

### Abstract

Patients clinically diagnosed with COVID-19 need to receive treatment in isolation to reduce person-to-person transmission of the virus. COVID-19 patients have been observed to experience an increase in anxiety and a reduction in sleep quality because of fear and uncertainty of the virus and isolation. Anxiety has been associated with reduced sleep quality, and both cause a decrease in immunity. It is important for patients' anxiety and sleep quality to be stable to maintain their immune systems. The use of benzodiazepine-type sleep-promoting drugs are commonly used to treat high levels of anxiety and reduced sleep quality. These drugs cause respiratory depression, which may delay diagnosis and compromise patients. So it is important for patients to use a non-pharmacological method to reduce their anxiety and improve their sleep quality.

This literature review reviewed the randomized controlled clinical study regarding progressive muscle relaxation (PMR) on COVID-19 patients and relevant publications. PMR, a deep muscle relaxation method, has been found to be effective in reducing patients' anxiety and improving their sleep quality in various clinical studies regarding other diseases. A total of 51 COVID-19 patients participated in the study, and 25 patients conducted PMR, while 26 did not and remained as the control group. The Spielberger State-Trait Anxiety Scale (STAI) and Sleep State Self-Rating Scale (SRSS) were used to measure patients' levels of anxiety and sleep quality before, after, and without PMR intervention. Review of the literature found PMR to be a successful method in improving COVID-19 patients' anxiety and sleep quality. PMR had a beneficial impact and significant difference regarding levels of anxiety ( $p < 0.001$ ) and sleep quality ( $p < 0.001$ ) in COVID-19 patients who conducted PMR.

### Statement of Problem

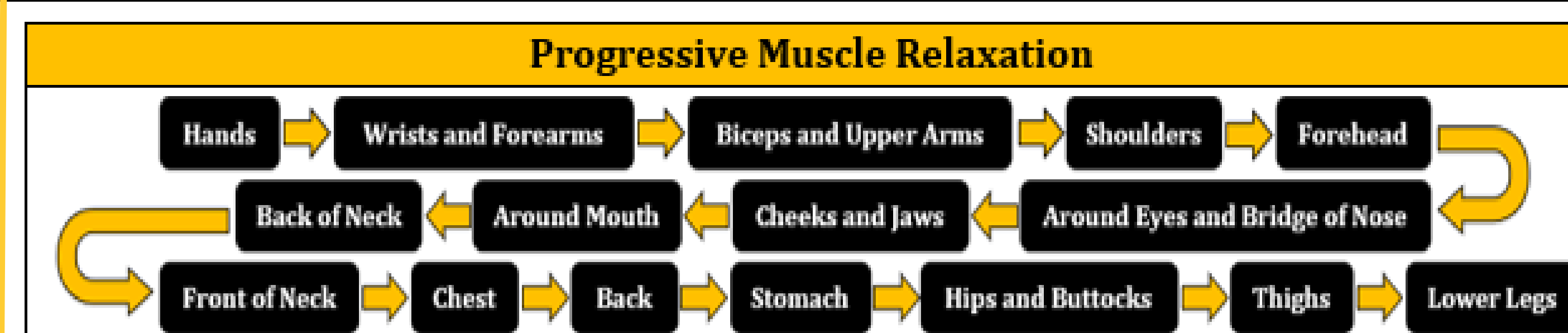
- COVID-19 patients experience high levels of anxiety and reduced sleep quality, which can lead to a decrease in immunity.
- Benzodiazepine-type sleep-promoting drugs are commonly used to treat high levels of anxiety and reduced sleep quality, but may cause respiratory depression.
- It is important to find a non-pharmacological method for COVID-19 patients to lower levels of anxiety and improve sleep quality.

### Systematic Literature Review

Publications were found through databases: PubMed and Google Scholars

- One randomized controlled clinical study: PMR on COVID-19 patients
  - 51 COVID-19 patients from Hainan General Hospital
  - 25 conducted PMR; 26 remained as control group
  - Spielberger State-Trait Anxiety Scale (STAI) and Sleep State Self-Rating Scale (SRSS) used to measure anxiety and sleep quality (important to note that patients self-reported)
- Relevant publications
  - Origins and mental effects of COVID-19
  - Effects of benzodiazepine-type sleep-promoting drugs on the respiratory system
  - PMR: What? & How?
  - PMR in randomized controlled clinical studies of other diseases

### Figures/Tables



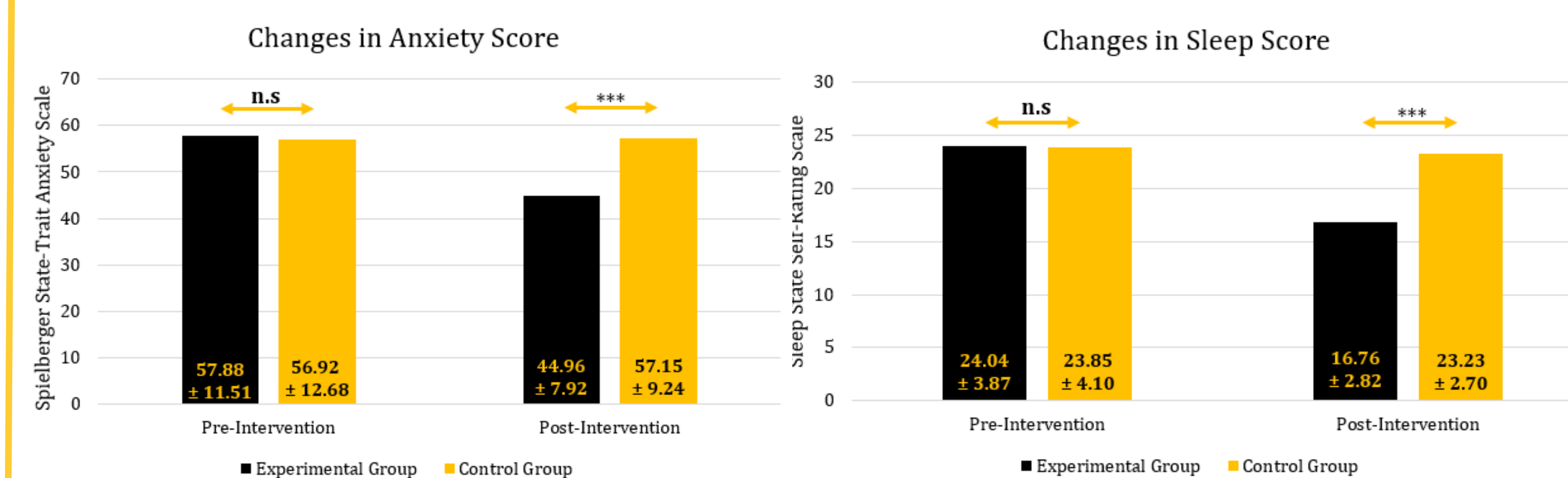
**Figure 1.** The order in which muscle groups are tensed during PMR is shown. Individuals lie down, breathe in, tense muscle group for 4-10 seconds, breathe out, relax for 10-20 seconds, and repeat all previous steps with next muscle group. PMR relieves muscle tension and decreases heart rate and blood pressure.

COVID-19 Patients' Demographic and Clinical Characteristics			
Variable	Experimental Group (n=25)	Control Group (n=26)	p-Value
Male	14 (56.00%)	14 (53.85%)	0.877
Female	11 (44.00%)	12 (46.15%)	0.877
Age (Years)			
20-35	4 (16.00%)	5 (19.23%)	1.000
36-50	8 (32.00%)	8 (30.77%)	0.925
51-65	9 (36.00%)	8 (30.77%)	0.692
>65	4 (16.00%)	5 (19.23%)	1.000
Clinical Symptoms			
Cough and Sputum	10 (40.00%)	11 (42.31%)	0.867
Fatigue	3 (12.00%)	4 (15.38%)	1.000
Headache	2 (8.00%)	3 (11.54%)	1.000
Haemoptysis	1 (4.00%)	1 (3.84%)	0.663
Diarrhoea	2 (8.00%)	3 (11.54%)	0.468
Dyspnoea	1 (4.00%)	3 (11.54%)	0.512
Asymptomatic	2 (8.00%)	3 (11.54%)	1.000
Lung CT Lesion			
Multiple lobes	17 (68.00%)	19 (73.07%)	0.691
Single lobe	8 (32.00%)	7 (26.92%)	0.691
Previous Sedative Use			
Benzodiazepines	3 (12.00%)	2 (7.69%)	0.963
Non-Benzodiazepines	2 (8.00%)	1 (3.85%)	0.972

**Table 1.** Demographic and clinical characteristics displayed for experimental and control group. No characteristics yielded major significance, and no characteristic was determined to have an adverse effect on the overall study.

Comparison of Mean Anxiety and Sleep Quality Scores				
Variable	Intervention Time	Experimental Group (n=25)	Control Group (n=26)	p-Value
STAI (Anxiety)	Pre-Intervention	57.88 ± 11.51	56.92 ± 7.92	0.730
	Post-Intervention	44.96 ± 12.68	57.15 ± 9.24	<0.001
SRSS (Sleep Quality)	Pre-Intervention	24.04 ± 3.87	23.85 ± 2.82	0.838
	Post-Intervention	16.76 ± 4.10	23.23 ± 2.70	<0.001

**Table 2.** Comparison of mean anxiety and sleep scores between experimental and control groups relative to PMR intervention. Anxiety scores were reported using STAI, and sleep scores were reported using SRSS. Patients self-reported scores.



**Figure 2.** One-way ANOVA test revealed PMR had a significant effect in decreasing anxiety in COVID-19 patients. \* $p \leq 0.05$ , \*\* $p \leq 0.01$ , \*\*\* $p \leq 0.001$ , \*\*\*\* $p \leq 0.0001$ .

**Figure 3.** One-way ANOVA test revealed PMR had a significant effect in improving sleep in COVID-19 patients. \* $p \leq 0.05$ , \*\* $p \leq 0.01$ , \*\*\* $p \leq 0.001$ , \*\*\*\* $p \leq 0.0001$ .

### Data Analysis

Abbreviations: Experimental Group (EG) and Control Group (CG)

#### Spielberger State-Trait Anxiety Scale

- EG Pre-Intervention vs. CG Pre-Intervention: Not Significant ( $p$ -value=0.730)
- EG Post-Intervention vs. CG Post-Intervention: Significant ( $p$ -value<0.001)

#### Sleep State Self-Rating Scale

- EG Pre-Intervention vs. CG Pre-Intervention: Not Significant ( $p$ -value=0.838)
- EG Post-Intervention vs. CG Post-Intervention: Significant ( $p$ -value<0.001)

### Conclusions

- The one-way ANOVA test between the EG's Post-Intervention and CG's Post-Intervention anxiety scores yielded significance, suggesting that PMR is effective in reducing COVID-19 patients' anxiety.
- The one-way ANOVA test between the EG's Post-Intervention and CG's Post-Intervention sleep scores yielded significance, suggesting that PMR is effective in improving COVID-19 patients' sleep quality.

### Study's Limitations

- One randomized controlled clinical study: PMR on COVID-19 patients
  - Patients had individual differences and psychological differences
  - Patients had varying attention spans during hospital stay
  - The patients in the randomized controlled clinical study were from one Chinese hospital: Hainan General Hospital
- Relevant publications
  - COVID-19 is a novel virus and knowledge on it is rapidly evolving

### Future Directions

- PMR should be further studied in other regions of the world to take cultural and environmental factors into account when assessing the efficacy of PMR in COVID-19 patients

### References

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