Determinants of Hypertension Treatment Adherence during the COVID-19 Pandemic: Lesson Learned from Various Studies Sites in Indonesia

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Abstract

Background: Hypertension is the most common comorbid disease which can cause further complications in COVID-19 patients. On the contrary, the pandemic has also caused lower health services and adherence to hypertension therapy. This study aimed to examine the impact of the COVID-19 pandemic on medication adherence in people with hypertension in Indonesia.

Methods: The research was conducted using an analytical quantitative method. Patients with hypertension from seven islands across Indonesia were recruited based on eligibility criteria during *Bulan Bakti* 2021, a social outreach by Ikatan Senat Mahasiswa Kedokteran Indonesia about basic health across Indonesia. The demographic and medication history of the respondents were recorded. The Indonesian version of the Morisky Medication Adherence Scale (MMAS-8) questionnaire was distributed, and the medication adherence level was assessed.

Results: A total of 1155 patients, mainly females (62.2%) participated in this study. More than half of the patients had low adherence (55.25%). Males (Adjusted Odd Ratio (AOR) 0.777 [CI 95% 0.529–1.019]), employed (AOR 0.857 [CI 95% 0.495–1.483]), higher income (AOR 0.522 [CI 95% 0.393–0.713]), and those who had information from healthcare worker (AOR 0.583 [CI 95% 0.361–0.878]) were found to have better medication adherence in multivariate logistic regression test.

Conclusion: Medication adherence level in patients with hypertension during the pandemic is markedly low. Integrated preventive and promotive measures, especially from healthcare workers, are needed to prevent further morbidity and mortality.

Keywords: Adherence, COVID-19, hypertension, Indonesia, social determinant of health

Introduction

The presence of comorbid diseases is one of the factors that can increase the risk of infection and worsen the condition of patients with COVID-19.[1] Laboratory confirmed cases of patients with COVID-19 and with any comorbidity have worsened clinical outcomes. A higher number of comorbidities is also linked to worse clinical outcomes.[2] Hypertension is one of the most common comorbid diseases experienced by patients who died from COVID-19. About 12% of patients with hypertension diagnosed with COVID-19 have a worse outcome.[3] Hypertension is a non-communicable disease characterized by a systolic blood pressure greater than or equal to 140 mmHg and diastolic blood pressure of 90 mmHg. Hypertension is becoming more common, especially in low-middle-income

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nations, and estimated 31.1% of individuals in the globe had hypertension in 2010. Hypertension is more common in low-middle income nations (31.5% or 1.04 billion persons) than in high-income nations (28.5% or 349 million people).[4] Based on the 2018 *Riset Kesehatan Dasar Indonesia* (Riskesdas), the prevalence of hypertension in the population aged over 18 years is around 34.1%, that is increased from 25.8% in 2013.[5]

Interestingly, hypertension is also known as a silent killer because it rarely causes symptoms. This asymptomatic condition is the leading cause of non-adherence to hypertension treatment.[6] Treatment adherence is one of the efforts to control non-communicable diseases. Better controlled hypertension may increase life expectancy, lower the economic burden, and improve quality of life.[7] In Nepal, Indonesia, and several countries in Sub-Saharan Africa and Oceania, treatment rates for women are fewer than 25%, and for males, are less than 20%. Moreover, women and men in other countries in North Africa, Central and South Asia, and Eastern Europe have control rates below 10%.[8] The recommendation of the Joint National Committee 7 has revealed that efforts to prevent the worsening of hypertension are lifestyle modifications, starting from diet regulation, increased activity, reduced salt intake, and weight loss.

Anti-hypertensive drugs as prophylaxis are needed to achieve the target of 135/85 mmHg if the lifestyle modification recommendations are unsuccessful.[8] Hypertension is considered to be uncontrolled if the systolic blood pressure is 140 mmHg and diastolic blood pressure is 90 mmHg based on an average of three measurements with or without anti-hypertensive treatment.[9] Non-adherence to treatment is one of the reasons for uncontrolled hypertension. Several studies have shown that the medication adherence rate in developed countries is only 50% and even lower in developing countries. Non-adherence to treatment is a big problem because it can lead to treatment failure and increase the possibility of complications.[10] Several factors associated with treatment non-adherence are the administration of lots of medication, the fear of the side effects, the belief that the condition is getting better, the lack of knowledge about the treatment, and the lack of follow-up to the nearest health facility.[11, 12]

The COVID-19 pandemic may impact on hypertension health services, leading to treatment non-adherence. A study conducted by World Health Organization (WHO) has shown increased barriers to health care for non-communicable diseases with greater severity of COVID-19 transmission. The impact of COVID-19 on health services is in the form of restrictions on the procurement of routine follow-ups, the deployment of some staff to serve COVID-19 patients, and the unavailability of drugs or other health products.[13] A study in the low-resource healthcare setting country found that 40% of patients with hypertension and type 2 diabetes mellitus reported the adverse impact of the COVID-19 pandemic on drug availability and routine follow-up schedules, which then led to an increase in patient non-adherence to medication.[10] Therefore, this study explored the impact of the pandemic on medication adherence in those with hypertension in Indonesia by using the Modified Morisky Adherence Scale 8 (MMAS 8) questionnaire.

Methods

This study was an empirical analytic study, using quantitative approaches with measurement parameters of treatment adherence among those with hypertension during the COVID-19 pandemic using questionnaires. This was a multicenter study in Indonesia conducted on those diagnosed with hypertension. Data collection was conducted by the Indonesian Medical Students Executive Boards Association (IMSEBA) which participated during Month of Service Program (*Bulan Bakti* 2021). The scope of the study was limited to variables related to the adherence to treatment of those with hypertension during pandemics. This research was conducted after receiving permission from the Ethics Commission of the Faculty of Medicine, Sriwijaya University no.093-2021.

All of the respondents consented, which was mandatory as a person had the right to choose and needed to know the goals and steps they followed during the study. The well-being, fairness, and life protection of the respondents were maintained by weighing the risks and steps of research implementation. Confidentiality of data and the privacy of the respondents were guaranteed.

The variable in this study was the level of adherence to the treatment of hypertension during the COVID-19 pandemic, which was defined as the observance of those with hypertension to take the treatment as directed by doctors. This variable was measured using eight questionnaire questions from the Morisky Medication Adherence Scale in

the Indonesian version of Indonesian that had been validated with Cronbach's alpha coefficient result of 0.824 and test-retest reliability test results using Spearman's rank correlation of 0.881.[14] Questions in the form of closed questions yes and no and the results of the questionnaire were assessed using the Guttman scale which was given as score of 1 if yes and score of 0 if not. The accumulated score was then categorized; if less than 6, then it was categorized as non-adherent, and if it was more than 6 then it was categorized as obedient.[15] In this study, the adherence level of respondents was ranged based on MMAS-8 score into three groups, low adherence (MMAS <6), medium adherence (6 to <8), and high

Table 1 Demographic Status of Respondents with Hypertension (n=1,115)

Demographic variables	n	%
Gender		
Female	718	62.2
Male	437	37.8
Age (year)		
<40	455	39.4
40–49	248	21.5
50–59	274	23.7
60–69	103	8.9
>70	75	6.5
Domicile		
Java	614	53.2
Sumatra	146	12.6
Kalimantan	42	3.6
Sulawesi	127	11
West Nusa Tenggara	81	7
Bali	134	11.6
Papua	11	1
Level of Education		
Elementary	108	9.4
Junior High	78	6.8
Senior High	475	41.1
Bachelor degree or higher	494	42.8
Employment status		
Employed	534	46.2
Unemployed	74	6.4
Retired	547	47.4
Income (IDR)		
>2,843,000	683	59.1
<2,843,000	472	40.9
Duration of hypertension		
<1 year	587	50.8
1–5 year	320	27.7
>5 year	248	21.5
Complication		
Yes	973	84.2
No	182	15.8
Source of Information		
Family	239	20.7
Media	237	20.5
Healthcare worker	545	47.2
Individual	134	11.6

Note: IDR= Indonesian Rupiah

Table 2 Adherence Level of Respondents with Hypertension from Seven Islands Across Indonesia (n=1,115)

Adherence level (score)	n	%
Low adherence (<6)	616	55.2
Medium adherence (6 to <8)	416	37.3
High adherence (=8)	123	11

adherence (=8). For the analysis purposes, the patients were classified into two, adherence and non-adherence, based on the MMAS-8 score; non-adherent (MMAS-8 score <6) and adherent (MMAS-8 score ≥6).[12]

Univariate analysis was employed using a crosstab between sociodemographic and treatment adherence, followed by a chi-square test.[16] Multivariate analysis of all independent variables together (overall) was conducted with logistic regression tests when the variable met the criteria to find out how much the variables studied contributed to the adherence to taking hypertension drugs during the COVID-19 pandemic and how many factors outside the study were able to influence it. The regression test was used to identify the most important independent variables.

Results

A total of 1,155 respondents with hypertension participated in this study, of whom 50.85% had hypertension for <1 year and 84.2% had complications. The majority of respondents were females (62.2%) and categorized into four groups of age namely <40 years old (39.4%), 40–49 years old (21.5%), 50–59 years old (23.7%), 60–69 years old (8.9%), and >70 years old (6.5%). Most of the patients' domiciles were in Java (53.2%), followed by Sumatra (12.6%), Bali (11.6%), Sulawesi (11%), and others, as shown in Table 1. Those with higher education, including high school and bachelor's or higher, were the largest in level education. The participants were more likely retired (47.4%) or employed (46.2%).

Most respondents received information from a health care worker (47.18%), contributing to 56.91% of respondents with high adherence to medication (Table 2). Of 1,115 respondents, most were in low adherence (55.25%) classification. There was 616 subjects who adhered to and 539 subjects who were non adhere to hypertension treatment. After a stepwise test that eliminated insignificant variables, the final model was obtained.

The logistic regression analysis identified the predicting factor for medication adherence. Male (AOR 0.777 [CI 95% 0.529–1.019]) had better treatment adherence than female. Retirees were 0.857 times to be non-adhere or were known to have a lower chance to non-adhere to the treatment than the unemployed patients (AOR 0.857 [95% CI: 0.495–1.483). A patient who had income over the minimum wage (>Rp2,843,000) would non-adhere half times compared to the patients who have income below (AOR 0.522 [95% CI: 0.393–0.713). In this study, source information on hypertension is also known to be the one factor of treatment adherence. Patient who got information from family (AOR 0.816 [95% CI: 0.498–1.337) and healthcare (AOR 0.583 [95% CI: 0.361–0.878) workers had the lower chance to non-adhere compared to the patient who got the information independently.

Discussion

Women with hypertension (n=718, 62.2%) participated more in this study than men (37.8%). This is consistent with The Indonesia Family Life Survey (IFLS-5), where the prevalence of women is higher than that of men in Indonesia.[15] Differences in gender and age would affect the probability of hypertension events. At the age of >60 years, women are more likely to have hypertension than men since women experience the menopause period, which involves hormonal changes that increase blood pressure.[16] The female respondents with hypertension treatment in our study had lower adherence than males (p<0.001). However, another study has shown that women are more likely to adhere to hypertension medication because female are more aware of individual health due to the availability of time and opportunities to visit treatment centers than males.[17]

Our study shows that a person at work has a lower risk of non-adherence to treatment than other employment statuses. This result is different from several previous studies, showing that people who work are even more

Table 3 Bivariable and Multivariable Analysis Results

Demographic Variables	Total Study Population		Crude Odds Ratio			Adjusted Odds Ratio		
	n	%	COR	95% CI (min-max)	p	AOR	95% CI (min-max)	P
Gender								
Female	718	62.2	1	0.636-1.058	0.128	1	0.529-1.019	0.069
Male	437	37.8	0.821			0.777		
Age (year)								
<40	455	39.4	1					
40–49	248	21.5	0.874	0,625-1.222	0.432			
50–59	274	23.7	0.783	0.568-1.079	0.135			
60–69	103	8.9	0.907	0.570-1.442	0.679			
>70	75	6.5	0.77	0.459-1.291	0.322			
Domicile								
Java	614	53.2	1					
Sumatra	146	12.6	0.768	0.526-1.122	0.173			
Kalimantan	42	3.6	1.095	0.549-2.185	0.797			
Sulawesi	127	11	1.065	0.700-1.621	0.768			
West Nusa Tenggara	81	7	1.429	0.831-2.457	0.197			
Bali	134	11.6	0.691	0.469-1.018	0.061			
Papua	11	1	1.168	0.306-4.451	0.820			
Level of Education								
Elementary	108	9.4	1					
Junior High	78	6.8	2.045	1.245-3.359	0.005			
Senior High	475	41.1	1.502	0.881-2.560	0.135			
Bachelor degree or higher	494	42.8	1.285	0.982-1.681	0.068			
Employment status								
Employed	74	6.4	1			1		
Unemployed	534	46.2	0.624	0.380-1.022	0.061	0.857	0.495-1.483	0.582
Retired	547	47.4	1.1259	0.895-1.502	0.263	1.776	1.276-2.474	0.001
Income (IDR)								
>2.843.000	472	40.9	1			1		
<2.843.000	683	59.1	0.666	0.518-0.856	0.002	0.522	0.393-0.713	<0.001
Duration of hypertension								
<1 year	248	21.5	1					
1–5 year	320	27.7	1.013	0.738-1.391	0.934			
>5 year	587	50.8	1.202	0.839-1.722	0.315			
Complication								
Yes	973	84.2	1					
No	182	15.8	0.724	0.506-1.035	0.077			
Source of Information								
Family	134	11.6	1			1		
Media	239	20.7	0.893	(0.893-0.549)	0.650	0.816	0.498-1.337	0.419
Healthcare worker	237	20.5	0.641	(0.641-0.398)	0.067	0.616	0.380-1.001	0.050
Individual	545	47.2	0.631	(0.631-0.410)	0.036	0.583	0.361-0.878	0.011

difficult to come to the health service unit for treatment.[18–20] Interestingly, our study also shows that someone with an income lower than IDR 2,800,000 is at risk for more disobedience. The salary factor for those with an income above the minimum wage in Jakarta is 6.08 times more adherence to treatment.[21]

All respondents had access to information about hypertension, diet, and lifestyle. Most of them get information related to hypertension and lifestyle from health care workers (47.18%), others get from family members or

neighbors (20.69%), and media information either online or print media (11.6%). Respondents who sought information from a healthcare worker have high adherence.22 An effective way to deliver information is by direct contact with active interaction between patients and healthcare workers, which can increase patients' adherence to medication.23

The limitation of this study is that the lots of laboratory needs to be improved. However, this research included large samples, minimizing fault in result and conclusion.

In conclusion, adherence level to medication in patients with hypertension during the pandemic is lower in females, non-employed, and lower-income. The source of information from non-healthcare workers might give barriers to the patients. Low adherence may result in higher complications. Thus educational intervention is essential to high-risk low-adherent groups, primarily in the COVID-19 pandemic era. Integrated preventive and promotive measures, especially from healthcare workers, are needed to prevent further morbidity and mortality.

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References

1. Susilo A, Rumende CM, Pitoyo CW, Santoso WD, Yulianti M, Herikurniawan H, et al. Coronavirus disease 2019: tinjauan literatur terkini. Jurnal Penyakit Dalam Indonesia. 2020;7(1):45–67.
2. Guan WJ, Liang WH, Zhao Y, Liang HR, Chen ZS, Li YM, et al. Comorbidity and its impact on 1590 patients with COVID-19 in China: a nationwide analysis. Eur Respir J. 2020;55(5):2000547.
3. Gunawan A, Prahasanti K, Utama MR. Pengaruh komorbid hipertensi terhadap severitas pasien yang terinfeksi Covid 19. Jurnal Implementa Husada. 2020;1(2):136–51.
4. Mills KT, Stefanescu A, He J. The global epidemiology of hypertension. Nat Rev Nephrol. 2020;16(4):223–37.
5. Badan Penelitian dan Pengembangan Kesehatan Kementerian Kesehatan Republik Indonesia. Laporan nasional Riskesdas 2018. Jakarta: Lembaga Penerbit Badan Penelitian dan Pengembangan Kesehatan; 2020.
6. Nurhidayati I, Aniswari, AY, Sulistyowati AD, dan Sutaryono S. Penderita hipertensi dewasa lebih patuh daripada lansia dalam minum obat penurun tekanan darah. Jurnal Kesehatan Masyarakat Indonesia. 2018;13(2):1–5.
7. Chaker L, Falla A, Vander LS, Muka T, Imo D, Jaspers L, et al. The global impact of non-communicable disease on macro-economic productivity: a systematic review. Eur J Epidemiol. 2015;30(5):357–95.
8. NCD Risk Factor Collaboration (NCD-RisC). Worldwide trends in hypertension prevalence and progress in treatment and control from 1990 to 2019: a pooled analysis of 1201 population-representative studies with 104 million participants. Lancet. 2021;398(10304):957–80.
9. Page MR. The JNC-8 hypertension guidelines: an in-depth guide. Am J Manag Care. 2014;20(1 Spec No):E8.
10. Shimels T, Kassu RA, Bogale G, Bekele M, Getnet M, Getachew A, et al. Magnitude and associated factors of poor medication adherence among diabetic and hypertensive patients visiting public health facilities in Ethiopia during the COVID-19 pandemic. PLoS One. 2021;16(4): e0249222.
11. Srikartika VM, Cahya AD, Hardiati RSW. Analisis faktor yang memengaruhi kepatuhan penggunaan obat pasien diabetes mellitus tipe 2. Jurnal Manajemen dan Pelayanan Farmasi. 2016;6(3):205–12.
12. Singh M, Lal P. Non-communicable diseases: challenges and impact of COVID-19 pandemic. Indian Pract. 2020;73(11):30–6.
13. World Health Organization NCD Department. Rapid assessment of service delivery for NCDs during the COVID-19 pandemic. Geneva: WHO; 2020.
14. Riani DA. Validasi 8-item Morisky Medication Adherence Scale versi Indonesia pada pasien hipertensi dewasa di Puskesmas Kabupaten Sleman dan Kota Yogyakarta [Thesis]. Yogyakarta: Universitas Gadjah Mada; 2017.
15. Khayyat SM, Hyat ARS, Alhazmi RSH, Mohamed MM, Abdul HM. Predictors of medication adherence and blood pressure control among Saudi hypertensive patients attending primary care clinics: a cross-sectional study. PloS One. 2017;12(1):e0171255.
16. Bantas K, Gayatri D. Gender and

hypertension (data analysis of the Indonesia basic health research 2007). Jurnal Epidemiologi Kesehatan Indonesia. 2019 ;3(1):7–18.
17. Bidmon S, Terlutter R. Gender differences in searching for health information on the internet and the virtual patient-physician relationship in Germany: exploratory results on how men and women differ and why. J Med Internet Res. 2015;17(6):e156.
18. Cho SJ, Kim J. Factors associated with nonadherence to antihypertensive medication. Nurs Health Sci. 2014;16(4):461–7.
19. Listiana D, Effendi S, Saputra Ye. Faktor-faktor yang berhubungan dengan kepatuhan penderita hipertensi dalam menjalani pengobatan di Puskesmas Karang Dapo Kabupaten Muratara. Journal of Nursing and Public Health. 2020;8(1):11–22.
20. Tambuwun AA, Kandou GD, Nelwan JE. Hubungan karakteristik individu dengan kepatuhan berobat pada penderita hipertensi di Puskesmas Wori Kabupaten Minahasa Utara. Jurnal KESMAS. 2021;10(4):112–21.
21. Pratiwi W, Harfiani E. Faktor-faktor yang berhubungan dengan kepatuhan dalam menjalani pengobatan pada penderita hipertensi di Klinik Pratama GKI Jabar Jakarta Pusat. Prosiding Seminar Nasional Riset Kedokteran (SENSORIK). 2020;1(1):27–40
22. Sinuraya RK, Destiani DP, Puspitasari IM, Diantini A. Tingkat kepatuhan pengobatan pasien hipertensi di fasilitas Kesehatan tingkat pertama di kota Bandung. Jurnal Farmasi Klinik Indonesia. 2018;7(2):124–33.
23. Lu CH, Tang ST, Lei YX, Zhang MQ, Lin WQ, Ding SH, et al. Community-based interventions in hypertensive patients: a comparison of three health education strategies. BMC Public Health. 2015;15:33.