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Effectiveness of WHO Stress Management for Improving Insomnia Severity Index Score in Telegram's Self-Isolated Online Group Population

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Abstract

Insomnia is one of the various symptoms frequently found in patients with post-covid syndrome (PCS) (19.1%). The WHO Stress Management (WSM) is an eclectic psychotherapy that combines mindfulness and relaxation which, theoretically, can be effective in treating insomnia due to PCS. This study aimed to explore the effectiveness of WSM in improving the Insomnia Severity Index Score for people with PCS. This was a quasi-experimental pre-test-post-test control study on 18 participants in the population of online self-isolation group in the Telegram who experienced insomnia. The intervention applied was WSM. These participants were compared to 18 controls who only received psychoeducation. Clinical insomnia symptoms were examined using the Insomnia Severity Index (ISI) before the intervention, then the control group was given sleep hygiene psychoeducation, and the treatment group was given WSM in 5 Zoom on-cam meetings once a week for 30–60 minutes. A re-assessment using the ISI post-test was then performed, and data were analyzed statistically. There was a change in score for insomnia symptoms in the treatment group (delta score 27.50) compared to the control group (delta score 9.50, p=0.00; OR 0.00, p=0.99, 95% CI). Thus, WSM can improve the insomnia score in the population with PCS.

Keywords: Insomnia, post covid syndrome, WHO stress management

Introduction

After the second wave of Covid-19 hit Indonesia in the middle of 2021, a new problem was raised, namely, post covid syndrome (PCS). PCS is when residual symptoms persist for more than 20 days after the PCR shows negative result.[1] Symptoms that fall into the PCS category include chronic fatigue, anxiety, joint pain, headache, orthostatic hypotension, palpitations, impaired cognition, anxiety, depression, and insomnia. These manifestations are found in almost 90% of Covid-19 survivors and the severity of symptoms varies from mild to moderately severe depending on the severity of the Covid-19 infection experienced.

The symptoms experienced by Covid-19 survivors are dysautonomia symptoms. Dysautonomia is an imbalance between sympathetic and parasympathetic nervous system activation that occurs due to infection with the SARS-CoV-2 virus that interferes with the work of the RAS system. Some journals say that the spike of the SARS-CoV-2 virus when it binds to ACE2 can interfere with the work of ACE2, resulting in the shedding of ACE2 receptors and disrupting the body's hemodynamic regulation (Lo 2021). In addition to hemodynamic disorders, there are prominent psychiatric disorders in the post-Covid-19 syndrome, such as anxiety, depression, sleep disorders, memory disorders, impaired concentration, and chronic fatigue syndrome.[2]

Among the many physical and psychiatric disorders that accompany the PCS condition, insomnia is often found in Covid-19 survivors. Even though they are declared physically healthy and able to work normally, Covid survivors still complain of difficulties in returning their sleep quality to the way they were before suffering from Covid.[3] The prevalence of insomnia during the Covid-19 pandemic reached 19.1%, and loneliness during the pandemic was considered to have a role in increasing the prevalence of insomnia.[4] A preliminary study conducted in November 2021 in the online Telegram

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application group found that the insomnia population was 29% of Covid-19 survivors who underwent self-isolation.

Hyperactivity of sympathetic neurons as a response to Covid-19 infection has a role in a cytokine storm. Dysautonomy correlated by Covid-19 mediated by viral infection itself[5], and post-infection stress is why this post covid syndrome phenomenon is ongoing even though SARS-CoV 2 PCR show a negative result. HPA axis activated on acute stress as a response of internal stressor namely infection, activated adrenal glands to produce cortisol as anti inflammation agent. Therefore, excessive glucocorticoid production makes resistency in the body. After this activation, adrenal glands showed hypoactivation because of HPA axis fatigue due to excessive neuroimmunology stimulation and cytokine storm.[6]

This hypocortisol state makes ongoing inflammation even in the real-time assessment, and no virus is shown. This condition correlated with various physical complaints that accompanied PCS. Persistent insomnia in PCS is caused by sympathetic overdrive. This condition has altered the neurotransmitter state in the brain. Inhibition of neurotransmitters such as GABA and melatonin has a role in interrupted circadian rhytm.[7,8]

Moreover, while proinflammatory cytokine is activated, so does the Mast cell, which will activate histamine. Histamine is a neurotransmitter that works in the state of wakefulness. Therefore its activation in an abundant amount resulted in difficulty in initiating sleep.[9,10] PCS is not only a problem caused by infection but a condition caused by stress mediated by sympathetic overdrive. Good stress management could result in the PCS's symptoms, including insomnia.

Beyond all the stress management methods recommended by various studies, relaxation and mindfulness are recommended for insomnia. In one meta-analysis study, there were 12 RCTs that recommended relaxation therapy for insomnia with an effect size of 0.99 (95% CI) compared to the control group; meanwhile, in a mindfulness study, there were 3 RCT that recommended this method to improve chronic insomnia symptoms with effect size 1.04 (95% CI)).[11] WHO Stress Management created by WHO to combine this two approachment so that this approachment therapy can be effective for insomnia.

When someone is influenced by negative emotion, there is interaction between sympathetic neurons and the HPA axis which can influence the immune system. Mindfulness can activate the parasympathetic nerve and decrease the peripheral stress response. Another study found that doing mindfulness meditation routinely can decrease TNF-α, IL-8, CRP and decrease NF-kB transcription to facilitate anti-inflammatory effects.[12] Mindfulness is known as a protective agent for aging because it can prevent telomere shortening, one of the chromosome components which has a role in the aging process.[13] That's why mindfulness is recommended to be given as a therapeutic modality in PCS because PCS is shown to accelerate the aging process in human cells due to inflammation action.[14]

Comprehensive management is needed to reduce morbidity and improve the quality of life of Covid-19 survivors so they can return to being productive as before. Because the PCR results have shown negative results, medical treatment for PCS is no longer needed so non-pharmacological approaches must be considered to manage complaints after Covid-19 infection. Non-pharmacological therapy based on relaxation therapy, such as progressive muscle relaxation, can be recommended as a non-psychopharmaca treatment because the intervention is easy, does not require special skills or special tools, and most importantly, can be done remotely, such as using video so that it can be given to patients who are undergoing treatment and undergoing isolation treatment.[5] Another non-pharmacological approach to mindfulness is also recommended because it is known to have a strong anti-inflammatory effect and slow down the inflammatory process that occurs in post-covid syndrome. Seeing that these two non-psychopharmaca therapy modalities promise good results for managing PCS symptoms, including insomnia, the authors obtained a stress management module issued by the World Health Organization WHO, which includes both non-psychopharmaca approaches. Hence, the authors are interested in using them to intervene in insomnia due to post-covid syndrome. This study aims to know the effectiveness of WHO Stress Management in improving insomnia scores in the population of post covid syndrome.

Methods

The research was conducted using a quasi-experimental, pre-test-post-test control group design. This study aimed to analyze the effect of giving the WHO stress management module to the population experiencing insomnia in the

online self-isolation group at Telegram. This research was conducted online in the period January–February 2022.

A preliminary study conducted online in November 2021 found that the insomnia rate was 29% in the PCS population. The sampling technique used was purposive sampling from the population screened in the preliminary study. The calculation of the research subjects was determined using the categorical comparative formula in pairs of two groups, and 18 subjects were found in each group. This calculation was determined by two groups paired comparative category formula by Sopiyudin Dahlan:

$$n1=n2 = 2\left[\frac{(Z\alpha+Z\beta)S}{X1-X2}\right]^2$$

Notes:
n1: the total amount of members in Group 1
n2: the total amount of members in Group 2
Zα: degree of freedom α (assigned by the researcher)
Zβ: degree of freedom β (assigned by the researcher)
S: standard deviation for insomnia score (assigned by the researcher)
X1-X2: meaningful difference in insomnia score between two groups (assigned by the researcher)

$$n1=n2 = 2\left[\frac{(1,96+0,84)\ 7,5}{7}\right]^2$$

n1=n2= 18

The subjects taken met the following inclusion criteria: 1. correspondent young to mid-adult (19–60 years), 2. able to read, write and have online access, 3. can understand and speak Indonesian, and 4. willing to be a research respondent and fill out a google form consent form. Meanwhile, the exclusion criteria are: 1. participants use sedative drugs (sleeping pills), 2. participants have life-threatening severe medical illnesses, and 3. patients refused to participate in this study.

The insomnia profile is assessed with Insomnia Severity Index (ISI), validated to use in Indonesia with a reliability score of Cronbach Alpha 0.989, online filled out by participants through Google Forms. ISI score is stated as a numeric scale. Clinical symptoms of insomnia stated on an ordinal scale stated as "not insomnia" (score 0–7), "subthreshold insomnia" (score 8–14), "moderate insomnia" (score 15–21), and "severe insomnia" (score 22–28).

WHO Stress Management is a module created by WHO on April 29th, 2020, uploaded online to WHO official site as a coping module to face stress and grief during the pandemic. It can use freely by the public and contains five introductory chapters: grounding, unhooking, acting on your value, being kind, and making room. This module combines mindfulness and relaxation therapy. No need to join any specific training to use this module. This module has audio guidance to help module application, either offline or online. This module is given online to participants through Zoom meetings five times once a week. During the online session, participants were urged to open the camera. This module was given 30–60 minutes according to chapter content.

The flow of this research is that individuals who meet the inclusion and exclusion criteria are motivated to participate in the study. Individuals who agree will be asked to fill out online consent (google informed consent forms), then divided into an exposure group and a control group, and then given the intervention according to the WHO stress management module. The intervention session was given 5 times in 5 weeks of online meetings via Zoom meetings for 30–60 minutes. The time selection is adjusted to the agreement of the author and the research subject. At the end of the study, the Insomnia Severity Index (ISI) Google form was distributed back to the two groups to be filled out as a post-test assessment. Then a comparison was made of the results of the two groups. The data obtained were tabulated and analyzed to determine the difference between scores and clinical insomnia. If the data is normally distributed, then the pre-and post-intervention scores are measured using a paired T-test. The Wilcoxon test is performed if the data is not normally distributed. In the measurement of control and treatment groups, if the data is normally distributed, then the measurement is carried out using the independent sample T-test. If the data is not normally distributed, then the measurement uses the Mann-Whitney test. The difference is significant when $p<0.05$. All statistical analyses used SPSS 17.0. This research has received permission from the Health Research Ethics Committee of Dr. Moewardi Hospital Surakarta with the number 27/I/HREC/2022.

Result

This research was conducted online by taking a sample of 36 people. Eighteen participants from the intervention group received psychoeducation

through sleep hygiene and Zoom meeting, guidelines, and training on WHO Stress Management for five sessions. In comparison, 18 participants from the control group were only given psychoeducation in the form of sleep hygiene. Both control and intervention groups had the most similarity in data except for age. The control group had a younger mean age than the treatment group (p=0.03). Both groups had more data on the female sex, with the highest data on higher education. The two majority groups did not have comorbid chronic diseases and did not take certain medicines from doctors.

A comparison of demographic data between the control and intervention groups was taken during first encounter of researcher and participant via Telegram, and the analysis was performed using the chi-square test, while the independent sample T-test was used for age. The results of the comparison of demographic

Table 1 Demographic Characteristics of Research Subjects

Characteristics	Psychoeducation (n=18)		WHO Stress Management (n=18)		P value*
	n	%	n	%	
Age (years)					0.03
Adult (19–44)	13	72.2	14	77.8	
Middle Adult (45–60)	5	27.8	4	22.2	
Gender					1.00
Man	6	33.3	8	44.4	
Woman	12	66.7	10	55.6	
Occupation					0.10
Not a Health Worker	7	38.9	10	55.5	
Health workers	11	61.1	8	44.4	
Co-morbidities					0.19
No co-morbidities	11	61.1	11	61.1	
With co-morbidities	7	38.9	7	38.9	
Diet and lifestyle					0.78
Sedentary lifestyle					
Living a sedentary lifestyle	4	22.2	3	16.7	
Not living a sedentary lifestyle	14	77.8	15	83.3	
Smoke					
Regular smoking	0	0	2	11.1	
Do not smoke	18	100	16	88.9	
Caffeine					
Regular caffeine consumption	2	11.1	2	11.1	
Do not consume caffeine	16	88.9	16	88.9	
Gadgets					
Using gadgets before bed	1	5.6	7	38.9	
Don't use gadgets before bed	17	94.4	11	61.1	
Routine drug history					0.09
Don't take regular medication	11	61.1	11	61.1	
Take regular medicine	7	38.9	7	38.9	

*chi-square

Table 2 Differences in Insomnia Scores in the Psychoeducational Group and the WHO Stress Management Group Pre and Post Treatment

	Pre-intervention	Post-intervention	*Delta score* (SD)	95% confidence interval		P value**
				Lower	Upper	
Psychoeducation (Mean±SD)	18.56±4.58	16.44±4.61	2.11	17.54	20.96	0.00
WHO Stress Management (Mean±SD)	19.94±5.51	9.61±5.03	10.33	11.04	15.02	0.00
P value*	0.00	0.00				

*Mann-Whitney test; ** Wilcoxon test

data for gender obtained a p-value of 1.00, education of 0.10, occupation of 0.10, a history of disease of 0.19, a history of routine drug use of 0.09, and diet and lifestyle data of 0.78. Overall demographic data can be seen in Table 1.

Clinical symptoms of insomnia are divided into three, namely subthreshold, moderate, and severe. Of the 18 people in the control group, 9 people experienced subthreshold insomnia, 8 people experienced moderate insomnia, and 1 person experienced severe insomnia; while in 18 people in the intervention group before exposure, 4 people experienced subthreshold insomnia, 8 people experienced moderate insomnia and 6 people who experienced severe insomnia.

The pre-intervention control group had a lower mean insomnia score of 18.56±4.58, while the treatment group had a higher average insomnia score of 19.94±5.51 with a p-value of 0.00 (95% CI: 20.96–17.56). After receiving psychoeducation, the control group had a mean insomnia score of 16.44±4.61. In contrast, after receiving psychoeducation and WHO Stress Management training, the treatment group had a mean insomnia score of 9.61±5.03 with p=0.00.

With p=0.00, there was no significant difference between insomnia scores in the control and treatment groups before the WHO Stress Management intervention was carried out. After that, a comparison was made between the control and treatment groups after the intervention, and the p-value =0.00. To see the effect of the WHO Stress Management intervention, pre-test and post-test measurements were made in the treatment group using the Wilcoxon test. There was a decrease in the clinical mean score in the control group from insomnia symptoms in the pre-test when compared with insomnia symptoms in the post-test results in the control group who were given psychoeducation in the form of sleep hygiene with p=0.00. There was a decrease in the clinical mean in the treatment group from the pre-test results compared to the post-test results in the treatment group with p=0.00 (95% CI) (Table 2).

The logistic regression analysis tests for the dominant risk factors of insomnia in COVID-19 survivors were gender (OR 1.49), occupation (OR 1.49), and diet and lifestyle (OR 1.49) with significant results (p<0.05) indicated by gender (p=0.04), occupation (p=0.04), diet and lifestyle (p=0.03) (Table 3).

Discussion

The different tests of demographic data between the control and treatment groups did not find any significant difference. Clinical conditions of insomnia in the control and treatment groups before the intervention showed p = 0.00, which showed significant results, indicating that in both groups before the intervention, there was clinical insomnia that was significantly different, where the insomnia score in the treatment group was higher than the control group (19.94±5.51). Then the control group received sleep hygiene psychoeducation, and the treatment group was given the WHO Stress Management intervention in addition to sleep hygiene psychoeducation. After five intervention sessions, repeated measurements were made. There was a change in the score on the Mann-Whitney test between the control and treatment groups after the WHO Stress Management intervention (p=0, 00). In the Wilcoxon test, there was a decrease in the clinical score of insomnia in the treatment group (9.61±5.03, p=0.00 95% CI) and the control group (16.44±4.61, p=0.00 95% CI). The improvement in insomnia symptoms in the control group is in line with a study conducted

Table 3 Logistic Regression Factors Affecting Insomnia

Characteristics	Psycho education (n=18)		WHO Stress Management (n=18)		p-value	Beta Coefficient	OR	95% Confidence Interval	
	n	%	n	%				Lower	Upper
Age					0.16	-0.25	0.77	-0.32	0.09
Early adulthood (19–44)	13	72.2	14	77.8					
Middle adult (45–60)	5	27.8	4	22.2					
Gender					0.04	0.41	1.49	0.01	0.46
Woman	12	66.7	10	55.6					
Man	6	33.3	8	44.4					
Occupation					0.04	0.38	1.49	0.05	0.42
Not a health worker	7	38.9	10	55.5					
Health workers	11	61.1	8	44.4					
Co-morbidities					0.82	-0.03	0.96	-0.24	0.19
No co-morbidities	11	61.1	11	61.1					
With co-morbidities	7	38.9	7	38.9					
Diet and lifestyle									
Sedentary lifestyle					0.28	0.53	1.65	-0.35	1.14
Living a sedentary lifestyle	4	22.2	3	16.7					
Not living a sedentary lifestyle	14	77.8	15	83.3					
Smoke					0.05	0.69	2.01	-0.02	1.16
Regular smoking	0	0	2	11.1					
Do not smoke	18	100	16	88.9					
Caffeine					0.65	-0.16	0.90	-0.93	0.59
Regular caffeine consumption	2	11.1	2	11.1					
Do not consume caffeine	16	88.9	16	88.9					
Gadgets					0.33	0.58	1.82	-0.41	1.15
Using gadgets before bed	1	5.6	7	38.9					
Don't use gadgets before bed	17	94.4	11	61.1					
Routine drug history					0.82	-0.04	0.96	-0.24	0.19
Don't take regular medication	11	61.1	11	61.1					
Take regular medicine	7	38.9	7	38.9					
WHO stress Management Interventions					0.26	-0.20	0.81	-0.32	0.09

by Chung et al., which showed that sleep hygiene can improve sleep efficiency in insomnia.[7] While the improvement of insomnia symptoms in the post-intervention treatment group was also in line with the meta-analysis conducted by Edinger et al.,[8] which showed that relaxation and mindfulness therapy had effect sizes of 0.99 and 1.04 so that the application of the WHO Stress Management Module which is a combination of the two provides effective results.

In logistic regression, which was conducted to look at the factors that influence insomnia, it was found that male gender and occupation as a health worker were influential factors, with ORs of 1.49 and p=0.04 (95% CI). The results on occupational and gender factors differ from the research conducted by Pappa and colleagues in 2020,[9] which stated that health workers were one of the risk factors for insomnia. This may be because the health workers in this study were health workers who worked as the front line in handling Covid-19, while the health workers in this study were mostly psychiatric residents who did not face Covid-19 directly in the emergency room or ICU and isolation rooms. For the female gender, a previous study by Pappa[9] found that women are generally more prone to insomnia because they are more prone to depression and anxiety. The results of diet and lifestyle factors are also in line with several previous studies that discussed the influence of certain lifestyles, such as a sedentary lifestyle that causes individuals to rarely move and interfere with light stimulation and circadian rhythms, increased time to use gadgets at night regularly before going to bed, as well as caffeine and alcohol consumption. Excessive alcohol can be a risk factor for increasing insomnia.[3,4,9,10]

In the logistic regression of the WHO Stress Management intervention, the OR was 0.81 with p=0.26. This shows that the intervention does not have a causative effect in influencing the improvement of insomnia symptoms clinically. This is possible due to the limitations of this study, including that there are confounding factors that are not taken into account, such as psychiatric disorders that can affect sleep quality such as anxiety disorders and depression which are commonly found during the pandemic.[11] In addition, the delivery of the WHO Stress Management module online can limit the engagement of participants, as shown by research conducted by Lally et al.,[13] which showed that performance in online classes is strongly influenced by participant engagement in class. Online to ensure that the material presented can be understood well and the homework can be done correctly so that the mastery and implementation of WHO Stress Management become more difficult to monitor because the delivery uses the online method. The mastery of the material from the WHO Stress Management intervention that was given was not carried out by post-test to test how deep the participants' understanding and mastery of the material was. Other factors that become limitations in this study are not being blinded at the time of sample selection and giving the intervention and the risk of the window effect.

This study is the first to examine the use of the Stress Management module issued by the WHO to be applied to symptoms of insomnia caused by post-covid syndrome. Research with offline methods is needed to see the effectiveness of WHO Stress Management interventions on other clinical symptoms of stress caused by post covid syndrome.

In conclusion, online WHO stress management can improve the average Insomnia Severity Index score in the population experiencing post-covid syndrome, but it is not clinically significant. This result is due to the online approach that can intervene in participants' focus and engagement. Further research is needed offline using the WHO Stress Management module to see the effectiveness of its use on other clinical symptoms of post-covid syndrome.

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