# Research on the Effect of Progressive Muscle Relaxation Therapy in Patients with Thyroid Cancer

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**Abstract:** *This current academic undertaking investigated the efficacy of the muscle relaxation therapy to thyroid cancer patients who underwent thyroid surgery in terms of their anxiety, symptoms of depression, sleep and quality of life. Specifically, it described the profile of the respondents in terms of their sex, mean age, and type of patients in the experiment; determined the respondents anxiety, symptoms of depression, sleep quality and quality of life before and after their thyroid surgery; tested differences of the variables when grouped according to their profile variables; established possible correealtion among the four variables; determined the efficacy of the muscle relaxation therapy on respondents' anxiety, symptoms of depression, sleep quality and quality of life; and proposed the efficacy of the muscle relaxation therapy in preventing anxiety and symptoms of depression as well as in improving thyroid cancer patients sleep quality and quality of life.*

**Keywords:** *Progressive Muscle Relaxation Therapy; Anxiety; Symptoms of Depression; Sleep and Quality of Life; Thyroid Cancer Patients*

## 1. Introduction

The subjects were 180 thyroid cancer patients diagnosed as thyroid cancer and planned to receive surgical treatment from Wanhua Hospital and Shanghai International Medical Center from January 2022 to June 2022 (the diagnosis and treatment criteria follow the NCCN 2014 thyroid cancer treatment guidelines); The patient has certain understanding ability, language expression ability and writing ability; The patient was informed and volunteered to participate in this study. Among the subjects, there was a history of sleep disorder, anxiety or depression, or other obvious causes of anxiety or depression, which affected the sleep and quality of life of the patients. Patients with thyroid cancer undergoing microwave ablation were divided into intervention group and control group. 90 patients treated in ward A were included in the intervention group. In the control group, 90 patients were treated in ward B. The purpose of this study was to explore the differences in mental health and quality of life of cancer patients before and after microwave ablation. On the basis of previous studies, this study decided to use progressive muscle relaxation therapy as the treatment method of the experimental group to explore whether this therapy is an effective means to restore the mental health and quality of life of cancer patients who have been cured.

From the perspective of psychology, this study takes patients with thyroid cancer who have undergone minimally invasive surgery as the subjects of investigation. The incidence of depression and anxiety in this population and its impact on sleep quality and quality of life were investigated through questionnaires. An exploratory study examined the effects of progressive muscle relaxation therapy on four variables: anxiety, depression, sleep quality and quality of life of patients with thyroid cancer. The comparison between the experimental group and the control group will objectively reflect the role of progressive muscle relaxation therapy in improving the mental health and quality of life of patients with thyroid cancer.

## 2. Methods

### 2.1 Research Design

In this study, the relationship between anxiety, depression, sleep quality and quality of life of patients

with thyroid cancer was measured by experimental methods, both inside and between subjects. When using this method, the researchers used four standardized questionnaires to collect, explain and analyze the quantitative data obtained from the interviewees, and compare the before and after and the control variables. This is to describe a phenomenon and its characteristics, and pay more attention to the description and psychological status of patients with thyroid cancer undergoing aggressive treatment. Similarly, this method used in the study simply describes the phenomena, groups and classifications in real life, and also examines the characteristics of a single sample in order to extend it to a single group by establishing the possible correlation between the four variables.

This study also adopts the control group experiment, also called parallel group experiment, which refers to an experimental method that has both experimental group and control group, and reveals the properties of things through comparison according to their similarities and differences. The purpose is to find out that the factor to be studied is the influence of the experiment by comparing the results of the experiment, so as to provide factual basis and direct evidence for scientific research. In medicine, psychology, education and other fields, there is a saying that "there is no experiment without control". Therefore, whether there is an appropriate control experiment will affect the research results in many cases[1]. In this study, patients with thyroid cancer undergoing microwave ablation were divided into intervention group and control group. 90 patients treated in ward A were included in the intervention group. In the control group, 90 patients were treated in ward B. The purpose of this study was to explore the differences in mental health and quality of life of cancer patients before and after microwave ablation. On the basis of previous studies, this study decided to use progressive muscle relaxation therapy as the treatment method of the experimental group to explore whether this therapy is an effective means to restore the mental health and quality of life of cancer patients who have been cured.

### 2.2 Participants

This study was carried out in Yantai Wanhua Hospital and Shanghai International Medical Center. The subjects were 180 thyroid cancer patients selected from the inpatients of Wanhua Hospital and Shanghai International Medical Center from January 2022 to June 2022. The subjects were diagnosed as thyroid cancer by histological biopsy and pathology, and planned to receive ultrasound-guided microwave surgery treatment (the diagnosis and treatment criteria follow the NCCN 2014 guidelines for thyroid cancer treatment); The patient has certain understanding ability, language expression ability and writing ability; The patient was informed and volunteered to participate in this study. Among the subjects, there was a history of sleep disorder, anxiety or depression, or other obvious causes of anxiety or depression, which affected the sleep and quality of life of the patients. Subjects will be randomly divided into 90 patients in the experimental group and 90 patients in the control group. They will undergo the same operation method, and their anxiety, depression index, sleep quality and quality of life will be uniformly evaluated before the operation.

### 2.3 Data Analysis

SPSS 26.0 was used for statistical analysis of the data, and the measurement data was described with ± s; The counting data is described by frequency and composition ratio. If the difference between the scores of the scale before and after the operation is subject to normal distribution or approximate normal distribution, the matched samples t-test shall be used; if not, the Wilcoxon test shall be used; For comparison between sex and treatment groups, if the data obey normal distribution or approximate normal distribution, use two independent samplest-test; if not, use Mann-Whitney U; Correlation If the data obey normal distribution or approximate normal distribution, Pearson correlation analysis shall be used; if not, Spearman correlation analysis shall be used, significance level α= 0.05.

## 3. Results and discussion

Table 1 shows the basic information of the respondents in this study. There are 180 respondents in total. The average age of the respondents is 49.45. There are more middle-aged and elderly people. Previous research data show that the age of thyroid cancer patients is 48.62, which is similar to the results of this study; Among the interviewees, 78 are men, accounting for 43.3% of the total number of interviewees, and 102 are women, accounting for 56.7% of the total number of interviewees. According to the previous research, the ratio of male to female incidence rate is about 1:3, and the incidence rate of male patients is lower than that of female patients. This selection of interviewees is inconsistent with this data; From the perspective of the treatment methods of the interviewees, the number of thyroid cancer

patients who participated in microwave ablation treatment was 180.

*Table 1: Profile Distribution of the Respondents*

*N = 180*

| Profile | Frequency (*f*) | Percentage (%) |
|---|---|---|
| **Sex** | | |
| Male | 78 | 43.3 |
| Female | 102 | 56.7 |
| | | |
| **AGE** | **49.17(mean age)** | |
| **Patient** | | |
| Control group | 90 | 50.0 |
| Experimental Group | 90 | 50.0 |

From the data obtained in this study, we can see that the average age of thyroid cancer is 49.17 years old, which is consistent with most other studies. For example, Yang Peng et al. (2013)[2] found that the average age of onset of 793 lung cancer patients was 57.56 years old, and Chen Zitong et al. (2020) calculated that the average age of onset of 10183 gastric cancer patients was 72.45 years old. Compared with the onset age of most other cancers, the onset age of thyroid cancer is younger. Compared with gender characteristics, most of the previous literature reports that the male incidence rate is significantly higher than the female, with a ratio of 1:3 or 1:2[3], which is not consistent with the conclusions of this survey. The reasons for the analysis are as follows: Wanhua Hospital is an enterprise hospital subordinate to Wanhua Group. As a chemical enterprise, the gender ratio of workers in the whole group is 4:1. Since Wanhua Hospital mainly provides physical examination and medical services for nearly 20000 employees of Wanhua Group, the number of male patients in the whole patient group is far higher than that of female patients. Although the subjects of this study are patients from two research units, Yantai Wanhua Hospital in Shandong Province and Shanghai International Medical Center, because the number of male patients in Yantai Wanhua Hospital is far higher than that of female patients, the number of male patients in the whole study data is more than that of female patients, which is inconsistent with the research results of other research centers. In recent years, because of the application of new technologies to treat diseases and the continuous education of patients, the majority of patients have a better and clearer understanding of the harm of thyroid cancer.

*Table 2: Respondents Anxiety level*

*N= 180, alpha = 0.05*

| | Preoperative [n/(%)] | | Postoperative [n/(%)] | |
|---|---|---|---|---|
| | Control group | Experimental group | Control group | Experimental group |
| anxiety-free (-49) | 0(0.0) | 0(0.0) | 71(78.9) | 6(6.7) |
| Mild anxiety(50-59) | 5(5.6) | 4(4.4) | 19(21.1) | 73(81.1) |
| Moderate anxiety(60-69) | 48(53.3) | 47(52.2) | 0(0.0) | 11(12.2) |
| Severe anxiety(70-) | 37(41.1) | 39(43.3) | 0(0.0) | 0(0.0) |

Table 2 shows that before the operation, the anxiety of the respondents in the control group and the test group was very serious, and more than 90% of the patients were in moderate anxiety or above. After the operation, the anxiety of the control group and the test group was significantly reduced, and the anxiety of the test group was significantly lower than that of the control group.

Patients with thyroid cancer will inevitably have anxiety during and after surgery since they are diagnosed as cancer. Some studies have shown that the incidence of anxiety in cancer patients during treatment is as high as 86.67%[4]. This study proves that the anxiety of the respondents has proved that 90% of the patients are in moderate or above anxiety state, which will cause physical and psychological damage to the patients. In this study, the main reason why thyroid cancer patients have higher anxiety than other cancer patients may be that thyroid cancer patients have a close relationship with emotion. Most thyroid cancer patients are in anxiety, which is also one of the main factors of thyroid cancer. Faced with such a serious anxiety disorder, more medical teams should pay attention to it and propose solutions.

*Table 3: Respondents Depression level*

*N= 180, alpha = 0.05*

| | Preoperative [n/(%)] | | Postoperative [n/(%)] | |
|---|---|---|---|---|
| | Control group | Experimental group | Control group | Experimental group |
| non-depression (-0.49) | 0(0.0) | 0(0.0) | 37 (41.1) | 0 (0.0) |
| Mild depression(0.50-0.59) | 18(20.0) | 23(25.6) | 43 (47.8) | 8 (8.9) |
| Moderate depression(0.60-0.69) | 62(68.9) | 61(67.8) | 10 (11.1) | 69 (76.7) |
| Severe depression(0.70-) | 10(11.1) | 6(6.7) | 0(0.0) | 13(14.4) |

Table 3 shows that before the operation, the depression in the control group and the test group was very serious. After the operation, the depression in the control group and the test group was significantly reduced, and the depression in the test group was significantly lower than that in the control group.

Most of the previous literature shows that tumor patients have different degrees of depression in various parts of the body, for example, depression is more common in patients with breast cancer and gastrointestinal cancer. However, the survey of 180 thyroid cancer patients in this study shows that their depression is still very common. As mentioned earlier, thyroid cancer is closely related to patients' negative emotions.

*Table 4: Respondents Sleep Quality*

*N= 180, alpha = 0.05*

| | Preoperative [n/(%)] | | Postoperative [n/(%)] | |
|---|---|---|---|---|
| | Control group | Experimental group | Control group | Experimental group |
| Sleep quality is good(-7) | 0 (0.0) | 0 (0.0) | 9 (10.0) | 0 (0.0) |
| Poor sleep quality(7-14) | 42 (46.7) | 45 (50.0) | 69 (76.7) | 41 (45.6) |
| Sleep quality is terrible(14-) | 48 (53.3) | 45 (50.0) | 49 (13.3) | 49 (54.4) |

Table 4 shows that before the operation, the sleep condition of the control group and the test group was poor, and more than 50% of the patients seriously affected the sleep treatment. After the operation, the sleep status of the control group and the test group increased significantly, and the sleep status of the test group was significantly higher than that of the control group.

Li Jiangfeng et al. (2017)[5] found that the incidence of sleep disorders in cancer patients was 51.6%, significantly higher than 29.38% of the urban general population. This study found that the incidence of severe sleep disorders in patients with thyroid cancer was also more than 50%. The main reason for sleep disorders in cancer patients was the psychological pressure of cancer fear, the pain of surgery, economic pressure, and cancer pain. During the treatment of cancer patients, poor sleep quality will affect the disease development and psychological status of patients, and it is easy to form a vicious circle. Therefore, improving the sleep quality of cancer patients is a very important issue.

Table 5 shows that before the operation, the quality of life of the control group and the test group was poor, and almost all patients' quality of life did not reach a good level. More than 56% of patients in both groups were in a poor quality of life state before the operation. After surgery, the quality of life in the control group and the test group increased significantly, and the quality of life in the test group was significantly higher than that in the control group. There are also many studies on the decline of the quality of life of cancer patients.

The study of Yang Deng et al. (2021) showed that the quality of life of elderly cancer patients was seriously reduced. Ren Zhiling et al. (2019)[6] found that the sense of shame of lung cancer patients was at a medium to high level, with low social support and poor quality of life. Dong Xian (2019)[7] found that the treatment cycle of cancer chemotherapy patients is long, and the patients' self-feeling burden is

extremely serious. This study also found that the proportion of thyroid cancer patients with poor quality of life exceeded 56%. This will seriously affect the mood of patients, and cause a shadow play for the smooth treatment and postoperative rehabilitation in the future.

*Table 5: Respondents Quality Of Life*

*N= 180, alpha = 0.05*

|  | Preoperative [n/(%)] | | Postoperative [n/(%)] | |
|---|---|---|---|---|
|  | Control group | Experimental group | Control group | Experimental group |
| Quality of life is terrible(-20) | 0 (0.0) | 1 (1.1) | 0 (0.0) | 1 (1.1) |
| Poor quality of life(21-30) | 56 (62.2) | 51 (56.7) | 8 (8.9) | 40 (44.4) |
| Average quality of life(31-40) | 33 (36.7) | 38 (42.2) | 63 (70.0) | 49 (54.4) |
| The quality of life is better(41-50) | 1 (1.1) | 0 (0.0) | 19 (21.1) | 0 (0.0) |
| Good quality of life(51-60) | 0 (0.0) | 0 (0.0) | 0 (0.0) | 0 (0.0) |

*Table 6: Difference of Anxiety with Profile*

*N= 180, alpha = 0.05*

| question | Preoperative ($\bar{x}\pm$s) | Postoperative ($\bar{x}\pm$s) | *t* | *P* |
|---|---|---|---|---|
| 1 I felt more nervous and anxious than usual | 2.89±0.79 | 2.79±1.02 | 1.036 | 0.302 |
| 2 I was worried for no reason | 2.98±0.85 | 2.79±1.01 | 2.070 | 0.040 |
| 3 I tend to get upset or panic | 2.91±0.81 | 2.87±0.97 | 0.443 | 0.659 |
| 4 I felt as if my body had been broken into pieces | 2.98±0.83 | 2.75±0.99 | 2.402 | 0.017 |
| 5 I feel that everything is going well and nothing bad is going to happen* | 1.97±0.79 | 2.33±1.04 | 3.714 | <0.001 |
| 6 My hands and feet trembled | 2.97±0.81 | 2.69±1.01 | 2.753 | 0.007 |
| 7 I am vexed with headache, neck pain and back pain | 2.99±0.81 | 2.76±1.01 | 2.417 | 0.017 |
| 8 I feel weak and tired easily | 3.02±0.82 | 2.77±0.99 | 2.456 | 0.015 |
| 9 I felt calm enough to sit still* | 1.96±0.85 | 2.19±0.99 | 2.301 | 0.023 |
| 10 I feel my heart beating faster | 2.93±0.88 | 2.67±1.05 | 2.517 | 0.013 |
| 11 I was sick with fits of vertigo | 2.98±0.82 | 2.77±0.99 | 2.373 | 0.019 |
| 12 I have a feeling of fainting | 2.90±0.83 | 2.74±1.07 | 1.582 | 0.115 |
| 13 I breathe in and out easily* | 2.01±0.85 | 2.24±1.02 | 2.331 | 0.021 |
| 14 I have numbness and tingling in my fingers and toes | 3.00±0.85 | 2.77±0.95 | 2.567 | 0.011 |
| 15 I'm suffering from a stomachache and indigestion | 3.05±0.87 | 2.62±1.02 | 4.292 | <0.001 |
| 16 I have to urinate often | 2.88±0.82 | 2.88±1.02 | 0.000 | 1.000 |
| 17 My hands are always warm and dry* | 1.92±0.83 | 2.31±1.25 | 3.843 | <0.001 |
| 18 I feel hot and red in the face | 2.99±0.80 | 2.80±1.02 | 2.042 | 0.043 |
| 19 I fall asleep easily and rest well at night* | 2.01±0.81 | 2.20±1.05 | 1.808 | 0.072 |
| 20 I had nightmares | 2.98±0.80 | 2.85±0.95 | 1.549 | 0.123 |

Note: Add the scores of 20 items to get a rough score. Multiply the rough score by 1.25 and take the whole number to get the standard score. Below 49 points are asymptomatic, 50-59 points are mild anxiety, 60-69 points are moderate anxiety, and>70 points are severe anxiety.

Table 6 shows that after intervention, the scores of all positive items of SAS scale decreased, while the scores of negative items increased. In the difference analysis of the total score of SAS scale before intervention (68.22 ± 4.88) and after intervention (50.26 ± 6.89), the results showed that the SAS score after intervention was significantly lower than that before intervention (P<0.001).

Some studies have shown that adequate communication before thyroid cancer surgery can fully understand the psychological state of patients before surgery, master the causes of patients' bad emotions,

and propose targeted psychological interventions, such as information support therapy, relaxation training, attention transfer therapy, music therapy, etc. This can help patients maintain physical and mental relaxation, effectively relieve pain during and after surgery, thus preventing and reducing complications, and shorten the length of hospital stay[8]. In this study, it was also found that the total score of SAS changed significantly before and after the intervention, from 68.22 ± 4.88 to the current (50.26 ± 6.89), and the anxiety of patients was also relieved, which proved the effectiveness of this measure (PMR) on anxiety relief.

*Table 7: Difference of Depression Level with Profile*

*N= 180, alpha = 0.05*

| question | Preoperative ($\bar{x}\pm$s) | Postoperative ($\bar{x}\pm$s) | *t* | *P* |
|---|---|---|---|---|
| 1 I think emotional excitement, melancholy | 2.99±0.82 | 2.74±1.01 | 2.650 | 0.009 |
| 2 I think the best mood is in the wee hours | 1.14±0.89 | 1.26±0.98 | 1.181 | 0.239 |
| 3 I'm going to cry or want to cry | 2.88±0.90 | 2.83±0.98 | 0.439 | 0.661 |
| 4 I don't sleep well at night | 2.97±0.87 | 2.82±1.06 | 1.485 | 0.139 |
| 5 I eat as much as I normally do* | 1.97±0.84 | 2.20±1.00 | 2.301 | 0.023 |
| 6 My sex function is normal* | 1.99±0.84 | 2.31±1.03 | 3.086 | 0.002 |
| 7 I think weight loss | 3.06±0.87 | 2.77±1.04 | 3.320 | 0.001 |
| 8 I'm upset about my constipation | 2.89±0.83 | 2.74±1.04 | 1.370 | 0.172 |
| 9 My heart beats faster than everyday | 2.91±0.82 | 2.83±0.99 | 0.885 | 0.377 |
| 10 I think I'm tired for no reason | 3.04±0.88 | 2.71±1.05 | 3.323 | 0.002 |
| 11 My mind was as clear as ever | 2.11±0.84 | 2.31±1.02 | 2.015 | 0.045 |
| 12 I do my work as if it were an ordinary day* | 2.04±0.86 | 2.23±1.00 | 1.819 | 0.071 |
| 13 I was restless and had trouble keeping calm | 2.99±0.80 | 2.82±1.02 | 1.824 | 0.070 |
| 14 I have hope for the future* | 2.09±0.77 | 2.18±0.99 | 0.864 | 0.389 |
| 15 I get angry more easily than normal | 3.08±0.80 | 2.78±1.06 | 2.887 | 0.004 |
| 16 I think it's easy to decide everything* | 2.01±0.89 | 2.29±1.01 | 2.728 | 0.007 |
| 17 I consider myself a useful and indispensable person | 2.09±0.83 | 2.16±1.03 | 0.743 | 0.458 |
| 18 My life is very meaningful* | 1.98±0.85 | 2.20±1.04 | 2.165 | 0.032 |
| 19 Others will be better off if I die | 3.04±0.84 | 2.76±1.06 | 2.787 | 0.006 |
| 20 I still love the things that I love everyday* | 2.03±0.82 | 2.22±0.99 | 1.936 | 0.054 |

Note: The depression severity index is calculated by the following formula: depression severity index=total score/80. The index is 0.25~1.0, <0.50 is no depression, 0.50~0.59 is mild depression, 0.60~0.69 is moderate depression, and>0.70 is severe depression.

Table 7 shows that after intervention, the scores of all positive items of SDS scale have decreased, while the scores of negative items have increased. In the analysis of the difference between the total score of SDS scale before intervention (0.63 ± 0.05) and after intervention (0.58 ± 0.86), the SDS score after intervention was significantly lower than that before intervention.

Meng Qingling (2010)[9] found that group psychotherapy can effectively relieve the depression of patients, and group psychotherapy is more effective than drug therapy alone. Chen Yan (2015)[10] also found that positive suggestion therapy has a good intervention effect on suicide ideation of patients with advanced cancer, eliminating some patients' suicidal tendencies and weakening suicide factors. Many different research teams have proved that the combination of psychological intervention and drug treatment can produce better results than drug treatment alone. This project confirmed that progressive muscle relaxation therapy can also reduce the depression of patients to a certain extent.

Table 8 shows that the scores of all dimensions of the PSQI scale decreased after the intervention. In the analysis of the difference between the total score of PSQI scale before intervention (14.00 ± 1.97) and after intervention (12.17 ± 2.97), the results showed that the score of PSQI after intervention was significantly lower than that before intervention (P<0.001), and the sleep quality was significantly relieved.

*Table 8: Difference of Sleep Quality with Profile*

*N= 180, alpha = 0.05*

| dimensionality | Preoperative ($\bar{x}\pm$s) | Postoperative ($\bar{x}\pm$s) | t | P |
|---|---|---|---|---|
| Subjective sleep quality | 2.03±0.87 | 1.69±1.07 | 3.317 | 0.001 |
| Delayed sleep | 1.98±0.83 | 1.74±1.00 | 2.425 | 0.016 |
| Sleep duration | 1.94±0.57 | 1.76±0.75 | 2.601 | 0.010 |
| Sleep efficiency | 2.04±0.82 | 1.67±1.07 | 3.529 | 0.001 |
| Sleep disorders | 2.00±0.26 | 1.76±0.40 | 7.385 | <0.001 |
| The use of sleep medications | 2.00±0.85 | 1.78±0.98 | 2.371 | 0.019 |
| Daytime dysfunction | 2.01±0.60 | 1.78±0.69 | 3.253 | 0.001 |

Note: Pittsburgh Sleep Quality Index (PSQI). The score of each sleep component ranges from 0 to 3, where 3 represents the largest dysfunction. The scores of sleep components are added to produce a total score ranging from 0 to 21. A higher total score (called global score) indicates poor sleep quality.

Jiang Aifei et al (2010)The effect of psychological intervention on patients with thyroid cancer undergoing radical surgery was studied. The research results also confirmed that relaxation training can help patients strengthen the control of their self-consciousness, balance the burden of bad emotions on the body, obtain the pleasure of relaxation, help patients fall asleep, improve sleep quality, reduce the impact of depression, anxiety and other bad emotions, which is very worthy of promotion and application. On the basis of previous studies, this study continues to explore the therapeutic value of progressive muscle relaxation therapy in patients undergoing minimally invasive surgery for thyroid cancer.

*Table 9: Difference of Quality of Life with Profile*

*N= 180, alpha = 0.05*

| question | Preoperative ($\bar{x}\pm$s) | Postoperative ($\bar{x}\pm$s) | t | P |
|---|---|---|---|---|
| appetite | 2.67±1.14 | 2.83±1.23 | 1.372 | 0.172 |
| spirit | 2.47±1.14 | 2.82±1.32 | 2.625 | 0.009 |
| sleep | 2.48±1.10 | 2.75±1.35 | 2.065 | 0.04 |
| exhausted | 2.46±1.16 | 2.73±1.31 | 2.047 | 0.042 |
| pain | 2.62±1.12 | 2.87±1.30 | 1.999 | 0.047 |
| Family understanding and cooperation | 2.50±1.15 | 2.81±1.26 | 2.409 | 0.017 |
| Understanding and cooperation from colleagues (including leaders) | 2.48±1.10 | 2.83±1.25 | 2.832 | 0.005 |
| Your own knowledge of cancer | 2.48±1.16 | 2.69±1.34 | 1.705 | 0.09 |
| Attitudes towards treatment | 2.36±1.12 | 2.72±1.27 | 2.872 | 0.005 |
| daily life | 2.48±1.12 | 2.91±1.30 | 3.549 | <0.001 |
| Side effects of treatment | 2.34±1.11 | 2.84±1.29 | 4.059 | <0.001 |
| facial expression | 2.46±1.09 | 2.77±1.30 | 2.438 | 0.016 |

Note: The full score of quality of life is 60 points, the good score is 51-60 points, the good score is 41-50 points, the general score is 31-40 points, the poor score is 21-30 points, and the extremely poor quality of life is<20 points.

Table 9 shows that the quality of life of patients is very low both before and after intervention. However, after intervention, the scores of all items in the QOL scale increased. In the difference analysis of the total score of QOL scale before intervention (29.80 ± 4.01) and after intervention (33.56 ± 5.53), the results showed that the score of QOL after intervention was significantly higher than that before intervention (P<0.001), and the quality of life was significantly improved.

Dong Xian (2019) [11]found that during the treatment of cancer patients undergoing chemotherapy, they can master their mentality through psychosocial support mode, help them improve their self-confidence, and improve their quality of life. In order to improve the quality of life according to the quality of life of cancer patients, researchers are using yoga as a treatment technology, and the results are remarkable (Liu Deng et al., 2021). Zhao Hongcai and Wang Xuhong (2019)[12] confirmed through the study of the effect of cognitive behavior intervention on the perioperative period of thyroid cancer patients that the cognitive behavior intervention measures for thyroid cancer patients during the perioperative period can alleviate the negative emotions of patients, effectively improve the psychological state of patients during the perioperative period, and improve the quality of life of patients after surgery. This study proves that the quality of life of patients with thyroid cancer before and after

surgery is at a low score. Considering the fact that patients have thyroid cancer in a short time, surgical trauma and fear of recurrence after surgery, it is also reasonable to conclude that the quality of life of patients with thyroid cancer is low in this study.

*Table 10: Participants Level of Anxiety Before and After the PMR*

N= 180, alpha = 0.05

|  | Preoperative [n/(%)] | Postoperative [n/(%)] | $\chi^2$ | P |
|---|---|---|---|---|
| anxiety-free (-49) | 0 (0.0) | 71 (78.9) | -12.013 | <0.001 |
| Mild anxiety(50-59) | 5 (46.7) | 19 (21.1) |  |  |
| Moderate anxiety(60-69) | 48 (53.3) | 0 (0.0) |  |  |
| Severe anxiety(70-) | 37 (41.1) | 0 (0.0) |  |  |

Table 10 showed that there was a significant difference in anxiety before and after PMR treatment, and there was a significant reduction in anxiety level after surgery.

Progressive muscle relaxation training has been widely used in cancer patients, such as breast cancer, thyroid cancer, lung cancer, gynecological malignancies, urinary malignancies, leukemia and lymphoma, and has achieved varying degrees of efficacy. Yang Manli et al. (2020)[13], after studying the application of progressive muscle relaxation training in cancer patients, concluded that progressive muscle relaxation therapy can improve the negative emotions of cancer patients, reduce nausea, vomiting and other side effects after chemotherapy, improve fatigue and sleep, and improve the quality of life, which is very beneficial to cancer patients. This research project has also achieved satisfactory results through progressive muscle relaxation training for patients with thyroid cancer.

*Table 11: Respondents Depression level*

N= 180, alpha = 0.05

|  | Preoperative [n/(%)] | Postoperative [n/(%)] | $\chi^2$ | P |
|---|---|---|---|---|
| non-depression (-0.49) | 0 (0.0) | 37 (41.1) | -9.632 | <0.001 |
| Mild depression(0.50-0.59) | 18 (20.0) | 43 (47.8) |  |  |
| Moderate depression(0.60-0.69) | 62 (68.9) | 10 (11.1) |  |  |
| Severe depression(0.70-) | 10 (11.1) | 0 (0.0) |  |  |

Table 11 shows that there is a significant difference in the depression of the subjects before and after PMR treatment, and the depression level of the subjects after surgery has a significant reduction.

Bai Lili et al., (2017)[14] To study the effect of progressive muscle relaxation training on the psychological and treatment compliance of patients with hospital-acquired pneumonia. The results show that progressive muscle relaxation training can significantly alleviate the anxiety and depression levels of patients with pneumonia. Among the patients in this experimental group, the proportion of patients with moderate anxiety level who did not undergo muscle training before surgery was as high as 68.9%. After receiving progressive muscle relaxation training, the proportion of patients with moderate anxiety level was significantly reduced to 11.1%. It can be seen that this treatment still has a significant effect in reducing the anxiety of patients, which is also close to the previous research results.

*Table 12: Respondents Sleep Quality*

N= 180, alpha = 0.05

|  | Preoperative [n/(%)] | Postoperative [n/(%)] | $\chi^2$ | P |
|---|---|---|---|---|
| Sleep quality is good(-7) | 0 (0.0) | 9 (10.0) | -6.064 | <0.001 |
| Poor sleep quality(7-14) | 42 (46.7) | 69 (76.7) |  |  |
| Sleep quality is terrible(14-) | 48 (53.3) | 12 (13.3) |  |  |

Table 12 shows that after PMR treatment, there is a significant difference in the sleep status of the subjects before and after the operation, and the sleep status of the subjects has a significant increase.

Wang Qin, &Jiang Xuelong (2020)[15] By studying the effect of progressive muscle relaxation training on the sleep quality of patients with chronic obstructive pulmonary disease, it was finally confirmed that 68 patients could effectively improve the sleep of patients with chronic obstructive pulmonary disease after 8 weeks of progressive muscle relaxation training. Wang Hongwei et al., (2020)[16]. Study the effect

of progressive muscle relaxation training on the sleep quality and psychological state of thyroid cancer patients treated with iodine 131, and also conclude that progressive muscle training can effectively relieve anxiety and depression of thyroid cancer patients treated with iodine 131, and improve sleep quality and quality of life. In the experimental group in this study, 53.3% of patients had serious sleep problems before surgery. After the treatment of progressive muscle relaxation therapy, only 13.3% of patients had serious sleep quality problems. It can be seen that progressive muscle relaxation training has a very good effect on the sleep quality of thyroid cancer patients.

*Table 13: Respondents Quality of life*

| N= 180, alpha = 0.05 | Preoperative [n/(%)] | Postoperative [n/(%)] | $\chi^2$ | P |
|---|---|---|---|---|
| Quality of life is terrible(-20) | 0 (0.0) | 0 (0.0) | | |
| Poor quality of life(21-30) | 56 (62.2) | 8 (8.9) | | |
| Average quality of life(31-40) | 33 (36.7) | 63 (70.0) | 7.801 | <0.001 |
| The quality of life is better(41-50) | 1 (1.1) | 19 (21.1) | | |
| Good quality of life(51-60) | 0 (0.0) | 0 (0.0) | | |

Table 13 shows that the quality of life of the subjects after PMR treatment is significantly different, and the quality of life of the subjects after surgery is significantly improved.

Hou Ningrui et al., (2017)[17] To study the effect of progressive muscle relaxation training on anxiety, depression and quality of life of breast cancer patients during perioperative period. The results show that after 5 weeks of progressive muscle relaxation training, breast cancer patients can not only alleviate their negative emotions but also improve their quality of life. Wei Jiao et al., (2016) [18]It also studied the effect of progressive muscle relaxation training on depression, anxiety and quality of life of breast cancer patients in the perioperative period. The results also proved that for breast cancer patients, progressive muscle relaxation training in the perioperative period can effectively alleviate the depression of patients, eliminate anxiety, and improve the quality of life of patients, which is worth popularizing in clinical practice. In this study, 62.2% of patients had poor quality of life before surgery. After the training of progressive muscle relaxation therapy, the number dropped to 8.9%. The reason for the remarkable effect should also be taken into account that after surgery, minimally invasive surgery makes patients recover quickly, without scars, and the psychological pressure of patients is relatively low.

*Table 14: Correlation Matrix of the Four Variables*

*N= 180, alpha = 0.05(Preoperative)*

| | | DEPRESSION | ANXIETY | SLEEP QUALITY | QUALITY OF LIFE |
|---|---|---|---|---|---|
| DEPRESSION | Pearson Correlation | 1 | -0.051 | 0.080 | 0.188 |
| | Sig. (2-tailed) | | 0.500 | 0.284 | 0.012 |
| ANXIETY | Pearson Correlation | -0.051 | 1 | -0.055 | 0.048 |
| | Sig. (2-tailed) | 0.500 | | 0.460 | 0.525 |
| SLEEP QUALITY | Pearson Correlation | 0.080 | -0.055 | 1 | 0.015 |
| | Sig. (2-tailed) | 0.284 | 0.460 | | 0.838 |
| QUALITY OF LIFE | Pearson Correlation | 0.188[*] | 0.048 | 0.015 | 1 |
| | Sig. (2-tailed) | 0.012 | 0.525 | 0.838 | |

**. Correlation is significant at the 0.01 level (2-tailed).

*Table 15: Correlation Matrix of the Four Variables*

*N= 180, alpha = 0.05(Postoperative)*

| | | Depression | Anxiety | Sleep Quality | Quality of Life |
|---|---|---|---|---|---|
| DEPRESSION | Spearman Correlation | 1 | .509[**] | .479[**] | -.410[**] |
| | Sig. (2-tailed) | | <0.001 | <0.001 | <0.001 |
| ANXIETY | Spearman Correlation | .509[**] | 1 | .401[**] | -.476[**] |
| | Sig. (2-tailed) | <0.001 | | <0.001 | <0.001 |
| SLEEP QUALITY | Spearman Correlation | .479[**] | .401[**] | 1 | -.363[**] |
| | Sig. (2-tailed) | <0.001 | <0.001 | | <0.001 |
| QUALITY OF LIFE | Spearman Correlation | -.410[**] | -.476[**] | -.363[**] | 1 |
| | Sig. (2-tailed) | <0.001 | <0.001 | <0.001 | |

**. Correlation is significant at the 0.01 level (2-tailed).

Table 14 and Table 15 showed that only the QOL scale and SDS scale had weak correlation before intervention (r=0.188, P=0.012), and there was no correlation between the other scales (P>0.05); With the intervention, there was significant correlation between the four scales after the intervention (P<0.001).

Tang Wei et al., (2009)[19] A correlation study was conducted on 108 adult epilepsy patients' quality of life with anxiety and depression. The results showed that the quality of life of epilepsy patients was poor, and their depression and anxiety were obvious. Their quality of life was closely related to anxiety and depression. Liu Liu et al., (2019)[20], after a study on the correlation between psychological resilience and anxiety, depression and quality of life in patients with liver cancer after surgery, proved that there was a significant negative correlation between the quality of life and the level of anxiety and depression in patients with cancer after surgery. Therefore, reducing the anxiety and depression of patients can improve their quality of life. This study also shows that after the gradual muscle relaxation therapy, the quality of sleep and quality of life of patients will also improve after the improvement of anxiety and depression levels. There is obvious correlation between the four indicators.

## 4. Conclusions

Most of the patients are women over the age of 46. The ratio of men to women is about one to two. When compared with normal people, cancer patients have higher levels of anxiety and depression, worse sleep quality and significantly reduced quality of life. Before the muscle relaxation therapy was administered, no significant differences in depression, anxiety, sleep quality or quality of life were found between the experimental and control groups. After the muscle relaxation therapy was implemented, the comparison between the experimental group and the control group showed that the depression level and anxiety level of the experimental group were significantly lower than that of the control group, and the sleep quality and quality of life of the experimental group were significantly better than that of the control group. After the muscle relaxation therapy was implemented, it was found that the depression and anxiety levels of the subjects in the experimental group were significantly lower than before the therapy, and the sleep quality and quality of life of the subjects in the experimental group were also significantly improved. On the depression scale, there was no significant difference in questions about whether the heart beat faster than usual. The results for this problem were not significant, suggesting that muscle relaxation therapy does not have a particularly significant effect on symptoms such as heart palpitations. It's also possible that patients with long-term cancer don't recognize the sensation of a heartbeat immediately after treatment, so the difference in outcomes isn't significant. On the anxiety scale, there was no significant difference in whether the heart beat faster than usual. The results for this problem were not significant, suggesting that muscle relaxation therapy does not have a particularly significant effect on symptoms such as heart palpitations. It's also possible that patients with long-term cancer don't recognize the sensation of a heartbeat immediately after treatment, so the difference in outcomes isn't significant. There was also no significant difference in results comparing whether patients urinated frequently, a question that asks people whether they had to urinate frequently, an indicator that is less closely related to cancer and more to their daily habits. Against this backdrop, it is understandable that the results of this indicator do not differ significantly. There was no significant difference in the bedtime results on the sleep questionnaire, which asks for a specific time to prepare for bed, which is clearly more related to personal habits. The effect of muscle relaxation therapy is very short compared to the amount of time an individual decides to go to bed and rest. It's not enough to just change a person's sleep and rest habits. So, obviously, this one is not affected by muscle relaxation therapy. Not surprisingly, there was no significant effect on changes in bedtime before and after muscle relaxation therapy. Again, not surprisingly, the results of question 17 were not significant. The question asked participants whether they felt sleepy while driving, eating and socializing during a month. This indicator clearly does not fit the reality of cancer patients. It's no secret that cancer patients are nearly zero likely to have driven in the last month, let alone been sleepy behind the wheel. Most cancer patients have their meals in the hospital during the last month, and the hospital diet is very simple, and cancer patients have to pay special attention to their diet, so the index of feeling sleepy during meals is not significant. What's more, muscle relaxation therapy works on the patient itself and has little impact on external factors, especially the patient's diet, so it is less likely to have a refreshing or hypnotic effect on the patient's diet. In terms of social interaction, cancer patients have very few social interactions, mainly with family and friends, so the social habits you had before you had the disease will continue after you have the disease, such as sleeping, which is a difficult habit to change, and muscle relaxation therapy is so transient that it is impossible to affect sleepiness during social activities. There was no significant difference in the quality of life questionnaire (QOL) on whether appetite was normal or not. As we all know, cancer can seriously affect the quality of life of patients, the quality of life of patients with cancer will definitely be seriously reduced. As an important measure of

quality of life, appetite has become a very serious consideration item, which not only affects people's quality of life, but also affects people's health status. In this study, there was no significant difference in patients' appetite before and after muscle relaxation therapy, indicating that muscle relaxation therapy has no significant effect on appetite recovery, at least not quickly. In addition, patients have a long recovery period after surgery, and it is not uncommon for appetite to decline consistently or even continuously during the recovery period. Therefore, it is reasonable to assume that patients' appetite did not improve significantly before and after muscle relaxation therapy.

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