




# Determination of impaired quality of life of hypertensive patients and its complications

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## ABSTRACT

Hypertension is a chronic disease difficult to manage well, and is ranked first in Sleman, Yogyakarta, Indonesia. This study aimed to determine the relationship between the factors of demography, comorbidity, medication, lifestyle, and access to health services related to the quality of life of people with hypertension and its complications. The study was conducted in a cross-sectional manner using data from the Sleman Health and Demographic Surveillance System from 2015 to 2018 in cycles 3 and 2 with the inclusion criteria of hypertensive patients and their complications aged 25 years or older obtained by using total sampling of 532 people. Measurement of quality of life was carried out using the Short Form 12v2 2a and 2b questionnaires presented in the physical component summary (PCS) and mental component summary (MCS). Data analysis was done using the Mann-Whitney test and Kruskal-Wallis test. The results showed factors related to the quality of life in PCS were variables of gender, age, diagnosis of hypertension and its complications, the presence of comorbidities, fatty foods, and drug consumption in the last 2 weeks, while factors related to the MCS were education and occupation seen from the  $p$  value  $< 0.05$ . Quality of life with hypertension and its complications influence and decrease the patient's physical more than mental condition.

## INTRODUCTION

Heart disease and stroke are among the highest causes of death in the world. Stroke, heart failure, and kidney disease are the main risk factors for hypertension. Therefore, hypertension is a health problem considered one of the most dangerous in the world (DiPiro *et al.*, 2015; Virani *et al.*, 2020). Hypertension is a condition in which the blood pressure in the arteries increases persistently. The normal blood pressure is 120/80 mmHg; moreover, a person is deemed hypertensive if the systolic blood

pressure is  $\geq 130$  mmHg and the diastolic blood pressure is  $\geq 80$  mmHg (Riley *et al.*, 2018; Whelton *et al.*, 2018).

According to several studies, the percentage of hypertension prevalence among the population aged  $\geq 18$  years diagnosed by doctors was 8.4% in Indonesia in 2018; this was 1% lower than the percentage in 2013. The prevalence of female hypertension was greater (36.9%) than that of male hypertension (31.3%) (Depkes, 2018). In 2019, hypertension was a noncommunicable disease that ranked first in Yogyakarta. In 2020, there were frequent cases of hypertension in the regency of Sleman, Yogyakarta, amounting to 138,702 cases. It was such an increase since there were 82,592 cases in the previous year (Depkes, 2019, 2020).

The American Heart Association has recorded that the number of people with hypertension in the United States aged over 20 years has amounted to over 74.5 million people (Benjamin *et al.*, 2019; Virani *et al.*, 2020). Indirectly, hypertension may

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affect the heart's condition due to several changes in the blood vessels, such as atherosclerosis. Atherosclerosis may result in cardiovascular disease and increase the risk of an ischemic incidence, such as angina and myocardial infarction (Tackling and Borhade, 2021). Hypertension may also negatively impact the heart directly due to the pressure effect of hypertension. The pressure effect of hypertension leads to left ventricular hypertrophy, which eventually becomes myocardial, thus making no arterial changes. A cardiac compensatory method is known as left ventricular hypertrophy in response to an increased resistance caused by increased blood pressure. Hypertrophy is a risk factor for coronary heart disease (Lalande and Johnson, 2008; Suhadi *et al.*, 2016).

There are two divisions of factors affecting one's quality of life. The sociodemographic factors such as gender, age, race, education, employment, and marital status. The medical aspect factors include long-lived hemodialysis, the disease stages, and the operational medical observational arrangements (Louzado *et al.*, 2021).

Age is one of the factors affecting one's quality of life. It is also one of the risk factors for cardiovascular disease (Aghamolaei *et al.*, 2011). One's declining quality of life often occurs when one becomes older. Reduced quality of life includes several aspects such as public health, physical function, physical role, social function, vitality, pain, and mental health. Moreover, gender plays an essential role in one's quality of life; men tend to have a better quality of life than women (Lee *et al.*, 2020). Educational background may also serve as a factor affecting one's quality of life. If someone has an excellent academic background, they tend to adapt to an unfavorable situation better. Therefore, educational background positively impacts one's quality of life (Aghamolaei *et al.*, 2011; Louzado *et al.*, 2021).

When viewing the sufferer based on their job, previous researchers found out that a sufferer with a lower socioeconomic condition would have a higher anxiety level than someone in a higher socioeconomic situation (Alegria *et al.*, 2018; Brook and Schmidt, 2008). That was how one's job affected one's quality of life. Moreover, some habits may affect one's health, such as the consumption of a poor diet of high calories, high fats, and high salt, lack of workout activities, and smoking (Gorski and Roberto, 2015). Poor diet is one of the factors in coronary heart disease. One should monitor their physical activity habits and smoking habits (Buttar *et al.*, 2005). Moreover, they need to consume more vegetables and fruit. One's quality of life can also be observed through healthcare, either preventive or medication. The excellent service aspect may increase the sufferer's satisfaction and quality of life.

Another research revealed that marital status played an essential role in the sufferer's quality of life. An unmarried person, a widow, or a widower had lower quality of life than a married person. Moreover, the sufferers in a later stage are more likely to feel the effects of their disease. They had a lower degree of health condition since they suffered various complications of their diseases. Both the infection and ferocity limited their activities and caused them to depend on medication. Eventually, that would affect the overall inner aspects of their quality of life (Carr *et al.*, 2001).

According to the psychometric property assessment results of the health-related quality of life instrument in the general population, we can employ an SF-12 instrument as one of the categories of instruments assessed as an established instrument (Haris *et al.*, 2019). One's quality of life is measured physically, mentally, cognitively, and socially since it is the ultimate goal of a chronic illness treatment intervention. It is crucial for a hypertensive person to have a good quality of life in order that they will be able to treat their disease. Hence, in this study, we aim to determine the relationship between the factors of demography, comorbidity, medication, lifestyle, and access to health services related to the quality of life of people with hypertension and its complications.

Here, we report that the factors that affected the quality of life of hypertension patients in Sleman, Yogyakarta, in the physical strain category were the gender variable, age, diagnosis of hypertension and its complications, page-disease, fatty foods consumption, and drug consumption in the last 2 weeks, whereas the factors that affected the mental component were education and occupation. Furthermore, the quality of life with hypertension and its complications influence and decreases the patient's physical more than mental condition.

## MATERIALS AND METHODS

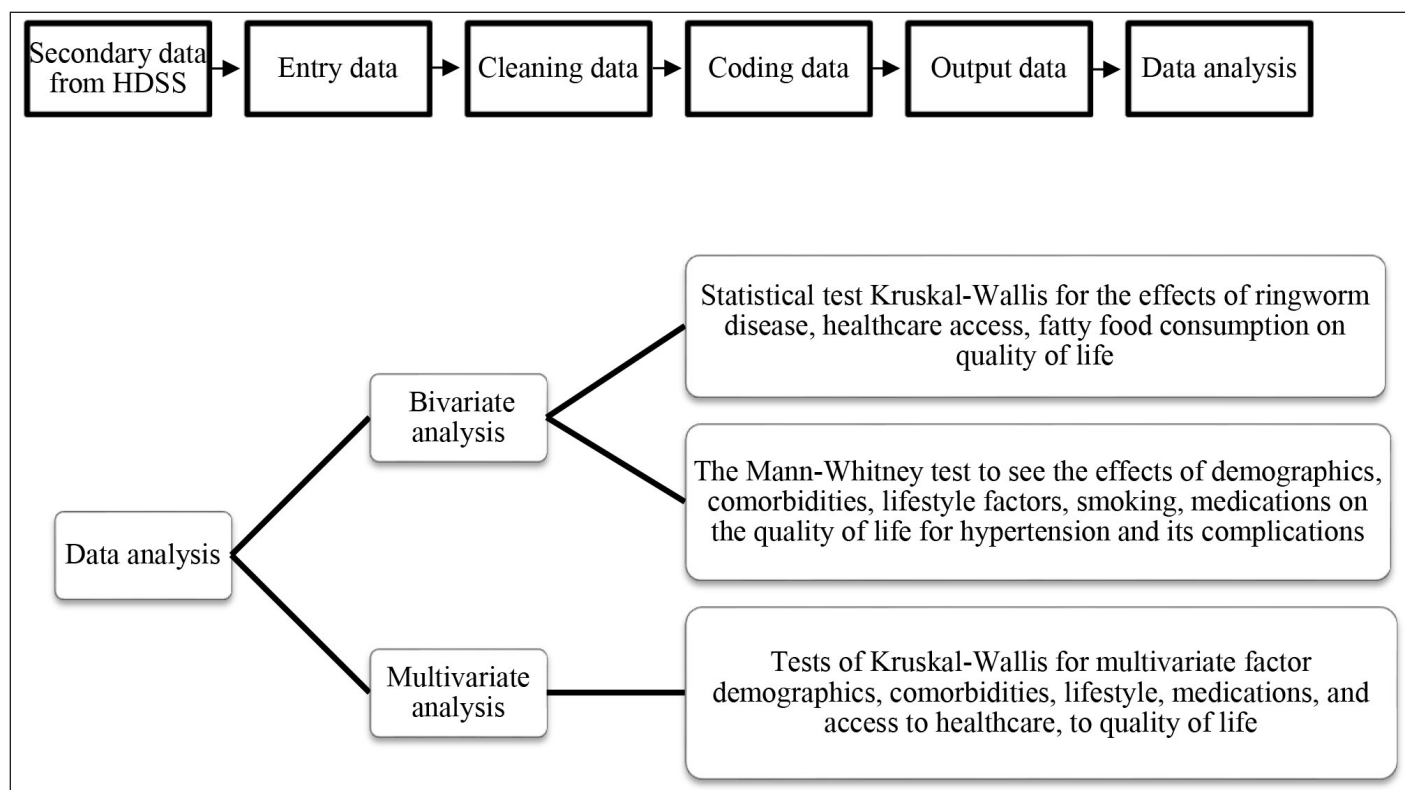
This study employed secondary data on the Health and Demographic Surveillance System (HDSS) in Sleman in the 2015–2018 period. The used data were the demographic data of individuals (their gender, age, marital status, education, and work), their comorbidities [stroke, pneumonia, diabetes mellitus (DM), and angina], their lifestyle factors (fatty foods and smoking), and their medical factors (old medicine for the past 2 weeks and the past 12 months). Moreover, their access to health services (the place for treatment and payment) served as an independent factor, while dependency was the quality of life using the SF-12 v2 (Kim *et al.*, 2014) with slight modification. The sampling was retrieved using purposive sampling, as shown in Figure 1.

Under the population of the longitudinal Sleman HDSS surveillance research, hypertension was recorded. The complications were made into a sample in the study of 532 respondents meeting the inclusion criteria (aged >25 years and lack of disability). Then, the respondents were to fill out the complete questionnaire. In contrast, the incomplete data from the respondents were excluded from this study. In terms of the aspects of quality of life measured in this study, they were divided into two components and made up of eight domains, as shown in Table 1.

The data analysis was carried out using Statistical Package for the Social Sciences software version 21 (IBM Corporation, Armonk, NY) and using statistical methods with the number, percentage, Mann-Whitney test, and Kruskal-Wallis test for multivariate analysis.

## RESULTS

Based on the research results conducted by taking the data from the HDSS of Sleman, Yogyakarta, from December 2020 to June 2021, there were 1,093 patients with hypertension and its complications. However, when the data were filtered, a sample of 532 respondents meeting the inclusion criteria was obtained.



**Figure 1.** Scheme for secondary data retrieval, phases of data processing, and stages of analysis.

**Table 1.** Summary of the Short Form 12v2 instruments with two components.

Physical component summary (PCS)	Mental component summary (MCS)
Physical function	Vitality
Physical role	Social position
Body aches	Emotional role
General health	Mental health

The distribution of the respondents with hypertension based on gender was dominated by female patients amounting to 336 patients or accounting for 36.8% (Table 2). Meanwhile, the number of male patients was 196, accounting for 36.8%. Moreover, most of the patients with hypertension and its complications were over 45 years old, with 383 (72%) married patients, 464 patients without university degrees which meant that they accounted for the majority, and 383 (72%) patients with jobs. Taking into account the respondents' lifestyles in this study, in general, they did not smoke. However, they still consumed a lot of fatty foods. Moreover, based on the kinds of treatment for the past 12 weeks, 244 respondents took the medication, meaning that fewer than half of the respondents took the pills for a short period, while more respondents took the drugs for the past 12 months. Based on the respondents' access to any health services, many respondents chose to go to public hospitals (or community health centers), amounting to 159 respondents (29.9%), and to health worker practices amounting to 187 respondents (35.2%) to receive medical treatment. As for the payment method of their medical treatment,

many respondents used insurance. However, few of them paid in cash.

The descriptive text could be observed in the distribution of the respondents with hypertension and its complications. Figure 2 showed that, of 532 respondents, 342 (64.3%) suffered from hypertension. Therefore, these statistics indicated that hypertension affected the occurrence of other complications. There were 43 (8.1%) respondents with hypertension + angina. There were 73 (13.7%) respondents with hypertension-caused angina and hypertension + stroke. Moreover, uncontrolled hypertension resulted in a high incidence of stroke [24 (4.5%) respondents], angina [39 (7.3%) respondents], and stroke + angina [8 (1.5%) respondents]. Thus, hypertension triggered other complications.

More respondents had a history of single hypertension than those with hypertension and its complications such as stroke and angina, as shown in Figure 3. More respondents were suffering from hypertension with stroke. Based on the data on comorbidities in hypertension and its complications, it was found that 38 respondents suffered from hypertension with DM. However, most of the respondents did not have comorbidities.

**Table 2.** Characteristics of demography, lifestyle, and access to health services of people with hypertension and its complications in Sleman, Yogyakarta.

Characteristics	Figures ( <i>n</i> = 532)	Percentage (%)
Gender		
Male	196	36.8
Female	336	63.2
Age		
≤45	65	12.2
>45	467	87.8
Marital status		
Married	383	72.0
Not married	149	28.0
Education		
Non-university graduate	464	87.2
University graduate	68	12.28
Occupation		
Not working	202	38
Working	330	62
Smoking		
No	475	89.3
Yes	57	10.7
Consumption of fatty foods		
Everyday	262	49.2
1×–2× a week	106	19.9
3×–6× a week	65	12.2
<3× a month	99	18.6
Getting treatment in the last 12 weeks		
No	288	54.1
Yes	244	45.9
Getting treatment in the last 12 months		
No	189	35.5
Yes	343	64.5
The place of medical treatment		
Public hospital	159	29.9
Private hospital	89	16.7
Health worker practice	187	35.2
Others	97	18.2
Payment method		
Insurance	245	46.1
Independently	198	37.2
No treatment	89	16.7

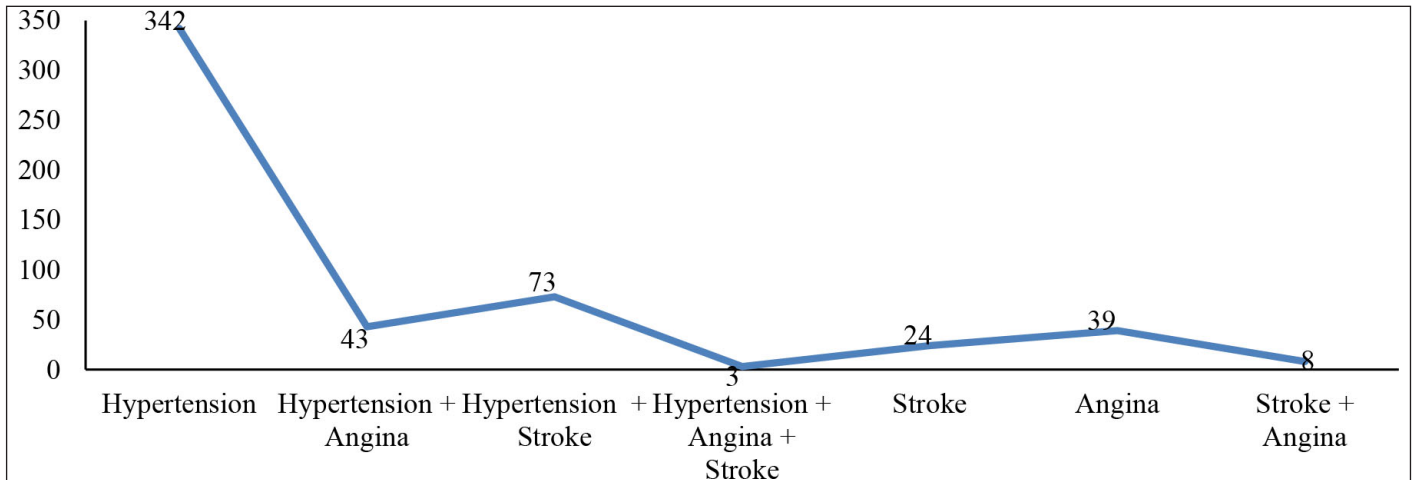
$p < 0.05$  = significant differences.

The factors related to physical components as shown in Table 3 were the variable of gender with  $p$  value = 0.011, age with  $p$  value = 0.006, diagnosis of hypertension and its complications with  $p$  value = 0.000, comorbidities with  $p$  value = 0.002, consumption of fatty foods with  $p$  value = 0.048, and medical treatment for the past 2 weeks with  $p$  value = 0.001. Meanwhile, the factors related to the mental component were the occupation

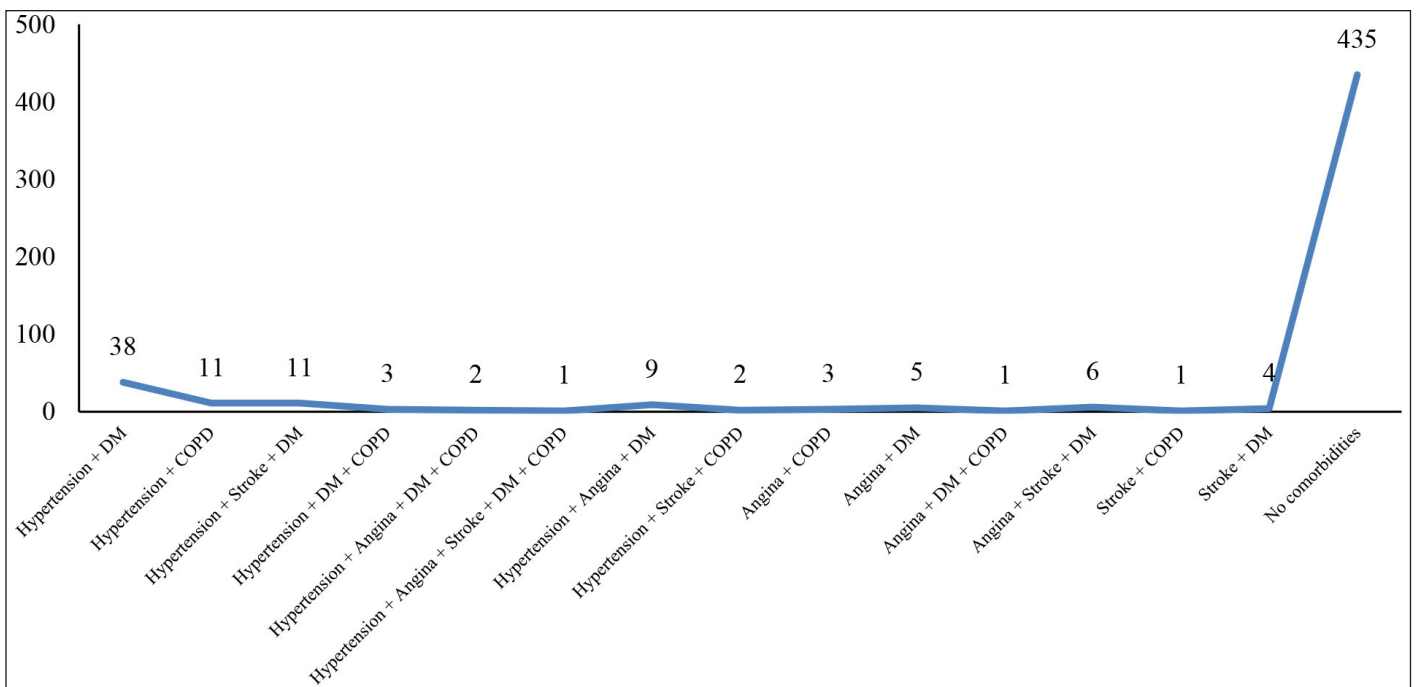
variable with  $p = 0.006$  and the education variable with  $p = 0.004$ , observed from the  $p$  value < 0.05.

## DISCUSSION

Based on the distribution of the characteristics of the respondents' gender, it was found that most of the respondents were women. Many women suffer from hypertension due to their



**Figure 2.** Patients with hypertension and its complications: clinical characteristics and complications.



**Figure 3.** Patients with hypertension and its complications have a variety of comorbidities that have distinct clinical characteristics.

hormones. Women experience menopause, and this increases the risk of high blood pressure (Wenger *et al.*, 2018). Female estrogen serves to increase high-density lipoprotein (HDL) (Demarin *et al.*, 2010). However, when a woman enters the menopause period, the production of this hormone will significantly decrease. Low HDL cholesterol levels and high levels of LDL (Low Density Lipoprotein) cholesterol lead to atherosclerosis, which increases blood pressure (Sagita *et al.*, 2019; Vergeer *et al.*, 2010).

Age affects the summary of physical components. Generally, hypertension occurs in over-40-year-old people. An over-40-year-old person allows a physiological change (Buford, 2016). The walls of their blood vessels lose their elasticity. The dilation of the blood vessels and the continuous pumping of the

blood cause increased blood pressure. If that situation continuously occurs, it will affect one's life quality, especially in physical activities (Amanda and Martini, 2018; Wagenseil *et al.*, 2009).

Hypertension and its complications and comorbidities also affect the physical components (Petrie *et al.*, 2018). However, that result was not in line by the previous study conducted by Perwitasari *et al.* (2018). The comorbidity,  $p = 0.045$ , showed a significant relation to the MCS scores but not PCS scores. Moreover, the results of this study were comparable to that of the previous research conducted by Khoirunnisa and Akhmad (2019), where the complication factor did not show a significant relation to the PCS scores; however, it showed a significant relation to the MCS scores where the  $p$  value = 0.001. The results of their study

**Table 3.** The results of multivariate analysis on the factors of dem ography, comorbidity, lifestyle, medication, and access to health services to the physical and mental health components.

Domain group SF 12				
Variable	Physical health component	<i>p</i> value	Mental health component	<i>p</i> value
Gender				
Male	244.35	0.011*	283.30	0.054
Female	279.72		256.70	
Age				
≤45 years old	315.18	0.006*	232.87	0.060
>45 years old	359.72		271.18	
Marital status				
Not married	261.65	0.650	277.34	0.310
Married	268.39		262.28	
Education				
Non-university graduate	265.12	0.588	259.07	0.004*
University graduate	275.93		317.71	
Occupation				
Not working	273.64	0.402	243.17	0.006*
Working	262.13		280.78	
Hypertension and its complications				
Hypertension	299.67	0.000*	262.89	0.364
Hypertension + angina	181.26		241.23	
Hypertension + stroke	192.15		270.18	
Hypertension + angina + stroke	327.00		166.33	
Stroke	239.08		318.08	
Angina	244.44		292.85	
Stroke + angina	152.38		277.63	
Comorbidities				
Hypertension + DM	261.67	0.002*	272.62	0.847
Hypertension + COPD	264.36		285.18	
Hypertension + stroke + DM	129.59		267.59	
Hypertension + DM + COPD	270.67		211.67	
Hypertension + angina + DM + COPD	16.50		442.00	
Stroke + DM	44.13		227.00	
Hypertension + angina + DM	174.17		215.67	
Hypertension + stroke + COPD	168.00		274.75	
Angina + COPD	267.33		385.17	
Angina + DM	244.60		257.60	
Angina + DM + COPD	463.50		200.50	
Angina + stroke + DM	188.33		359.67	
No comorbidities	277.36		264.63	
Hypertension + angina + stroke + DM + COPD	223.00		261.00	
Stroke + COPD	83.00		243.50	
Fatty foods				
Everyday	282.21	0.048*	262.22	0.360
1–2×/week	245.45		254.78	
3–4×/week	277.22		266.48	
<3×/month	240.43		290.39	

*Continued*



Domain group SF 12				
Variable	Physical health component	<i>p</i> value	Mental health component	<i>p</i> value
Smoking				
No	268.99	0.281	264.50	0.387
Yes	245.78		283.13	
Drug consumption in the last 2 weeks				
Not consuming	287.63	0.001*	263.28	0.599
Consuming	241.56		270.31	
Drug consumption in the last 12 months				
Not consuming	282.73	0.071	262.02	0.617
Consuming	257.56		268.97	
Place for medical treatment				
Public hospital/puskesmas	258.77	0.053	260.07	0.886
Private hospital	232.34		262.43	
Health worker practices	278.93		272.31	
No treatment and others	286.54		269.58	
Payment method				
Insurance	253.84	0.087	270.87	0.682
Independently	269.15		258.93	
No treatment	295.46		271.33	

\*  $p < 0.05$  = significant differences.

were by that of this study which significantly affected the MCS scores. The quality of life in all domains of patients diagnosed with hypertension with stroke was significantly worse than in those with hypertension alone. The presence of other chronic diseases limited the patient's physical activity and more drugs taken by the patient, resulting in more possibility of the side effects of the drugs might affect the patient's quality of life and patient's compliance. Any symptoms of hypertension and cardiovascular diseases will greatly impact the quality of life especially physical health.

Comorbidities such as DM and Chronic Obstructive Pulmonary Disease (COPD) affect the physical components. Various factors contribute to the incidence of hypertension, one of which is DM. A type 2 DM obese patient often experiences hypertension since hypertension can result in cell insensitivity to insulin. Insulin regulates the metabolism of carbohydrates by increasing the glucose uptake in the cells to disturb the level of blood sugar.

The consumption of fatty food affects the summary of the physical components. The consumption of fatty food is one of the risk factors in hypertension that can be controlled, including lifestyle and behaviors such as lack of physical activities, obesity, food consumption, and stress (Wang *et al.*, 2010). A blocked blood vessel may result from the high levels of fats in the blood so that it can affect or interfere with the cardiovascular system. Fats can indirectly lead to hypertension which may, in turn, lead to cardiovascular disease. Moreover, heart attacks and strokes may result from increased body weight and an increased level of cholesterol. Accordingly, if a patient with hypertension experiences complications of strokes and heart attacks, their quality of life will be worse. Moreover, those symptoms and the impacts of the disease may reduce one's socialization activities

with the environment and their mental health (Wagenseil *et al.*, 2009; Wang *et al.*, 2010; Wenger *et al.*, 2018).

Medical treatment received for the past 2 weeks affected the summary of the physical components. This result was comparable to the previous study conducted by Karuniawati and Supadmi (2016). They found a relation between one's quality of life and their adherence to medication taking. The adherence to routine medication taking affects one's physical activities affecting the duration of hypertension. Therefore, the better the patient's compliance, the greater the decrease and control of their blood pressure, improving their quality of life (Karuniawati and Supadmi, 2015).

The educational background affected the MCS. Therefore, this result was not comparable to the previous study conducted by Khoirunnisa and Akhmad (2019), stating that education did not significantly relate to the MCS scores with  $p = 0.14$ . Moreover, the result was also not by the previous study conducted by Xu *et al.* (2016), stating that a low level of education was associated with lower physical function and body ache scores. Hypertensive patients with a lower level of education have a worse condition with lower scores of physical function and body ache than those with a higher level of education (Xu *et al.*, 2016). This study provided more effects on the hypertensive patients' physical components than their mental components. However, in this study, education impacted the summary of the cognitive elements, probably due to their different social lives and expectations.

Occupational factors affected the MCS. However, this result was not by the previous study conducted by Xu *et al.* (2016), stating that those who suffered from hypertension were unemployed people who had better general health and had poorer social function than those who worked. It meant that the study had

some effects on the summary of mental components, which was consistent with this study stating that the overview of mental parts affected both working and nonworking people since those who did not work had a lower socioeconomic status which would result in their poor quality of life.

## CONCLUSION

The quality of life of hypertensive patients and their complications decreased more on physical conditions consisting of gender, age, diagnosis of hypertension and its complications, presence of comorbidities, fatty foods, and drug consumption during the last 2 weeks. Meanwhile, the mental condition of decreasing quality of life is influenced by education and work factors. Gender and age affect some factors, including hormonal, physiological, and functional changes in the body and perceptions. Those factors affect the quality of life of each individual. In addition, lifestyles such as consuming fatty foods and drugs during the last 2 weeks can affect blood vessels and blood pressure control, impacting the quality of life of people with hypertension and its complications. Self-awareness is necessary for people with hypertension and its complications when dealing with unhealthy lifestyle factors that can trigger hypertension. Lack of knowledge and education are factors worth considering when someone is trying to improve their quality of life.

## CONFLICT OF INTEREST

The authors report no financial or any other conflicts of interest in this work.

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## AUTHOR CONTRIBUTIONS

All authors made substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data; took part in drafting the article or revising it critically for important intellectual content; agreed to submit to the current journal; gave final approval of the version to be published; and agree to be accountable for all aspects of the work. All the authors are eligible to be an author as per the international committee of medical journal editors (ICMJE) requirements/guidelines.

## ETHICAL APPROVALS

This study does not involve experiments on animals or human subjects.

## DATA AVAILABILITY

All data generated and analyzed are included within this research article.

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