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The Nutritional Variation Next to COVID-19: A Cross-Sectional Study

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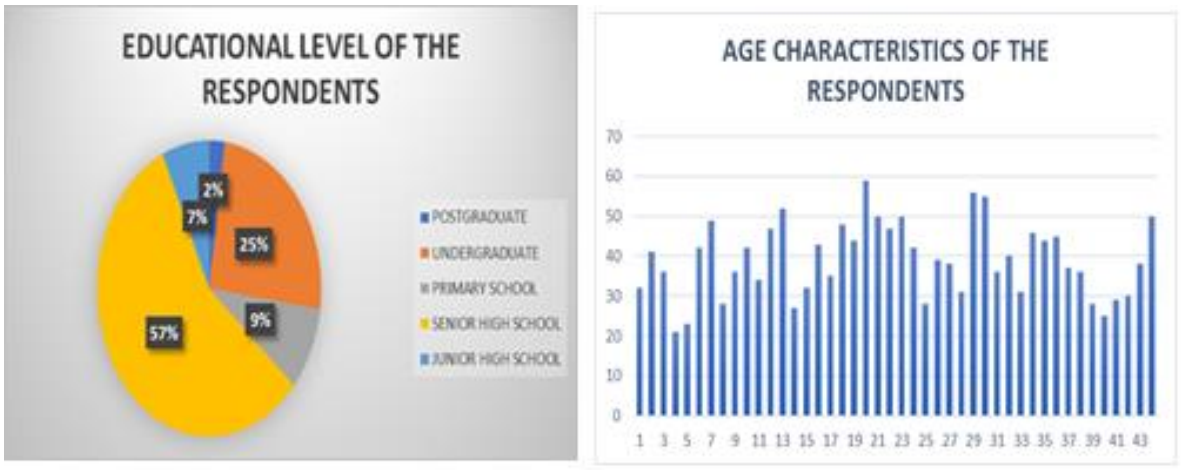
ABSTRACT

The COVID-19 pandemic has been going on since the end of 2019 until now and many positive residents have been confirmed to be suffering from symptoms of COVID-19. However, there is still little literature discussing nutrition based on community characteristics after the COVID-19 pandemic. Therefore, this article aims to analyze nutrition of the community after the COVID-19 pandemic. This study was an observational descriptive analytic design of the cross-sectional study. The samples were participants of the community service who were teachers and parents of the kindergarten school. The data were analyzed using T-test and linear regression analysis. The study results indicated that there were significant differences between the pretest score and posttest score with a p-value <0.001. In addition, all the factors including age, educational level, pretest and posttest score, weight, and height altogether significantly contribute to the nutritional status. Several measures need to be taken to mitigate the impact of the COVID-19 pandemic including those providing educational services and healthy nutrition and lifestyle to improve the community's health.

GRAPHICAL ABSTRACT



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Introduction

COVID-19 was detected for the first time at the end of 2019 in Wuhan, China [1]. COVID-19 is caused by a type of virus that can replicate which was widely known as SARS-Cov2 or Severe Acute Respiratory Syndrome of Coronavirus 2 [2, 3]. Its sufferers have spread to almost all countries in the world with a total of sufferers until May-2023 reaching 767,364,883 confirmed cases [2]. Its symptoms are similar to the symptoms of SAR-COV, namely the appearance of respiratory symptoms such as fever, cough, runny nose, or shortness of breath [4].

This COVID-19 infection usually infects lung tissue and alveolar cells in the lungs and patient's immune system. Not surprisingly, sufferers who are at risk of experiencing symptoms of COVID-19 are patients with a low immune system, including the elderly, infants, or other chronic sufferers [1, 2]. Therefore, the role of fruits and vegetables is allegedly to increase the body's resistance which is useful for warding off various diseases including diseases caused by this virus [5, 6]. Macronutrients and micronutrients contained in fruits and vegetables are very important for improving health conditions and as immunomodulators to ward off various diseases [7, 8].

In various infectious diseases mediated by the occurrence of inflammatory reactions, some nutrients such as the content of omega-3 fatty acids can reduce the incidence of inflammatory reactions in the process of bacterial or viral infections. However, the content of omega-6 fatty acids is suspected to trigger the prolongation of the inflammatory process. Hence, the supplementation of omega-3 fatty acids can improve inflammatory conditions in various infectious diseases [9].

Mental health is often associated with stress, anxiety, and depression. Meanwhile, stress events that occur in a person are often related to the behavior of eating unhealthy foods. Several references said that the habit of fast food is mostly associated with a decrease in mental health. Excessive consumption of foods with a high salt content and high sugar content either in soft drinks or drinking drinks with high sugar content is also often associated with a decrease in mental health. Conversely, the habit of consuming fruits and vegetables is often associated with improving mental health [10, 11]. Meanwhile, several studies also revealed that someone who is experiencing a decline in mental health, including stress, can trigger someone to consume foods with high energy, high sugar, and fat [12]. In addition, there is research that suggests that a woman who is experiencing stress tends to experience a high appetite to eat foods that are high in sugar and fat. Several studies explain that gender factors in which women with high levels of stress tend to consume foods high in fat and sugar but this does not apply to the male gender. This is because men tend to do stress management with a problem-based solution approach [13].

Meanwhile, several studies have suggested that someone who consumes food that is still traditional with minimal cooking processes and several types of food such as fish, vegetables, and fruit also reported lower levels of depression [14, 15]. In addition, consumption of vegetables is less likely associated with stressful events, conversely, consumption of fast food and soft drinks and high sugar content is also often associated with stressful events. In addition, the consumption of spicy and salty foods often causes a person to become addicted to the same food and can lead to obesity and a person's mental health. Someone who is experiencing stress often seeks a form of escape by consuming unhealthy and fatty foods because these foods often make them more comfortable. Several explanations for why it occurs are often associated with changes in hypothalamic-pituitary and adrenal function that mediate these events including the tendency for someone who is stressed to consume foods with high energy, fat, and sugar, and this is more common in women than men [16].

Several studies examining the diet of food consumption in college students show that the composition of the diet consists mostly of high-fat, low-energy diets, and a lack of intake of micronutrients needed for the body. Thus, it is highly recommended that a person has a balanced diet of energy, fat, macronutrients, and micronutrients, and does regular exercise [17]. In

addition, several steps can be taken to increase public and student awareness about the importance of consuming a balanced diet between macronutrients and micronutrients. Steps by providing counseling or knowledge to the community are important to take to change people's behavior related to the selection of food ingredients towards choosing balanced foods and adequate nutrition to reduce the impact on people's mental health.

Several studies have recommended stress therapy with the use of healthier consumption compared to drug therapy because of the low side effects of using food therapy for stress. Furthermore, other studies have mentioned that the use of anti-inflammatory and anti-oxidant drugs such as omega 3 in fish and curcumin is believed to be a food supplement that has a good effect. Moreover, certain types of food that often cause allergies that can trigger inflammatory effects such as eggs, nuts, milk, and wheat can be consumed in moderation [18].

Other research also suggested that the use of other micronutrients such as vitamin D, iron, and selenium is important for supporting the body's immune system. In addition, other studies argued that the consumption of whole grains, fruits, seafood, and vegetables can boost the immune system as a diet that contains many antioxidants such as beta carotene, vitamin C, and several polyphenols can boost the immune system. In addition, several diets such as vitamins A, B2, C, E, iron, zinc, and polyphenols are often mentioned to contribute to the immune system. The type of food consumed by a person in childhood greatly determines the tendency of a person to be allergic. However, the role of the environment can also affect the immune system, including stress on the body and psychological factors besides obesity, smoking, consumption of alcohol and poor nutrition, and imbalance of macronutrients and micronutrients. Hence, there is an opinion that someone who consumes food with good nutrition can improve one's quality of life. Consumption of foods that contain lots of fruits, vegetables, olive oil, and whole grains, makes our diet healthier. Limiting the amount of consumption of fatty foods is important to boost immunity; including limiting highly processed and cooked foods [19].

In addition, the consumption of a high-fiber diet is often associated with lower rates of obesity and indirectly reduces inflammation that occurs in the body and can be further used to prevent various digestive tract diseases. The large consumption of trans-fatty foods, high in salt and simple carbohydrates while lacking in fiber and complex carbohydrates, as well as foods with high calories and a lack of vitamins or minerals, causes an unhealthy diet that can cause various inflammatory diseases, obesity, diabetes, and other immune diseases [20]. The role of vitamin D itself is believed to be related to a person's immune function because some immune cells have receptors for vitamin D and can help transform monocytes into macrophages, aid phagocytosis, and modify inflammatory cytokinin secretion and destroy pathogens directly [21]. In addition, vitamin D receptors are presented to T, B, and APC (Antigen Presenting Cell) lymphocytes. Moreover, zinc is an important micronutrient for supporting the work of the immune system and preventing further inflammatory processes [22]. The use of food for the consumption of micronutrients selenium is also important for boosting the immune system due to its important function as an antioxidant and anti-inflammatory. Selenium deficiency is believed to prevent chronic disease and heart disease based on its function with glutatión preventing damage due to oxidative stress and increasing immune function against phagocytosis of pathogens [23] improving the immune system, especially during the outbreak of various diseases caused by viruses, including consuming at least 2 bowls of fruit, 2.5 bowls of whole grain vegetables, 160 g of meat to taste, and nuts. People are advised to reduce the amount of salt consumed to less than 1 teaspoon (5 g), vitamin D (600IU), zink (10 mg), iron (27 mg), and selenium 15-60ug) [19].

Despite the consumption of B vitamins, calcium is related to mental disorders. Besides that, mental disorders that occur in a mother can affect children in fulfilling nutritional needs both macronutrients and micronutrients, and can affect nutritional status and malnutrition in

children. The provision of foods rich in vitamins A, C, D, and E, or magnesium is often associated with a reduction in the incidence of mental health disorders. Unbalanced and inadequate nutritional consumption can exacerbate anxiety and stress or depression. Meanwhile, several opinions state that consumption of vitamin D and high BMI, and obesity are related to the incidence of depression and vice versa [23, 24].

In the same vein, other opinions stated that a lack of food and nutrition can lead to malnutrition which can lead to various chronic diseases such as diabetes, asthma, and others. The study on the correlation between educational service and nutritional status particularly in Indonesia is still rare. Hence, this study could be of interest to add knowledge in the area of nutrition. Based on the importance of the educational service to educate society, this study aimed to analyze whether the educational service influences the nutritional status of the community. This study hypothesizes that there is an association between the educational service to the nutritional status of the participants.

Materials and Methods

This study was a part of community services to educate the community about mental health improvement. The nutritional status was analysed using cross-sectional descriptive analysis. The data was taken upon approval of the respondents involved in the community service to fulfil the evaluation after the education of the community service program. Univariate and bivariate analyses were then performed using T-test analysis [25], and then the respondents involved in the community service as many as forty-four respondents of the teacher and parents of a kindergarten school in Kartasura district were asked to complete the pretest conducted before the educational session of the community service and the posttest which was given to the respondents after the educational session as well as the demographics information.

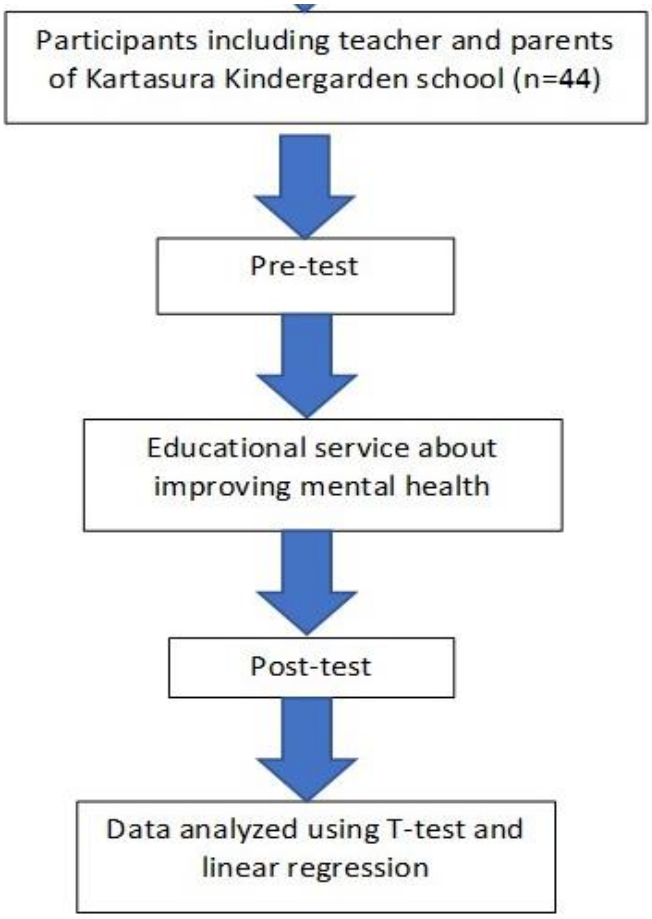

Figure 1: The study flowchart

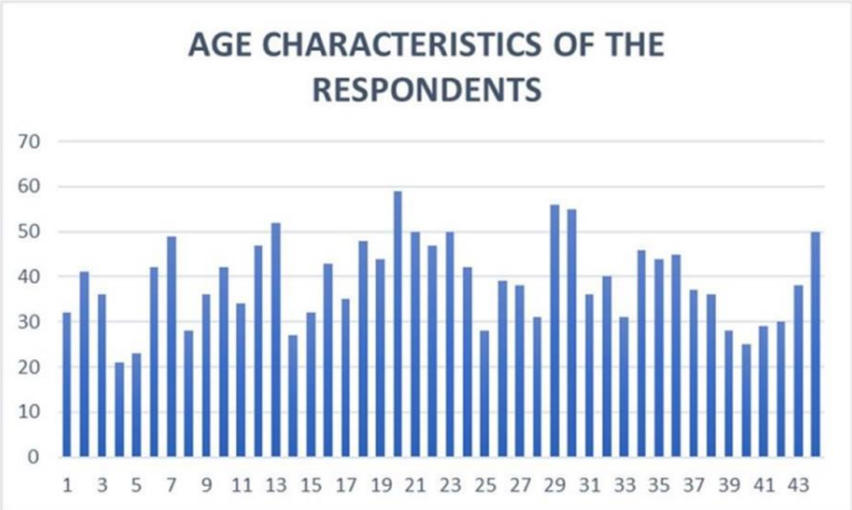

Figure 2: The age characteristics of the respondents (years) (the primary source)

The pretest and posttest form consisted of ten questions each evaluating the respondents' understanding of the educational session of improving mental health. The nutrition status was calculated based on the height and weight data following the formula of weight/height^2 and the obesity status was determined from which nutrition status < 23 was considered as normal and >=23 was determined as obesity.

Results and Discussion

For data analysis, SPSS version 26 was then utilized. The respondents consented to follow the study upon participating in this study. The study followed the Declaration of Helsinki principles in conducting the study. The study protocol has been granted for ethics approval from the institutional board of KEPK Universitas Muhammadiyah Surakarta (No. 4960/B.2/KEPK-FKUMS/VII/2023). The study flowchart is depicted in Figure 1.

In this study, the respondents were in the age range of 21 to 59 years old with a mean of 39 (SD= 9.33) (Figure 2). Meanwhile, the employment characteristic of the respondents was mostly housewives (41%) followed by the teacher (34%), and entrepreneur was the least respondents (11%) (Figure 3). The educational level of the respondents was depicted in Figure 4, where the senior high school was considered as the most educational level (57%) followed by the undergraduate level (25%) and postgraduate level as the least educational level (2%). Figure 5 demonstrated the obesity status of the respondents (45.5% obesity) and the mean the respondents were overweight nutrition status (Mean = 23.73, SD = 4.35).

In Table 1, it was indicated that using the T-test analysis there was a significant difference in each characteristic of the respondents encompassing pretest and posttest value, age, educational level, nutritional status, and obesity status with p-value <0.001.

Meanwhile, multivariate analysis was employed which suggested the significance of all the contributing factors encompassing pretest score, age factor, educational level, nutrition status, and obesity status to the posttest value indicated a significant p-value <0.001 and with a relatively strong R Square value of 0.434 (Table 2). In addition, in regards to the nutrition status, it was depicted in Table 2 that, all the factors entailing pretest and posttest scores, age factor, educational level, weight, height, and obesity status significantly contributed to the nutrition status with p-value <0.001 and a strong R Square value of 0.995. This means that educational sessions to educate the community to further understanding of the prevention of detrimental aspects of nutrition status such as community service on the importance of a healthy diet daily as well as those educational sessions to prevent any factors that influence the nutrition status including mental health and disease prevention.

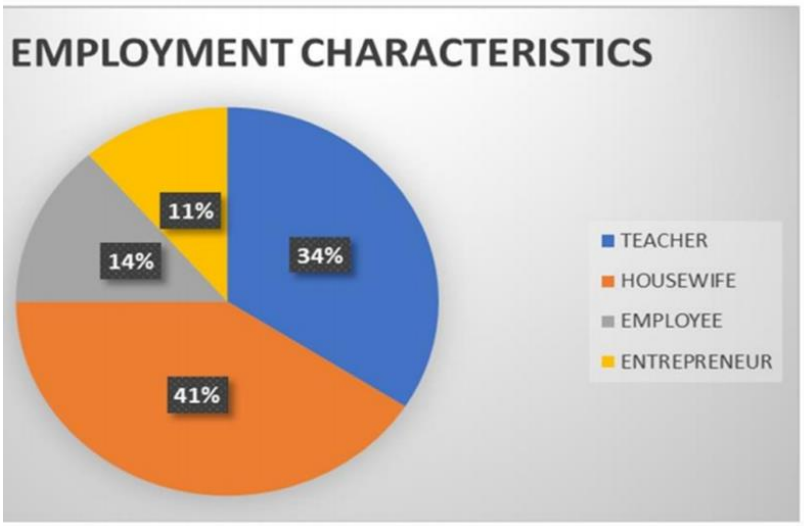

Figure 3: The employment characteristics (the primary source)

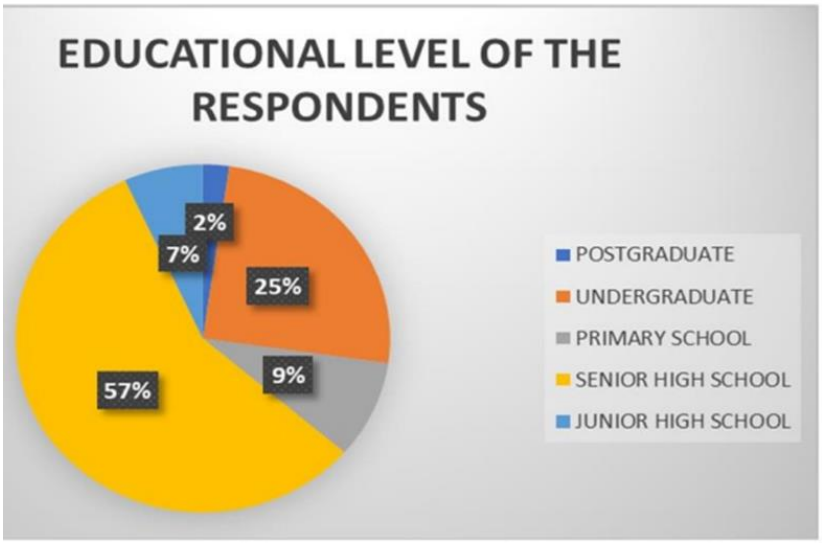

Figure 4: The educational level of the respondents (the primary source)

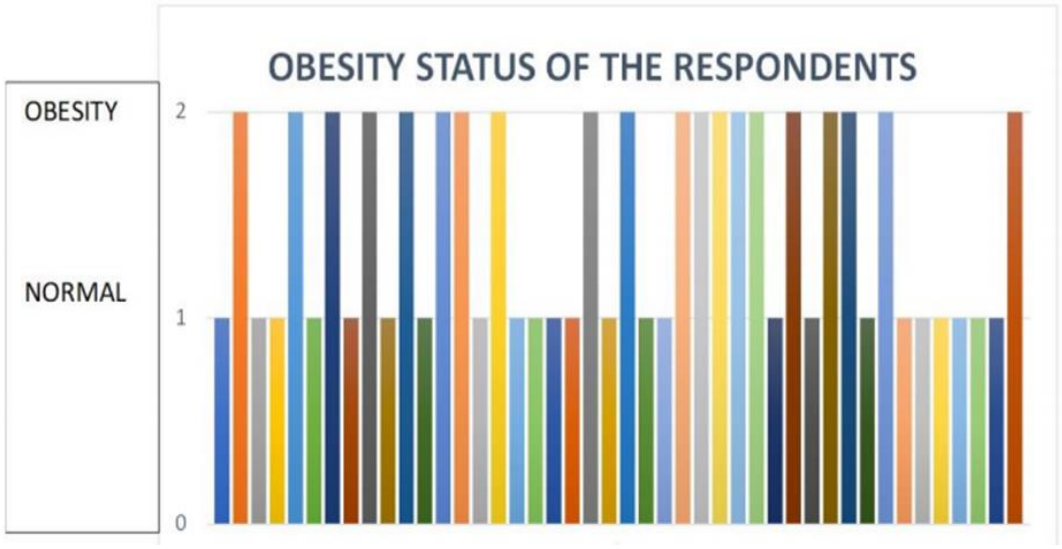

Figure 5: Obesity status of the respondents (the primary source)

Table 1: The characteristics of the respondents and bivariate analysis using T-test (n=44)

Characteristics	Mean±SD	Median (Range)	P-value	95%CI*
Pretest	56.36±15.86	55.00(60.00)	0.000	51.54-61.19
Posttest	73.181±16.53	70.00(70.00)	0.000	68.16-78.21
Age (year)	39.14±9.33	38.50(38.00)	0.000	36.30-41.97
Education	3.05±0.89	3.00(4.00)	0.000	2.78-3.32
Nutrition	23.73±4.35	22.67(22.03)	0.000	22.41-25.05
Obesity	1.45±0.50	1.00(1.00)	0.000	1.30-1.61
Weight	57.23±10.71	55.00(48.00)	0.000	53.93-60.48
Height	155.39±6.77	155.00(31.00)	0.000	153.33-157.44

**significant at p<0.05 (two-tailed).*

Table 2: Multivariate analysis using linear regression

Characteristics	R	R Square	Adjusted R Square	Std. Error (95%CI)	F	P-value	Unstandardized B
Postest,	0.659	0.434	0.359	13.236	5.819	0.000	44.947
Nutrition Status	0.997	0.995	0.994	0.343	984.314	0.000	49.832

Several studies revealed that the food consumed by a person can affect the mental health of the person. This is mainly related to the frequent consumption of fatty foods and its association with frequent occurrences of depression and anxiety [14, 15]. Moreover, some foods are related to those that are often consumed by people who live in In the Western world, where large portions of high-calorie foods, and foods that are often processed with a high saturated fat composition are often associated with the occurrence of inflammatory processes in the body and can cause a decrease in a person's cognitive function [15, 26].

The findings of this study were supporting a previous study that suggested that age also contributes to nutrition status, within which those who are older lead to less active habits and sedentary lifestyles, and unhealthy diets which could exaggerate obesity and nutritional status disturbances [27, 28].

Several measures can be taken to mitigate the impact of obesity such as providing educational sessions to educate society to better taken healthy diet such as consuming fruits and vegetables, avoiding any alcohol and tobacco, regularly and sufficiently conducting exercise, increasing mental health conditions, providing supports for those suffering mental distress or depression, and preventing from any chronic disease that detrimental to the nutritional status. Moreover, the spread of acute disease needs to be controlled using community service to educate society [29, 30] involving the community to manage the environment healthy, thus, can prevent further societal burden due to the spread of disease which can also affect the mental health of the society within which providing education to the community can benefit to improve communities' health [31-34].

Conclusion

Based on this study, it was found that there were significant differences among factors encompassing age, pretest and posttest scores, educational level, and nutritional status. Hence, it is suggested that educational sessions to educate society could be important to enhance healthy lifestyles to be conducted daily and provide support programs to maintain better nutritional conditions among children and older age. In addition, it is expected that further study could be extended by exploring the role of educational service in different areas and using different tools to assess its benefit to enhance communities' health.

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Authors' Contributions

All authors contributed to data analysis, drafting, and revising of the paper and agreed to be responsible for all the aspects of this work.

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