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Research

Effect of Telang Flower (*Clitoria ternatea*) Drink to Reduce Insomnia in Post COVID-19 Patients

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ABSTRACT

Background: The COVID-19 pandemic evokes an effect on patients of post-COVID-19. One of them is diminished sleep quality known as insomnia. Concerning the problem, WHO strongly supports the supportive supplementary medicines made from traditional plants during the COVID-19 pandemic, one of which is by utilizing butterfly pea flowers. The study aimed to determine the effect of butterfly pea flower drinks on insomnia in post-COVID-19 patients
Subjects and Method: This was a randomized controlled trial. The population in this study was 36 respondents who experienced insomnia post-COVID-19. The sampling technique used was simple random sampling. The total sample of 32 respondents was divided into 2 groups, namely 16 respondents as an intervention group and 16 respondents as a control group. This research was conducted for 14 days, from September 18 to October 3, 2022, at the Islamic Housing Complex, Neighborhood Unit 001, Kelapa Dua, Tangerang Regency. The independent variable in this study was the administration of butterfly pea flower drink and the dependent variable was insomnia. The study instruments used were observation sheets for the administration of butterfly pea flower drink and the Insomnia Rating Scale (IRS) questionnaire for the insomnia variable. The study used an independent t-test for data analysis.
Results: Independent t-test results indicated that the intervention group (Mean= - 4.31 SD= 3.70) was lower than the control group (Mean= -0.38; SD= 2.50), and the result was statistically significant (p= 0.001).
Conclusion: There is an effect of butterfly pea flower drink on insomnia in post-COVID-19 patients.

Keywords: butterfly pea flower, post-COVID-19, insomnia, healthy drink.

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BACKGROUND

Post COVID-19 will affect patients sleep quality, causing acute insomnia. Insomnia symptoms will become more severe in insomniacs after suffering from COVID-19 (WHO, 2022). The results of a survey conducted by GridHEALTH state that 1500 out of 100,000 members in the Survivor Crop Facebook group experienced insomnia during COVID-19 (Hartono, 2020). Many people experience high anxiety during the COVID-19 pandemic. In addition, COVID-19 patients may suffer from stress, changes in concentration, irritability, decreased pro-

ductivity, interpersonal conflicts, and insomnia (Morin and Carrier, 2021). Insomnia will affect physical health, such as heart disease, hypertension, obesity, diabetes, impaired body immunity, and decreased libido. Furthermore, the impact of insomnia may also generate psychological disorders, namely stress, anxiety, even develop into depression, and memory loss (Forester and Ratep, 2016).

Memory loss occurs due to brain recovery and memory consolidation obtained from the impaired good quality of sleep. Most survivors of COVID-19 do not experience relatively severe symptoms that require hospitalization. Yet they struggle to recover from psychological and physiological problems in the long term. Even patients exposed to COVID-19 experience high rates of depression until several months after COVID-19 with fear of dying while sleeping. This causes insomnia, thus will harm their biological and emotional health. Depression is a mental illness that affects one's feelings, physical health, and behavior. Approximately 30% of patients suffering from depression do not respond to drug therapy and 70% of patients failed to achieve complete recovery (Adelina, 2013).

Sleep quality is particularly important to maintain physical and mental health because it can improve the immune system during a pandemic to avoid disease attacks, including COVID-19 infection. However, during the COVID-19 pandemic, there were changes in sleep patterns, sleep duration, and electronic (gadgets) use in adults, making them spend more time in bed and causing lower sleep quality (Afifah, 2020).

The ingredients contained in the roots of butterfly pea flowers (Clitoria ternatea L) contain saponins, alkaloids, flavonoids, fatty acids, delphinidin 3,3',5' tri-glucoside, phenols, and beta-sitosterol that can act as antidepressants (Adelina, 2013). This butterfly pea flower has been proven to increase the amount of acetylcholine and acetylcholinesterase activity in the brain. However, the type of substance that acts as an antidepressant is not yet known for certain. Oral treatment using an alcoholic extract of Clitoria ternatea at a dose of 460 mg/kg significantly extended the time it takes to cross the maze, as produced by chlorpromazine on mice with anxiety. Animals treated with Clitoria ternatea at a dose of 100 mg/kg showed a significant increase in infection ratio and discrimination index providing evidence for nootropic activity (Chauhan et al., 2012).

This study aimed to analyze the administration of drinks in the form of butterfly pea flower drink (Clitoria ternate L) in eliminating insomnia in post-COVID-19 sufferers. With the insomnia being resolved, it is expected that they can return to their normal life without disturbing daily activities so that they can be more productive.

SUBJECTS AND METHOD

1. Study Design

The study used a true experiment with a pretest and post-test control group design to compare the results of the intervention group and control group with each group conducting a pre-test and post-test. The study was about the effect of giving butterfly pea flower drink on insomnia in post-Covid-19 patients. The study was conducted from September 18 - October 3, 2022 at the Islamic Housing Complex, Neighborhood Unit 001, Kelapa Dua, Tangerang Regency.

2. Population and Sample

The population of the study was 36 respondents, which consisted of 6 respondents who experienced severe insomnia, 9 respondents who experienced moderate insomnia, and 21 respondents who experienced mild insomnia. A simple random sampling was carried out with a total sample of

32 respondents divided into 2 groups, namely a control group that consisted of 16 respondents and an intervention group that consisted of 16 respondents given butterfly pea flower infusion drinks.

3. Study Variables

The independent variable was the administration of the butterfly pea flower infusion drink, and the dependent variable was insomnia.

4. Operational Definition of Variables

The administration of butterfly pea flower drinks was administering a drink made from oven-dried butterfly pea flowers, and consumed 2 times a day, in the morning and evening @ 50 ml for 14 days**.**

Insomnia was the disruption of one's abnormal cycle for a month or more who had difficulty falling asleep which took more than half an hour to sleep, difficulty in staying asleep, frequent waking up at night, and unrefreshing sleep, thus causing impairment of daily activities.

5. Instruments

The study instrument for the variable of the administration of butterfly pea flower drink was observation sheets, whereas for the variable of insomnia was the Insomnia Rating Scale (IRS) questionnaire. The measurement scale for dependent variables was numeric. The measurement results were presented in code 1: score 25-32 (severe insomnia), code 2: score 18-24 (moderate insomnia), and code 3: score 11-17 (mild insomnia).

6. Data Analysis

The data analysis was univariate analysis to describe each variable, including the independent variable (the administration of butterfly pea flower drink) and the dependent variable (insomnia). Bivariate analysis used an independent t-test because it used a numerical measurement scale and consisted of two unpaired groups.

RESULTS

1. Sample Characteristic

Table 1 showed the description of the total sample in each variable. Table 2 showed the categories of variables, total sample, and also the percentage of each variable.

Based on table 1. the characteristics of subjects were 30 female respondents (93.8%), while the remaining 2 respondents (6.3%) were men. The majority of the subjects educational background was high school with 20 respondents (62.5%), and 1 subject (3.1%) respectively for elementary, junior high school, and S2, and the remainder 9 subjects (28.1%) were D3/SI. In terms of occupation, most of the subjects were housewives with 21 subjects (65.5%), the remainder were entrepreneurs, private employees, retired, and civil servants with 1 subject (3.1%). The age of the subjects was divided into 5 categories and the majority were early and late elderly, with respectively 13 subjects (40.6%) and the remainder were senior, late adulthood, and early adulthood.

Table 2. Characteristics of research subjects.

Groups	Pre		Post	
	n	%	n	%
Intervention	16	50	16	50
Control	16	50	16	50
Total	32	100	32	100

Table 2. Characteristics of research subjects.

Variables	Categoris	Frequency (n)	Percentage (%)
Student Age	Male	2	6.3
	Female	30	93.8
Education	Elementary School	1	3.1
	Junior High School	1	3.1
	High School	20	62.5
	Associate/Bachelor's Degree	9	28.1
	Master's Degree	1	3.1
Occupation	Housewife	21	65.5
	Entrepreneur	4	12.5
	Private- employee	2	6.3
	Retired	4	12.5
	Civil Servant	1	3.1
Age	Senior	1	3.1
	Late elderly	13	40.6
	Early elderly	13	40.6
	Late adulthood	4	12.5
	Early adulthood	1	3.1

2. Bivariate Analysis

Tables 2 showed that the normality test from the Kolmogorov-Smirnov test data in the audio-visual and audio groups is not normal. with p<0.001 less than 0.05. Then the data transformation is still not normal so that the data used for the bivariate test uses a non-parametric test from the 2 Independent t test, namely Mann Whitney.

Table 2. Independent T-Test on the Effect of Butterfly pea flower drink on Insomnia in Post-COVID-19 Patients.

Group	Insomnia		Mean	SD	p
	n	%			
Intervention	16	50	-4.31	3.70	0.001
Control	16	50	-0.38	2.50	

Table 3. showed the results of independent t-test. It indicated that the intervention group (Mean= -4.31; SD= 3.70) was lower than control group (Mean= 0.38; SD= 2.50), which (p= 0.001) it indicated there as an effect of butterfly pea flower drink on insomnia in post-COVID-19.

DISCUSSION

According to the CDC, the consequences of long covid can cause a variety of symptoms that persist several months after being declared cured of Covid-19 infection. The most common symptom is easy to fatigue that interferes with daily activities. It also affects the respiratory, heart, and digestive systems, as well as neurological symptoms. These neurological symptoms include headaches, difficulty thinking or concentrating, changes in the sense of taste and smell, anxiety or depression, and difficulty sleeping (CDC, 2022). Difficulty sleeping or known as insomnia is a condition where a person becomes awake every night or wakes

up easily and finds it difficult to go back to sleep. Such insomnia can cause stress, lack of concentration, weak lethargy, as well as mood disorders.

It is in line with a study conducted by (Susanto et al., 2022) which shows that 256 respondents (66.5%) of 385 respondents have the post-COVID-19 syndrome. The majority of respondents were women aged 18-40 years. The most commonly complained symptom is anxiety or depression. A total of 16.8% of subjects with COVID-19 reported persistent symptoms for more than 3 months (Susanto et al., 2022). Study conducted at the University of Ottawa on the increase in insomnia cases involving 190,000 participants in post-COVID-19 patients found that the level of depression, anxiety, and Post Traumatic Stress Disorder (PTSD) increased by 23.87% compared to before the Covid-19 pandemic (LPM Sinovia, 2020).

According to the Diagnostic and Statistical Manual of Mental Disorder,5th Edition (DSMV), insomnia is the disruption of a person's abnormal cycle for a month or more that disrupt daily activities. A person is said to have insomnia when it is difficult to start sleep, and it takes more than half an hour to sleep, difficulty maintaining sleep, frequent awakenings at night, and sleep that is not refreshing (Glasheen, Batts, 2016). Post-COVID-19 insomnia should receive special attention in its treatment. There are several ways to overcome insomnia problems, including behavioral therapy, sleep hygiene practices, medicamentosa therapy, such as the use of anti-anxiety drugs to complementary therapies (Chigome et al., 2018). However, long-term use of medications, such as antianxiety drugs, can evoke side effects that may worsen sleep quality in the elderly (Taylor, 2015).

Factors causing insomnia include a decrease in melatonin production, ineffective signalling disorders, and an excessive amount of toxins in the body. In the case of insomnia as a result of oxidative stress, it occurs due to the presence of free radicals that enter the body causing an excessive amount of toxins in the body. Therefore, it is necessary to give antioxidants that will significantly help to overcome insomnia problems. High antioxidants will boost more melatonin production or more effective signal, so insomnia can be resolved, and sleep quality is improved. Intercellular signals are mediated by hormones, neurotransmitters, peptides, and so on.

In insomnia that occurs as a result of a neurotransmitter or other hormonal imbalance, for example, due to thyroid disorders, the administration of antioxidants is not effective to overcome the problem. Butterfly pea flowers are used in traditional medicine to stimulate the brain in mental illness and mental functional disorders. Due to clitorienolactone and isoflavonoid constituents in butterfly pea flower therefore it is beneficial in lowering stress and depression (Ngadni et al., 2021).

Antioxidant activity in managing oxidative stress in biological systems proceeds through various mechanisms, such as free radical scavenging, oxidative enzyme inhibition, as a metal ion chelate, and as a cofactor of antioxidant enzymes (Lakshan et al., 2019). Among the common methods for testing a source's ability in free radicals scavenging are the DPPH (2,2-DiPhenyl 1-PicrylHydrazyl), ABTS (2,2′-Azinobis(3-ethylBenzoThiazoline-6-Sulfonate), ORAC (Oxygen radical absorbance capacity), FRAP (Ferric-Reducing Antioxidant Power) and TEAC (Trolox equivalent antioxidant capacity) methods. Other notorious methods are HRSA (Hydroxyl radical scavenging activity) and SRSA (Superoxide radical scavenging activity). The working principle of antioxidants is free radical scavenging

activity, so it can prevent or protect cells from damage due to oxidative stress or lipid peroxidation due to free radical attacks. Antioxidants are electron-giving or reductant compounds.

Antioxidants are also compounds that can inhibit oxidation reactions, by binding the free radicals and highly reactive molecules, as a result, cell damage will be inhibited (Gollen B, Mehla J, and Gupta P, 2018). The working mechanism of antioxidants serves as (1) a physical barrier to prevent ROS access to biologically important parts, e.g. UV filters, and cell membranes; (2) chemical trapping/attacking energy and electrons, extinguishing ROS, such as rubberonoids, anthocyanidins; (3) catalysts that neutralize or divert ROS, e.g. antioxidant enzymes SOD (superoxide dismutase), catalase, and glutathione peroxidase; (4) binding/inactivation of metal ions to prevent the generation of ROS, e.g. ferritin ceruloplasmin, catechins and (5) as a chain-breaking antioxidant that scavenge and destroy ROS, such as ascorbic acid/vitamin C, tocopherol/vitamin E, glutathione, and flavonoids (Marpaung, 2020b). The antioxidation activity of butterfly pea flowers extracted by various procedures and solvents and tested through various methods has been reported in several studies.

WHO strongly supports the supportive supplementary of traditional plant-based medicines during the Covid-19 pandemic (WHO, 2021). Traditional plants owned by Indonesia are remarkably diverse. Indonesia is a tropical country that has high biodiversity and a variety of medicinal plants. Many traditional plants can help in overcoming insomnia problems, such as nutmeg, watercress, and butterfly pea flowers. Empirically in the days of our ancestors, in Indonesia, and especially by the Betawi people, butterfly pea flowers were used to make babies' eyes clear (Novianti, 2017). People in India use the butterfly pea plant to treat insomnia, fever, and headaches. In Madagascar, butterfly pea flowers are used as joint pain relievers. In Myanmar, a mixture of butterfly pea flower juice and milk is used to cure sore eyes (De-Filipps and Krupnick, 2018).

The composition of fresh clitoria ternatea consists of 92% water, 0.05% anthocyanins and 98.72% antioxidant activity, (Handito et al., 2022), other active compounds, namely flavonoids, flavonoid glycolsides, kaempferol glycosides, quercetin glycosides, and myricetin glycosides (Purwaniati et al., 2020), water, fat, crude fiber, protein, carbohydrates, and calcium (Neda, Rabeta and Ong, 2013). This anthocyanin substance is believed to help the production of magnesium oxide nanoparticles which are increasingly used in biomedical applications (John Sushma et al., 2016; Oguis et al., 2019). A study (Marpaung, 2020a) also shows that the content of 2 g butterfly pea flower extract in 400 ml of water is equivalent to 2.16 mg of delphinidin 3-glucoside.

The advantage of butterfly pea flowers is that they are very minimal in taste and aroma that it may lower their sensory value, therefore adding other ingredients are possible to disguise the aroma and taste. Some human senses may dislike the purple color in butterfly pea flowers. The aroma, smell, and color of butterfly pea flowers can be covered by the addition of flavors, such as lime juice, lemon, pineapple, lemongrass, and other ingredients. The addition of other acidic ingredients, such as lime or lemon can lower the pH, so it can change the blue color of butterfly pea flowers to purple and can increase the stability of anthocyanins. However, the butterfly pea flowers' pH in food mixtures is relatively stable toward the hot temperature during the cooking process (Lijon et al., 2017; Mar-

paung, 2020a). A study that has been carried out by (Anthika et al., 2015) that sterilizes butterfly pea flowers using ultrafiltration (UF) membranes shows that the absence of bacteria during the 21 days of observation and the increased number of anthocyanin concentrations corresponds to the antibacterial activity of the extraction.

The color in butterfly pea flowers is also widely used for natural food and drink coloring (Muhammad Ezzudin and Rabeta, 2018). In accordance with a study that has been carried out by (Handito et al., 2022) that butterfly pea flowers are a natural coloring agent that is safe to use in food because it contains anthocyanin pigments. Anthocyanins include pigments called flavonoids that is soluble in water. The pigments in anthocyanins are red, blue or violet which usually can be found in flowers, fruits, and vegetables (Gamage et al., 2021).

This anthocyanin content serves as a source of antioxidants that can be added to the manufacture of various types of food products, such as drinks, ice cream, syrup, bread, and cookies. Furthermore, butterfly pea flowers are also one of the herbal drinks found in the community that are beneficial for maintaining body immunity, and there are many other health benefits of the drinks made from butterfly pea flowers.

AUTHOR CONTRIBUTION

The first author contributed to conducting preliminary study and conducting research, one of which was to provide education about the benefits of butterfly pea flowers and explain study procedures, as well as observations on the intervention group that obtained the treatment of butterfly pea flower drinks. The second author contributed to assisting with the preliminary study and the implementation of the study, processing the data, analyzing the data, and making final reports, and articles.

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CONFLICT OF INTEREST

There is no conflict of interest in this study.

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