

Original Article

The pandemic of COVID-19 decreased adherence to treatment among hypertension patients at Dr. Zainoel Abidin Hospital

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Abstract

Hypertension is one of the leading causes of mortality and morbidity worldwide. Treatment adherence is an essential factor in controlling blood pressure among hypertensive patients. This study aimed to evaluate the effect of the Coronavirus disease 2019 (COVID-19) pandemic on treatment adherence among hypertensive patients at Dr. Zainoel Abidin Hospital, Aceh, Indonesia, as well as to determine its associated factors. A cross-sectional study was conducted at the Cardiac Center by utilizing medical records of hypertensive patients visiting during the period of April-July 2019 and December 2020-March 2021. Bivariate analysis using the Kruskal-Wallis test was employed to examine the effect of the COVID-19 pandemic on patients' adherence. The results showed that the number of patients adhering to treatment significantly decreased ($p < 0.001$) by 22.7%, from 179 patients in 2019 to 64 patients in 2020. The data also suggested a significant positive association between residential and patient adherence before the pandemic ($p = 0.006$); however, no significant difference was observed between residential and patients' adherence after the pandemic ($p = 0.282$). Furthermore, our study found no association between age and adherence before and after the pandemic ($p = 0.690$ in 2019 and $p = 0.125$ in 2020). In conclusion, the pandemic of COVID-19 significantly affected treatment adherence among patients with hypertension at Aceh provincial hospital, with a decreased number in patient visits up to 22.7%.

Keywords: Hypertension, adherence, COVID-19 pandemic, age, residential

Introduction

Hypertension is one of the leading causes of mortality and morbidity worldwide; however, people are often unaware of the condition since hypertension often comes without symptoms, and is thereby referred to as the "silent killer" (World Health Organization, 2021). Hypertension is defined as a systolic blood pressure of ≥ 140 mmHg or/and a diastolic blood pressure of ≥ 90 mmHg (Unger et al., 2020). The World Health Organization (WHO) reported that hypertension affected approximately 22.1% of the world's total population aged above 18, with the 3rd highest prevalence (25.1%) was recorded in Southeast Asia (World Health Organization, 2015). According to the Indonesian Basic Health Research (Riskesdas, 2018), the prevalence of hypertension in Indonesia was 8.3% and 8.84% respectively based on physician and drug diagnosis. Aceh occupies the 10th national rank with a prevalence of more than 9% (Badan Penelitian dan Pengembangan Kesehatan, 2018). In 2019, the number of hypertension patients in Aceh who received standardized healthcare services was 283,910 or 25% of the total hypertension patients, with 100% coverage in Simeulue, Aceh Jaya, Aceh Barat Daya, and Kota Banda (Dinas Kesehatan Aceh, 2019).

Adherence to treatment is of critical importance in controlling blood pressure among hypertensive patients as it will help improve the patients' quality of life (Sinuraya et

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al., 2018). Conversely, poor compliance to anti-hypertensive medication is the primary cause of increased blood pressure (Abegaz et al., 2017). Based on a previous study, the compliance to treatment and blood pressure check among patients with hypertension in Aceh was 65% (Suardi, 2011).

The causes of non-adherence among hypertensive patients were lack of understanding of the treatment, high cost of anti-hypertensive drugs, local beliefs and culture, the emergence of adverse effects of drug used, limited access to health services, and the use of complementary medicines (Adedoyin et al., 2010). Two studies conducted in Aceh revealed different prevalence in treatment adherence among productive age patients (20-60 years old). The first study suggested that the prevalence rate was 65% among patients aged 20-40 years and 25% among those aged 40-59 years. Meanwhile, another study found a twice higher prevalence (52.9%) in the treatment adherence among patients of the same age (40-59 years) (Fithria and Isnaini, 2014; Suardi, 2011).

A pandemic is defined as an epidemic that occurs worldwide and affects a large number of individuals (World Health Organization, 2014). In primary health facilities in Indonesia, the highest decline in visitors was noted at week 14-21, 2020, which was recognized as the initial period of the COVID-19 pandemic. The decline in healthcare utilization mainly occurred among children under 9 (71%), women (46%), registered patients (49%), and outpatients (48%). Unfortunately, the number of patients with hypertension visiting healthcare centers also decreased during the pandemic (Rhatomy and Prasetyo, 2020).

According to the latest study, individuals over 65 years of age with coronary heart disease or hypertension were more likely to get infected with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), the cause of COVID-19, and experienced more severe symptoms (Li et al., 2020). In a retrospective cohort study of 72,314 cases in China, patients with cardiovascular disease had five times higher risk of mortality (10.5%), regardless of age (Wang et al., 2020). A study showed that of the total 57 COVID-19 patients who have died, 19.7% was due to cardiac injury, 10.6% had a history of coronary heart disease, and 4.1% had heart failure (Shi et al., 2020).

Therefore, based on the high prevalence rate of hypertension in Aceh and the influence of the pandemic on patient adherence to treatment and control, the authors are interested in examining the effect of the COVID-19 pandemic on hypertension patient adherence at Dr. Zainoel Abidin Hospital, Indonesia.

Methods

Study design and participants

A cross-sectional study was carried out at Dr. Zainoel Abidin Hospital, Banda Aceh, Indonesia. The data was collected by comparing medical records of hypertension patients visiting the cardiac center from December 2020 to March 2021 and those admitted during the period of April and July 2019. Utilising a simple random sampling technique, patients who: 1) were diagnosed with hypertension, 2) aged ≥ 17 years; 3) had received treatment at the hospital for at least four months in 2019 and/or 2020; and 4) had a complete medical record were included in the study. The minimum sample size was calculated using the Slovin formula.

Study variables

Adherence to treatment was determined by calculating the number of days the patient did not visit the hospital after one month. Patients who did not visit the hospital ≥ 28 days after a month was classified as very disobedient, 19-27 days (disobedient), 10-18 days (less obedient), and ≤ 9 days (obedient). Residential was categorized into two:

Banda Aceh and outside Banda Aceh. Participants age was grouped into six age groups: 17–25, 26–35, 36–45, 46–55, 56–65, and >65 years.

Statistical analysis

Univariate and bivariate analysis was employed in this study. Univariate analysis was used to assess the association between demographic characteristics (residential and age) and adherence to treatment. Bivariate analysis was performed using the Kruskal-Wallis test. P-value of <0.05 was defined significant.

Ethical clearance

This study was approved by the Research Ethics Committee of the Faculty of Medicine, Syiah Kuala University and Dr. Zainoel Abidin Hospital (KEPK FK-RSUDZA) (032 /EA/FK-RSUDZA/2021).

Results

Characteristics of study participants

The distribution of the study participants based on residential and age are presented in Table 1 and Table 2. The total sample was 475 (301 from 2019 and 174 from 2020). Most of the patients aged between 56–65 years and resided outside the city of Banda Aceh.

Table 1. Distribution of study participants based on residential (n=475)

	Residential	Frequency (%)	Total (%)
2019	Banda Aceh	140 (29.5)	301 (63.4)
	Outside Banda Aceh	161 (33.9)	
2020	Banda Aceh	88 (18.5)	174 (36.6)
	Outside Banda Aceh	86 (18.1)	
	Total		475 (100.0)

Table 2. Distribution of subjects age (n=475)

	Age (year)	Frequency (n)	Percentage (%)
2019	17–25	7	1.5
	26–35	8	1.7
	36–45	26	5.5
	46–55	53	11.2
	56–65	109	22.9
	>65	98	20.6
2020	17–25	5	1.1
	26–35	6	1.3
	36–45	14	2.9
	46–55	32	6.7
	56–65	66	13.9
	17–25	51	10.7
	Total	475	100.0

Association between residential and treatment adherence

The result of Kruskal Wallis analysis revealed a significant association between residential and adherence to treatment in 2019 ($p=0.006$) (Table 3). Conversely, there was no significant difference in the treatment adherence between patients living in Banda Aceh and those residing outside Banda Aceh in 2020 ($p=0.282$) (Table 4).

Table 2. Association between residential and adherence to treatment among hypertension patients in 2019

Residential	Adherence								Total		p-value
	Obedient		Less-obedient		Disobedient		Very disobedient				
	n	%	n	%	N	%	N	%	N	%	
Banda Aceh	94	31.2	28	9.3	9	3.0	9	3.0	140	46.5	0.006
Outside Banda Aceh	85	28.2	39	13.0	15	5.0	22	7.3	161	53.5	
Total	179	59.4	67	22.3	24	8.0	31	10.3	301	100.0	

Table 3. Association between residential and adherence to treatment among hypertension patients in 2020

Residential	Adherence								Total		p-value
	Obedient		Less-obedient		Disobedient		Very Disobedient				
	n	%	N	%	N	%	N	%	n	%	
Banda Aceh	34	19.5	23	13.2	12	6.9	19	10.9	88	50.6	0.282
Outside Banda Aceh	30	17.3	18	10.3	12	6.9	26	15.0	86	49.4	
Total	64	36.8	41	23.6	24	13.8	45	25.9	174	100.0	

Association of age and treatment adherence

The results of Kruskal Wallis test, as shown in Table 5 and 6, exhibited no significant association between age and patient adherence both in 2019 ($p=0.690$) and 2020 ($p=0.125$).

Table 4. The association between age and treatment adherence for hypertension patients in 2019

Age (year)	Adherence								Total	p-value	
	Obedient		Less-obedient		Disobedient		Very Disobedient				
	N	%	n	%	N	%	n	%	n		%
17–25	3	1.0	2	0.7	2	0.7	0	0.0	7	2.3	0.690
26–35	4	1.3	4	1.3	0	0.0	0	0.0	8	2.7	
36–45	13	4.3	8	2.7	2	0.7	3	1.0	26	8.6	
46–55	33	11.0	10	3.3	5	1.7	5	1.7	53	17.6	
56–65	63	21.0	22	7.3	8	2.7	16	5.3	109	36.2	
>65	63	21.0	21	7.0	7	2.3	7	2.3	98	32.6	
Total	179	59.4	67	22.3	24	8.0	31	10.3	301	100.0	

Table 5. The effect of age on treatment adherence for hypertension patients in 2020.

Age (year)	Adherence								Total	p-value	
	Obedient		Less-obedient	Disobedient		Very Disobedient					
	N	%		n	%	N	%	n	%	n	%
17–25	0	0.0	0	0.0	1	0.6	4	2.3	5	2.9	0.125
26–35	1	0.6	3	1.7	2	1.1	0	0.0	6	3.4	
36–45	5	2.9	2	1.1	1	0.6	6	3.4	14	8.0	
46–55	12	6.9	6	3.4	5	2.9	9	5.2	32	18.4	
56–65	27	15.5	16	9.2	8	4.6	15	8.6	66	37.9	
>65	19	10.9	14	8.0	7	4.0	11	6.3	51	29.3	
Total	64	36.8	41	23.6	24	13.8	45	25.9	174	100.0	

The effect of COVID-19 pandemic on treatment adherence

Our study suggested that COVID-19 pandemic significantly affected the adherence among hypertensive patients ($p < 0.001$), indicated by a significant decrease in the number of obedient patients and significant increase in the number of very disobedient patients in 2020 (Table 7).

Table 6. Effect of the COVID-19 pandemic on treatment adherence

Years	Adherence								Total	p-value
	Obedient		Less-Obedient		Disobedient		Very Disobedient			
	n	%	n	%	N	%	N	%	n	
2019	179	59.5	67	22.3	24	8.0	31	10.3	301	100.0
2020	64	36.8	41	23.6	24	13.8	45	25.9	174	100.0

<0.001

Discussion

Participants' characteristics

In the present study, the largest sample size was found in the group of 56-65 years of age, with a total sample of 175 (36.8%). This finding was in accordance with that reported by the Basic Health Research (Riskesdas), suggesting that the incidence of hypertension increases with age (Badan Penelitian dan Pengembangan Kesehatan, 2018). Increased incidence of hypertension among the elderly occurs due to several mechanisms, including hemodynamic changes, arterial stiffness, neurohormonal dysregulation, and renal retention (Oliveros et al., 2020). Blood vessels inflexibility is the biggest cause of the increase in systolic blood pressure and heart rate (Benetos et al., 2019).

In regards to participants residential, we found that most of the patients (48.0%) came from different cities in Aceh. This data is corresponding to the number of hypertension patients reported on Aceh health data profile 2019, where Banda Aceh occupied the 16th rank out of 23 districts, with a total number of hypertension patients reached 11,836 (Dinas Kesehatan Aceh, 2019). This might be influenced by the fact that Banda Aceh has the highest number of hospitals and healthcare facilities compared to other districts (Badan Pusat Statistik Provinsi Aceh, 2013).

Association between residential and treatment adherence

Our data suggested that there was a significant association between residential and adherence to treatment in 2019 ($p = 0.006$). In other word, there was a significant difference in treatment adherence between patients residing in Banda Aceh and outside Banda Aceh. This finding was in line with that reported in a previous study, indicating that distance to hospital was significantly associated with non-adherence among hypertensive patients. Long distance was a barrier to adherence, especially in the areas with poor infrastructures and high poverty rates (Ambaw et al., 2012). Further, a study conducted in Punjab, India, suggested that distance to medical facility was the second most common reasons for patients not to adhere to follow-up visits (Das et al., 2021) (Table 3).

In contrast to the 2019 results, statistical analysis showed no significant difference in the treatment adherence between patients living in Banda Aceh and those outside Banda Aceh in 2020 ($p = 0.282$) (Table 4). The potential explanation for this was presumably due to the fear of hypertension complications, which induce patients to be more commitment to treatment. According to a previous study, higher perception of individual susceptibility to complications of hypertension was positively associated with higher possibility of that individuals to be involved in the treatment (Rosemann and Brüning, 2014). Furthermore, this condition might also be influenced by patients'

trusts towards health care providers, as an essential factor to increase patients' adherence to treatment (Burnier and Egan, 2019). Our finding is consistent with that of a previous research conducted in Uganda, which showed no significant association between distance to health facilities with patients' adherence to follow-up visits. The most common cited reasons of non-adherence among patients with chronic diseases were financial problems, inadequate health care systems, and poor communication between patients and healthcare workers (Kalyango et al., 2014).

Association of age and treatment adherence

In terms of age, the result of our investigation exhibited no significant association between age and patient adherence both in 2019 ($p=0.690$) and 2020 ($p=0.125$). During COVID-19 pandemic, the Social Health Insurance Administration Body (BPJS) used several strategies to help hypertensive patients get check-up without having to go to the hospital, as well as promoted an online pharmacy program to help patients purchase anti-hypertension drugs, encouraging treatment adherence among high-risk patients (Badan Penyelenggara Jaminan Sosial, 2021). This result corresponds to a study carried out among African-American hypertension patients, which showed no significant association between age and non-adherence to follow-up visits (Nwabuo et al., 2014). In contrast, a study in India showed that younger patients did not consider hypertension as a serious illness and did not receive good guidance, while older patients had troubles to adhere to treatment due to long distance to healthcare facilities (Das et al., 2021). In addition, a study in Islamabad, Pakistan, also exhibited a significant association between age and treatment follow-up adherence, in which participants aged ≥ 60 years showed 1.5 times higher adherence to treatment (Mahmood et al., 2020). Adherence has been reported to increase with age. The potential explanation for this is because older patients tend to suffer from more severe illness, subsequently increasing their awareness of the disease and resulting in better adherence to treatment and follow-ups (Kim et al., 2019).

The effect of COVID-19 pandemic on treatment adherence

Our study revealed that the number of obedient patients has decreased significantly in 2020, whereas the number of very disobedient patients increased significantly in the same year, suggesting that COVID-19 pandemic significantly affected the adherence among hypertensive patients at Dr. Zainoel Abidin Hospital, Banda Aceh, Indonesia ($p<0.001$) (Table 7). There was approximately 27.7% reduction in the number of obedient patients in 2020 due to the COVID-19 pandemic, which has affected health services worldwide. The current CDC guidelines recommend staying at home and reducing the likelihood of exposure for all high-risk individuals (Khera et al., 2020). Similarly, study at the Duke University also showed 33.1% reduction in the number of cardiovascular outpatients during the first 15 weeks of COVID-19 pandemic, in which 53% of patients cancelled their appointments (Wosik et al., 2021). Decrease in adherence to treatment has also been associated with a decrease in outpatient visits, evidenced by approximately 60% reduction in outpatient visits in early April (Mehrotra et al., 2020). Further, an investigation at Brazilian university hospitals also reported a 26.6% reduction in the number of patients, from 1.145 patients and 11.588 consultation sessions in 2019 to 1.025 patients and 8.506 consultation sessions in 2020, suggesting the impact of COVID-19 on patients adherence to treatment (Carvalho et al., 2020).

Conclusion

This study suggested a significant reversed association between COVID-19 pandemic and adherence to treatment among hypertension patients in Aceh provincial hospital. The study also exhibited a significant positive association between residential and

adherence to treatment; however, no association was observed between age and patients' compliance during the pandemic of COVID-19.

Authors' contributions

Conceptualization: GSR and MR; Data Curation: GSR, MR, and HN; Formal Analysis: GSR, MR, and HN; Resources: GSR; Validation: GSR, MR, HN, MS, and FDI; Writing – Original Draft Preparation: GSR, MR, HN, MS, and FDI; Writing – Review & Editing: GSR, MR, HN, MS, and FDI.

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Conflict of interest

The authors declare no conflict of interest.

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