abdominal surgery** in India during the first two days post-operative. They reported that PMRT was very effective in pain relieve among study group compared to control group. They further added that PMRT helped their patients to overcome the distressing feelings during post-operative period and improve their quality of life. The fourth, a very recent meta-analysis accomplished in Canada, titled" **Perioperative psychotherapy for persistent postsurgical pain and physical impairment"** where they reviewed 11757 studies and concluded that moderate quality evidences supported the hypothesis that Perioperative cognitive behavioral therapy and relaxation therapy including PMR are effective for reducing persistent pain and physical impairment during post-operative period (**Wang et al., 2018**). [29] The fifth, **Topcu & Findik** (2012) [18] in Edirne, Turkey, they conducted a study titled" **Effect of relaxation exercises on controlling post-operative pain"** where it was discovered that Pain levels were found to be reduced after the relaxation exercises compared with the levels before the relaxation exercises ($p < .001$). It was concluded that relaxation exercises, a non-pharmacologic method, are effective in reducing postoperative pain and should therefore be included in a regimen to control postoperative pain in patients who have undergone abdominal surgery. The six, a study implemented in

Bangalore, India, titled " **Effectiveness of progressive muscle relaxation technique on pain and physiological parameters among patients who are subjected to abdominal surgery**" where it was shown that there was a statistically significant difference among the study group before and after PMRT in relation to pain intensity scores on the first and second post-operative days (Suthahar., 2009). [30] The seven, a study carried out in Brazil studied "**the use of PMR technique for pain relief in gynecology and obstetrics**". They concluded that PMR significantly decreased pain perception among study group compared to control group. They further recommended that health care team should prepare their patients to apply PMR during the preoperative period to be used as a pain control method during the post-operative period (Paula et al., 2002).[31]

On the other hand, the present findings relatively don't harmonize with A systematic review and meta-analysis accomplished in China, titled" **Efficacy of relaxation therapy as an effective nursing intervention for post-operative pain relief in patients undergoing abdominal surgery: A systematic review and meta-analysis"** where they reported that PMR proved effective in relieving acute postoperative pain among postoperative patients (included post-hysterectomized women). Although these, they also concluded that the overall quality of the studies was not high. On the whole, despite trials demonstrating the benefits of relaxation therapy for immediate pain relief in patient's post-abdominal surgery, there is lack of high-quality scientific evidence substantiating its routine use. There is a need for more robust randomized control trials (RCTs) utilizing standardized relaxation protocols to provide further evidence on this subject (Wanxia et al.,2019).[32]

On evaluating the effect of progressive muscle relaxation on physiological parameters among post hystereztomized women, the results of the current study demonstrated that highly statistically significant differences among the study group before and after intervention was detected in relation to post hysterectomy physiological parameters. They were also found between the study and the control groups after intervention. Where, the physiological parameters (systolic blood pressure value, diastolic blood pressure value, the pulse rate and the respiratory rate) became lower after the intervention among the experimental group unlike the control group.

The present findings relatively correspond with ***three*** other studies. The ***First*** study was conducted in Brazil, they concluded that PMRT had a significant effect on vital parameters (pulse rate, respiratory rate, systolic blood pressure value and diastolic blood Pressure value); where mean values of the physiological parameters after PMRT were decreased than values before the intervention and also, highly statistically significant differences were found among the study group before and after intervention in relation to physiological parameters **(Paula, et al., 2002).**[31] The **Second** study was carried out in **Bangalore**, India, where it was detected that highly statistically significant differences were found between the study and the control groups after PMRT. Also highly statistically significant differences were revealed among the study group before and after intervention**;** where blood pressure vale, pulse rate and respiratory rate decreased after the intervention than before it on the first and second post-operative days **(Suthahar., 2009)**. [30] The ***third*** study conducted by **Devi & Saharia , 2017** [28] in India, titled" **Effect of progressive muscle relaxation on post-operative analgesia"** where it was revealed that PMRT decreased the mean postoperative vital signs among the study group after the intervention compared with the control group; also, there were highly statistical significance differences among the study group after practicing PMR exercise where mean of arterial blood pressure values , heart and respiratory rates were decrease between 0 to 3 days post-operative. In addition, there was positive correlation between the level of pain intensity and mean arterial pressure; when the level of pain increases, the mean arterial pressure also increases.

Also, the ***forth*** study conducted by **Yilmaz &Bulut, 2020** [33] in Turkey**,** titled "**The effect of progressive relaxation training on preoperative anxiety and surgical stress response"** they concluded that the vital signs (systolic blood pressure, diastolic blood pressure, pulse rate and respiration rate) of the patients in the experimental group was lower than that of the control group in the postoperative period after abdominal surgery. The ***fifth*** study conducted by **Ko and Lin, 2011**[34] in Taipei, Taiwan, titled" The effect of using a relaxation on pulse, respiration, blood pressure and anxiety levels of surgical patients" they concluded that a relaxation can significantly reduce the level of anxiety and vital signs related to anxiety in major abdominal surgery patients; where the mean respiratory rate dropped from (18·4± 6·9) to (16·8±7·4), the mean pulse rate dropped from (81·9± 33·5) to (70.4± 33·7) and the mean systolic blood pressure decreased from 125·4± 16 mmHg to 121·5 ±13·4 mmHg. Also, they reported that there were a highly statistical differences among the experimental group related to vital signs.

In addition, the six one was conducted in **India by Jebha** (2014); which evaluate "the effectiveness of Jacobson's progressive muscle relaxation technique on level of anxiety among preoperative mothers undergoing elective LSCS". The study concluded that PMRT decreased the mean postoperative vital signs (blood pressure, pulse and respiration) among the study group after the intervention compared with the control group. Also, a significant difference was found among the post caesarean women who receive PMRT.[(35)]

VI. CONCLUSION

Based on the findings of the present study, it can be concluded that hypothesis (H1) and hypothesis (H2) are accepted as the results revealed that progressive muscle relaxation technique has a significant effect in reducing intensity of post-hysterectomy pain as measured by VAS, JPOMS & CPPRS among post- hysterectomized women. Also, it has a remarkable effect on maintaining physiological parameters (blood pressure value, pulse rate& respiratory rate) within normal ranges

VII. RECOMMENDATIONS

Based on the findings of the present study the following recommendations are suggested:

1. Progressive muscle relaxation technique should be integrated as post- hysterectomy care into the routine nursing care plan to increase the efficiency and quality of nursing care.

2. Jacobson's progressive muscle relaxation technique can be used as an adjunct therapy along with pain medications as an effective treatment of pain management for post-hysterectomy women to improve functional activity and to promote early post- operative recovery.

3. In service training programs as- workshops and conferences- should be carried out periodically for nurses to ensure that they are aware about PMR technique, its advantages and how to apply it.

Future studies: Replication of the present study under different circumstance sampling, setting, measurement, duration of management is recommended to validate its results.

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APPENDICES – A

List of Table:

Table (1): Number and percent distribution of the participants according to their socio-demographic characteristics

Socio-demographic characteristics	Study group (n=40)		Control group (n=40)		F/X^2 (P)
	No.	%	No.	%	
Age (years):					
30-	6	15.00	3	07.50	1.232 (0.297)
40-	18	45.00	20	50.00	
50-60	16	40.00	17	42.50	
Level of education:					
- Illiterate/Read &Write	4	10.00	10	25.00	7.521 (0.057)
- Basic	12	30.00	16	40.00	
- Secondary or its equivalent	18	45.00	13	32.50	
- University or more	6	15.00	1	02.50	
Occupation:					
- Housewife	31	77.50	30	75.00	0.069 (0.793)
- Working	9	22.50	10	25.00	
Type of occupation:	**(n=9)**		**(n=10)**		
- Worker	4	44.44	8	80.00	3.089 (0.213)
- Employee	4	44.44	1	10.00	
- Merchant	1	11.11	1	10.00	
Current residence:	**(n=40)**		**(n=40)**		
- Urban	22	55.00	18	45.00	0.800 (0.371)
- Rural	18	45.00	22	55.00	

X^2 (P): Chi-Square Test &P for X^2 Test F (P): Fisher Exact test &P for F Test *: Significant at $P \leq 0.05$

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Table (2): Number and percent distribution of the participants according to their previous gynecological history

Previous gynecological history	Study group (n=40)		Control group (n=40)		F /X² (P)
	No.	%	No.	%	
Presence of gynecological Surgery:					
- Yes	22	55.00	18	45.00	0.800 (0.371)
- No	18	45.00	22	55.00	
Type of surgery:	**(n=22)**		**(n=18)**		
- Myomectomy	10	45.45	12	66.67	2.297 (0.317)
- Dilatation & Curettage	8	36.36	5	27.78	
- Excision of ovarian cyst	4	18.18	1	05.55	

□² (P): Chi-Square Test &P for □2 Test F (P): Fisher Exact test &P for F Test Significant at P ≤ 0.05

Table (3): Number and percent distribution of the participants according to their current gynecological surgery (hysterectomy)

Current gynecological surgery	Study group (n=40)		Control group (n=40)		1. 2. F /X² (P)
	No.	%	No.	%	
Causes of hysterectomy:					
- Uterine fibroids	25	62.50	29	72.50	3.349 (0.341)
- Uterine bleedings	10	25.00	9	22.50	
- Placenta accrete	3	07.50	0	00.00	
- Uterine prolapse	2	05.00	2	05.00	
Type of hysterectomy:					
- Total	24	60.00	25	62.50	0.053 (0.818)
- Subtotal	16	40.00	15	37.50	
Type of anesthesia:					0.000 (1.000)
- General	40	100	40	100	
Type of analgesic:					
- Ketolac	28	70.00	30	75.00	1.455 (0.228)
- Voltaren	12	30.00	10	25.00	
Frequency of analgesic administration (hours):					
- 12	30	75.00	25	62.50	0.251 (0.617)
- 24	10	25.00	15	37.50	

X 2(P): Chi-Square Test &P for X 2 Test

F (P): Fisher Exact test &P for F Test

*: Significant at P ≤ 0.05

Table (4): Mean distribution of the participants according to their intensity of post-hysterectomy pain using VAS

Mean pain intensity	Study group (n=40)			Control group (n=40)			T- test(P)
	Before	After	Mean Change	Before	After	Mean Change	
	Mean ±SD	Mean ±SD		Mean ±SD	Mean ±SD		
1st session	8.98 ± 0.730	5.42 ± 1.647	-3.56	8.90 ± 0.900	9.25 ± 1.104	0.35	Before: 0.437(0.664) After: 12.217 (<0.0001)**
F(P)	12.498 (<0.0001)**			1.554 (0.124)			
2nd session	8.23 ± 0.891	4.17 ± 1.083	- 4.06	8.33 ± 0.952	8.75 ± 1.406	0.42	Before: 0.485 (0.629) After: 16.322 (<0.0001)**
F(P)	18.310 (<0.0001)**			1.564 (0.121)			
3rd session	6.68 ± 0.888	3.03 ± 1.074	- 3.65	6.95 ± 1.339	7.10 ± 1.280	0.15	Before: 1.062 (0.291) After: 15.405 (<0.0001)**
F(P)	16.565 (<0.0001)**			0.512 (0.610)			
4th session	5.70 ± 0.648	1.88 ± 0.853	-3.82	5.90 ± 0.588	6.13 ± 1.042	0.3.03	Before: 1.446 (0.152) After: 19.961 (<0.0001)**
F(P)	22.554 (<0.0001)**			1.2158 (0.228)			
5th session	5.00 ± 0.453	1.50 ± 0.599	-3.5	5.50 ± 0.452	5.42 ± 0.911	- 0.08	Before: 4.942 (0.002)* After: 22.739 (<0.0001)**
F(P)	29.475 (<0.0001)**			0.055 (0.956)			

F (P): F for One – Way ANOVA test & (P) for F test *: Significant at P ≤ 0.05 **: Highly Significant at P ≤ 0.05

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Table (5): Number and percent distribution of the participants according to their intensity of post-hysterectomy pain using JPOM

Sessions	Study group (n=40)				Control group (n=40)				F /X2 (P)
	Before		After		Before		After		
	No.	%	No.	%	No.	%	No.	%	
1st session									
- Mild	*0*	*00.00*	*14*	*35.00*	*0*	*00.00*	*0*	*00.00*	**Before:** 0.000 (1.000)
- Moderate	0	00.00	17	42.50	0	00.00	1	02.50	**After:**46.89(0.000)**
- Sever	40	100.0	9	22.50	40	100.0	39	97.50	
F /X2 (P)	50.61(0.000)**				1.013 (0.314)				
2nd session									
- Mild	0	00.00	20	50.00	0	00.00	0	00.00	**Before:** 1.219 (0.544)
- Moderate	8	20.00	11	27.50	6	15.00	8	20.00	
- Sever	28	70.00	9	22.50	32	80.00	30	75.00	**After:** 27.90 (0.000)**
- Intolerable	4	10.00	0	00.00	2	05.00	2	05.00	
F /X2 (P)	50.61 (0.000)**				3.065(0.219)				
3rd session									
- Mild	0	00.00	25	62.50	0	00.00	0	00.00	**Before:** 0.056 (0.813)
- Moderate	14	35.00	10	25.00	13	32.50	9	22.50	**After:** 51.29 (0.000)**
- Sever	26	65.00	5	12.50	27	67.50	31	77.50	
F /X2 (P)	43.21(0.000)**				1.003 (0.317)				
4th session									
- Mild	0	00.00	36	90.00	0	00.00	0	00.00	**Before:**4.501 (0.105)
- Moderate	30	75.00	4	10.00	28	70.00	23	57.50	**After:**66.21 (0.000)**
- Sever	10	25.00	0	00.00	12	30.00	17	42.50	
F /X2 (P)	65.88(0.000)**				10.323(0.006)				
5thsession									
- Mild	0	00.00	38	95.00	0	00.00	2	05.00	**Before:**0.213 (0.644)
- Moderate	38	95.00	2	05.00	37	92.50	33	82.50	**After:**64.86 (0.000)**
- Sever	2	05.00	0	00.00	3	07.50	5	12.50	
F /X2 (P)	72.40(0.000)**				2.729 (0.256)				

χ^2 (P): Chi-Square Test &P for χ^2 Test F (P): Fisher Exact test &P for F Test

*: Significant at P ≤ 0.05 **: Highly Significant at P ≤ 0.05

Table (6): Mean distribution of the participants according to their systolic blood pressure

Mean systolic blood pressure	Study group (n=40)			Control group (n=40)			T- test(P)
	Before	After	Mean Change	Before	After	Mean Change	
	Mean ±SD	Mean ±SD		Mean ±SD	Mean ±SD		
1st session	124.62 ± 7.196	116.75 ± 4.606	- 7.87	122.88 ± 6.969	124.63 ± 7.196	1.75	Before: 1.099 (0.275) After: 5.833 (<0.0001)**
F(P)	5.8257 (<0.0001)**			1.1049 (0.273)			
2nd session	125.87 ± 3.871	113.13 ± 4.339	- 12.74	123.88 ± 6.951	123.62 ± 7.678	- 0.26	Before: 1.582 (0.1177) After: 7.523(<0.0001)**
F(P)	13.857(<0.0001)**			0.1588 (0.874)			
3rd session	121.25 ± 4.494	112.00 ± 3.889	- 9.25	119.62 ± 4.081	121.13 ± 5.603	1.51	Before: 1.698 (0.093) After: 8.466 (<0.0001)**
F(P)	9.8437(<0.0001)**			1.378 (0.172)			
4th session	118.37 ± 3.821	111.87 ± 3.337	- 6.5	117.35 ± 5.305	117.10± 4.797	- 0.25	Before: 0.9867 (0.3268) After: 5.660 (<0.0001)**
F(P)	9.8437(<0.0001)**			0.2211 (0.826)			
5th session	116.00 ± 9.222	112.00 ± 4.051	- 4	113.50 ± 4.696	114.63 ± 5.357	1.13	Before: 1.528 (0.1306) After: 2.477 (0.015)*
F(P)	2.5116 (0.014)*			1.003 (0.319)			

F (P): F for One – Way ANOVA test & (P) for F test *: Significant at P ≤ 0.05 **: Highly Significant at P ≤ 0.05

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Table (7): Mean distribution of the participants according to their diastolic blood pressure& pulse rate

Mean diastolic blood pressure	Study group (n=40)			Control group (n=40)			T- test(P)
	Before	After	Mean Change	Before	After	Mean Change	
	Mean ±SD	Mean ±SD		Mean ±SD	Mean ±SD		
1st session	82.75 ± 3.747	74.13 ± 4.220	- 8.62	81.38 ± 4.667	82.75 ± 3.572	1.37	Before: 1.447 (0.152) After: 9.861(0.000)**
F(P)	9.6604 (0.000)**			1.4743 (0.144)			
2nd session	83.00 ± 2.953	72.88 ± 3.180	- 10.12	81.37 ± 5.683	81.13 ± 4.735	- 0.24	Before: 1.609 (0.111) After: 9.148 (0.000)**
F(P)	14.7488 (0.000)**			0.205 (0.838)			
3rd session	81.75 ± 4.378	73.50 ± 3.242	- 8.25	80.70 ± 4.527	80.87 ± 5.175	0.17	Before: 1.054 (0.295) After: 7.633 (0.000)**
F(P)	10.739 (0.000)**			1.1498(0.2537)			
4th session	80.25 ± 4.929	72.37± 3.578	- 7.88	78.63 ± 4.934	79.50 ± 4.356	0.87	Before: 1.469 (0.1458) After:7.595 (0.000)**
F(P)	8.1825(0.000)**			1.7969 (0.076)			
5th session	76.88 ± 5.849	73.00 ±4.051	- 3.88	74.88 ± 5.369	76.00 ± 5.570	1.12	Before: 1.593 (0.115)After:2.755 (0.000)**
F(P)	3.449 (0.000)**			0.9156 (0.363)			

Mean pulse rate	Study group (n=40)			Control group (n=40)			T- test(P)
	Before	After	Mean Change	Before	After	Mean Change	
	Mean ±SD	Mean ±SD		Mean ±SD	Mean ±SD		
1st session	89.25±4.223	79.58±4.489	-9.67	87.70±4.778	90.98±3.278	3.28	Before: 1.5373 (0.1283) After: 12.664 (<0.0001)**
	9.923 (<0.0001)**			3.580 (0.001)*			
2nd session	87.50±4.139	76.85±5.087	-10.65	86.33±4.654	87.35±5.400	1.02	Before: 1.188 (0.2384) After: 8.951(<0.0001)**
	10.271(<0.0001)**			1.792 (0.077)			
3rd session	85.58±3.493	74.85±4.336	-10.73	85.03±4.406	86.18±5.420	1.15	Before: 1.188 (0.2384) After: 8.951(<0.0001)**
F(P)	12.4948(<0.0001)**			1.041 (0.3010)			
4th session	79.45±3.876	71.08±2.823	- 8.37	80.17±5.706	81.50±6.610	1.33	Before: 1.188 (0.2384) After: 8.951(<0.0001)**
F(P)	12.359 (<0.0001)**			1.3254 (0.1889)			
5th session	79.55±4.602	70.92±2.005	-9.63	80.87±5.858	79.26±5.762	0.39	Before: 1.1207 (0.2659) After: 8.6458 (<0.0001)**
F(P)	12.13(0.000)**			0.3025 (0.7631)			

F (P): F for One – Way ANOVA test & (P) for F test *: Significant at P ≤ 0.05 **: Highly Significant at P ≤ 0.05