

11-30-2022

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### Recommended Citation

Widya A L, Gayatri C, Deby A M, et al. Quality of Life of Hypertensive Patients Undergoing Chronic Disease Management Program during the COVID-19 Pandemic. *Kesmas*. 2022; 17(4): 264-269

DOI: 10.21109/kesmas.v17i4.6224

Available at: <https://scholarhub.ui.ac.id/kesmas/vol17/iss4/5>

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# Quality of Life of Hypertensive Patients Undergoing Chronic Disease Management Program during the COVID-19 Pandemic

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## Abstract

The COVID-19 pandemic has restricted some common activities for hypertensive patients undergoing the Chronic Disease Management Program at primary health care, decreasing the quality of life. This study aimed to measure the quality of life of hypertensive patients undergoing the Chronic Disease Management Program at primary health care of Manado City, North Sulawesi Province, Indonesia, during the COVID-19 pandemic. Also to determine factors influencing hypertension such as sex, age, education, employment status, monthly income and duration of hypertension. This cross-sectional study was carried out on 150 hypertensive patients randomly sampled at primary health care from June to September 2021. The data were analyzed using the Mann-Whitney test. The utility value and the visual analog scale of hypertensive patients with and without complications were  $0.808 \pm 0.13$  and  $80.2 \pm 8.16$  and  $0.761 \pm 0.17$  and  $75.1 \pm 7.56$ , respectively. The quality of life of hypertensive patients without complication is better than that of hypertensive patients with complication.

**Keywords:** Chronic Disease Management Program, COVID-19, hypertension, noncommunicable disease, quality of life

## Introduction

By 2025, 1.56 billion adults are estimated to suffer from hypertension. The data from the 2018 Indonesian Basic Health Research/*Riset Kesehatan Dasar* (Riskesdas) showed an increase in the prevalence of hypertension in Indonesia from 2013 to 2018 by 25.8% to 34.11% and particularly in North Sulawesi Province in 2018 by 33.12%.<sup>1</sup> Hypertension was recorded as a comorbid condition, with the highest percentage of the incidence of COVID-19 patients at 49.8%.<sup>2</sup> Elderly patients and comorbid hypertension may be risk factors for a poor prognosis in patients with COVID-19. Therefore, the government should treat hypertensive patients because they are vulnerable to coronavirus infection.<sup>2,3</sup>

Since January 1, 2014, Healthcare and Social Security Agency/*Badan Penyelenggara Jaminan Sosial Kesehatan* (BPJS Kesehatan) has been committed to ensuring equitable health for all Indonesians by providing decent health care for the community. One of the government's health service systems is integrated between participants, health facilities, and BPJS Kesehatan in the form of the Chronic Disease Management Program/*Program Pengelolaan Penyakit Kronis* (Prolanis). Furthermore, it is designed to offer people with hypertension and type 2

diabetes mellitus an optimal quality of life at affordable healthcare costs. Activities included in Prolanis include medical/educational consultations, home visits, reminders, club activities, and monitoring of health status. However, the COVID-19 pandemic resulted in limited medical/educational consultations; hence, home visits and club activities were not carried out. This condition is because restrictions on community activities are being put in place following government regulations to prevent the spread of COVID-19.

The European Quality of Life-5 Dimensions (EQ-5D) consists of a short questionnaire and the determination of the Visual Analog Scale (VAS) value, which only takes a short time. The results of the questionnaire will give a clear picture of the participants' health condition.<sup>4</sup> The standard measure of health status developed by the EuroQol Group, European Quality of Life, can be used in clinical and economic assessments. The EQ-5D has been widely used to measure Health-Related Quality of Life (HRQoL), both in the general population and directly in patients.<sup>4</sup> It is also used to describe and assess the health status of various diseases. The European Quality of Life-5 Dimensions-5 Levels (EQ-5D-5L) instrument is widely used and can measure HRQoL and

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Received : September 12, 2022  
Accepted : November 27, 2022  
Published : November 30, 2022

utility.<sup>5</sup> The EQ-5D-5L instrument consists of five dimensions describing individual health in walking ability (mobility), self-care, usual activities, pain or discomfort, and anxiety or depression. Each dimension has five severity levels: no problems, slight problems, moderate problems, severe problems, and extreme problems.<sup>5</sup> However, to accurately measure the quality of life (QoL) of Indonesians, it is better to use the Indonesian version of The EQ-5D-5L.<sup>6-8</sup>

However, cardiovascular disease and hypertension can significantly affect the QoL of patients, and a long-term reduction in cardiovascular risk is an important goal in treating high blood pressure.<sup>6</sup> A previous study tried to find ways to improve the QoL of people with high blood pressure so that they can do daily tasks better, have less physical and mental pain, and fully participate in family and social life.<sup>9</sup> In the context of health, the QoL is often equated with the length of life. In order to determine the general population and patients' health status and to measure the impact of health care interventions, an assessment of various elements affected physically, mentally, emotionally, and socially is used.<sup>10</sup> Hypertension is associated with a lower QoL, with patients scoring lower in almost all dimensions, including physical ability and vitality, compared to the general population. This disease affects patients' QoL in the form of headaches, dizziness, depression, anxiety, and fatigue as well as impaired vitality, social function, mental health, and psychological function.<sup>11,12</sup>

The prevalence of hypertension is increasing every year, specifically in North Sulawesi Province.<sup>1</sup> Further studies should be carried out to improve the QoL, the service, and the treatment system for patients suffering from the disease. Locally, the results of further studies can be a reference for the organizers to improve further the QoL of participants in the chronic disease management program. Globally, it can be used as information and reference material that a health service policy program existing in Indonesia through the Prolanis can improve the QoL of hypertensive patients. Therefore, this study aimed to measure the QoL of hypertensive patients undergoing Prolanis during the COVID-19 pandemic and determine the factors that significantly influenced it using the EQ-5D-5L instrument.

## Method

This cross-sectional study was conducted during the COVID-19 pandemic from June to September 2021 at five primary health cares (PHCs) in Manado City, North Sulawesi Province, Indonesia. This city was selected due to a high prevalence of hypertension.<sup>1</sup> The subjects were 150 patients selected using a random sampling method divided into two categories: 75 hypertensives with complications and 75 hypertensives without complications.

The selected participants fulfilled the established criteria: aged >18 years, agreed to participate, and had the adequate ability to complete the questionnaire in this study. The questionnaire data consisted of an agreement sheet, characteristic data, and EQ-5D-5L and VAS data. The characteristic data collected include sex, age, education, employment status, monthly income, and duration of hypertension. The stage of conducting the survey started by introducing the authors to the participants, explaining the aims of the study, and asking for willingness to fill out the questionnaire. The participants who agreed to complete the questionnaire were asked to fill out a consent form.

The patient's QoL was measured using the EQ-5D-5L instrument. The conversion of the state of health into the utility value was based on the Indonesian value system. The dimensions measured in the instrument included walking ability, self-care, usual activities, pain/discomfort, and anxiety/depression. Each dimension was measured with five response levels, where the non-response was coded 1 to code 5 if it was very problematic. There were 3,125 possible state of health combinations to describe the level of each dimension, ranging from 11111 (perfect health) to 55555 (worst health). Furthermore, the value of the VAS was determined on a scale of 0–100, corresponding to the state of health observed by the participants during the study period. The number 0 represented the worst health status imaginable, while 100 represents the best health status imaginable,<sup>5</sup> and the questionnaire used was validated.<sup>6-8</sup>

The percentages of patient characteristics were calculated, which included sex, age, education, employment status, monthly income, and duration of hypertension. Furthermore, grouping was carried out based on the problem response in each EQ-5D-5L domain. The value for utility value conversion was based on the Indonesian value system. The data were analyzed using SPSS 22.0 for Windows (free version). Since the utility and VAS scores were not normally distributed, the Mann-Whitney test,<sup>13</sup> was used to observe the differences in each group of patients' QoL based on their characteristics.

## Results

This study was conducted on 150 patients at five PHCs in Manado City that was committed to being a place for data collection during the COVID-19 pandemic from June to September 2021. The population was residents of Manado City, and the sample was those who came to the PHCs. According to the data, most participants with hypertension, with or without complications, were female, aged  $\leq 50$ , not attending higher education, unemployed, earned the regional minimum wage (RMW), and had been suffering for more than a year (Table 1).

**Table 1. Patients Characteristics**

Variable	Category	Hypertension			
		Without Complication		With Complication	
		n = 75	%	n = 75	%
Sex	Male	24	32	30	40
	Female	51	68	45	60
Age	≤50 years	22	29.33	17	22.67
	>50 years	53	70.67	58	77.33
Education	≤Senior high school	42	56	46	61.33
	>Senior high school	33	44	29	38.67
Employment status	Employed	31	41.33	22	29.33
	Unemployed	44	58.67	53	70.67
Monthly income	≤RMW	48	64	52	69.33
	>RMW	27	36	23	30.67
Duration of hypertension	≤1 year	17	22.67	9	12
	>1 year	58	77.33	66	88

**Note:** RMW = Regional Minimum Wage

**Table 2. Problem Responses in Each European Quality of Life-5 Dimensions-5 Levels Domain**

EQ-5D-5L Domain	Category	Hypertension	
		Without Complication	With Complication
		n (%)	n (%)
Mobility	No Problem	51 (68%)	41 (54.67%)
	Problem	24 (32%)	34 (45.33%)
Self-care	No Problem	67 (89.33%)	59 (78.67%)
	Problem	8 (10.67%)	16 (21.33%)
Usual activity	No Problem	65 (86.67%)	56 (74.67%)
	Problem	10 (13.33%)	19 (25.33%)
Pain/Discomfort	No Problem	10 (13.33%)	8 (10.67%)
	Problem	65 (86.67%)	67 (89.33%)
Anxiety/Depression	No Problem	29 (38.67%)	30 (40%)
	Problem	46 (61.33%)	45 (60%)

**Note:** EQ-5D-5L = European Quality of Life-5 Dimensions-5 Levels

Table 2 describes the problem response data in each EQ-5D domain. The highest problem-free responses among participants without complications were reported with self-care (89.33%) and usual activities (86.67%). The same applied to participants with complications: self-care (78.67%) and usual activities (74.67%). The lowest problem response in hypertensive patients with and without complications was self-care and usual activities, at 21.33%, 25.3%, 10.67%, and 13.33%, respectively. In contrast, most problematic responses were reported in the pain/discomfort and anxiety/depression dimensions in hypertensive patients with or without complications. Hypertensive patients without complications reported pain/discomfort at 86.67% and anxiety/depression at 61.33%. For hypertensive patients with complications, the percentages of the pain/discomfort and anxiety/depression domains were 89.33% and 60%, respectively.

Data in Table 3 describes the utility and VAS values

of hypertensive patients with and without complications. Hypertensive patients without complications had a utility value of  $0.808 \pm 0.13$  and VAS value of  $80.2 \pm 8.16$ , while hypertensive patients with complications had a utility value of  $0.761 \pm 0.17$  and VAS value of  $75.1 \pm 7.56$ . A comparison of the QoL in two groups of participants showed that the group of hypertensive patients without complications had a better QoL than those with complications based on utility and VAS values. The statistical utility value test with the Mann-Whitney test revealed significant differences in hypertensive patients without complications in age ( $p$ -value < 0.001), monthly income ( $p$ -value < 0.001), and duration of hypertension ( $p$ -value < 0.001) but not in those with complications in age ( $p$ -value < 0.001), education ( $p$ -value = 0.020), employment status ( $p$ -value = 0.001), and monthly income ( $p$ -value = 0.067). On the other hand, the VAS value showed a significant difference in patients' characteristics. In hyper-

**Table 5. Value of Utility and Visual Analog Scale Based on Hypertensive Patients' Characteristics**

Characteristic	Category	Utility						Visual Analog Scale					
		Without Complication			With Complication			Without Complication			With Complication		
		Average	SD	p-value	Average	SD	p-value	Average	SD	p-value	Average	SD	p-value
Total		0.808	0.13		0.761	0.17		80.2	8.16		75.1	7.56	
Sex	Male	0.847	0.03	0.090	0.774	0.18	0.559	82.1	3.88	0.047	0.774	0.18	0.955
	Female	0.791	0.16		0.753	0.17		79.3	9.44		0.753	0.17	
Age	<50 years	0.900	0.07	<0.001	0.886	0.07	<0.001	86.4	7.59	<0.001	0.886	0.07	<0.001
	≥50 years	0.770	0.14		0.725	0.18		77.6	6.98		0.725	0.18	
Education	≤SHS	0.816	0.11	0.960	0.735	0.18	0.020	79.9	6.58	0.909	0.735	0.18	0.151
	>SHS	0.799	0.16		0.807	0.15		80.6	9.90		0.807	0.15	
Employment status	Employed	0.819	0.15	0.419	0.863	0.08	0.001	81.1	9.46	0.660	0.863	0.08	0.010
	Unemployed	0.801	0.12		0.719	0.19		79.5	7.14		0.719	0.19	
Monthly income	≤RMW	0.769	0.15	<0.001	0.738	0.18	0.026	77.3	7.07	<0.001	0.738	0.18	0.076
	>RMW	0.879	0.07		0.813	0.16		85.4	7.46		0.813	0.16	
Duration of hypertension	≤1 year	0.907	0.06	<0.001	0.861	0.04	0.067	87.6	6.15	<0.001	0.861	0.04	0.891
	>1 year	0.780	0.14		0.747	0.18		78.0	7.37		0.747	0.18	

Notes: SHS = Senior High School, SD = Standard Deviation; RMW = Regional Minimum Wage

**Table 4. Binary Logistic Regression Analysis on Factors Significantly Associated with Utility of Hypertensive Patients with Complication**

Variable	p-value	Odds Ratio
Sex	0.362	0.560
Education	0.349	2.293
Employment status	0.011	14.253
Monthly income	0.672	0.724

**Table 5. Binary Logistic Regression Analysis on Factors Significantly Associated with Utility of Hypertensive Patients without Complication**

Variable	p-value	Odds Ratio
Age	0.023	10.611
Education	0.094	10.161
Employment status	0.541	0.460
Monthly income	0.087	0.110

tensive patients without complications, the characteristics were sex (p-value<0.047), age (p-value<0.001), monthly income (p-value<0.001), and duration of hypertension (p-value<0.001), while those with complications, the characteristics differed in age (p-value<0.001) and employment status (p-value<0.010). This significant difference indicated that there were differences in QoL in each group of participants according to these variables. Overall, age in each patient group showed a significantly different value (p-value<0.001).

The output results are presented in Table 4. Variables in the equation, with variable X4 (employment status) having a significant value of 0.011, which was less than 0.05 in this study. This variable partially had a significant effect on the Y (with complications) variable with an odds ratio (OR) value of 14.253. Table 5 describes that in this study, variable X2 (age) had a significant value of 0.023 and was smaller than 0.05. The age variable partially had a significant effect on the Y (without complications) variable, with an OR value of 10.611. Variable X5 (monthly income) had a significant value of 0.087, which was more than 0.05, so this variable partially had no significant effect on variable Y (without complications) with an OR value of 0.110.

## Discussion

The distribution of participants' data according to sex showed that females were the majority of participants, with a proportion of 60% and 68% for hypertensive patients with and without complications, respectively. This result was in line with a study in Bandar Lampung City, Lampung Province, Indonesia, that 54.48% of 134 hypertensive patients were female.<sup>14</sup> A study in Yogyakarta City, Special Region of Yogyakarta Province, Indonesia, also stated that people suffering from hypertension were dominated by females (75%).<sup>15</sup> In terms of age, patients aged 50 years and above have the highest percentage of participants, both with (77.3%) and without complications (70.67%). A similar study by Kustanti, *et al.*,<sup>16</sup> also showed a high prevalence of hypertension in patients aged 65–80 years (60-80%). The utility and VAS values were higher in patients aged ≤50 years. A study by Xu, *et al.*,<sup>17</sup> supported this data and revealed that hypertensive patients aged ≤50 years had the highest average utility value.

Regarding the relationship between sex and age in terms of the prevalence of hypertension, women at the age of 40 should be aware of hypertension. They enter the premenopausal period at this age. Hence, estrogen and menstruation hormones will decrease until they fi-

nally experience menopause. The estrogen hormone helps control activities and protect against disease.<sup>18</sup> Therefore, when the amount decreases, the organs of the female body lose their capacity and become uncontrolled, which causes the atrial vessels to harden and become tense. Furthermore, it is more dangerous if hypertension occurs in postmenopausal women because endothelial cells will be destroyed due to reduced estrogen content. Damage to the endothelium will trigger the emergence of plaque in the blood and increase blood pressure.<sup>19</sup>

Most patients' education was still at a low level ( $\leq$ senior high school). Education plays an important role in the therapeutic process as it relates to a person's ability to receive information on the disease and its treatment and can describe their level of understanding.<sup>19</sup> Xu, *et al.*,<sup>17</sup> reported that patients with higher levels of education tend to have a better QoL. A study by Anggara and Prayitno,<sup>20</sup> also found that the prevalence of hypertension tends to be higher in patients with low levels of education due to their ignorance of health and difficulty receiving information that affects their behavior and lifestyle. Furthermore, a low level of education is directly proportional to employment and income.

Most hypertensive patients were unemployed and had an income below the RMW. A low level of education indirectly related to poverty, having no place to live, and finding it difficult to find a permanent job, which eventually becomes a stressor.<sup>21</sup> Stress will cause cardiovascular disease through recurrent force per unit area elevations, as well as by stimulating the system to supply giant amounts of vasoconstriction hormones that increase force per unit area. Although stress does not directly cause cardiovascular disease, it does cause recurrent force per unit area elevations, which may eventually lead to cardiovascular disease.<sup>21</sup> Furthermore, a person's lack of activity impacts a higher heart rate. The higher the heart rate, the harder the heart contracts and the stronger the pressure on the artery walls.<sup>22</sup> Individuals with sufficient socioeconomic status will be able to fulfill their daily needs, and vice versa.

In this study, 77.33% of hypertensive patients did not have complications, and 88% had the disease for more than a year (Table 1). Hypertension is a chronic disease; therefore, measuring the length of the illness is an essential variable in measuring the QoL.<sup>2</sup> A person suffering from a disease for a long period, or in this case, a chronic disease such as hypertension, can affect the quality of their life as it can limit their activities. Patients suffering from this disease for longer than one year have a lower QoL (Table 4). In contrast, Hamida, *et al.*,<sup>23</sup> stated patients suffering from the disease for less than one year have a higher utility value.

The QoL of individuals with hypertension is worse than that of normotensive individuals.<sup>17</sup> Chronic disease

is a factor that leads to a person's non-compliance with drug use, which can affect the QoL. Hypertension is one of the risk factors for this disease in which cells become insensitive to insulin and plays a role in increasing the glucose taken up by cells. On the other hand, hypertension can be caused by diabetes mellitus, which can trigger an increase in fluid volume that increases blood pressure, reduce the ability of blood vessels to expand, and cause changes in the body's ability to produce insulin, thereby increasing the rate of blood pressure.<sup>24</sup> The percentage of responses to the pain/discomfort and anxiety/depression domains exceeds half of the participants involved (Table 2). These results were in line with a study by Hamida, *et al.*,<sup>23</sup> which stating that hypertensive patients had the highest problem response in pain/discomfort (100%), followed by the anxiety/depression domain (84%).<sup>23</sup> The health status of hypertensive patients will deteriorate as they age, significantly impacting their poor QoL. All chronic diseases, including hypertension, significantly impact the patient's QoL.

## Conclusion

The COVID-19 pandemic has negatively impacted on the QoL of hypertensive patients undergoing Prolanis because not all of the activities there can be implemented. Based on the results of this study, hypertensive patients without complications have a better QoL compared to those with complications. The most commonly-reported problems are in the pain/discomfort and anxiety/depression domains. Factors influencing the patient's low QoL are low level of education (not attaining higher education), unemployment, low monthly income.

## Abbreviations

Riskesmas: Riset Kesehatan Dasar; BPJS Kesehatan: Badan Penyelenggara Jaminan Sosial Kesehatan; Prolanis: Program Pengelolaan Penyakit Kronis; EQ-5D: The European Quality of Life-5 Dimensions; VAS: Visual Analog Scale; HRQoL: Health-Related Quality of Life; EQ-5D-5L: The European Quality of Life-5 Dimensions-5 Levels; QoL: Quality of Life; Prolanis: Program Pengelolaan Penyakit Kronis; PHC: Primary Health Care; RMW: Regional Minimum Wage.

## Ethics Approval and Consent to Participate

This study was carried out after receiving approval from the Health Research Ethics Committee of RSUP. Prof. Dr. R.D. Kandou, Manado City, North Sulawesi Province, Indonesia, Number 092/EC/KEPK-KANDOU/VI/2021.

## Competing Interest

The authors declare that there is no significant competing financial, professional, or personal interest that might have affected the performance or presentation of the work described in this manuscript.

### Availability of Data and Materials

The data and materials in this study are available to the corresponding author upon request.

### Authors' Contribution

WAL and GC were involved in conceptualizing the study design and contributed to data collection. DAM and HW analyzed the data. SP edited and supervised the work. All authors were involved in the manuscript's writing and final approval.

### Acknowledgment

The authors express profound gratitude to the Universitas Sam Ratulangi Research and Community Service Institute for funding this research. The authors are also grateful to the parties who assisted in this research, particularly the primary health care in the Manado City area.

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