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The Correlation between Dietary Pattern with the Prevalence and Degree of Depression in Female Students of SMAK St. Louis Surabaya

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A B S T R A C T

Introduction: The increasing prevalence of depression and irregular dietary pattern amongst adolescent, especially women, has become an important issue today. A number of studies confirm that dietary pattern plays a role as one of the biological factors affecting mood regulation through the production of nerotransmitters, however, there are conflicting results regarding the matter in adolescent. This study aimed to examine the correlation between dietary pattern and depression in adolescent.

Methods: This study was done through cross sectional analytical observational study in 89 high school students in SMAK St. Louis Surabaya. The data was gathered through two types of questionnaires filled by the respondents. The questionnaires were Food Frequency Questionnaire to assess dietary intake pattern and Beck Depression Inventory to assess the occurence of depression amongst the respondents.

Results: The study showed high prevalence of irregular dietary pattern and depression within the sample. From Spearman correlation test, there is no correlation between dietary pattern and the prevalence as well as the degree of depression ($p > 0,05$).

Conclusion: There is no correlation between dietary pattern and depression in adolescent. It may be caused by a lot of other factors contributing to the occurence of depression, including biological, psychological, and social factors.

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Introduction

Depression in adolescents continues to be one of the increasing mental illness problems in the world. Based on World Health Organization data published in 2017, South East Asia has the highest prevalence of depression in the world.[1] Badan Penelitian dan Pengembangan Kesehatan Kementerian Kesehatan RI stated in 2013 that East Java has a higher prevalence of depression than the average rate in Indonesia.[2] The study also stated that depression in adolescent is more common in women.

Depression is a disease that is influenced by multiple factors, including dietary pattern. The type and frequency of food intake become important in the incidence of depression because nutrients that enter the body are precursors of the formation of brain neurotransmitters that play a role in mood regulation.[3]

Healthy dietary pattern is still a big problem in East Java. The results of the research conducted by Badan Penelitian dan Pengembangan Kesehatan Kementerian Kesehatan RI in 2013 showed that the consumption behavior of vegetables and fruits in 90% of East Java people aged 10 years or older is still classified as "less" (less than 5 servings of fruits and or vegetables every day for 7 days), while the consumption behavior of sweet foods that is classified as "frequent" (more than once per day) reached 47.8%, salty foods reached 24.3%, and fatty foods and cholesterol reached 49.5%. These data make East Java one of the top five provinces in Indonesia with the behavior of consuming foods high in fat and cholesterol.[2] Kim (2015) showed that the risk of depression increased in adolescents who ate less green vegetables and fruits per day.[4] A research conducted by Cowen (2015) also showed a correlation between the infrequent consumption of food rich in carbohydrates and depression. He stated that deficiency of carbohydrates lead to insufficiency of tryptophan, which could cause mood disorder in people with a history of previous mental illness.[5] However, there are other researchers who confirm that there is no correlation between dietary pattern and depression.[6, 7]

These facts lead to the curiousity whether irregular dietary pattern takes part in the high prevalence of depression in East Java. This research aimed to find whether there is a correlation between eating pattern and depression.

Methods

This research was conducted using analytical observational study with cross sectional approach. Ethical clearance fit test had been published by Faculty of Medicine Universitas Airlangga before the research began. Eighty-nine female students from the tenth grade of SMAK St. Louis Surabaya were recruited for the research using total sampling method. Inclusion criteria were met if the participants still have an intact family with both parents still married to each other. Exclusion criteria include being in psychiatric treatment or therapy within the past 2 years or having a family with a history of mental illness. After a thorough explanation through a written information for consent, all participants filled out written informed consent, accompanied by an autograph signed by the participants, their parents, and a witness other than the researcher. Then, all participants filled two questionnaires. First, Beck Depression Inventory questionnaire to assess the depression level, and second, Food Frequency Questionnaire to assess the dietary pattern of the participants. These data were then analyzed using descriptive statistics (frequency, mean, and standard deviation) and analytic statistics (Spearman correlation test). These statistic tests were used to analyze the correlation between each of the dietary pattern (staple food, side dish, fruits and vegetables, breakfast, and water) with the prevalence and degree of depression.

Results

Characteristics of Subjects

This research was conducted at SMAK St. Louis Surabaya, a private catholic high school located on Jalan Polisi Istimewa 7, Surabaya 60265. The respondents of this study include 89 students of the 10th grade of SMAK St. Louis Surabaya. There were 2 samples aged 15 years old, 85 samples aged 16 years old, and 2 samples aged 17 years old. The average age was 16, with a standard deviation of 0.213. The result showed 46.1% of the total participants had depression, varying from mild, moderate, to severe degree of depression.

Dietary Intake Pattern and Depression

Table 1. The distribution of staple food intake pattern and depression in second term tenth grade female students of SMAK St. Louis Surabaya in 2019.[1]

Dietary Pattern	N[2]	%	Depression						Total	%	*P*[3]
			Mild	%	Moderate	%	Severe	%			
>1x/day	39	59.1	19	28.8	5	7.6	3	4.5	66	100.0	
1x/day	8	50.0	6	37.5	2	12.5	0	0.0	16	100.0	0.122
≤3x/week	1	14.3	5	71.4	1	14.3	0	0.0	7	100.0	

[1]In percentage
[2]Normal (no depression)
[3]The result of Spearman correlation test

Table 2. The distribution of side dish intake pattern and depression in second term tenth grade female students of SMAK St. Louis Surabaya in 2019.[1]

Dietary Pattern	N[2]	%	Depression						Total	%	*P*[3]
			Mild	%	Moderate	%	Severe	%			
>1x/day	20	71.4	6	21.4	2	7.1	0	0.0	28	100.0	
1x/day	11	40.7	12	44.4	2	7.4	2	7.4	27	100.0	0.122
≤3x/week	17	50.0	12	35.3	4	11.8	1	2.9	34	100.0	

[1]In percentage
[2]Normal (no depression)
[3]The result of Spearman correlation test

Table 3. The distribution of fruits intake pattern and depression in second term tenth grade female students of SMAK St. Louis Surabaya in 2019.[1]

Dietary Pattern	N[2]	%	Depression						Total	%	*P*[3]
			Mild	%	Moderate	%	Severe	%			
>1x/day	8	50.0	7	43.8	0	0.0	1	6.2	16	100.0	
1x/day	13	48.1	10	37.0	3	11.1	1	3.7	27	100.0	0.535
≤3x/week	27	58.7	13	28.3	5	10.9	1	2.2	46	100.0	

[1]In percentage
[2]Normal (no depression)
[3]The result of Spearman correlation test

Table 4. The distribution of vegetables intake pattern and depression in second term tenth grade female students of SMAK St. Louis Surabaya in 2019.[1]

Dietary Pattern	N[2]	%	Depression						Total	%	*p*[3]
			Mild	%	Moderate	%	Severe	%			
>1x/day	12	63.2	5	26.3	1	5.3	1	5.3	19	100.0	
1x/day	10	52.6	8	42.1	1	5.3	0	0.0	19	100.0	0.358
≤3x/week	26	51.0	17	33.3	6	11.8	2	3.9	51	100.0	

[1]In percentage
[2]Normal (no depression)
[3]The result of Spearman correlation test

Table 5. The distribution of water intake pattern and depression in second term tenth grade female students of SMAK St. Louis Surabaya in 2019.[1]

Dietary Pattern	N[2]	%	Depression						Total	%	*P*[3]
			Mild	%	Moderate	%	Severe	%			
>1x/day	43	55.8	25	32.5	7	9.1	2	2.6	77	100.0	
1x/day	2	33.3	2	33.3	1	16.7	1	16.7	6	100.0	0.389
≤3x/week	3	50.0	3	50.0	0	0.0	0	0.0	6	100.0	

[1]In percentage
[2]Normal (no depression)
[3]The result of Spearman correlation test

Based on the tables presented, the highest frequency percentage of staple food and water consumption is once a day, whereas the highest percentage for side dish, fruits, and vegetables consumption frequency is three times or less per week.

Descriptively, it shows that the higher the frequency of staple food intake, the lower the possibility of the participant to have depression. On the other side, the lower the frequency, the possibility to have mild depression is higher. For the side dish, participants tend to have moderate depression as they consume less side dish throughout the week. Meanwhile, participants who consume fruits more frequently has higher tendency to have mild and severe depression. The case is also different regarding vegetables consumption. It is found that the more vegetables are consumed, the lower tendency it is of one having depression. The result also shows participants who consume water less frequently have more possibility of having mild depression. However, Spearman correlation test shows no correlation between each of the dietary pattern components and depression ($p > 0.05$).

Discussion

The high prevalence of irregular dietary pattern within the participants can be caused by psychosocial factors including peer pressure, wrong type of diet, advertisements, and body image.[8] These factors cause a tendency to reduce consumption of staple foods and rarely consume fruits and vegetables.[9] This irregular dietary pattern can cause malnutrition in adolescents, which will then lead back to irregular dietary pattern habit.[8] The dietary pattern is considered irregular if the sample consume staple food, side dish, fruits and vegetables less than once a day, does not consume breakfast or consume breakfast more than once a day, and drink water less than two liters a day.

The high prevalence of depression in participants (46.1%) is in line with the result of a study that found an increase in the prevalence of depression in adolescents.[10] In 2017, World Health Organization stated that depression is common in adolescents.[1] Adolescents are more susceptible to depression because of the changes that occur biologically, psychologically, and socially.[11] Depression is also more common in women.[12, 13] This might be because women are more dominated by intuition or emotion when compared to rational thinking.

Through this research, it appears that dietary pattern is not associated with depression. This result is consistent with the results of a research conducted by Winpenny.[6] However, the statement contradicts the results of the research done by Kim and Khayyatzadeh.[4, 7] The existence of two conflicting statements can be caused by the application of the biopsychosocial (BPS) concept in the occurence of mental illness.

The concept of BPS, in relation to mental health, states that mental health is the result of interaction between biological, psychological, and social factors.[14] Biological factors associated with the occurrence of depression include one's dietary pattern. Dietary pattern plays an important role in the formation of brain neurotransmitters. A deficiency in the number of brain neurotransmitters can cause mood disorders.[3] Neurotransmitters that play an important role in the incidence of depression are serotonin, dopamine, noradrenaline, and GABA.[15] However, biological factor does not give a significant effect in the event of depression if it is not combined with social and psychological factors. Some psychosocial determinants that have major role in the occurrence of depression in adolescents include pressure from peers, pressure in adapting, social media, conditions in the family, and socioeconomic. In addition, adolescence is also a period of

self-identity search, which is also a factor in the occurrence of depression.[16]

Based on Spearman correlation test, there is no correlation between the pattern of staple food intake and depression. This is shown by the *p*-value of 0.122 ($p > 0.05$). Theoretically, consumption of staple foods rich in carbohydrates plays a role in the release of insulin into the bloodstream. Insulin enhance tryptophan intake and distribution into the brain, which will then be converted into serotonine.[15] Tryptophan deficiency is known to cause mood disorder, but only in someone with a history of previous depression.[5]

According to Spearman correlation test, there is no correlation between the pattern of side dish intake and depression. This is indicated by the p-value of 0.122 ($p > 0.05$). This result is supported by Winpenny (2018) who stated that consumption of protein had no significant relationship with the occurrence of depression in adolescents.[6] However, this statement contradicts the results of research by Sanchez-Villegas (2007) and Li Y (2017) which stated that protein consumption is associated with a reduced risk of depression.[17, 18] Proteins are composed of amino acids, precursors of brain neurotransmitters. Theoretically, protein deficiency will increase the risk of depression, but only in someone with a history of depression or a family history of depression.[19]

Spearman correlation test result also showed no correlation between fruit and vegetable intake patterns with depression. This is indicated by the *p*-value greater than 0.05, which is 0.535 for the correlation of fruit intake and depression patterns, and 0.358 for the correlation between vegetable intake and depression patterns. This result is supported by Winpenny, *et al*. (2018)[6] but opposed by Kim (2015). He stated that the risk of depression in adolescents increases with the decreasing in green vegetables and fruit consumption per day.[4]

Adequate fruits and vegetables are important in fulfilling the demand of antioxidants and micronutrients of the body. Micronutrients deficiency, such as iron, are found to increase the possibility of having depression.[20] However, it also depends on the type of the fruits and vegetables consumed. For example, subjects in this research tend to consume banana, which contains a lot of carbohydrates. Fruits that are rich in carbohydrates can increase the risk of depression in someone who has a history of depression, but it will not affect people with no history of previous depression.

Based on the result of the study, there is no correlation between the pattern of water intake and depression. This is indicated through the results of Spearman correlation test which produces a *p*-value of 0.389 ($p > 0.05$). This result is in line with the statement of Haghighatdoost (2018) who examined the relationship between water consumption with the risk of depression and anxiety in adults in Iran.[21] In his research, he did not find any relationship between the frequency of water consumption with the risk of depression. Stevenson (2016) also found that the increase in water quality and quantity did not have any correlation with psychological stress in women.[22] Theoretically, water consumption has a role in distributing nutrients into the brain as well as the neutralization process of inflammation factors in the body. This theory is supported by Munoz (2015) who examined the relationship between water consumption and mood in female students aged 18-22 years old and found that the frequency of water consumption is related to the mood of his respondents.[23]

Conclusion

From this study, it is concluded that there is no correlation between dietary pattern and the event of depression in the 10th grade female students of SMAK St. Louis Surabaya ($p > 0.05$). For further research, it is recommended to increase the homogenity of the sample to obtain more representative result. For example, by choosing samples based on a specific age group, specific body weight, or same regular activities.

CONFLICT OF INTEREST

The author stated there is no conflict of interest in this study.

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