The association between drug therapy problems and blood pressure control of patients with hypertension in public health center setting

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Abstract

Background: Patients with hypertension are at risk of experiencing Drug Therapy Problems (DTPs). However, few have studied the pattern of DTPs in Indonesian public health center (PHC) and how it affected the blood pressure control.

Objective: This study aims to identify DTPs and its association to blood pressure control among patients with hypertension in Indonesian PHCs.

Methods: A descriptive, observational and cross-sectional study involving 150 selected persistent hypertensive patients was conducted from August to December 2019 in 63 PHCs in Surabaya. A questionnaire asking patients' experiences during treatment of hypertension was used. Chi-square test was used to analyze the association between DTPs and blood pressure control.

Results: The majority of respondents were aged 50-65 (54.7%), female (76%), only half has controlled blood pressure (52.7%) and most of them used three to four medicines at the same time (57.3%). A total 563 DTPs was identified with 15.6% was unnecessary drug use, 11.4% indicated need for additional drug therapy, one-fifth experienced dosage too low (21.5%) and non-adherence (19.2%) and 26% suffered from adverse drug reactions. There was a significant association between number of DTPs and blood pressure control ($P<0.05$).

Conclusion: Most patients experienced more than two DTPs and undertook more than three medicines at the same time. There is a significant association between the number of DTPs in hypertensive patient and the blood pressure control.

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Introduction

The shift of pharmacist orientation from product to services and patient's quality of life has been coined in the philosophy of pharmaceutical care.[1] Within this philosophy, pharmacists hold direct responsibility to assess, prevent and resolve drug therapy problems (DTPs).[2] DTPs have been defined as any undesirable events, actual or potential, that may prevent patients from the benefits of drug therapy.[3]

DTPs have been major concern in patients with chronic condition including hypertension. In fact, due to the possibility of polypharmacy and presence of multiple comorbidities, patients with hypertension are at high risk for DTPs. Costa *et al* (2019) highlighted that at least one DTP was identified from hypertensive patients undertaking polypharmacy.[3] This is not the only issue as battling against hypertension has been major homework globally.

World Health Organization mentioned that at least 1 of 3 people worldwide suffered from hypertension. This number might increase to 1.5 billion people by 2025 with fatality reaches 9.4 million people die from hypertension and its complications every year.[4] Indonesian population is also not immune to hypertension. There was a significant increase of hypertension prevalence among population aged 18 years from 25.8% (2013) to 34.1% (2018) with estimation of 63 million people living with hypertension.[5] Likewise, both the prevalence in East Java – the second largest province – and in Surabaya – the second largest city in Indonesia – have reached almost 20% of the population.[6,7]

Identifying DTPs in patients with hypertension is critical as it may lead to uncontrolled blood pressure particularly in resource-limited setting countries like Indonesia. For instance, a study in

Ethiopia determined the prevalence of DTPs ranged from 73-80% with poor selection of antihypertensive drugs, dosing issues and drug interactions were the major problems.[9] This number is not different to other countries including Brazil[10] and Nigeria.[9] Given that most of Indonesians have been commonly treated in public health center (PHC), it is therefore important to conduct this study in PHC setting.

Materials and Methods

A descriptive, observational and cross-sectional study was conducted from August to December 2019 in 63 PHCs in Surabaya. Approximately two or three respondents were recruited using purposive sampling. Only patients who had been diagnosed with hypertension for more than six months, taking at least one antihypertensive drug, speak Indonesian, and providing consent for participation were recruited. A minimum sample of 150 respondents was required for this study. Patients completed interviewer-assisted questionnaire about the experience during therapy. Any presence of DTPs was recorded and subsequently analyzed for its association with blood pressure control using Chi-square test. Ethical clearance was obtained from the Research Ethics Commission of the Faculty of Public Health, Universitas Airlangga (No. 200/EA/KEPK/2019).

Results and Discussion

Characteristics of respondents

Table 1 shows that majority of respondents were aged 50-65 (54.7%) and female (76%). This result may slightly differ to some studies mentioning that females are less likely to have hypertension than male. However, after the age of 40 years, women are prone to hypertension than men due to changes in physiology and hormonal reducing the elasticity of blood vessels which may accelerate the increased of blood pressure.[11] This finding has strengthened other studies that women aged 40 years are susceptible to hypertension.[12-15]

Respondents' experience with hypertension

Most respondents have suffered from hypertension for five years (26.7%). Half of the respondents had blood pressure of 120-139 mmHg and 80-89 mmHg (50.7%) indicating stage of pre-hypertension according to JNC VIII and they were having controlled blood pressure (52.7%) within the past 6 months. Two-third of the respondents took three to four medicines at the same time (Table 2).

The high portion of respondents with controlled blood pressure is in contrast to study in Lesotho with only 20% of hypertensive patients were in controlled state of blood pressure.[14] Understanding the state of blood pressure is important as hypertension requires long-term pharmacotherapy to prevent complications such as stroke and heart and kidney disorders.[16]

The fact that most respondents were taking polypharmacy is not surprising since anecdotal evidence illustrating that hypertensive patient visiting PHC in Surabaya often received more than one drug some of which were amlodipine, HCT, captopril, nifedipine, candesartan and lisinopril. In addition, other comorbidities and symptoms may present including pain, ulcers and cough, which makes patients receive more than one drug. This is in line to PHCs in Central Sulawesi stated that in addition to antihypertensive drugs, patients also used paracetamol (13%), mefenamic acid and Ibuprofen (<2%).[17] The high number of medicines taken by patients may result non-compliance and possible drug interactions,[2] as indicated by a study in UK, showed that hypertensive patients who used three or more drug items were tended to incompliance to treatment.[18]

Pattern of DTPs

A total 563 DTPs was recorded as highlighted in Table 3. Dosage too low (21.5%), adverse drug reaction (26.6%) and non-compliance (19.2%) are three DTPs recorded from one-fifth of respondents, respectively. This finding reflected that both actual and potential DTPs may exist in patients with hypertension. The most common adverse drug reaction as expressed by respondents was due to taking Captopril resulting dry cough. In addition, the use of HCT in patients may have contributed to hyperuricemia, hyperlipidemia, and hyperglycemia.

Another DTPs recorded was an unnecessary drug therapy that indicated that patient did not necessarily need the drug. As found

Table 1. Characteristics of respondents.

Characteristics (n=150)	Frequency	Percentage
Age (in years)		
<50	35	23.3
50-65	82	54.7
>65	33	22.0
Sex		
Male	36	24.0
Female	114	76.0
Education		
Illiterate	21	14.0
Elementary school	55	36.7
Junior high school	25	16.7
Senior high school	35	23.3
Diploma	3	2.0
Bachelor	10	6.7
Postgraduate	1	0.6
Occupation		
Unemployed	26	17.3
Government employee	4	2.7
Retired	9	6.0
Housewife	65	43.3
Private employee	46	30.7

Table 2. Respondents' experience with hypertension.

	Frequency	Percentage
Experience with hypertension (n=150)		
<1	31	20.6
1-5	40	26.7
5-10	39	26.0
10-20	37	24.7
>20	3	2.0
Outcome Therapy (Blood Pressure in mmHg)		
<120 and 80	3	2.0
120-139 and 80-89	76	50.7
140-159 and 90-99	30	20.0
160-180 and 100-110	39	26.0
>180 and >110	2	1.3
Blood pressure control		
Controlled blood pressure	79	52.7
Uncontrolled blood pressure	71	47.3
Number of Drug Items in Respondents		
<3 items	19	12.7
3-4 items	86	57.3
>4 items	45	30.0

in this study for example if patient received two painkillers at once such as paracetamol and mefenamic acid. Approximately 15% of respondents experienced unnecessary drug therapy. A few respondents experienced ineffective drug therapy (1.1%) since patients cannot achieve the desired therapeutic target after using the drug for a particular period. For instance, respondents received sympathomimetic drugs for reducing his or her common cold, which eventually increase blood pressure.[19-24]

Dosage too low occurred in more than 20% of respondents. For instance, a patient used 5mg amlodipine for several weeks, but his blood pressure was still above 160/100mmHg. This indicated that change to dose regimentation is necessary, yet nothing was done. Dosage too low also occurred in case patients using NSAIDs that constrict blood vessels.[20,24] In contrast, DTPs of dosage too high (4.6%) has been evident in patients taking two tablets of amlodipine 10 mg at once. This is against the maximum daily dose of amlodipine which is 10 mg. Doubling the dose may not necessarily need since combination of therapy of antihypertension, for instance with diuretics or other appropriate antihypertensive groups, can result better evidence.[16,21] In addition, a dosage too high can occur as a result of drug interactions. For example, concurrent use of simvastatin and amlodipine can cause muscle pain in patients.[20]

DTPs of non-compliance (19.2%) in this study illustrated by respondents did not refill drugs and forgot to use drugs as instructed. The overall DTPs in this study are similar to a study in Medan, North Sumatra mentioning unnecessary drug therapy (7.6%), needs additional drug therapy (47.0%), ineffective drug therapy (21.2%), adverse drug reaction (9,1%), dosage too low (1.5%), and non-compliance (13.6%) are the pattern of DTPs in PHC.[22]

Table 4 highlighted that most respondents had three to four DTPs (57,3%) similar to a study by Redzuan *et al*. (2017) in Malaysia concluding on average 2.15±1.5 DTPs per patient with 88.8% of patients had at least one DTPs.[23]

Table 3. Pattern of DTPs in respondents.

Number of types of DTPs (n=150)	Frequency	Percentage
Unnecessary drug therapy	88	15.6
Needs additional drug therapy	64	11.4
Ineffective drug therapy	6	1.1
Dosage too low	121	21.5
Adverse drug reaction	150	26.6
Dosage too high	26	4.6
Noncompliance	108	19.2
Total DTPs	563	100.0

Table 4. Number of DTPs in respondents.

Number of DTPs in respondents (n=150)	Frequency	Percentage
<3 DTPs	22	14.7
3-4 DTPs	86	57.3
>4 DTPs	42	28.0

Table 5. Chi-square analysis.

	Blood pressure control	Number of DTPs
Chi-Square	0.427[a]	10.,493[b]
df	1	6
Asymp. Sig.	0.514	0.000

[a]0 cells (0,0%) have expected frequencies less than 5. The minimum expected cell frequency is 75,0. [b]0 cells (0,0%) have expected frequencies less than 5. The minimum expected cell frequency is 21,4.Chi-Square103,493, Asymp. Sig. = 0.000<0.05, H0 is accepted (there is a relationship).

Association between DTPs and blood pressure control

The results of statistical analysis with chi-square test in Table 5 obtained *p-value* = 0.000 (<0.05) illustrating there is significant association between the number of DTPs and blood pressure control either controlled or uncontrolled.

Conclusions

Most patients experienced more than two DTPs and undertook more than three medicines at the same time. There is a significant association between the number of DTPs in hypertensive patient and the blood pressure control.

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