Jurnal Ilmu Kedokteran dan Kesehatan Indonesia
Volume 5 Nomor 1, Maret 2025
E-ISSN : 2827-797X; P-ISSN : 2827-8488, Hal 58-68
DOI: https://doi.org/10.55606/jikki.v5i1.5829
Available online at: https://researchhub.id/index.php/jikki

Association Between Knowledge, Attitudes, and Healthy Eating Behaviors With Metabolic Syndrome at Nusa Cendana

Yesenia Belliani Dju[1], Ika Febianti Buntoro[2], Rahel Rara Woda[3], Herman Pieter Louis Wungouw[4]
[1] Fakultas Kedokteran dan Kedokteran Hewan Universitas Nusa Cendana, Indonesia
[2-3] Departemen Kedokteran Kepulauan dan Tanah Kering, Fakultas Kedokteran dan Kedokteran Hewan Universitas Nusa Cendana, Indonesia
[4] Departemen Penunjang Diagnostik, Subbagian Radiologi, Fakultas Kedokteran dan Kedokteran Hewan Universitas Nusa Cendana, Indonesia

Jl. Adisucipto Penfui,Kupang, NTT, Indonesia
*Email: yeseniadju@gmail.com ika_buntoro@staf.undana.ac.id rahelrarawoda@staf.undana.ac.id rahelrarawoda@gmail.com

Abstract *Background :Metabolic Syndrome (SM) is a condition in which a person has high blood pressure, central obesity and dyslipidemia, with or without hyperglycemics that occur at the same time. Metabolic syndrome can have an impact on cognitive decline, eating patterns and can increase the risk of non-communicable diseases also cardiovascular diseases.Aim :Knowing the relationship between knowledge, attitudes and behaviors of healthy eating patterns to the incidence of metabolic syndrome in the academic community of Nusa Cendana University.Method :This study used a correlation analytical research design with a Cross Sectional design with the examination carried out based on NCEP ATP III criteria and filled out a questionnaire of knowledge, attitudes and behaviors about healthy eating patterns. Data analysis used non-parametric test Chi square test. There is a significant relationship between knowledge, attitudes and behaviors of healthy eating patterns towards the incidence of metabolic syndrome in the academic community of Nusa Cendana University.*

Keywords: *Knowledge, Attitudes, Behavior, Patterns, Metabolic*

1. INTRODUCTION

Metabolic Syndrome (MS) is a condition in which a person has high blood pressure, central obesity and dyslipidemia, with or without hyperglycemia. When these conditions are present at the same time in one person, then the person has a high risk of macrovascular disease.

According to the organization The National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III) considers that SM is a risk factor for cardiovascular disease in addition to increased levels of Low Density Lipoprotein (LDL) cholesterol, atherogenic dyslipidemia (prothrombotic state), insulin resistance, hypertension, abdominal obesity and increased inflammatory markers are considered as striking characteristics of SM**.**

Epidemiological data from the International Diabetes Federation states that the prevalence of metabolic syndrome in the world is 20-25%.[3] Herningtyas et al.'s 2019 study in Yogyakarta found that the prevalence of MS in the adult population in Indonesia was 21.66% of 8,573 people. Basic Health Research Data in 2018 showed that the prevalence of metabolic syndrome components included hypertension prevalence of around 27.72% over 18 years, central obesity prevalence of around 19.31% over 18 years and diabetes mellitus prevalence of around 0.86% over 15 years.

Received: Februari 14, 2025; Revised: Februari 28, 2025; Accepted: Maret 28, 2025; Published: Maret 30, 2025;

The impact of metabolic syndrome is to increase the risk of non-communicable diseases, such as type 2 diabetes mellitus by five times and the risk of cardiovascular disease by three times. In addition, other impacts caused by SM are micro albuminuria, chronic kidney disease, sexual dysfunction, cognitive dysfunction, and cancer.According to Fahad in 2013 in Jakarta, metabolic syndrome has an impact on cognitive decline and several pathophysiologies of diseases, namely obstructive sleep apnea, breast cancer, colon cancer, bladder cancer, kidney disease and prostate gland. In addition to physiological impacts, metabolic syndrome also has psychological impacts such as anger and depression.

Eating patterns are the most important behavior that can affect nutritional status and health status. This is because the quantity and quality of food consumed will affect the health level of individuals and society. If the body is healthy and free from various chronic diseases or non-communicable diseases (NCDs) related to nutrition, then the understanding of knowledge, attitudes and behavior of the community needs to be improved towards balanced nutritional consumption.

According to a study by Listyandini et al in 2020 in Jakarta, it was found that 38.7% of workers experienced metabolic syndrome. There is a relationship between age, length of service, carbohydrate intake, and physical activity, with metabolic syndrome in workers. It is necessary to improve food intake management, especially carbohydrates, and it is necessary to create a program to increase physical activity in office workers.

According to Widayati in 2019 in Yogyakarta, there was a relationship between knowledge, attitudes and behavior with metabolic syndrome from 122 people, namely a high level of knowledge about healthy lifestyles (56.5%) but with a low level of education or below high school, namely 102 people, positive attitudes (66.1%) in 82 people and behavior (67.7%) 84 people. Where the level of knowledge, attitudes, and behavior related to healthy lifestyles is high/good, the results of measuring cardiovascular disease risk factors, namely SM, will be low or normal. However, according to research by Solechah et al in 2014 in Bogor, there was no relationship between knowledge, attitudes, behavior and intake/eating patterns due to low levels of education and no differences in nutrient intake patterns.

Good and correct knowledge will be the basis for behaving correctly in managing a healthy diet because knowledge and attitude greatly influence a person's behavior. Based on the description above, the researcher is interested in conducting research on "The Relationship between Knowledge, Attitude and Behavior of Healthy Diet Patterns to the Incidence of Metabolic Syndrome in the Academic Community of Nusa Cendana University".

2. METHOD

This research was conducted by Nusa Cendana University onsite from September 29 - November 18, 2022. This research is a correlation analytical research with a Cross Sectional design, namely research used to analyze the relationship between dependent and independent variables with data collection carried out simultaneously at one time. The population in this study was conducted on the academic community of Nusa Cendana University, namely the Faculty of Agriculture as many as 29 people, the Faculty of Science and Engineering as many as 21 people, the Faculty of Medicine and Veterinary Medicine as many as 17 people, the Faculty of Public Health as many as 2 people and the Faculty of Teacher Training and Education as many as 1 person with a total of 70 respondents. The inclusion criteria in this study were the academic community of Nusa Cendana University who were lecturers and permanent employees as well as students and were willing to sign an informed consent in the research conducted. The measuring instrument used was a questionnaire that had been tested for validity and reliability on 30 respondents at Stikes Maranatha who were not included in the research sample. The contents of the knowledge, attitude, and behavior questionnaires about healthy eating patterns were adjusted to the General Guidelines for Balanced Nutrition in the form of multiple choices (A-D) for the knowledge questionnaire while the choice statements strongly agree, agree, disagree and strongly disagree for the attitude questionnaire then the choice statements are true and false for the behavior questionnaire. Scoring, each correct answer is given a value of 5 with a good category (score 40-50), sufficient category (score 30-39), less category (score <29) while each wrong answer for the knowledge and behavior questionnaire is scored 0, for the attitude questionnaire is divided by 2, namely the score closest to the correct will be reduced by 3.9 then the score that is not close to the correct answer at all is reduced by 2.9. Other measuring instruments, namely body weight, height, waist circumference, blood pressure measurements were carried out by researchers and blood sampling for triglyceride levels, HDL and fasting blood sugar was carried out by clinicians from the NTT Provincial Health Laboratory. The data that has been collected will be analyzed using a computer program analytically, and using the Chi-square test with a level of each bivariate test variable P <0.05 then the diagnosis of metabolic syndrome is established based on the criteria of NCEP ATP III, namely if there are at least 3 of 5 risk factors including waist circumference ≥ 102 cm in men or ≥ 88 cm in women, blood pressure ≥ 130/85 mmHg, fasting blood glucose levels ≥ 110 mg / dL, hyper-triglyceridemia ≥ 150 mg / dL (≥ 1.7 mmol / L), HDL levels <40 mg / dL for men or <50 mg / dL for women.

3. RESULTS

The characteristics of the 70 respondents can be seen in the following table.

Table 1. Respondent Characteristics

Characteristics Responden	Frekuensi (N= 70)	Presentase (%)
Gender		
Male	28	40
Female	42	60
Age		
17-25 year	15	21,4
26-35 year	9	12,9
36-45 year	25	35,7
46-55 year	9	12,9
56-65 year	12	17,1
Work		
Lecturer	16	22,9
PNS	15	21,4
educational staff	24	34,3
Mahasiswa	15	21,4
Last education		
SMP	1	1,4
SMA	18	25,8
Diploma	4	5,7
Bachelor	24	34,3
Magister	15	21,4
Doktor	8	11,4
Agama		
Islam	12	17,1
Katolik	9	12,9
Kristen Protestan	48	68,6
Hindu	1	1,4
Origin of Faculty		
FAPERTA	29	41,4
FST	21	30,0
FKKH	17	24,3
FKM	2	2,9
FKIP	1	1,4

Body Mass Index		
Thin	37	52,9
Normal	3	4,3
Fat	10	14,3
obesity	20	28.6

Respondents were male as many as 28 respondents (40%) and female as many as 42 respondents (60%). The largest number of respondents were in late adulthood as many as 25 respondents (35.7%) and the fewest were in early adulthood and elderly as many as 9 respondents (12.9%). In the job category, the largest number of respondents were in education personnel as many as 24 respondents (34.3%) and the fewest were in civil servants and students as many as 15 respondents (21.4%). In terms of last education, the largest number of respondents were bachelor's graduates as many as 24 respondents (34.3%) and the fewest were junior high school graduates as many as 1 respondent (1.4%).

The respondents who adhere to the most religion are Protestant Christians, namely 48 respondents (68.6%) and the least adhere to Hinduism as much as 1 respondent (1.4%). The most respondents are from the Faculty of Agriculture as much as 29 respondents (41.4%) and the least from the Faculty of Teacher Training and Education as much as 1 respondent (1.4%). The Body Mass Index of the most respondents is thin as much as 37 respondents (52.9%) and the least is 3 respondents (4.3%).

Univariate Analisys

Table 2. Distribution Data on Knowledge of Healthy Eating Patterns

Knowledge of Healthy Eating Patterns	**Frekuensi**	**Presentase (%)**
Good	63	90,0
Enaungh	6	8,6
Less	1	1,4
Total	70	100

Based on table 2, with a total of 70 respondents, 63 people (90%) had good knowledge about healthy eating patterns, 6 people (8.6%) had sufficient knowledge and 1 person (1.4%) had insufficient knowledge. This shows that most respondents have good knowledge about healthy eating patterns.

Table 3. Distribution of Healthy Eating Pattern Attitude Data

Healthy Eating Attitudes	**Frekuensi**	**Presentase (%)**
Good	65	92,9
Enaung	4	5,7
Less	1	1,4
Total	70	100

Based on table 3. with a total of 70 respondents, 65 people (92.9%) have a good attitude towards healthy eating patterns, 4 people (5.7%) have a sufficient attitude and 1 person (1.4%) has a poor attitude. This shows that most respondents have a good attitude towards healthy eating patterns

Table 4. Distribution of Healthy Eating Behavior Data

Healthy Eating Behavior	**Frekuensi**	**Presentase(%)**
Good	58	82,9
Enaungh	9	12,8
Less	3	4,3
Total	70	100

Based on table 4. with a total of 70 respondents, 58 people (82.9%) have good behavior regarding healthy eating patterns, 9 people (12.8%) have sufficient behavior and 3 people (4.3%) have poor behavior. This shows that most respondents have good behavior regarding healthy eating patterns.

Table 5. Distribution of Metabolic Syndrome Component Data

Variabel	**Frekuensi (N= 70)**	**Presentase (%)**
Waist size		
Normal	48	68,6
Obesity Sentral	22	31,4
Triglyceride Levels		
Normal	54	77,1
Tall	16	22,9
Blood pressure		
Normal	61	87,1
Tall	9	12,9
Rate HDL		
Normal	64	91,4
Rendah	6	8,6
Fasting Blood Sugar Levels		
Normal	64	91,4

Tall	6	8,6

Based on table 5. with a total of 70 respondents, it can be seen that there are several components of metabolic syndrome including waist circumference, triglyceride levels, blood pressure, HDL levels and fasting blood sugar levels. In the waist circumference variable, 48 people (68.6%) had normal waist circumference while 22 people (31.4%) were centrally obese. The triglyceride level variable was 54 people (77.1%) had normal triglyceride levels while 16 people (22.9%) had high triglyceride levels. The blood pressure variable was 61 people (87.1%) had normal triglyceride levels while 9 people (12.9%) were hypertensive. The HDL level variable was 64 people (91.4%) had normal HDL levels while 6 people (8.6%) had low HDL levels. The fasting blood sugar level variable was 64 people (91.4%) had normal fasting blood sugar levels while 6 people (8.6%) had high fasting blood sugar levels. This shows that most respondents have normal waist circumference, normal triglyceride levels, normal blood pressure, normal HDL levels and normal fasting blood sugar levels so that the incidence of metabolic syndrome is also small.

Table 6. Metabolic Syndrome Distribution Data

Sindrom Metabolik	**Frekuensi**	**Presentase (%)**
Ya	4	5,7
Tidak	66	94,3
Total	70	100

Based on table 6, with a total of 70 respondents, 66 people (94.3%) did not experience metabolic syndrome, while 4 people (5.7%) experienced metabolic syndrome.

Bivariate Analisys

Bivariate analysis in this study was conducted using the Chi-square test.

Variabel	**Sindrom Metabolik**		**Total**	**Koefisien Kontingensi**	***p value****
	ya	Tidak			
Knowledge					
Good	0	63	63		
Enoungh	4	2	6	-0,726	0,000*
Not Enoungh	0	1	1		
attitude					
Good	0	65	65		
Enoungh	3	1	4	-0,891	0,000*
Not Enoungh	1	0	1		
My man					

Good	0	58	58		
Enoungh	4	5	9	-0,512	0,000*
Not Enoungh	0	3	3		

Based on the results of the Chi-square statistical test, it was found that there is a relationship between knowledge, attitudes and behavior of healthy eating patterns and the incidence of metabolic syndrome with p = 0.850 (p <0.05).

4. DISCUSSION

In this study, there were 4 respondents who experienced metabolic syndrome, including 3 women and one man from a total of 70 respondents. This is in line with Kusumaningnastiti et al (2019) and Suhaema et al (2015), stating that the prevalence of metabolic syndrome is higher in women with an age range of over 30 years. Increasing age and work have a higher risk of experiencing metabolic syndrome

Based on the results of the chi square analysis test, there is a significant relationship between knowledge, attitudes and behavior of healthy eating patterns with metabolic syndrome at a p value of 0.000. This is in line with previous research that knowledge, attitudes and behavior have a relationship to the occurrence of metabolic syndrome.

Good knowledge is due to a person's high level of education, so their knowledge of health is getting better. This is in line with the results of the study, namely the characteristics of the respondents whose last education was dominated by bachelor's degrees, as many as 24 people (34.3%). Knowledge, attitudes and perceptions of disease are important key aspects in metabolic syndrome management. Having good knowledge and attitudes towards risk factors and disease management will help increase awareness and build healthy living practices for disease control and prevention.

Several factors that contribute to the emergence of metabolic syndrome include work factors that trigger workers to tend to behave sedentary, unhealthy eating patterns, smoking behavior, stress, and others. In addition, it is also necessary to reduce behavior that is less active and improve nutrition or health is important in efforts to prevent diseases due to non-communicable diseases or degenerative diseases, as well as increase work productivity.

Table 7 shows the results of the correlation between knowledge, attitudes and behavior of healthy eating patterns with the incidence of metabolic syndrome is a strong correlation and the direction of the correlation is negative. The negative direction of the correlation is because the results of the contingency coefficient analysis test showed a negative correlation value which means that the relationship is not unidirectional or opposite. This is in accordance with

the results of the study, namely that most respondents have good knowledge, attitudes and behavior of healthy eating patterns so that the incidence of metabolic syndrome is low. The better the knowledge, attitudes and behavior regarding healthy eating patterns, the lower the incidence of metabolic syndrome. Another examination result, namely the body mass index, shows that there are still respondents who are categorized as obese and overweight, where one possible cause is the respondent's sedentary behavior, namely work activities in this case as employees or lecturers who sit more and work using laptops during the Covid-19 pandemic. Therefore, it is necessary to implement a healthy lifestyle including physical activity in order to maintain nutritional status in normal conditions.

Because the results of the study showed that most respondents had good knowledge, attitudes and behaviors about healthy eating patterns, so that someone could know well about healthy eating patterns and apply them regularly in consuming food every day and paying close attention to the types of food. Then based on needs also according to nutritional adequacy figures so that this condition indicates good health. This condition is the same as Fahad's research (2013) that food intake affects the incidence of metabolic syndrome.

Good knowledge, attitudes and behaviors regarding healthy eating patterns will make someone have positive attitudes and behaviors in paying attention to healthy eating habits and avoiding unhealthy eating habits. This is in line with Husna (2017) that the habit of consuming unhealthy foods continuously accompanied by stress and an unhealthy lifestyle has an impact on blood pressure and weight, resulting in metabolic syndrome.

In this study, the age category of respondents who experienced metabolic syndrome was on average above 30 years. In general, the increase in SM will peak at the age of 50 years and usually develops or worsens in old age. In addition, weight gain will increase sympathetic activity to burn fat, but excessive increase in sympathetic activity will allow hypertension to occur. Metabolic syndrome will appear when a person with a genetic tendency experiences obesity. However, not all individuals with overweight or obesity experience metabolic syndrome due to the possibility of several other factors that play a role, namely genetic predisposition and insulin resistance. Obesity itself does not always cause metabolic disorders and not all people with metabolic disorders experience obesity. If associated with diet, then high energy, protein, fat and carbohydrate consumption or exceeding needs will pose a greater risk of metabolic syndrome.

5. CONCLUSIONS DAN SARAN

Because the significant value = P < 0.05, there is a relationship between knowledge, attitude and behavior of healthy eating patterns and the incidence of metabolic syndrome in the academic community of Nusa Cendana University. Based on a total of 70 respondents, only 4 people (5.7%) experienced metabolic syndrome while 66 people (94.3%) did not experience metabolic syndrome.

REFERENCES

Dewi, I. G. A. S. K., et al. (2010). Pola eating related to metabolic syndrome in the elderly at the geriatric polyclinic of Sanglah Hospital, Denpasar. *Indonesian Journal of Clinical Nutrition, 3*(3).

Eff, A. R. Y., Rahayu, S. T., & Lena, A. P. (2022). Prevention efforts for metabolic syndrome disease since adolescence. *Indonesian Community Service Journal, 2*(3), 255–260. https://doi.org/10.52436/1.jpmi.612

Fahad, M. (2013). *The relationship between diet patterns and metabolic syndrome and physical activity description of healthy heart gymnastics club members of Campus II Syarif Hidayatullah State Islamic University* [Bachelor's thesis, UIN Syarif Hidayatullah Jakarta].

Firmansyah, H. (2019). *Relationship between knowledge of healthy lifestyle and clinical symptoms of metabolic syndrome in young lecturers at Muhammadiyah University of Jember* [Bachelor's thesis, Muhammadiyah University of Jember].

Grundy, S. (2018). Metabolic syndrome. In E. Bonora & R. A. DeFronzo (Eds.), *Diabetes complications, comorbidities and related disorders* (pp. 71–107). Springer. https://doi.org/10.1007/978-3-319-73574-0_4

Herningtyas, E. H., & Ng, T. S. (2019). Prevalence and distribution of metabolic syndrome and its components among provinces and ethnic groups in Indonesia. *BMC Public Health, 19*(1), 377. https://doi.org/10.1186/s12889-019-6711-7

Husna, F. A. (2017). *Relationship between lifestyle and metabolic syndrome incidence in employees with obesity nutritional status at PT. Pamapersada Nusantara, Tanjung Enim District, South Sumatra* [Thesis, Hasanuddin University].

International Diabetes Federation. (2018). *Information on the IDF consensus worldwide definition of the metabolic syndrome*. https://www.idf.org/webdata/docs/IDF_Meta_def_final.pdf

Kusumaningnastiti, B., Probosari, E., Dieny, F. F., & Fitranti, D. Y. (2019). Tipetubuh (somatotype) with metabolic syndrome in non-obese adult women aged 25–40 years. *Indonesian Journal of Clinical Nutrition, 16*(2), 72. https://doi.org/10.22146/ijcn.42345

Listyandini, R., Dewi Pertiwi, F., & Puspa Riana, D. (2020). Dietary intake, stress, and physical activity with metabolic syndrome in workers in Jakarta. *Jurnal An-Nur*, Universitas Muhammadiyah Jakarta. https://jurnal.umj.ac.id/index.php/AN-NUR

Listyandini, R., Dewi Pertiwi, F., & Puspa Riana, D. (2020). Dietary intake, stress, and physical activity with metabolic syndrome in workers in Jakarta. *Faculty of Health Sciences, Ibn Khaldun University Bogor*. https://jurnal.umj.ac.id/index.php/AN-NUR

Ministry of Health of the Republic of Indonesia. (2014). *Regulation of the Minister of Health of the Republic of Indonesia Number 41 concerning balanced nutrition guidelines*. Jakarta.

Ministry of Health of the Republic of Indonesia. (2018). *Basic health research of East Nusa Tenggara 2018*.

Pitsavos, C., et al. (2006). Diet, exercise and metabolic syndrome. *The Review of Diabetic Studies, 3*, 118. https://www.the-rds.org

Solechah, S. A., Briawan, D., & Kustiyah, D. L. (2014). Proportion and risk factors of metabolic syndrome among female workers in textile factory in Bogor City. *Nutritional Food Panel, 37*(1), 21–32.

Suhaema, et al. (2015). Dietary patterns with the occurrence of metabolic syndrome in Indonesia. *National Public Health Journal, 9*(4). Mataram.

Widayati, A., Fenty, F., & Linawati, Y. (2019). The relationship between knowledge, attitudes, and practices of a healthy lifestyle with the risk of cardiovascular disease in rural adults in the Special Region of Yogyakarta. *Indonesian Journal of Clinical Pharmacy, 8*(1). https://doi.org/10.15416/ijcp.2019.8.1.1

World Health Organization. (1999). *Definition, diagnosis and classification of diabetes mellitus and its complications. Part 1: Diagnosis and classification of diabetes mellitus*. World Health Organization.

Yaacob, N. (2018). *Knowledge, attitude, lifestyle practices and factors affecting behaviour modifications in relation to metabolic syndrome among type 2 diabetes patients attending diabetes clinic HUSM, Kelantan* [Master's thesis, Universiti Sains Malaysia].

Yusfita, Y. (2018). Hubungan perilaku sedentari dengan sindrom metabolik pada pekerja. *The Indonesian Journal of Public Health, 13*(1), 143–155. https://doi.org/10.20473/ijph.v13i1.2018.143-155

Zahtamal, Rochmah, W., Prabandari, Y. S., & Setyawati, L. K. (2014). Prevalence of metabolic syndrome in corporate workers. *National Journal of Public Health, 9*(2).