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Original Research

Decreased Body Mass Index (BMI) in COVID-19 Patients with Anosmia Symptoms

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Abstract

Introduction: COVID-19 is a respiratory infection caused by the SARS-CoV-19 virus and impacts the appearance of anosmia symptoms. Anosmia impacts reducing appetite, so it impacts fulfilling the nutritional needs of COVID-19 patients. This study aims to determine the effect of anosmia on the nutritional status of COVID-19 patients.
Methods: This study is an observational study with a retrospective cohort design. The samples of this study were 48 health record data of COVID-19 patients who experienced anosmia in Karangploso View Housing, Malang Regency, from July to December 2021, selected according to the inclusion and exclusion criteria. Research data analysis using the SPSS version 22 program using the paired T-test and Wilcoxon test with (α=5%).
Results: The paired T-test results showed a significant difference in the patient's weight between before and after COVID-19 illness with symptoms of anosmia (p-value = 0.000). The results of the Wilcoxon Test showed a significant difference in the nutritional status (BMI) of respondents between before and after COVID-19 illness with symptoms of anosmia (p-value = 0.000).
Conclusion: The condition of anosmia alters a person's food preferences, resulting in the perception of certain foods as less pleasant, bland, and unappealing. This condition results in loss of appetite, inadequate nutrient intake, and potential malnutrition. Self-efforts to prevent malnutrition due to anosmia in COVID-19 patients: using aromatic herbs and spices, eating small and frequent meals, modifying food texture and color seasoning, and consulting a dietician to develop a balanced and nutrient-rich meal plan.

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INTRODUCTION

The COVID-19 virus outbreak is a respiratory infection caused by the SARS-CoV-19 virus and has one form of clinical manifestation in the form of anosmia [1]–[6]. Anosmia is the loss of smell or impaired sense of smell [6]–[8]. The condition of anosmia can cause depression because COVID-19 patients lose the ability to smell the smells they like, such as food and so on [9]–[12]. The loss of this ability can also lead to a decrease in appetite, which can lead to malnutrition and changes in nutritional status in the long run. This is especially the case for COVID-19-positive patients when nutritious food intake is necessary for the body to maintain good immunity levels. Studies have reported that people with olfactory dysfunction have reduced health outcomes, one of which is associated with reduced food-tasting ability [9], [13].

A retrospective study concluded that 47% (54 out of 114) of 19 COVID-19 patients reported anosmia [6]. Anosmia started 4.4 (±1.9) days after the onset of infection, and the mean duration of anosmia was 8.9 (±6.3) days [4]. A previous study [6] showed that olfactory disorders occurred in 85.6%, which could be anosmia or hyposmia. About 79.7% of patients experience hyposmia and anosmia without nasal obstruction or rhinorrhea, and these symptoms can persist in 56% of patients even though they have been declared cured [1]. The correlation test results between anosmia patients and the ability to feel food showed a score ($p < 0.001$), which means a positive correlation. This indicates that patients with anosmia experience a reduction in enjoying the taste of food [9], [11]. Data from the Malang District Health Office in 2020 showed changes in adult nutritional status during the Covid-19 pandemic. As seen from BMI, 48% experienced a decrease in nutritional status from ideal to thin and 23% from obese to ideal or standard.

The process of SARS-CoV-2 virus infection to cause clinical manifestations in the form of anosmia begins with the process of intercellular virus spread, causing significant damage to the nucleus of olfactory epithelial cells [1], [4]–[6], [14], [15]. Damage to epithelial cells, the first signal reception in the first layer of the olfactory system, will cause olfactory dysfunction, so manifestations of loss of smell occur [3], [4]. The process of anosmia indicates a failure of odor stimulus (e.g., food odor) to be captured by receptors on olfactory sensory cells so that the odor stimulus is ignored, and no odor stimuli are continued to the brain [9], [13], [16]. A decreased olfactory power can impact the patient's condition, up to a reduced appetite. Covid-19 patients with anosmia have reduced enjoyment of food flavors, which in turn leads to malnutrition, changes in nutritional status, and decreased immunity [9], [12], [16], [17].

Nutritional intake that is complete and in sufficient quantities is an important thing that must be pursued when treating COVID-19 patients [18], especially those with anosmia disorders, to prevent the worsening of their nutritional status. So, managing positive COVID-19 patients with anosmia symptoms is necessary to maintain body immunity levels by consuming nutritious food despite the lack of taste pleasure while eating [11], [12].

According to [14], a straightforward way to improve appetite in patients with olfactory dysfunction is to add more robust flavors so that the food consumed is not "tasteless." To be more precise in determining nutritional management, especially for COVID-19 patients with anosmia, it is necessary to have complete data on changes in nutritional status. It is also considered that the existence of anosmia with all its effects does not only occur in COVID-19 patients but can also occur in Paget's disease, Sjogren's syndrome, multiple sclerosis, and schizophrenia. Based on the description above, it is necessary to research how anosmia affects the nutritional status of COVID-19 patients.

METHODS

Study Design

This study is an observational study with a retrospective cohort design. This researcher aims to identify the effect of anosmia on the nutritional status of COVID-19 patients. This study was conducted from July 15 to August 11, 2023.

Participant

The samples of this study were 48 health record data of COVID-19 patients who experienced anosmia in Karangploso View Housing, Malang Regency, from July to December 2021, selected according to the inclusion and exclusion criteria. The inclusion criteria are health records of COVID-19 patients with weight data before and after illness and height. The exclusion criteria are the health records of COVID-19 patients referred to the hospital.

Data Collection Procedure

The independent variable in this study is the incidence of anosmia felt by residents. The dependent variable is residents' Body Mass Index (BMI) before and after recovering from COVID-19 infection. The instrument in this study is a patient observation sheet to identify data on name, age, gender, length of illness, symptoms during disease (cough, flu, fever, joint pain, treatment during COVID-19, nutritional status before and after illness, changes in nutritional status).

Data Analysis

Analysis of research data using the SPSS version 22 program using the paired T-test to determine the effect of anosmia on body weight (BW) before and after illness and the Wilcoxon test to determine the effect of anosmia on BMI before and after an illness. Test with CI95% and $\alpha = 5\%$.

Ethical Consideration

This research has received approval from the Politeknik Kesehatan Malang Number 241 / KEPK-POLKESMA/ 2023 health research ethics committee.

RESULTS

According to the results of the study in Table 1, it can be concluded that respondents who suffered from COVID-19 and felt symptoms of anosmia were male (24 people or 60%) with the most length of stay for 14 days (35 people or 87.5%), the most common symptom felt was fever (21 people or 52.5%). The patient's weight before illness was at a median of 58 kg

with a mean of 57.48 kg (46 - 74 kg). Patient weight after disease at a median of 51 kg with a mean of 52 kg (41 - 69 kg). The BMI of patients before illness was at a median of 21.45 with a mean of 21.808 (18.5 - 26.5 Kg). The patient's BMI before illness was at a median of 19.45 with a mean of 19.728 (16.6 - 24.6). Most respondents who suffered from COVID-19 experienced a decrease in nutritional status (IMT) (33 people or 82.5%).

Based on the statistical test results in Table 4 and Table 5, it can be concluded that there is a significant difference in the nutritional status (BMI) of respondents between before and after COVID-19 illness with symptoms of anosmia (p-value = 0.000).

Table 1
Description of gender, education, length of illness, symptoms at the time of illness, and nutritional status

Variable	f	%
Sex		
Male	24	60
Female	16	40
Duration of illness		
14 days	35	87.5
> 14 days	5	12.5
Cough symptoms		
Yes	15	37.5
No	25	62.5
Flu symptoms		
Yes	15	37.5
No	25	62.5
Fever symptoms		
Yes	21	52.5
No	19	47.5
Symptoms of Joint Pain		
Yes	4	10
No	36	90
Isolation		
Self-isolation at home	24	60
self-isolation at hospital	16	40
Nutritional status before illness		
Ideal	24	60
Fat	9	22.5
Obese	7	17.5
Nutritional status after illness		
Skinny	17	42.5
Ideal	18	45
Fat	5	12.5
Change in nutritional status		
Decrease	33	82.5
Remain	6	15
Up	1	2.5

Table 2

Distribution of Age, BW, BMI before and after illness

Variable	Mean	Median	Min	Max
Age	32.10	30.5	20	51
BW before illness	57.48	58	46	74
BMI before illness	21.808	21.45	18.5	26.5
BW after illness	52	51	41	69
BMI after illness	19.728	19.45	16.6	24.6

Table 3

Normality Test of Weight and BMI Data with Shapiro-Wilk Test

Independent Variable	*p-Value*
BW before illness	0.102
BMI before illness	0.024
BW after illness	0.344
BMI after illness	0.044

Table 4

Pairwise T-test results on BW data

	Mean	Difference	CI95%	*p Value*
BW before illness	57.48 (6.991)	5.475 (3.471)	4.365-6.585	0.000
BW after illness	52 (6.280)			

Table 5

Wilcoxon Test Results on BMI Data

	Median (Minimum – Maximum)	*p Value*
BMI before illness (n=40)	21.450 (18.5-26.5)	0.000
BMI after illness (n=40)	19.450 (16.6-24.6)	

DISCUSSION

Based on the results of the study, it can be concluded that the symptoms of anosmia in respondents who experienced COVID-19 significantly affected the nutritional status of patients. Most respondents who suffered from COVID-19 with accompanying symptoms of anosmia experienced a decrease in nutritional status (BMI) when they were declared cured. The reduction in nutritional status can be seen in the difference in average body weight of ± 5 Kg between before and after illness. Almost half of all respondents have a thin nutritional status after COVID-19 illness with anosmia symptoms.

In the results of a previous study, it was stated that COVID-19 patients who were hospitalized experienced drastic weight loss

or more than 5 kg in 22% of patients who underwent hospitalization, especially in patients admitted to the ICU (85%). These patients had the most complaints of decreased appetite (58%). One in three patients experienced taste changes, loss of taste (33%), and or loss of smell or anosmia (27%)

Based on previous studies, the phenomenon of anosmia in COVID-19 patients occurs due to significant damage to the nucleus of olfactory epithelial cells due to infection of supporting cells and vascular pericytes of the epithelium and olfactory bulb [9], [17].[1], [7], [15], [19]. Another hypothesis suggests that anosmia occurs due to neuronal death caused by a cytokine storm, specifically the role of IL-6 produced by neurons through stimulation of the SARS-CoV-2 virus spike protein [1], [4]–[6], [20]. Damage to the nucleus of olfactory epithelial cells causes failure of the odor stimulus to be captured by receptors on olfactory sensory cells so that the stimulus is ignored, and no odor stimuli are continued to the brain [9], [13], [16].

The study's results reported that people with olfactory dysfunction in COVID-19 survivors resulted in decreased health levels; one of the causes was reduced food-tasting ability and decreased enjoyment of life [9], [13]. Another study also mentioned that a lack of hunger sensation was reported as the leading cause of reduced appetite in the acute and post-acute phases of COVID-19 infection. Changes in chemosensory perception (taste and smell) were described as the main cause of appetite changes, leading to a faster sensation of fullness when consuming food [9], [12], [13], [17]. The loss of this ability can also decrease appetite, which in the long run can lead to malnutrition.

The sense of smell is vital in our perception of food flavors. The condition of anosmia can cause depression because patients lose the ability to smell preferred odors, such as food and so on [9]–[12]. Anosmia can alter a person's food preferences. As smell contributes significantly to the perception of flavor in a person's mind, people with anosmia cannot smell the aroma of food, resulting in the perception of certain foods as less pleasant, bland, and unappealing. This results in a reduced/loss of desire to eat. Loss of appetite causes individuals to consume less food, leading to a decrease in overall food intake. This can lead to inadequate nutrient intake and potentially malnutrition [13], [16], [17].

Individuals with anosmia need to pay attention to their nutritional status and take steps to ensure they fulfill their dietary needs, especially during times of illness. Some independent efforts can be made to prevent malnutrition due to anosmia in COVID-19 patients, including using aromatic herbs and spices, such as basil, rosemary, and cinnamon, to enhance the taste of food; eating small, frequent meals throughout the day to ensure adequate nutrition; and incorporating a variety of textures, colors, and seasonings into meals can help improve the eating experience for those with anosmia. Equally important is seeking help from a healthcare professional or registered dietitian to develop a balanced and nutrient-rich meal plan [12], [13], [16].

CONCLUSION AND RESEARCH IMPLICATIONS

the symptoms of anosmia in respondents who experienced COVID-19 significantly affected the nutritional status of patients. Most respondents who suffered from COVID-19 with accompanying symptoms of anosmia experienced a decrease in nutritional status (BMI) when they were declared cured. The reduction in nutritional status can be seen in the difference in average body weight of ± 5 Kg between before and after illness. Almost half of all respondents have a thin nutritional status after COVID-19 illness with anosmia symptoms. Several independent efforts can be made to prevent malnutrition due to anosmia in COVID-19 patients, including using aromatic herbs and spices, such as basil, rosemary, and cinnamon, to enhance the taste of food; eating small, frequent meals throughout the day to ensure adequate nutrition; and incorporating a variety of textures, colors, and seasonings into meals can help improve the eating experience for those with anosmia. Seek help from a healthcare professional or registered dietitian to develop a balanced and nutrient-rich meal plan.

STUDY LIMITATIONS

The limitations of this study are that the patient's weight was measured using different scales, and the results of the last calibration are not known.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest in this study.

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