Factors Related to Medication Adherence among Essential Hypertensive Patients in Tertiary Hospitals in Yangon, Myanmar

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Abstract

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Poor adherence to medications is one of the major public health challenges. Due to little study on the adherence to anti-hypertensive treatment in Myanmar, where the prevalence of hypertension is the highest among South-East Asian Countries (42%), this study aimed to determine the prevalence of the adherence and to identify the factors related to medication adherence among hypertensive patients in Yangon, Myanmar.

A hospital-based cross-sectional study was done on a sample of 216 hypertensive patients who recruited by convenient sampling method at tertiary hospitals in Yangon, Myanmar during April and May 2015. Face-to-face interview was conducted using a structured questionnaire to gather information on socio-demographic, knowledge, perception, self-efficacy, family support and cues to action. The medication adherence was measured by Morisky Medication Adherence Scale (MMAS-8). "Good adherence" was defined as MMAS-8 scores of 6 or greater out of a total score of 8 points whereas "Poor adherence" as point of less than 6. Descriptive statistics, chi-square test and multiple logistic regressions were used for data analysis.

Only 50% of hypertensive patients were reported as good adherence to anti-hypertensive medication. Using backward multiple logistic regression, younger age (adjOR=3.03, 95%CI=1.15-7.99), male patients (adjOR=1.84, 95%CI=1.01-3.37), low household income (adjOR=2.39, 95%CI=1.17-4.85), longer duration of hypertension (adjOR=4.00, 95%CI=1.87-8.59 for those within 1-3 years and adjOR=2.63, 95%CI=1.12-6.20 for those with more than 3 years compared to those less than 1year)) and higher level of perceived barriers (adjOR=2.55, 95%CI=1.27-5.09) were related with poor medication adherence.

This study reported relatively high proportion of poor medication adherence. With regard to perceived barriers, such as medication side effects and complex dosing, health education program can be designed in out-patient settings particularly for patients with a long duration of hypertension. In addition, implementation of health insurance system should be considered to address external barriers like financial problem.

Keywords: hypertension, adherence, Morisky Medication Adherence Scale-8items, Myanmar

ปัจจัยที่สัมพันธ์กับความร่วมมือในการใช้ยาของผู้ป่วยความดันโลหิตสูงที่เข้ารับการรักษาในโรงพยาบาลตติยภูมิ เมืองย่างกุ้ง ประเทศพม่า

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บทคัดย่อ

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ปัจจัยที่สัมพันธ์กับความร่วมมือในการใช้ยาของผู้ป่วยความดันโลหิตสูงที่เข้ารับการรักษาในโรงพยาบาลตติยภูมิ เมืองย่างกุ้ง ประเทศพม่า
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ความไม่ร่วมมือในการใช้ยาคือปัญหาสำคัญของวงการแพทย์ ในประเทศพม่าความชุกของโรคความดันโลหิตสูงถูกพบมากที่สุดในเอเชียตะวันออกเฉียงใต้(42%) อย่างไรก็ตามการศึกษาถึงปัจจัยที่มีผลต่อความร่วมมือในการใช้ยาในผู้ป่วยที่มีภาวะความดันโลหิตสูงมีน้อยมาก การวิจัยในครั้งนี้มีจุดมุ่งหมายเพื่อตรวจสอบความชุกและปัจจัยที่มีผลต่อความร่วมมือในการใช้ยาในผู้ป่วยที่มีภาวะความดันโลหิตสูงในเมืองย่างกุ้ง ประเทศพม่า

การศึกษานี้เป็นการเก็บข้อมูลแบบภาคตัดขวางโดยใช้การเลือกหน่วยตัวอย่างตามสะดวก ซึ่งมีกลุ่มตัวอย่างของผู้ป่วยความดันโลหิตสูง 216 คน จากโรงพยาบาลระดับตติยภูมิในย่างกุ้ง ประเทศพม่า การเก็บข้อมูลใช้การสัมภาษณ์โดยใช้แบบสอบถามเพื่อรวบรวมข้อมูลทางสังคมและประชากร ความรู้ การรับรู้ การรับรู้สมรรถนะตนเอง การสนับสนุนของครอบครัว และ สิ่งชักนำให้เกิดการปฏิบัติ ดำเนินการในช่วงเดือนเมษายนและพฤษภาคม 2015 ความร่วมมือในการใช้ยาถูกประเมินโดยใช้แบบวัด Morisky Medication Adherence Scale (MMAS-8). "ความร่วมมือที่ดี" ได้รับการกำหนดให้เป็นคะแนน MMAS-8 มากกว่าหรือเท่ากับ 6 คะแนนจากคะแนนรวม 8 จุดในขณะที่ "ความร่วมมือที่ไม่ดี" ได้รับการกำหนดให้เป็นคะแนน MMAS-8 น้อยกว่า 6 คะแนน สถิติเชิงพรรณนา การทดสอบไคสแควร์และการวิเคราะห์ถดถอยโลจิสติกพหุคูณถูกนำมาใช้ในการวิเคราะห์ข้อมูล

ผู้ป่วยความดันโลหิตสูงร้อยละ 50 รายงานว่าให้ความร่วมมือที่ดีในการรักษาความดันโลหิตสูง ผลการวิเคราะห์การถดถอยโลจิสติค ชี้ให้เห็นว่าว่าปัจจัยที่มีผลต่อการให้ความร่วมมือในการรักษาน้อย ประกอบด้วย อายุที่น้อย (adjOR = 3.03, 95% CI = 1.15-7.99) ผู้ป่วยชาย (adjOR = 1.84, 95% CI = 1.01-3.37) รายได้ของครัวเรือนที่ต่ำ (adjOR = 2.39, 95% CI = 1.17-4.85) ระยะเวลาที่มีภาวะความดันโลหิตสูง (adjOR =4.00, 95%CI=1.87-8.59 สำหรับผู้ป่วยที่มีภาวะความดันโลหิตสูงในช่วง 1-3 ปี และ adjOR = 2.63, 95% CI = 1.12-6.20 สำหรับผู้ป่วยที่มีภาวะความดันโลหิตสูงมากว่า 3 ปี) และการมีระดับการรับรู้อุปสรรคที่สูงกว่า (adjOR = 2.55, 95% CI = 1.27-5.09)

การศึกษาครั้งนี้ชี้ให้เห็นว่าผู้ป่วยส่วนใหญ่ยังขาดความร่วมมือที่ดีในการรักษา การให้ความรู้แก่ผู้ป่วย เช่น ความรู้ในเรื่องผลข้างเคียงของยา การใช้ยาที่ซับซ้อน อาจจะเป็นช่องทางที่สามารถเพิ่มความร่วมมือในการรักษาโรคโดยเฉพาะอย่างยิ่งสำหรับผู้ป่วยนอกที่มีภาวะความดันโลหิตสูงเป็นระยะเวลาที่ยาวนาน นอกจากนั้นการปรับปรุงระบบประกันสุขภาพที่สามารถลดอุปสรรคทางด้านการเงินจะเป็นอีกหนึ่งช่องทางที่จะช่วยส่งเสริมความร่วมมือที่ดีในการรักษาโรคแก่ผู้ป่วยได้

คำสำคัญ: ความดันโลหิตสูง ความร่วมมือในการรักษา แบบวัด Morisky Medication Adherence Scale-8items ประเทศพม่า

Introduction

Hypertension is a significant public health challenge in primary health care and a major contributing factor to cardiovascular disorder, cerebrovascular disorder and kidney diseases if not detected early and treated appropriately. More than one in three adults have high blood pressure in the world[1] and the overall prevalence of hypertension in adults aged 25 and older was around 40% globally in 2008[2]. According to WHO, the hypertension poses serious threat to the low and middle income countries[2]. In South-East Asia region, 1.5 million people die from the complications of hypertension every year[3]. In Myanmar, 44.3% of adult males and 39.8% of adult females are with hypertension which is the highest prevalence rate among South-East Asian countries in 2011[4].

There are various effective medical regimens for management of hypertension which are indispensable for hypertensive patients to have adequate control of blood pressure. Treatment adherence is critical to treatment success in hypertensive patients[5]. WHO estimates that 50-70% of patients do not adhere to treatment as prescribed[5], particularly concentrated in developing countries due to deprived accessibility of medications and health care services[5]. In case of no suitable treatment and control of hypertension, 50% of hypertensive patients will die of coronary disease, 33% of stroke and 10-15% of renal failure[6]. In addition, non-adherence may cause increasing health expenditure, reducing quality of life and eroding public confidence in health system7. Patient's adherence to treatment are influenced by their subjective belief and health conditions and their perception are also essential in improvement of adherence[8, 9].

Little has been acknowledged on adherence of anti-hypertensive treatment in Myanmar. This study therefore was conducted to determine the proportion of treatment adherence within the target population and to identify the factors related to adherence of anti-hypertensive treatment with the guidance of Health Belief Model. This model proposes that whether or not individuals take action to protect their health be subject to whether they believe that they are susceptible to an ill health condition; that the existence of that condition would have serious concerns and that they have a way of action to avoid the condition and benefits of taking the action outweigh the costs[10]. Therefore, we undertook this study to assess anti-hypertensive treatment adherence using the validated Morisky Medication Adherence (MMAS-8items)11 and its related factors among the hypertensive patients attending out-patient departments of tertiary hospitals in Yangon, Myanmar.

Methods

The cross-sectional study was conducted to determine the proportion and factors related to anti-hypertensive medication adherence among hypertensive patients attending to out-patient departments (OPDs) of three tertiary hospitals in Yangon, Myanmar during April and May 2015. Patients were screened for eligibility by the out-patient record book and who meet the eligibility criteria were selected. The subjects invited to our study were hypertensive patients aged 30 or higher with diagnosis of hypertension and taking anti-hypertensive treatment for at least six months duration. The exclusion criteria are patients with secondary hypertension in which hypertension is caused by identifiable underlying secondary causes,

pregnant women with pre-eclampsia, patients having cognitive impairment which are determined by their physicians. The sample size was calculated with the formula of $n=Z^2P(1-P)/E^2$, where N is the required sample size, Z is the Z statistics for predetermined a error, P is the estimated prevalence of hypertension, and E is the margin of error. We took Z a =1.96 for 95% confidence. The estimated prevalence in the study was set at 50%, the conservative estimate. The margin of error was taken as 7%. After allowing the non-response rate of 10%, the final adjusted sample size was 216. Therefore, a total of 216 hypertensive patients by convenient sampling method were recruited and face-to-face interview by a researcher was conducted to gather information. This study was approved by the Institutional Review Board of Mahidol University, Thailand and Department of Medical Research and Ministry of Health, Myanmar, and written informed consent form was obtained from all participants.

A structured questionnaire on socio-demographic characteristics, knowledge on hypertension, perception on hypertension (perceived susceptibility, perceived severity, perceived benefits and perceived barriers), self-efficacy, family support and cues to action was developed based on Health Belief Model[12-14] by all the researchers. Since some variables were not normally distributed, median values or tertiles were used as appropriate to categorize the independent variables. For example, household income and knowledge on hypertension was divided into three equal proportions (tertiles), while perception on hypertension, self-efficacy and cues to action were categorized into two levels using median values of each variables.

For the medication adherence, the valid and reliable 8-item Morisky Medication Adherence Scale (MMAS-8), which was developed with the objectives of determining adherence to anti-hypertensive medication[15, 16] and which was applicable even in a busy clinical setting[17] was employed. The MMAS-8 consists of 8 items of specific medication-taking behaviors and response categories are yes or no for each items and a 5-point likert response for the last item. The total scores range from zero to eight and dichotomized into good adherence (score ≥6) and poor adherence (score <6)[18].

For the reliability and validity of questionnaire, 20 hypertensive patients from another hospital, which was not included in the study, were interviewed with the questionnaire. Cronbach alpha coefficients of questionnaire components were relatively high: 0.71 for perception on hypertension, 0.84 for adherence of anti-hypertensive medication, 0.92 for self-efficacy, 0.74 for cues to action and 0.83 for family support. Kuder-Richardson 20 for knowledge on hypertension was 0.91.

Data management and analysis were done by using SPSS software (version 16). The relationship between categorical variables was tested using the chi-square test or fisher's exact test as appropriate. In the multiple logistic regressions, the factors showing significance in previous literatures, such as age, gender, education, number of family members, co-morbid diseases, knowledge on hypertension, perception on hypertension, self-efficacy and cues to action were also added in the analysis with the three significant factors from chi-square test (household income, duration of hypertension, and perceived barrier barriers).

The backward multiple logistic regressions were employed to find the significant predictors.

Results

The general characteristics among total 216 hypertensive patients were shown in Table 1. The mean age was 52.8 years and the more than half of the patients were female (58.8%), married (67.6%), and had secondary or high school education (60.7%) and other co-morbid diseases (63%). Forty-eight percent of patients have suffered with hypertension within 1-3 years and 27% of patients had more than 3 year duration of hypertension.

Responses to MMAS-8 items were shown in Table 2. Only 50.9 % of patients (score ≥6 out of 8) were sentenced to have good adherence while 49.1% were poorly adherent (score <6) (Table 2). Approximately 58% of patients forgot to take medicines and 40% missed to take drugs within 2 weeks. Nearly 68% of patients did not cut back or stop medicine, but 10.2% of patients stop medication themselves when they feel better. Almost 30 % of patients forgot to bring medicine when they travelled or left home, over 80% did not feel stressed with their treatment and closely 60% having difficulty in remarkably to take medicines.

When compared with patients who had good adherence to anti-hypertensive treatment, the patients who had poor adherence were more likely to have low household income (48.1% vs. 27.3%), longer duration of hypertension within 1-3 year (56.6 % vs. 40%), more than 3 years (29.1% vs. 5.5%) and negative perception towards barriers of anti-hypertensive treatment (58.5% vs. 39.1%) (p-value < 0.01) which were statistically significant. The average household income was from 400,00 to 1,000,000 kyats per month, poor adherent patients were found in the group of low household income (less than 100,000 kyats per month). A significant difference was found in the percentage of non-adherers between of group of duration of hypertension for more than 1 year (p value = 0.002) (Table 3).

Table 4 presented the results of multiple logistic regression analysis demonstrating the relation of several factors with adherence of anti-hypertensive medication. Factors significantly related to poor adherence to medications were younger age (30-45years) (adjOR=3.03, 95%CI=1.15-7.99), male patient(adjOR=1.84, 95%CI=1.01-3.37), lower household income of less than 100,000 kyats per month (adjOR=2.39, 95%CI=1.17-4.85), longer duration of hypertension within 1-3 years (adjOR=4.00, 95%CI=1.87-8.59), longer duration of hypertension for more than 3 years (adjOR=2.63, 95%CI=1.12-6.20) and higher level of perceived barriers (adjOR=2.55, 95%CI=1.27-5.09).

Table 1 General Characteristics of Hypertensive patients (n=216)

	Number (%) or Mean ± SD
Age (years)	52.8 ± 12.5
30-45	38 (17.6)
46-60	86 (39.8)
>60	91 (42.6)
Gender	
Male	89 (41.2)
Female	127 (58.8)
Education	
Primary school or lower education	85 (39.4)
Secondary or High school	93 (43.0)
College/ Bachelor or Higher Degree	38 (17.6)
Occupation	
Government/ Non-government/ Own Business	107 (49.5)
Housewife/ Unemployed/ Others	109 (50.5)
Marital status	
Single	21 (9.7)
Married	146 (67.6)
Divorced/ Widowed/ Separated	49 (22.7)
Household Income (kyats per month)[†]	164,950 ± 109,450
Low (≤100,000)	81 (37.5)
Middle (100,001-199,999)	60 (27.8)
High (≥200,000)	75 (34.7)
Number of family members in Household	5.1 ± 1.1
<5	55 (25.5)
≥5	161 (74.5)
Number of children under 12 years in Household	0.19 ± 0.44
0	178 (82.4)
1-2	38 (17.6)
Any diseases together with hypertension	
No/ Don't know	80 (37.0)
Co-morbid diseases	136 (63.0)
Duration of Hypertension	
<1year	53 (24.5)
1-3year	104 (48.1)
>3year	59 (27.4)
Methods of diagnosis of Hypertension	
In a routine medical control	63 (29.2)
Screening Program	115 (53.2)
Emergency services/ Others	38 (17.6)
Types of medicine taken	
Beta blocker	5 (2.3)
ACE inhibitor	107 (49.5)
ARB	28 (13.0)
Calcium Channel Blocker	73 (33.8)
Others	3 (1.4)

[†] Household income was categorized into tertiles. Average currency exchange rate between kyat and US$ is 1US$=1000kyats.

Table 2: Drug taking behavior within last six months according to MMAS- 8 items score (n=216)

	Yes	No
	N (%)	N (%)
Forget to take medicine	125 (57.9)	91 (42.1)
Miss to take medicine within last 2 weeks	86 (39.8)	130 (60.2)
Cut back or stop medicine without telling to doctor	70 (32.4)	156 (67.6)
Forget to bring medicine when travel or leave home	62 (28.7)	154 (71.3)
Take medicine yesterday	187 (86.6)	29 (13.4)
Stop taking medicine when feel symptoms are under control	22 (10.2)	194 (89.8)
Feel hassled about sticking to treatment plan	42 (19.4)	174 (80.6)
	More than once	Never
Difficulty in remembering to take all medicine	122 (56.5)	94 (43.5)
Total Score(Mean ± SD)	5.4 ± 2.3	
Good Adherence (≥6)	110 (50.9)	
Poor Adherence (<6)	106 (49.1)	

Table 3   Relationship between potential risk factors and adherence to medication (n=216)

	Adherence to anti-hypertensive treatment		Chi-square	p-value
	Good	Poor		
	N (%)	N (%)		
Age (years)				
30-45	17 (15.5)	21 (19.8)	2.196	0.334
46-60	49 (44.5)	37 (34.8)		
>60	44 (40.0)	48 (43.8)		
Gender				
Male	40 (36.4)	49 (46.2)	2.167	0.141
Female	70 (63.6)	57 (53.8)		
Education				
Primary school or lower education	42 (38.2)	43 (40.6)	2.839	0.242
Secondary or High school	44 (40.0)	49 (46.2)		
College/ Bachelor or Higher	24 (21.8)	14 (13.2)		

Table 3   Relationship between potential risk factors and adherence to medication (n=216) Cont.

	Adherence to anti-hyperten-sive treatment		Chi-square	p-value
	Good	**Poor**		
	N (%)	**N (%)**		
Household Income				
Low (≤ 100000)	30 (27.3)	51 (48.1)	10.027	0.007
Middle (100001-199999)	36 (32.7)	24 (22.6)		
High (≥ 200000)	44 (40.0)	31 (29.2)		
Number of family members in Household				
<5	27 (24.5)	28 (26.4)	0.099	0.753
≥5	83 (75.5)	78 (73.6)		
Any diseases together with hypertension				
No/ Don't know	41 (37.3)	39 (36.8)	0.005	0.942
Co-morbid diseases	69 (62.7)	67 (63.2)		
Duration of Hypertension				
<1year	38 (34.5)	15 (14.2)	12.525	0.002
1-3year	44 (40.0)	60 (56.6)		
>3year	28 (5.5)	31 (29.2)		
Knowledge of hypertension				
Good level	41 (37.3)	15 (14.2)	0.763	0.683
Moderate level	37 (33.6)	30 (28.3)		
Low level	28 (5.5)	32 (30.2)		
Perceived susceptibility				
Positive	78 (70.9)	71 (67.0)	0.389	0.533
Negative	32 (29.1)	35 (33.0)		
Perceived severity				
Positive	107 (97.3)	102 (96.2)	0.188	0.718
Negative	3 (2.7)	4 (3.8)		
Perceived benefits				
Positive	101 (91.8)	93 (87.7)	0.983^{α}	0.321
Negative	9 (8.2)	13 (12.3)		
Perceived barriers				
Positive	67 (60.9)	44 (41.5)	8.133	0.004
Negative	43 (39.1)	62 (58.5)		
Self-efficacy				
High level	60 (54.5)	1 (48.1)	0.894	0.344
Low level	50 (45.5)	55 (51.9)		
Cues to action				
High level	72 (65.5)	70 (66.0)	0.008	0.928
Low level	38 (34.5)	36 (34.0)		

$^{\alpha}$ Fisher's exact test was used for analysis.

Table 4 Final Model of Multiple Logistic Regression for Predictors of Medication Adherence in Hypertensive patients

	Crude OR (95% CI)	Adjusted OR (95% CI)	p-value
Age (years)			
30-45	1.13 (0.53-2.42)	3.03 (1.15-7.99)	**0.025**
46-60	0.69 (0.38-1.25)	1.21 (0.59-2.47)	0.600
>60	1	1	
Gender			
Male	1.50 (0.87-2.59)	1.84 (1.01-3.37)	**0.047**
Female	1	1	
Education			
Primary school	1.76 (0.80-3.85)	NS	
Secondary/High school	1.91 (0.88-4.14)		
College/ Bachelor	1		
Household income			
Low (≤ 100000)	2.41 (1.27-4.59)	2.39 (1.17-4.85)	**0.016**
Middle (100001-199999)	0.95 (0.47-1.89)	1.02 (0.46-2.17)	0.967
High (≥ 200000)	1	1	
Number of family members			
<5	1.10 (0.60-2.04)	NS	
≥5	1		
Any Co-morbid diseases			
No/ Don't know	1	NS	
Co-morbid diseases	1.02 (0.59-1.77)		
Duration of hypertension			
< 1year	1	1	
1-3 year	3.46 (1.69-7.05)	4.00 (1.87-8.59)	**<0.001**
>3 year	2.81 (1.29-6.18)	2.63 (1.12-6.20)	**0.027**
Knowledge on Hypertension			
Good level	1		
Moderate Level	1.07 (0.56-2.05)	NS	
Poor Level	0.81 (0.41-1.61)		
Perceived susceptibility			
Positive	1		
Negative	1.20 (0.68-1.61)	NS	
Perceived severity			
Positive	1		
Negative	1.20 (0.68-1.61)	NS	
Perceived benefit			
Positive	1		
Negative	1.57 (0.64-3.84)	NS	
Perceived barrier			
Positive	1		
Negative	2.20 (1.27-3.78)	1	**0.008**
Self-efficacy		2.55 (1.27-5.09)	
High Level	1		
Low Level	1.29 (0.79-2.21)	NS	
Cues to action			
High Level	1		
Low Level	0.97 (0.56-1.71)	NS	

Discussion

In this study, we found that only 50% of out-patient hypertensive patients in three tertiary hospitals in Yangon, Myanmar reported as good medication adherence Poor adherence to anti-hypertensive medication was significantly related to being younger age (30-45 years), male, longer duration of hypertension (more than one year), lower household income and poor perception on treatment barriers.

The adherence of anti-hypertensive medication as measured by MMAS-8items in this study was 50.9% lower than that of a previous study (75%) in Yangon, Myanmar in 2010[19]. It may be explained possibly due to different sampling methods. The previous Myamese study was done at private clinics where mainly richer and educated people visited whereas most of the patients in the present study are poorer and lower educated people. Moreover, our study used a validated tool, MMAS 8-items for assessment of medication adherence, whereas in the previous Myanmar study, the self-structured questionnaire developed by the researchers was used for evaluation of adherence of anti-hypertensive treatment. Meanwhile, in comparison with other countries in Asia, the adherence rate in our sample is nearly similarly low as shown in Malaysia (53.4%)[20] and Hong Kong (55.1%)[21]. Compared to the prevalence using MMAS-8 items to assess anti-hypertensive medication adherence in other countries, it was not much different from those in southeastern Louisiana (51.7%)[22], Hong Kong (65.1%)[23], and Palestine (63.2%)[24].

In the present study, patients with poor adherence to treatment were younger (30-45 years), who were three times less likely to adhere to anti-hypertensive medication, consistent with a number of other studies[25-27]. This can be explained that the younger aged group is mostly working, so that they are probably busy and running in their work and another explanation may be younger people think that they feel healthy, and are busy in running their work which leading to irregular taking medication. They usually pay attention when the disease was severe and worsening of symptoms[28-30]. This study also reported gender difference in adherence to medications, as men were found 1.84 times to be less adhered when compared to women. This finding is in line with most studies done on this issue[20, 31, 32]. This can be partly explained that mostly men have a responsibility to earn money and the heavy workload among men can lead to forget taking medicine and follow-up for treatment.

One of the factors accounting for poor adherence of anti-hypertensive medication among the patients was low household income and this is matched with the study done in Southern Taiwan[33] and in Nigeria[25]. There was 2.4 times less adhere to anti-hypertensive medication in low household income patients (less than 100,000 kyats per month) among this study populations. It was suggested that low income patients can't access the health care services compared those with high income leading to poor treatment adherence. There was only 2% of total GDP spending on health care in Myanmar and health expenditures are largely driven by private-pay[34]. The health insurance system helps reduce financial barriers in access to anti-hypertensive medication. In Myanmar, there is no public health insurance system, thus the expenditures on health care cost can cause financial burden on the patients especially in poor households.

One predictor variable, duration of hypertension was shown relationship with treatment adherence in this study. Patients living with hypertension for longer duration (more than 1 year) were less likely to adhere to medication, as in detailed, patients who knew the diagnosis of hypertension with 1 – 3 year were 4 times less likely adhere to anti-hypertensive medication and for more than 3 year duration were found as 2.629 times poorly adhere to anti-hypertensive medication than those with less than 1 year duration. As long as duration of hypertension, the length and routine nature of treatment cause boredom to patients and desire to withdraw leading to poor adherence to treatment[35]. This is correspond with other studies showing that the medication adherence drop sharply after initiating medications in patients with chronic diseases[36]. This can also be due to higher health care expenditure in long-term anti-hypertensive therapy and leading to disruption of treatment adherence[37].

As shown in our study, the perceived susceptibility, perceived severity and perceived benefits did not show any relationship, inconsistent with other studies[19, 26, 32]. The patients having negative perception towards anti-hypertensive medication were 2.5 times less likely to adhere to anti-hypertensive medication compared to those with positive perception towards to barriers. Concerning perception on hypertension, a negative perception towards efficiency of medication appears to be the barrier for adherence of anti-hypertensive treatment which can be observed in one of Spanish studies[35]. As shown in this study, a number of studies emphasizing on perception revealed that modification of patient's perception on hypertension may lead to higher adherence[8, 38]. According to the Health Belief Model, the likelihood of adoption of health behavior is largely regulated by the perceived barriers to treatment which has been proved as the most powerful of the HBM dimensions by various studies[13].

Limitations and strengths

The potential limitations of this study should be considered when interpreting the results. Firstly, due to hospital-based cross-sectional study, there would be different between hypertensive patients who did not come to hospital during the time of study and those participated in our study. It may be related to selection bias. Furthermore, the findings would not be applicable to the general population due to the hospital based study design. In addition, this study focused mainly on the patient's related factors on adherence, so that further study considering information on role of health professionals, like physicians and nurses and health system in community setting is guaranteed.

Conversely, some strengths can be perceived from this study. Medication adherence was measured using reliable and validity tool (MMAS-8), which is a good estimator of medication taking behaviors. Furthermore, due to limited study in Myanmar regarding adherence of anti-hypertensive treatment, this study can contribute to more understanding about the prevalence of adherence of anti-hypertensive treatment and its predicting factors in this population. Lastly, these findings could be helpful in designing the interventions to improve adherence to anti-hypertensive medication in hospital settings.

Conclusion

The study suggests that age, gender, household income, duration of hypertension and perceived

barriers are pivotal in determining the adherence to anti-hypertensive medication in tertiary care hospitals in Myanmar. Ensuring adherence to anti-hypertensive treatment to avert complications of hypertension remains a key challenge to public health in many developing countries. Although all findings are not new with respect to previous literature, these findings can serve to confirm what has been found in Myanmar context especially in tertiary hospital settings.

Based on this findings, providing free medical care services and implementation of health insurance system which will be comprehensive health service package especially for poor patients can minimize the financial barriers towards treatment adherence. Provision of health education on how to take medication properly and how to deal with adverse effects of medications and explaining the importance of long-term medication adherence can improve the patient's adherence and subsequently treatment effectiveness. In addition, the strategies to overcome the barriers of treatment adherence should be established by focusing not only on patient's individual factors but also on physician's and health system support. Future research as community based study with large sample size to explore more information regarding not only on patient's but also provider's and health system's related factors towards adherence of anti-hypertensive treatment should be conducted. In conclusion, due to the importance of medication adherence to achieve the full benefits of treatment, to provide a better quality of life in patients and to prevent adverse reactions attributable to the result of non-adherence is evident, adherence, special support and efforts should be given among hypertensive patients in Myanmar.

References:

1. World Health Organization. 2013. Available from: http://www.who.int/features/qa/82/en/.

2. World Health Organization. High blood pressure: Global and Regional Overview. World Health Organization, 2013.

3. Alwan A. Global status report on noncommunicable diseases 2010: World Health Organization. 2011.

4. World Health Organization. Non-communicable diseases in the South-East Asia Region: Situation and Response. New Delhi: World Health Organization, 2011.

5. Sabaté E. Adherence to long-term therapies: evidence for action: World Health Organization; 2003.

6. Kamran A, Azadbakht L, Mahaki B, Sharifirad G. Psychometric testing of an instrument designed to measure nutritional perceptions of hypertensive patients. J Educ Health Promot. 2014;3.

7. World Health Organization. Preventing chronic diseases: a vital investment. Geneva, Switzerland: WHO; 2007.

8. Hsiao CY, Chang C, Chen CD. An investigation on illness perception and adherence among hypertensive patients. Kaohsiung J Med Sci. 2012;28(8):442-7.

9. Petrie KJ, Jago LA, Devcich DA. The role of illness perceptions in patients with medical conditions. Current opinion in psychiatry. 2007;20(2):163-7.

10. Sharifirad G, Entezari MH, Kamran A, Azadba-kht L. The effectiveness of nutritional education on the knowledge of diabetic patients using the health belief model. J Res Med Sci: the official journal of Isfahan University of Medical Sciences. 2009;14(1):1.

11. Morisky DE, Ang A, Krousel-Wood M, Ward HJ. Predictive validity of a medication adherence measure in an outpatient setting. J CLIN HYPER-TENS 2008;10(5):348-54.

12. Glanz K, Rimer BK, Lewis FM. Health Behavior and Health Education: Theory, Research and Practice (3rd ed): Wiley, John & Sons, Incorporated; 2002.

13. Janz NK, Becker MH. The health belief model: A decade later. health education and behavior. 1984;11(1):1-47.

14. Rosenstock IM. Historical Origins of the Health Belief Model. Health Education Monographs. 1974;2(4).

15. de Oliveira-Filho AD, Morisky DE, Neves SJF, Costa FA, de Lyra DP. The 8-item Morisky Medication Adherence Scale: validation of a Brazilian–Portuguese version in hypertensive adults. Research in Social and Administrative Pharmacy. 2014;10(3):554-61.

16. Oliveira-Filho AD, Barreto-Filho JA, Neves SJ, Lyra JDP. Association between the 8-item Morisky Medication Adherence Scale (MMAS-8) and blood pressure control. Arquivos brasileiros de cardiologia. 2012;99(1):649-58.

17. Lee WY, Ahn J, Kim JH, Hong YP, Hong SK, Kim YT, et al. Reliability and validity of a self-reported measure of medication adherence in patients with

type 2 diabetes mellitus in Korea. J Int Med Res. 2013;41(4):1098-110.

18. Krousel-Wood M, Islam T, Webber LS, Re R, Morisky DE, Muntner P. New medication adherence scale versus pharmacy fill rates in hypertensive seniors. AM J MANAG C 2009;15(1):59.

19. Htun HN. Adherence to Antihypertensive Treatment of Patients with Essential Hypertension in Yangon, Myanmar: Mahidol University; 2010.

20. Ramli A, Ahmad NS, Paraidathathu T. Medication adherence among hypertensive patients of primary health clinics in Malaysia. Patient preference and adherence. 2012;6:613.

21. Kang CD, Tsang PP, Li WT, Wang HH, Liu KQ, Griffiths SM, et al. Determinants of medication adherence and blood pressure control among hypertensive patients in Hong Kong: A cross-sectional study. INT J CARDIOL. 2015;182:250-7.

22. Holt EW, Muntner P, Joyce C, Morisky DE, Webber LS, Krousel-Wood M. Life Events, Coping, and Antihypertensive Medication Adherence Among Older Adults The Cohort Study of Medication Adherence among Older Adults. American journal of epidemiology. 2012;176 (suppl 7):S64-S71.

23. Lee GK, Wang HH, Liu KQ, Cheung Y, Morisky DE, Wong MC. Determinants of medication adherence to antihypertensive medications among a Chinese population using Morisky Medication Adherence Scale. 2013.

24. Sa'ed H, Al-Jabi SW, Sweileh WM, Morisky DE. Relationship of treatment satisfaction to medica-tion adherence: findings from a cross-sectional

survey among hypertensive patients in Palestine. Health and quality of life outcomes. 2013;11(1):1-7.

25. Ajayi EA, Adeoti AO, Ajayi IA, Ajayi AO, Adeyeye VO. Adherence to Antihypertensive Medications and Some of Its Clinical Implications in Patients Seen At a Tertiary Hospital in Nigeria.

26. Kamran A, Ahari SS, Biria M, Malpour A, Heydari H. Determinants of patient's adherence to hypertension medications: application of health belief model among rural patients. Ann Med Health Sci Res. 2015;4(6):922-7.

27. Demoner MS, Ramos ERdP, Pereira ER. Factors associated with adherence to antihypertensive treatment in a primary care unit. Acta Paulista de Enfermagem. 2012;25(SPE1):27-34.

28. Hareri HA, Gedefaw M, Simeng B. Assessment of prevalence and associated factors of adherence to anti-hypertensive agents among adults on follow up in Adama Referal hospital, East Shoa, Ethiopia-cross sectional study. Int J Curr Microbiol App Sci. 2014;3(1):760-70.

29. Di Martino M, Veronesi C, Degli Esposti L, Scarpa F, Buda S, Didoni G, et al. Adherence to antihypertensive drug treatment and blood pressure control: a real practice analysis in Italy. Authors' reply. J Hum Hypertens. 2008;22(1):51-3.

30. Boima V, Ademola AD, Odusola AO, Agyekum F, Nwafor CE, Cole H, et al. Factors Associated with Medication Nonadherence among Hypertensives in Ghana and Nigeria. Int J Hypertens. 2015;2015.

31. Ambaw AD, Alemie GA, W/Yohannes SM, Mengesha ZB. Adherence to antihypertensive treatment and associated factors among patients on follow up at University of Gondar Hospital, Northwest Ethiopia. BMC public health. 2012;12(1):282.

32. Joho AA. Factors Affecting Treatment Compliance Among Hypertension Patients in three District Hospitals-Dar es Salaam: Muhimbili University of Health and Allied Sciences; 2012.

33. Lin Y, Huang Y, Yang Y, Wu J, Chang C, Lu F. Adherence to antihypertensive medications among the elderly: a community-based survey in Tainan City, Southern Taiwan. Taiwan Geriatr Gerontol. 2007;2(3):176-89.

34. Shobert B. Health care in Myanmar 2013. Available from: http://www.forbes.com/sites/benjamin-shobert/2013/08/19/healthcare-in-myanmar/.

35. Gascón JJ, Sánchez-Ortuño M, Llor B, Skidmore D, Saturno PJ, TreatmentCompliancein HypertensionStudyGroup. Why hypertensive patients do not comply with the treatment Results from a qualitative study. Family practice. 2004;21(2):125-30.

36. Park JH, Shin Y, Lee SY, SI. L. Antihypertensive drug medication adherence and its affecting factors in South Korea. INT J CARDIOL. 2008;128(3):392-8.

37. Flack JM, Novikov SV, Ferrario CM. Benefits of adherence to anti-hypertensive drug therapy. Eur Heart J. 1996;17:16-20.

38. George J, Shalansky SJ. Predictors of refill non-adherence in patients with heart failure. BRIT J CLIN PHARMACO 2007;63(4):488-93.