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Effectiveness of manipulative therapy in improving sleep quality and reducing fatigue levels in post-COVID-19 workers

Skuteczność terapii manualnej w poprawie jakości snu i redukcji poziomu zmęczenia u pracowników po COVID-19

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Abstract

This research aims to determine the effectiveness of manipulative therapy in improving sleep quality in post-COVID-19 workers. The research was carried out in the Special Region of Yogyakarta, Indonesia. The research design used a quasi-experimental design with a one-group pretest-posttest design. The research sample was 20 post-COVID-19 workers who had poor sleep quality and experienced fatigue. The treatment was carried out once with a duration of 45 minutes. Sleep quality was measured using the Sleep Quality Questionnaire (KKT) instrument and fatigue levels used the Indonesian version of the Fatigue Severity Scale. The level of sleep quality experienced by the samples before and 24 hours after treatment can be described: 18 (90%) samples had poor sleep quality and 2 (10%) samples had good sleep quality before treatment, and after 24 hours after treatment, 18 (90%) experienced good sleep quality improvement and 2 (10%) samples still had poor sleep quality. Level of fatigue: 20 (100%) samples experienced complaints of fatigue before treatment and 24 hours after treatment 1 (5%) still experienced fatigue and 19 (95%) other samples did not experience fatigue or decreased fatigue. The criteria for sleep quality and level of fatigue, seen from the total scores on the questionnaire filled in by the sample, are in accordance with the score norms. Data analysis techniques use normality tests and difference tests. The research results show that the traditional massage method improves sleep quality and reduces fatigue levels significantly with a p-value < 0.05.

Keywords
traditional massage, sleep quality, massage, COVID-19, post-COVID workers

Streszczenie

Celem niniejszego badania jest określenie skuteczności terapii manualnej w poprawie jakości snu u pracowników po COVID-19. Badanie przeprowadzono w Specjalnym Regionie Yogyakarta, Indonezja. Projekt badawczy wykorzystał quasi-eksperymentalny układ z jedną grupą z pomiarem przed i po leczeniu. Próba badawcza obejmowała 20 pracowników po COVID-19, którzy mieli niską jakość snu i doświadczali zmęczenia. Leczenie przeprowadzono jednokrotnie i trwało 45 minut. Jakość snu mierzono za pomocą narzędzia Sleep Quality Questionnaire (KKT), a poziomy zmęczenia mierzono indonezyjską wersją skali nasilenia zmęczenia (Fatigue Severity Scale). Poziom jakości snu doświadczany przez próbki przed i 24 godziny po leczeniu można opisać następująco: 18 (90%) próbek miało niską jakość snu i 2 (10%) próbki miały dobrą jakość snu przed leczeniem, a po 24 godzinach po leczeniu 18 (90%) doświadczyło poprawy jakości snu, a 2 (10%) próbki nadal miały niską jakość snu. Poziom zmęczenia: 20 (100%) próbek zgłaszało dolegliwości zmęczenia przed leczeniem, a 24 godziny po leczeniu 1 (5%) nadal doświadczało zmęczenia, a 19 (95%) innych próbek nie zgłaszało zmęczenia lub zgłaszało zmniejszenie zmęczenia. Kryteria jakości snu i poziomu zmęczenia, widziane z sumarycznych wyników w kwestionariuszu wypełnionym przez próbki, są zgodne z normami wyników. Techniki analizy danych wykorzystują testy normalności i testy różnic. Wyniki badań pokazują, że tradycyjna metoda masażu znacząco poprawia jakość snu i redukuje poziom zmęczenia z wartością p < 0,05.

Słowa kluczowe
tradycyjny masaż, jakość snu, masaż, COVID-19, pracownicy po COVID-19

Introduction

The COVID-19 outbreak, which began in China in December 2019, is a global pandemic that extended its reach worldwide until 2023, encompassing various strains of the SARS-CoV-2 virus [1]. Professions at heightened risk for COVID-19 often require frequent physical interaction during routine tasks. The virus has adversely affected average Indonesian citizens, causing symptoms ranging from mild to severe, as evidenced by case data from January 3, 2020, to February 16, 2023 [2]. In the Special Region of Yogyakarta, there were 6,733,697 individuals impacted by the COVID-19 virus, with 47,060 confirmed cases of COVID-19. The cumulative case count in the Special Region of Yogyakarta has designated the region as a red zone, consequently leading to the implementation of lockdown measures and urging employees to engage in remote work.

Employees contracting COVID-19 may face lingering repercussions post-recovery, such as reduced work productivity, heightened fatigue, increased anxiety, and disrupted sleep quality, as research supports [3]. A person infected with COVID-19 in the acute phase after COVID will experience confusion, delirium, stress, and sleep disturbances, which affect long-term neuropsychiatric symptoms in the form of anxiety, depressive symptoms, and cognitive impairment. According to [4], medium and long-term effects after COVID include dyspnoea, decreased exercise capacity, stress factors, and sleep disturbances.

In the new normal following COVID-19, recovered workers are expected to resume their regular, often offline, tasks. However, due to the aforementioned issues, there may be a decline in performance productivity. Research [5] stated that 175 respondents were Jabodetabek workers who had been confirmed with COVID-19 had decreased work productivity. Contributing factors to reduced work productivity in individuals exposed to COVID-19 include neurocognitive dysfunction, impaired impulse control, and heightened anxiety, all linked to the virus's effects on sleep patterns [6]. The COVID-19 pandemic has caused significant disruptions in sleep quality, both during the infection with COVID-19 and in the post-COVID-19 period. It has been observed that the highest percentage, specifically 40% of individuals in the post-COVID phase, have encountered sleep disturbances [1]. The author's research [7] using the Insomnia Severity Index, compared sleep disturbances in individuals without COVID-19, those who tested positive, and those in the post-COVID phase. It revealed that post-COVID syndrome results in higher levels of insomnia or sleep disruption than in the non-COVID and COVID-positive groups.

The fatigue experienced in the post-COVID period can be termed 'post-COVID fatigue syndrome,' arising from damage to the cardiovascular system and necessitating an extended recovery period. This syndrome indirectly affects a person's quality of life, including stress levels and sleep quality. Fatigue syndrome after COVID is included in neurological disorders [8].

Both short-term and long-term post-COVID symptoms present challenges for affected workers, especially when they are moderate to severe. These symptoms, particularly related to fatigue and sleep quality, can diminish work productivity. Consequently, specialized treatment is essential in addressing these concerns. Research suggests that treatment for post-

COVID symptoms can include pharmacological options, such as antidepressants, melatonin, and lithium salts, as well as non-pharmacological methods like breathing exercises, aromatherapy, meditation, yoga, and massage [9].

The results of field observations on 22-25 February 2023 in filling out the post-COVID-19 questionnaire, to 20 workers who have been exposed to COVID can be described as follows: (1) Of the 20 workers who have experienced COVID from 2019-2022, have complaints of easy fatigue and uncomfortable sleep compared to before being exposed to COVID-19. (2) 5 of the 20 post-COVID-19 workers have additional symptoms such as: some are easily feverish, easily hungry, and some have decreased appetite. (3) The results of this observation, 13 out of 20 workers after COVID-19 have not done alternative treatment with massage.

Manipulative therapy is a tactile technique involving the manipulation of the body through manual contact, employing a range of movements, including effleurage, skin rolling, friction, and tapotement [10]. Administering this treatment results in various physiological effects on the body, including muscle relaxation, decreased pulse rate, enhanced blood and lymph circulation, elevated endorphin hormone levels, heightened serotonin hormone levels which can aid in reducing cortisol and alleviating depression, and increased dopamine levels that are beneficial for reducing norepinephrine and anxiety [11].

Manipulative therapy encompasses a variety of techniques, and in this research, one of the methods employed involves manipulation through effleurage, pressure (trigger point), and friction, using the palm or thumb. The use of these techniques aims to provide energy, relaxation of thickened muscles, and improve blood flow [12]. The third treatment of manipulation, starting from the feet upwards, aims at the heart, which serves to relax the muscles by destroying myoglosis in the body.

This research is conducted with the objective of assessing the effectiveness of manipulative therapy in enhancing sleep quality among post-COVID-19 workers, addressing the issues at hand. In this research, manipulative therapy primarily emphasizes effleurage, applying pressure (trigger point), and friction-based techniques.

Materials and methods
Study design

This research adopts a quasi-experimental design, specifically a one-group experimental design. The sample underwent initial measurements before receiving treatment to collect pretest data. Subsequently, they were measured again 24 hours after the treatment to collect posttest data. The comparison between pretest and posttest results determines any differences. The sampling method employed in this research is accidental sampling.

Participants

The research's population comprises workers residing in the Special Region of Yogyakarta who have previously been exposed to COVID-19 and are experiencing issues related to sleep quality and fatigue. This research employed a purposive sampling technique, selecting the sample based on specific criteria and using a sample size calculator application to determine a total of 20 samples. The sample selection for this rese-

arch involves specific inclusion and exclusion criteria. Inclusion criteria encompass individuals who are short-term and long-term post-COVID workers, meet moderate to severe COVID criteria, report complaints of fatigue and sleep disturbances, express willingness to participate as respondents, and fall within the age range of 20-60 years. Exclusion criteria consist of individuals who currently have open wounds, are in a state of ill health, or are in an isolation period.

Instruments
This research centers on examining fatigue in post-COVID-19 workers. Fatigue is attributed to dysfunction in the paraventricular hypothalamus and the impairment of gamma-aminobutyric acid following exposure to COVID-19. This fatigue was measured using the Indonesian version of the fatigue severity scale, which can be used as a measure of fatigue felt in various conditions, from normal populations to populations with severe neurological disorders, and has been tested for validity and reliability in research [13] with a Cronbach's alpha result of 0.880. Fatigue is experienced by post-COVID-19 workers in carrying out daily activities.

Sleep quality in this research was measured using a sleep quality questionnaire (KKT). This instrument was validated by three experts in sleep medicine, psychological nursing, and gerontological nursing from Thailand. Its reliability was confirmed through a test-retest method with a Pearson correlation coefficient above 0.444 and a Cronbach's alpha of 0.89, based on 20 samples from two hospitals in Medan. These results indicate that the questionnaire is both reliable and valid [14]. Sleep quality disorders are experienced by post-COVID-19 workers.

Treatment
The treatment in this research involved manipulative therapy, including effleurage movements, pressure (trigger points), and friction, applied from the toes to the head for 45 minutes.

Statistics analysis
Data processing is conducted using the SPSS data processing application version 25. The normality test serves as one of the preliminary assessments in data analysis. Its purpose is to ascertain whether the data follows a normal distribution or not. The normality test is essential in determining the subsequent steps of calculations. Prior to performing various data tests, it is imperative to assess whether the data adheres to a normal distribution pattern. If the normality test reveals that the data is normally distributed (with a p-value > 0.05), parametric calculations are employed. Conversely, if the data is not normally distributed (with a p-value < 0.05), non-parametric calculations are utilized. In statistical terms, data is considered to be normally distributed when the p-value exceeds 0.05, while a p-value below 0.05 indicates non-normal distribution. The statistical analysis includes the Paired t-test and the Wilcoxon signed-rank test, both with a significance level set at 0.05. The t-test will produce t values and probability values (p) which can be used to prove whether or not there is a significant difference between pretest and posttest at a level of 5%. The significance level is determined by examining the p-value. If p < 0.05, then there is a significant difference; if p > 0.05, then there is no significant difference.

Results
The research outcomes pertain to a study carried out on a sample of 20 post-COVID-19 workers who reported experiencing sleep quality disturbances and fatigue. The sample data underwent processing through descriptive analysis, encompassing both demographic information and research data, and prerequisite tests were conducted using the SPSS application.

Descriptive analysis
The research sample was described based on age group, occupation, years of history with COVID-19, level of sleep quality, and fatigue. The following are the results:

Table 1. Sample by age (n = 20)

Age group [year]	Total	Percentage
20-30 years	13	65%
31-40 years	5	25%
51-60 years	2	10%

The distribution of age groups in Table 1 reveals that the majority of the samples fall within the 20-30 years age group, comprising 13 (65%) samples. This is followed by the 31-40 years age group, which accounts for a total of 5 (25%) samples, and the 51-60 years age group, where there are 2 (10%) samples in the treatment.

Table 2. Sample based on type of work

Type of work	Total	Percentage
Driver	1	5%
Teacher	1	5%
Private employee	8	40%
Coach	1	5%
Odd jobs	2	10%
Self-employed	7	35%

Table 2 illustrates the diversity of occupations held by the participants in this research, encompassing office workers and field workers. The breakdown is as follows: 1 (5%) driver, 1 (5%) teacher, 8 (40%) private employees, 1 (5%) coach, 2 (10%) odd jobs, and 7 (35%) self-employed individuals. The variety of jobs in the research sample shows that the spread of COVID-19 can affect all groups, including both office and field workers. This is reinforced by research [15], which suggests that work affects the spread of COVID-19 due to physical contact, work environment, air ventilation, and underestimating regulations regarding COVID-19 prevention.

Table 3. Distribution of samples affected by COVID-19

Exposed to COVID-19 (years)	Total	Percentage
2020	4	20%
2021	9	45%
2022	7	35%

Based on the outcomes presented in Table 3, it becomes evident that among the participants in this research who contracted COVID-19, 4 (20%) were affected in the year 2020, 9 (45%) in 2021, and 7 (35%) in 2022. The sample of post-COVID individuals from the years 2020 to 2022 suggests the presence of enduring consequences following exposure to COVID-19, particularly concerning the manifestation of sleep quality disorders attributed to cognitive dysfunction.

Table 4. Sleep quality criteria total percentage

Pre & post	Sleep quality criteria	Total	Percentage
Pretest	< 18 poor sleep quality	18	90%
	≥ 18 good sleep quality	2	10%
Postest (after 24 hours)	< 18 poor sleep quality	2	10%
	≥ 18 good sleep quality	18	90%

According to the outcomes presented in Table 4, an overview of the sleep quality levels experienced by the sample before and 24 hours after treatment can be provided. Before treatment, 18 (90%) of the participants had poor sleep quality, while 2 (10%) had good sleep quality. After 24 hours of treatment, 18 (90%) showed improvements in sleep quality, moving from poor to good, while 2 (10%) participants still experienced poor sleep quality. Sleep quality criteria were determined based on the scores obtained from the questionnaire filled out by the participants, aligned with the established scoring norms.

Table 5. Fatigue criteria through scoring questionnaire

Pre & post	Fatigue criteria	Total	Percentage
Pretest	≥ 36 experience fatigue	20	20
	< 36 does not experience fatigue	0	0
Postest (after 24 hours)	≥ 36 experience fatigue	1	1
	< 36 does not experience fatigue	19	19

According to the outcomes presented in Table 5, we can elucidate the level of fatigue experienced by the sample before and 24 hours after treatment. Prior to the treatment, all 20 (100%) participants reported complaints of fatigue. However, after 24 hours of treatment, only 1 (5%) individual still experienced fatigue, while 19 (95%) other participants did not report any fatigue or a reduction in fatigue.

This section describes the data collected and processed with the SPSS application, including the minimum, maximum, mean, and standard deviation values of the pretest and posttest data:

Table 6. Pretest and posttest data of sleep quality

Indicators (pretest & postest)	Min	Max	Mean	SD
Pretest sleep quality	10.00	21.00	13.9	2.88
Postest sleep quality	15.00	27.00	19.9	2.97

According to the outcomes from the pretest and posttest data, it is evident that there is an improvement in sleep quality, as indicated by increases in the minimum, maximum, average, and standard deviation values. The mean score for sleep quality in the pretest was 13.9, and after 24 hours of treatment, there was an enhancement in sleep quality, with a mean score of 19.9.

Table 7. Pretest and postest fatigue level data

Indicators (pretest & postest)	Min	Max	Mean	SD
Pretest fatigue level	36.00	57.00	44.5	5.539
Posttest fatigue level	12.00	37.00	24.6	5.305

Based on the results of pretest and posttest data, it is known that there is a decrease in fatigue levels in the minimum, maximum, average, and standard deviation values in the treatment. Pretest fatigue data mean score of 45.5 after 24 hours of treatment, there was a decrease in fatigue level with a mean of 24.6.

Table 8. Manipulative therapy data normality test results (Shapiro-Wilk)

Treatment	Variables	Data	Significance	Description
Manipulative therapy	Fatigue	Pretest-posttest difference	0.193	Normal
	Sleep quality	Pretest-posttest difference	0.191	Normal

Table 8 shows that the p-value is greater than 0.05, indicating that the data follows a normal distribution, allowing for parametric analysis in hypothesis testing.

Table 9 shows a significance value of 0.000 for the treatment hypothesis test, indicating a significant difference between the pretest and posttest data, as this value is less than 0.05.

Table 9. Hypothesis test

Treatment	Analysis	Variables	Sig (2-Tailed)	Description
Manipulative therapy	Paired t-Test	Fatigue	0.000	Significant
	Paired t-Test	Sleep quality	0.000	Significant

Discussion

The discussion in this research revolves around the utilization of manipulative therapy as a non-pharmacological treatment approach aimed at enhancing sleep quality and alleviating excessive fatigue experienced by post-COVID-19 workers. Non-pharmacological treatment through massage therapy exhibits favorable physiological effects in the management of sleep quality. These physiological effects on the body include improved blood circulation, stimulation of hormonal and nervous systems, and relaxation of tense muscles [16]. Therefore, these effects will improve sleep quality and reduce the level of fatigue in workers after COVID-19. The manipulative therapy used in this research is effleurage, pressure (trigger point), friction. Manipulation techniques such as effleurage, applying pressure (trigger point), and friction using the palm of the hand or thumb have advantages in enhancing blood circulation and alleviating tension in muscles caused by the buildup of metabolic byproducts [17]. The combination of effleurage and friction techniques will trigger the release of endorphins, serotonin, and dopamine hormones that are beneficial to the body, by providing calmness, reducing pain or soreness [18], so that physiologically it can improve sleep quality. This research is in line with research [19] entitled "The effect of traditional Thai massage on quality of sleep in adults with sleep problems" that the treatment given can improve sleep quality and reduce fatigue significantly without side effects, and research [20] entitled "Effect of mechanical-bed massage on exercise-induced back fatigue in athletes" concluded that massage treatment can help athletes overcome fatigue due to exercise, by modulating sympathetic and parasympathetic nervous system activity. Calculation of data analysis shows the results of improving sleep quality and reducing the level of fatigue of post-COVID-19 workers with a significance value of $0.00 < 0.05$ in the paired t-test analysis, in indicators of fatigue and sleep quality. Fatigue and sleep quality are interconnected factors [21]. A worker's fatigue is a subjective sensation influenced by factors such as extended work duration, physical labor, mental exertion, and non-ergonomic working postures. These factors can impact the level of fatigue experienced by workers and are associated with both sleep quality and circadian rhythm [22]. Post-COVID-19 workers are at a heightened risk of experiencing factors contributing to fatigue and poor sleep quality, primarily stemming from incomplete recovery of the cardiorespiratory system dysfunction. This condition can adversely impact their work productivity. Therefore, therapeutic treatment for post-COVID-19 workers dealing with fatigue and sleep quality issues represents a non-pharmacological intervention aimed at mitigating fatigue levels and enhancing sleep quality. Non-pharmacological ap-

proaches, such as massage therapy, offer positive physiological effects in managing fatigue levels and sleep quality. These effects include promoting smooth blood circulation, stimulating the hormonal and nervous systems, and relieving tension in muscular areas [16]. The physiological effects on the body are smooth blood flow, stimulate the hormonal and nervous systems, and relax muscles that have experienced tension [16], so that these effects will reduce fatigue levels and improve sleep quality in post-COVID-19 workers. The massage therapy used in this research is effleurage, pressure (trigger point), and friction. The acute effect of massage therapy can reduce fatigue levels, as evidenced by research [22] entitled "The acute effect of traditional Thai massage on recovery from fatigue in basketball players" states the results of a study with a sample of 8 basketball players in the traditional Thai massage group given a simulation of a basketball game for 20 minutes and then measured heart rate variability and physical fitness, then given a 10-minute Thai massage treatment, indicating that Thai massage can increase recovery in the acute phase.

Conclusions

Manipulative therapy treatment has proven to be efficacious in enhancing the sleep quality of post-COVID-19 workers. It can serve as a preventive or rehabilitative measure for sleep quality issues in these individuals, displaying a substantial impact on diminishing fatigue levels and ameliorating sleep quality. This treatment offers the advantage of stimulating the release of endorphins, serotonin, and dopamine hormones, which confer benefits to the body by inducing a sense of calmness and reducing pain or discomfort.

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