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Effect of Relaxation Therapy and Vitamin C Supplementation on Stress and CD4 Levels of Mentall Illness Patients

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A significant increase in the number of mental disorders has been a phenomenon in the world, including Indonesia. It may indicate by the increasing number of the inpatients of mental hospitals. The study aims to determine the effect of the combination of psychosocial therapy and vitamin C on the stress and immunity level of patients with mental disorders. This study applied pre-experimental design on three groups in which each group consists of seven respondents with an assumption that 20% will be lost of follow up. The sampling technique is purposive sampling. The criteria of the respondents include patients with schizophrenia, adults and administered with the same antipsychotic medication. The intervention includes the 500 mg of vitamin C and relaxation technique for four weeks on a daily basis. The stress levels and immunity of the patients are measured at the end of each month. One-way ANOVA is employed as the data analysis technique. The results of analysis in stress levels and immune responses between the three groups after the intervention of Vitamin C and relaxation techniques showed a mean difference in each group. The F value of 1.534 and an associated p value of 0.234 for stress levels, and f value of 0.790 with p value of 0.469 statistically indicate the insignificant difference between the three groups. Meanwhile, during the interview as an assessment of stress levels, the second and third intervention groups were more cooperative compared to the first group. Respondents were more cooperative during mental status examination after the end of the second and third weeks, and showed an improvement in CD4 immunity (cluster of differentiation 4).

Keywords: Progressive relaxation, Vitamin C, immune response, mental status.

Currently, the prevalence of mental health disorders has shown a significant increase throughout the world including in Indonesia. The World Health Organization (WHO) claimed that severe psychiatric disorders will be experienced by at least 10% of the population in the period of their lives, of which the most suffered is Schizophrenia with the number reaching 21 million people in the world[1]. Moreover, the Ministry of Health reported that in Indonesia, approximately 14 million people aged over 15 years suffer from depression and psychiatric disorders in with the number

of severe mental disorders, e.g., schizophrenia, reaches 400,000[2]. Furthermore, patients with mental disorders is increasing and hospitalization is required hence the increasing number of clients of mental hospitals is unavoidable. Consequently, the ratio of patients who enter and leave the mental hospital is found to be uneven. According to the data of five state mental hospitals, the government only provides 0.4 beds per 10,000 population with the budget for a hospital is merely 5.3% of the national budget[2]. As a result, these hospitals cannot accommodate the increase in the average number of inpatients.

The issue of increasing number of inpatients has been addressed through assorted methods. Among them is to accelerate the recovery of patients through effective and efficient treatments as provided by health services of the hospital. It is expected that appropriate health services can have an impact on shortening the length of hospitalization[3]. Meanwhile, the effectiveness of psychopharmaceutical treatment has been known in healing mental patients in hospitals. The combination of treatment given at this time aims to reduce symptoms, instead of overcoming the cause[4,5]. Predisposing factors of functional psychosis are severe stressors, individuals do not have a self-defense mechanism in fighting the stressor. A stress may produce physical and psychological changes that cause the person's immune disturbance or the immune system to become weak[6,7].

Individual who experiences chronic stress causes decline of natural T cell production[8]. It is argued that chronic stress can deplete the supply of vitamin C in the body and cause a person to be less able to cope with the coming stressor[9]. In fact, these vitamins and minerals are found limited amounts in body human and food ingredients[10], therefore the deficiency needs to be added through supplements such as Vitamin C.

Psychopharmaceutical therapy has been used to overcome stress in patients with mental disorders while psychosocial therapy (e.g. relaxation techniques) is a complementary technique to reduce stress in patients[5]. Nurses are health staffs who have significant contribution in recovery process since they manage the patients for 24 hours[3,5]. Nevertheless, the process does not necessarily include drug therapy or pharmacotherapy but other methods that involve medical, psychosocial, spiritual and cultural aspects. Among an example of psychotherapeutic model is music therapy[11,12]. Treatment carried out by nurses to reduce stress and augment immunity in psychotic patients is mostly in the form of psychosocial therapies, including progressive relaxation technique. This technique has been known to lower blood pressure, normalize cholesterol, normalize the heart rate and increase the immunity of patients[5,13].

The initial stage of the immune response in people with depression is the decline in T-cells or helper cells (CD4 cell count) as the impact of the general immune response. Meanwhile, specific immune response linked to depression is IL-6 in which the specific immune response is related to physiological conditions. Furthermore, specific response related to psychological conditions in mental disorders is IL-12, in which it has a significant role in increasing T-cells as examined by CD4 levels[14]. Based on this, patients with particular psychological conditions can be associated with immune response of CD4. Such a disorder can be treated by relaxation therapy. Seyed Alinaghi et al., found that individual meditation successfully improves the immune response of CD4[15]. Based on the facts and theories, the test of complementary therapeutic interventions is required. The applied therapeutic model should stimulate the body to produce immunity so that patients can be more resistant to stressors that stimulate it.

MATERIALS AND METHODS

The present study employs a pre-experimental method. There are 26 respondents divided into groups in which each of them consisting of seven samples with an assumption 20% of the samples will be lost of follow up. The sampling technique is purposive sampling. The samples are patients with schizophrenia, adult and administered with the same antipsychotic. Ethical clearance has been obtained from the ethics committee of the local mental hospital.

Previous study found that the administration of 1000 mg of vitamin C for one week could increase leukocytes by a month[16]. The immunity and mental status of the patients have been examined prior the administration of Vitamin C with a dose of 500 mg and relaxation techniques

on a daily basis for 4 (four) weeks. In the present study, patients were divided into three groups. The stress levels and immune responses of the patients in the first group were examined at the end of the first month (7 times intervention). Meanwhile, those in the second and third groups were examined at the end of the second month (intervention 14 times) and at end of the third month (intervention 21 times), respectively. The patients' mental status was examined by using an assessment of mental illness developed by Stuart and Sundeen (1997), which was modified and weighed. Immunity level was done through laboratory analysis on the CD4 cell count of patients with mental disorders.

The implementation of relaxation technique on patients

During the implementation of psychotherapy intervention of progressive relaxation technique, some patients were supportive yet some were less cooperative. Based on the procedure, psychotherapy in patients was scheduled for 20 minutes but in some cases, it must be stopped earlier due to various disturbances, such as noise, patient's non-cooperative behaviours, and doctor's examination that could not be delayed. Psychotherapy was carried out in an inpatient room due to the absence of a special room for psychotherapy in the hospital. Consequently, the implementation of progressive relaxation technique was suboptimal and ineffective.

In the present study, one-way ANOVA was employed as the data analysis technique. The intervention procedures were as follows:

Group	Pre-test	Post-test			
	O	M1	M2	M3	M4
Experimental	X1	X2	X3	X4	

Pre-test is an examination of the mental status of the patients before the intervention. Furthermore, the post-test of M1, M2, and M3 is the examination of repeated stress levels and M4 is the examination of the patients' mental status at the end of the intervention.

RESULTS

As many as 26 respondents were involved in the present study in which they were selected from several wards of a mental hospital. Analysis was carried out on 21 respondents who followed the intervention regularly for 3 (three) weeks.

Characteristics of respondents

The demographic characteristics of the respondents were also investigated. The educational background of the respondents ranges from elementary to senior high school. There are six respondents (28.6%) graduated from elementary school, five respondents (23.8%) graduated from junior high school, and ten respondents (47.6%) graduated from senior high school. In the context of the marital status, 13 respondents (61.9%) were single and eight respondents (38.1%) were married. Furthermore, there are 14 male respondents (66.7%) and seven female respondents (33.3%).

Stress levels and immune responses of the respondents

Mental status is an indicator that relates to the stress level of the respondents. In the present study, the stress levels of patients before and after the intervention were examined to reveal the differences in stress levels and immunity levels of respondents (N: 21). The results of the analysis are presented in Table 2 below:

Table 2 describes the results of the analysis of the stress levels on three groups of respondents with a total of 21 patients. The average value before the intervention was 388.2, which showed a severe stress level and implied that all patients had criteria of moderate to severe mental disorders. Subsequently, the average value of the mental status after the intervention was 245.3,

Table 1. Distribution of Respondent Characteristics

Variable	F	Percentage (%)
Age		
• < 30 years	10	47.60%
• ≥ 30 years	11	52.40%
Gender		
• Male	14	66.70%
• Female	7	33.30%
Marital status		
• Married	8	38.10%
• Unmarried	13	61.90%
Educational background		
• Elementary school	6	28.60%
• Junior high school	5	23.80%
• Senior high school	10	47.60%

which showed a moderate stress level and implied the mental status of the respondents had shifted into mild to moderate level. Quantitatively, this shifting shows the improvement of mental status from before to after intervention. The result of the t-test with a given f of 5.46 and an associated p value of 0.000, hence it can be perceived that there is a significant difference in the mental status of patients before and after the intervention. Furthermore, the result of the laboratory test of CD4 is an indicator of the immune response of the patients showed that before the intervention the average CD4 level was lower (657.3) than after the intervention (862.3) in which the f score was 4.346 with p value 0.000. It implied the difference of CD4 level, before and after intervention.

Differences in level of stress and respondent's immune response on a periodic basis

In the present study, the stress levels and immune responses of the respondents were also monitored on a periodic basis during the intervention. Subsequently, the analysis was carried out every weekend for one month. Table 3 is a periodic description of stress levels at the end of each week during the intervention.

Table 3 describes that the results of the difference analysis in the stress levels among the three groups, before and after intervention. The intervention included the administration of vitamin C and the implementation of relaxation technique. The F value was 0.597 with p value of 0.561 before the intervention, and the given f of 1.534 with p value of 0.234 after the intervention. Statistically, the results showed that there were no periodic differences among the three groups after the intervention. In addition to stress levels, the immune responses of the respondents were also examined on a periodic basis. Blood collection for CD4 laboratory testing on respondents was done periodically and simultaneously with the examination of stress levels. The results of laboratory test are presented in Table 4.

Table 4 demonstrates the CD4 immune response among the three groups before and after intervention. The average CD4 cells count before intervention was 659.71 and became 557.90 after intervention. The result of the t- test between the three groups before the intervention showed f value of 0.025 and p value of 0.975 that statistically showed insignificant difference between the three

Table 2. Differences in stress levels and immune responses of respondents, before and after intervention

	Mean before	Mean after	SE	Sd	T test	P Value
Level of stress	388.2	245.3	.269	15,192	5.460	.000
Immunity (CD4 cells)	657.3	862.3	.362	37,237	4.346	.000

Table 3. Test result of the level of stress in the end of month

Stress level	N	Mean Square		F		P Value	
M1	7	Before	After	before	after	before	after
M2	7	15.42	12.603	0.597	1.534	0.561	0.234
M3	7						

Table 4. Test result of Immune responses (CD4 cells) on a periodic basis

Immune response (CD4)	N	Mean Square		F		P Value	
M1	7	before	after	before	after	before	after
M2	7	659.71	557.90	0.025	0.790	0.975	0.469
M3	7						

groups after the intervention. The results of the analysis of differences in immune responses of the three groups after the intervention with the administration of vitamin C, the implementation of relaxation technique and control showed an f value of 0.790 and p value of 0.469. It implies insignificant differences of the three groups after the intervention.

DISCUSSION

Respondents

The respondents of this study mostly graduated from senior high school background. Previous studies as reported by the WHO also found that schizophrenia tends to occur at a young and productive age[17], hence several factors become the reasons of why most respondents have high secondary educational background. In addition, mental disorders may be a precipitation factor that occurs when the patients reach a productive age, namely in their senior high school[5]. Some of their families explained that they could not continue higher level of education partly because of economic factors.

Kennedy et al., and Townsend and Morgan found that socioeconomic factor is one of the predisposing factors of schizophrenia. In fact, it is more common in the lower socioeconomic class society and has been related to dense housing, inadequate nutrition and prenatal care, lack of resources, and despair from poverty[18,5]. In this study, 50% of respondents were not married, which is linked to the reason that schizophrenia occurs at a young age and productive age. It confirms the result of a survey that concluded schizophrenia tends to occur in patients who are single or unmarried[19].

Immune response (CD4)

The CD4 cells count as examined in the present study showed a normal level. Meanwhile, it should be below normal as indicated by the results of studies carried out by Taninguci et al., and Jamil on specific immune responses that concluded CD4 levels of depressed HIV/AIDS patients is lower than those who are not depressed[20,21]. Similarly, Muller et al., has carried out a research on schizophrenic patients and claimed that schizophrenia is characterized by an increase in natural/non-specific immunity and a decline in Th1 cells, in which the marker of T-helper cells is a CD422 clinical testing[22].

The empirical reason for CD4 normal results in patients with schizophrenia and the symptoms of depression is that during the observation, patients seemed to experience a disruption of reality orientation or the symptoms of the inability to distinguish between real and unreal. Yirmia asserted that the psychiatric condition of the patient has exceeded the threshold of depression in which they fail to distinguish between reality and imaginary, and in the psychoneuroimmunology perspective, the depression level of the patient is lower hence the CD4 cells count is higher[23].

Differences in stress levels and CD4 immune responses of the patients

The results of the analysis of stress levels and CD4 cells of the patients in three treatment groups revealed that there were no significant differences between them. Meanwhile, the results of the laboratory tests with the mean calculation showed the tendency of differences occurred during the process of vitamin C and relaxation techniques. In general, all patients experience a significant decline in CD4 and stress levels. Based on the average value of each group, the average decline in CD4 cells after intervention was less on the second- and third-week groups, which is 10% lower compared to those of the intervention group in the first week. The decline in CD4 is partly caused by the effect of antipsychotic drugs. Yirmiya explicated that the depression and antipsychotic drugs have an impact on the immunomodulatory system disorders, one of which is a decline in CD4. Such drugs are immunosuppressive in which it suppresses the immune system[23].

Ascorbid acid (Vitamin C) is one of the antioxidants in addition to vitamins E and B. The nature of these substances is oxidative activity that has an impact on the immune system. Oxidative reactions or the increased oxygen for energy occur when cell metabolism in mitochondria causes the increase in ATPase, enzymatic activity, and power hause[24]. In addition, vitamin C also has a high polarity which contains a high number of hydroxyl groups that are easily soluble in water. A study showed that the intervention with Vitamin C showed a higher immune quality of mice compared to the group without vitamin C[25]. Another factor

that affects the immune responses and stress levels is the condition of the patient. Respondents with higher acute category tend to less concentrate in following the guidance of progressive relaxation. On the contrary, those with lower acute category have better concentration in following the guidance. The responses of the patients indicate the implementation of psychotherapy relaxation technique is less suitable for acute patient since it requires approximately 20 min and high concentration during the implementation.

Townsend affirmed that patients categorized in acute group are characterized by particular mental conditions, including concentration impairment. Furthermore, Stuart and Videbenck claimed that patients categorized in Group III or acute have a propensity for not understanding the treatment program and experiencing affective and psychomotor disorders, hence relaxation techniques cannot be applied to acute patients[5,26]. Nevertheless, former studies has been suggested that patients in the category of maintenance and health promotion can participate in several treatment programs scheduled by nurses and other medical personnel[4,5].

CONCLUSION

The combination of complementary therapies in the therapeutic process in patients with mental disorders is very crucial to improve the condition of patients in a shorter period. In addition, the efficacy of therapy is also influenced by the categorization of the mental status of patients and it is also important to highlight that patients with mental disorders regularly undergo unpredictable emotional changes.

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