Factors Predicting Medication Adherence in Patients with Essential Hypertension in Malé, Maldives*

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Abstract

Purpose: To examine the influence of complexity of regimen, health literacy, patient-doctor relationship, family support and duration of antihypertensive drug use on antihypertensive medication adherence in patients with essential hypertension in Malé, Maldives.

Design: Correlational predictive study.

Methods: The study includes 172 convenience samples with essential hypertension in Malé, Maldives. Demographic data questionnaire, the Hill-Bone Medication Adherence Subscale, Medication Regimen Complexity Index, the European Health Literacy Survey Questionnaire - short version, The Patient-Doctor Relationship Questionnaire, and Modified Family Support and Conflict scale for patients with essential hypertension were used as research instruments. Data were analyzed using descriptive statistics and logistic regression analysis.

Main findings: Among the 172 participants, 61% were female, mean age was 55.21 (SD = 10.66) and 54.7% of the participants were adherent to antihypertensive medication. Complexity of regimen, health literacy, patient-doctor relationship, family support and duration of antihypertensive drug use accounted for 36.1% of the variance explained in adherence to antihypertensive medication (Nagelkerke R^2 = .36). It was also found that complexity of regimen, sufficient and excellent level of health literacy, and high level of patient-doctor relationship were significant predictors of medication adherence (OR = .91, 95%CI [.85, .97], p = .01; OR = 4.83, 95%CI [1.59, 14.62], p = .01; OR = 3.43, 95%CI [1.02, 11.56], p = .05; and OR = 10.52, 95%CI [3.05, 36.19], p = .01, respectively).

Conclusion and recommendations: This study provides an understanding of antihypertensive medication adherence in patients with essential hypertension in Malé, Maldives, and the factors affecting adherence. However, further research is needed to explore more on factors affecting medication adherence in these patients and how health care providers can address these factors to improve antihypertensive medication adherence.

Keywords: essential hypertension, health literacy, medication adherence, physician patient relationship

ปัจจัยทำนายความร่วมมือในการใช้ยาของผู้ป่วยโรคความดันโลหิตสูงชนิดไม่ทราบสาเหตุ ในเมืองมาเล ประเทศมัลดีฟส์*

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บทคัดย่อ

วัตถุประสงค์: เพื่อศึกษาอิทธิพลของความซับซ้อนของแบบแผนการใช้ยา ความรอบรู้ด้านสุขภาพ สัมพันธภาพระหว่างผู้ป่วยกับแพทย์ การสนับสนุนจากครอบครัว และระยะเวลาของการใช้ยาลดความดันโลหิต ต่อความร่วมมือในการใช้ยาลดความดันโลหิตของผู้ป่วยโรคความดันโลหิตสูงชนิดไม่ทราบสาเหตุ ในเมืองมาเล ประเทศมัลดีฟส์

รูปแบบการวิจัย: การวิจัยความสัมพันธ์เชิงทำนาย

วิธีดำเนินการวิจัย: กลุ่มตัวอย่างเป็นผู้ป่วยโรคความดันโลหิตสูงชนิดไม่ทราบสาเหตุ จำนวน 172 คน ในเมืองมาเล ประเทศมัลดีฟส์ โดยวิธีการเลือกแบบสะดวก เก็บรวบรวมข้อมูลโดยใช้แบบสอบถามข้อมูลส่วนบุคคล แบบวัดความร่วมมือในการใช้ยา แบบวัดความซับซ้อนของแบบแผนการใช้ยา แบบสอบถามความรอบรู้ด้านสุขภาพ แบบสอบถามสัมพันธภาพระหว่างผู้ป่วยกับแพทย์ และแบบสอบถามการสนับสนุนจากครอบครัว วิเคราะห์ข้อมูลโดยใช้สถิติเชิงพรรณนา และการวิเคราะห์ถดถอยโลจิสติก

ผลการวิจัย: กลุ่มตัวอย่าง 172 คน เป็นเพศชายร้อยละ 61 อายุเฉลี่ย 55.21 ปี (SD = 10.66) มีความร่วมมือในการใช้ยาร้อยละ 54.7 โดยความซับซ้อนของแบบแผนการใช้ยา ความรอบรู้ด้านสุขภาพ สัมพันธภาพระหว่างผู้ป่วยกับแพทย์ การสนับสนุนจากครอบครัว และระยะเวลาของการใช้ยาลดความดันโลหิต สามารถร่วมกันทำนายความร่วมมือในการใช้ยาได้ร้อยละ 36.1 (Nagelkerke R^2 = .36) ซึ่งความซับซ้อนของแบบแผนการใช้ยา ความรอบรู้ด้านสุขภาพที่เพียงพอและระดับดีมาก และสัมพันธภาพระหว่างผู้ป่วยกับแพทย์ที่ดี สามารถทำนายความร่วมมือในการใช้ยาอย่างมีนัยสำคัญทางสถิติ (OR = .91, 95%CI [.85, .97], p = .01; OR = 4.83, 95%CI [1.59, 14.62], p = .01; OR = 3.43, 95%CI [1.02, 11.56], p = .05 และ OR = 10.52, 95%CI [3.05, 36.19], p = .01 ตามลำดับ)

สรุปและข้อเสนอแนะ: การศึกษานี้ให้ความเข้าใจเกี่ยวกับการให้ความร่วมมือในการใช้ยาลดความดันโลหิตในผู้ป่วยโรคความดันโลหิตสูงชนิดไม่ทราบสาเหตุ ในเมืองมาเล ประเทศมัลดีฟส์ และปัจจัยที่มีผลต่อความร่วมมือในการใช้ยา อย่างไรก็ตาม จำเป็นต้องมีการวิจัยเพิ่มเติม เกี่ยวกับปัจจัยที่ส่งผลต่อการรับประทานยาอย่างต่อเนื่องในผู้ป่วยเหล่านี้ และพยาบาลจะสามารถจัดการกับปัจจัยเหล่านี้อย่างไร เพื่อปรับปรุงความร่วมมือในการรับประทานยาลดความดันโลหิตได้อย่างต่อเนื่อง

คำสำคัญ: ความดันโลหิตสูงชนิดไม่ทราบสาเหตุ ความรอบรู้ด้านสุขภาพ ความร่วมมือในการใช้ยา สัมพันธภาพระหว่างผู้ป่วยกับแพทย์

Background and Significance

An estimated 1.28 billion adults and older persons worldwide have hypertension that significantly increases the risks of heart, brain, kidney and other diseases leading to premature death.[1] In the Maldives, hypertensive diseases were the fourth leading causes of death for all ages in 2014.[2] Since disease registries for NCDs are often not available, and data available to the general public is limited to research studies undertaken by the Ministry of Health and WHO statistical data, the prevalence of hypertension cannot be clearly indicated. Nevertheless, essential hypertension is a chronic disease which has to be treated with medication for life. Thus, hypertension contributes to illness burden particularly in all vascular diseases, leading to an increase in treatment cost. A study conducted by Wang, et al.[3] showed mean yearly medication expenditure for hypertensive individuals to be twofold more than that of non-hypertensive individuals. Therefore, non-adherence to medication can significantly increase the cost burden on the healthcare system. Thus, treatment adherence can contribute to cost-saving, leading to health and economic improvement of the country.

Adherence to medication in patients is multifaceted, individualized, and is influenced by several factors. Due to the nature of the disease, patients have no symptoms, and patients with hypertension may fail to take their medication as prescribed.[4]

The World Health Organization (WHO) estimates that 50%-70% of patients receiving antihypertensive treatments tend to adhere to their medication as prescribed.[5] WHO states adherence to medication is a multifactorial phenomenon which can be explained in 5 dimensions.[5] These five dimensions, according to the WHO Multidimensional Adherence Model (MAM), are social and economic factors, condition-related factors, patient-related factors, therapy-related factors and healthcare system-related factors. Various factors identified and reported to affect medication adherence in patients with hypertension in previous studies can be integrated in these five dimensions.

One such factor is the patient-doctor relationship, which can be explained as interaction between a doctor and patient which brings about beneficial change in the patient. Patient-doctor relationship has been shown to significantly affect medication adherence.[6] The huge expatriate workforce and rapid turnover of healthcare staff in the Maldives might impair the patient-doctor relationship. Additionally, the patient-doctor ratio, language barrier, and limited time for consultations can also impact this therapeutic relationship. Similarly, the complexity of regimen, which includes the dosage form, dosing frequency and additional directives, has been found to predict medication adherence.[5]

Patients with essential hypertension usually have one or more comorbidities which require medication. Previous studies which focused on the complexity of regimen, have only explored the complexity of the antihypertensive medications prescribed to the patient or explored one of the factors that contributes to the complexity of regimen.[4,7] However, in the current study, the complexity of the medication regimen was explored with the inclusion of all prescription medication the patient is receiving.

Previous research, which explored health literacy and its effect on medication adherence, has focused mainly on medical words recognition or functional health literacy of the patient.[8] Whereas, in this study defined and studied health literacy as a person's ability to acquire, understand, appraise and apply health information. Maldivians outside of the medical professions are mostly conversant with the basic medical jargon (e.g., cancer, stroke, heart attack, antibiotics, and dialysis). The issue is further complicated by the vast expatriate workforce, few local doctors, and limited Maldivian names for medical terms. As a result, health literacy among patients with hypertension in the Maldives may differ from prior research.

Patients with hypertension need lifestyle changes, which require psychological and physical support from the family. Thus, family support has been associated with better medication adherence in patients with hypertension along with other chronic conditions.[5,7] However, most previous studies examined the relationship between medication adherence and social support from family, friends, and significant others.[4,7] Thus, this study focused solely on the support from the patient's family members and its impact on the patient's medication adherence. Furthermore, due to the difference in culture, beliefs and behaviors in the Maldives, as well as family support and its impact on antihypertensive adherence in this study population may contradict the findings from previous research.

Although, lifestyle modifications have been linked to blood pressure control, some patients primarily relay on medication for hypertension control.[9] Similarly, duration of antihypertensive use has been found to predict medication adherence in studies conducted in other countries.[6-7,9] However, its effect on antihypertensive medication adherence in the study population may differ due to the differences in the patient's beliefs and practices.

Although many studies have reported medication adherence in individuals with essential hypertension, these investigations were done in a variety of settings and yielded inconsistent findings. To date, no study has been done in this issue in the Maldives. A study of patients with essential hypertension in the Maldives is, thus, needed to better understand the rate of medication adherence and its associated factors. This paper, therefore, focuses on the factors predicting medication adherence among patients with essential

hypertension in the Maldives, using the WHO MAM model as a conceptual framework. The findings of this study could help tailor effective interventions and strategies to improve medication adherence in patients with hypertension in the Maldives.

Objectives

1. To explore the rate of antihypertensive medication adherence in patients with essential hypertension in Malé, Maldives.

2. To determine the predictive power of complexity of regimen, health literacy, patient-doctor relationship, family support and duration of antihypertensive drug use on antihypertensive medication adherence in patients with essential hypertension in Malé, Maldives.

Methodology

This study was a correlational predictive study.

Population and Sample

The participants of this study were patients with essential hypertension who received treatment from two hospitals in the Maldives. A sample size 172 subjects was calculated using the G*power software version 3.1.9.2.[10] Odds Ratio 2.39 obtained from the previous study[11] in which family support predicted medication adherence was applied to calculate the sample size of this study. Other parameters included $\alpha = .05$, power $= .80$, probability $(Y = 1; X = 1)$ $H1 = .614$ and Probability $(Y = 1; X = 1)$ $H0 = .386$.

With convenience sampling, patients aged 18 and above, with a confirmed diagnosis of essential hypertension who visited the outpatient department of Indira Gandhi Memorial Hospital and Senahiya Military Hospital and met the following inclusion criteria: Taking at least one antihypertensive medication for at least six months, self-administering medication, and being able to communicate and understand Maldivian language, were selected. Patients were excluded if they were diagnosed with secondary or gestational hypertension, severe comorbidities (such as metastatic cancer and end stage renal disease), mental illness (such as major depressive disorder, schizophrenia and bipolar disorder), and cognitive impaired found in those age 60 years and above (screened by the General Practitioner Assessment of Cognition (GPCOG) questionnaire[12] and scored less than 9).

Research Instruments

The following six questionnaires were used to collect data in this study:

1. A structured questionnaire consisting of 18 items, developed by the researchers, was used to collect the sociodemographic and clinical data of the respondents.

2. The Hill-Bone Medication Adherence Subscale (HBMA-K) developed by Song, et al.[13] was used to measure medication adherence. It consists of 8-items which measure the medication taking behavior of the patient on a 4-point Likert scale ranging from 1 (all of the time) to 4 (none of the time), with a total score ranging between 8 and 32. Higher score indicates higher adherence. With a cutoff point of 80 percent, patients who scored 26 or more are considered adherent.

3. Medication Regimen Complexity Index (MRCI) developed by George, et al.[14] was used to measure the complexity of regimen. The three-section questionnaire consists of a total 65-items. Section 1 (32 items) assess the information related to the dosage forms of the prescribed medications. Section 2 (23 items) assesses the dosage frequency of the prescribed medications and section 3 (10 items) focuses on the additional directives (e.g., take before food, specific time of the day) the patient was given for medication administration. As there is no limit to the number of drugs a patient can be prescribed, the MRCI is used as an open index. Thus, a higher score indicates higher complexity of regimen.

4. The European Health Literacy Survey Questionnaire - short version (HLS-EU-Q16) developed by Sørensen, et al.[15] was used to measure health literacy. It consists of 16-items in three subdomains, health care, disease prevention and health promotion. The questionnaire is scored on a 5-point Likert scale ranging from 0 (don't know) to 4 (very easy). Using the formula [Index = (average-1)*(50/3)], the standardized index score was calculated for each patient. The index score ranges from 0 to 50, with higher scores indicating higher level of health literacy. The scores are divided into 4 levels: inadequate, problematic, sufficient and excellent level of health literacy.

5. The Patient-Doctor Relationship Questionnaire (PDRQ-9) developed by Van der Feltz-Cornelis, et al.[16] was used to measure the relationship between patient and doctor. The questionnaire consisted of 9-items

measured on a 5-point Likert scale from 1 (not at all appropriate) to 5 (totally appropriate), with a total score ranging from 9 to 45. Higher score means a better patient-doctor relationship. The scores are divided into 3 levels: 9 to 20 as poor, 21 to 32 as moderate and 33 to 45 as high level of patient-doctor relationship.

6. The Modified Family Support and Conflict Scale for patients with hypertension used to measure family support in this study was derived from Turkish version of the Diabetes Family Support and Conflict (DFSC) scale[17] which was derived from the original DFCS scale by Paddison[18] to measure family support in patients with type 2 diabetes. The scale consists of two dimensions, support and conflict. For the administration in the current study, wording was changed to relate to the study population. The 10-items are scored on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), with higher score indicating higher family support.

All six questionnaires used for data collection in the study were translated into the Maldivian language using the forward-backward translation process, after receiving permission from the questionnaire developers. Questionnaires were face validated and reliability of the instruments was tested with a pilot study of 30 patients whose characteristics were similar to the study sample. The Cronbach's alphas of HBMA-K, HLS-EU-Q16, PDRQ-9 and Modified Family Support and Conflict Scale for patients with hypertension were .71, .84, .89 and .78 respectively. The intra-class coefficient for the MRCI was .99.

Ethical Consideration

Ethical approval for the research study was obtained from the Institutional Review Board of Faculty of Nursing, (COA No.IRB-NS2018/463.0911) Mahidol University, Health Research Council of the Maldives and Health Research Academy of Indira Gandhi Memorial Hospital. Permission for data collection was obtained from both study settings. Prior to data collection, all respondents were provided with the patient information sheet and written consent was obtained.

Data Collection

Data collection took place from March to June 2019 after getting ethical clearance and permission from all concerned sectors. The research study was introduced and the objectives were explained to the physicians and nurses at the research settings, who then helped the researcher by announcing the research project to participants. Participants who agreed to participate were given the research information, and written consent was taken. Furthermore, participants were informed of their right to refuse to participate in the study at any time which had no effect on treatment received. Data were collected by using self-administered questionnaires and information from patient records. The participants took 30-40 minutes to complete the questionnaires. A total of 236 patients were approached of which 48 patients refused to participate; nine patients above 60 years were excluded as GPCOG score was < 9; and 7 questionnaires were omitted due to unfilled data less than 80 percent. Finally, 172 patients were included.

Data Analysis

Statistical analysis was done using the Statistical Package for Social Science (SPSS) version 18. Data obtained through the questionnaires were coded for data entry and alpha level .05 was set for significance level. Continuous variables were analyzed using mean, standard deviation, and range. Categorical demographic data and clinical information was analyzed using descriptive statistics including frequency and percentage. Mann Whitney U test and Chi-square test were done for univariate analysis. The predictive power of the independent variables on medication adherence was analyzed using binary logistic regression.

Findings

Sociodemographic characteristics

Among the 172 respondents, 61% were female and respondents' mean age was 55.21 (SD = 10.66). The majority of respondents (79.7%) were married, 55.8% were employed and 39% earned a monthly family income between Maldivian Rufiyaa (MVR) 15,001-30,000 (MVR 1 = USD 0.065). Half of the respondents (51.7%) perceived their family income as enough. One hundred and two respondents (59.3%) paid for their healthcare expenditure through the government health insurance scheme and some expenses on their own, whereas only 7 (4.1%) of the respondents paid on their own for all health care expenses.

Clinical characteristics

Nearly half of the respondents (48.8%) had controlled blood pressure at the time of data collection.

Of the total sample, 43% of respondents were diagnosed within the past 1 to 5 years and 44.2% took their first antihypertensive medication within the past 1 to 5 years. Furthermore 59.3% of respondents had comorbidities, from which 29.4% of the patients had both dyslipidemia and diabetes mellitus. Angiotensin Receptor Blockers was the most prescribed medication (69.8%) followed by calcium channel blockers (5.8%).

Medication adherence

The mean score of HBMA subscale for the respondents was 27.41 (SD = 3.93). While 54.7% of respondents were adherent to their prescribed antihypertensive medications, 45.4% of them were not (see Table 1).

Table 1: Medication Adherence of the Respondents (N = 172)

Characteristics	$\overline{X}$ (SD)	Range	n	%
Medication adherence	27.41 (3.93)	19-32	172	100
Non-adherent (<26)			78	45.4
Adherent (≥26)			94	54.7

Association between the study variables and medication adherence

Mann Whitney U test was used to compare the mean score of complexity of regimen, family support and duration of antihypertensive drug use between adherent and non-adherent groups. Chi-square test was applied for health literacy and patient-doctor relationship.

The results from the univariate analysis showed that complexity of regimen (p = .005), health literacy (p = .001) and patient-doctor relationship (p = .001) were significantly associated with medication adherence (see Table 2). However, the mean score of family support (p = .146) and duration of antihypertensive drug use (p = .333) were not significant different between the adherent and non-adherent respondents.

Predicting factors of medication adherence

Results of the binary logistic regression analysis of the study variables showed that this model accounts for 36% of the variance in medication adherence (R^2 = .36) High complexity of medical regimen had a chance of non adherence more than low complexity 9% (OR = .91, 95%CI = .85, .97, p = .01). Sufficient and excellent level of health literacy, and high level of patient-doctor relationship were significant predictors of medication adherence (OR = 4.83, 95%CI [1.59, 14.62], p = .01; OR = 3.43, 95%CI [1.02, 11.56], p = .05; and OR = 10.25, 95%CI [3.05, 36.19], p = .01 respectively).

Family support and duration of antihypertensive drug use had no significant power to predict medication adherence in Maldivian patients with essential hypertension (Table 3).

Table 2: Mann Whitney U Test and Chi-Square Test for Independent Variables (N = 172)

Variables	Adherent n = 94	Non-adherent n = 78	χ^2 / Z	p-value
Complexity of regimen, $\overline{X}$ (SD)	8.32 (5.57)	10.42 (6.12)	-2.78	.005[1]
Health literacy, n (%)			16.67	.001[2]
Inadequate	7 (7.4)	17 (21.8)		
Problematic	10 (10.6)	19 (24.4)		
Sufficient	54 (57.5)	26 (33.3)		
Excellent	23 (24.5)	16 (20.5)		
Patients-doctor relationship, n (%)			30.11	.001[2]
Poor	4 (4.3)	18 (23.1)		
Moderate	11 (11.7)	25 (32.1)		
High	79 (84)	35 (44.9)		
Family support, $\overline{X}$ (SD)	41.95 (6.1)	40.85 (5.9)	-1.45	.146[1]
Duration of antihypertensive drug use, $\overline{X}$ (SD)	6.70 (6.6)	7.19 (6)	- .97	.333[1]

[1] Mann Whitney U test, [2] chi-square test

Table 3: Factors predicting antihypertensive medication adherence (N = 172)

Variables	B	SE	Wald	df	p-value	OR	95%CI lower	95%CI upper
Complexity of regimen	- .10	.03	7.93	1	.01	.91	.85	.97
Health literacy								
Inadequate (Ref.)								
Problematic	.08	.66	.01	1	.91	1.08	.29	3.90
Sufficient	1.58	.57	7.79	1	.01	4.83	1.59	14.62
Excellent	1.23	.62	3.96	1	.05	3.43	1.02	11.56
Patient-Doctor Relationship								
Poor (Ref.)								
Moderate	.33	.72	.21	1	.65	1.39	.34	5.65
High	2.35	.63	13.92	1	.01	10.52	3.05	36.19
Family support	- .01	.03	.01	1	.91	.99	.93	1.06
Duration of antihypertensive drug use	.03	.03	1.18	1	.28	1.03	.97	1.09

Ref. = Reference group, OR = Odd Ratio, 95%CI = 95% Confidence Interval, Predictive correct = 74.4%, Hosmer & Lemeshow test = 4.08 (df = 8, p = .85), Cox & Snell R^2 = .27, Nagelkerke R^2 = .36

Discussion

According to this study findings, 54.7% of the respondents were adherent to their antihypertensive medication. This result is in line with the 50%-70% antihypertensive adherence prevalence estimated by WHO.[5] The current study's finding supports the systematic review and meta-analysis by Abegaz, et al.[19] and the study by Li, et al.[20] which reported an overall adherence prevalence of 54.8% and 53.4% respectively.

Conferring to the results of the HBMA-K questionnaire, forgetting to take the prescribed antihypertensive medication (mean score = 3.16, SD = 0.80) was noted as the main reason for non-adherence among the respondents in this study. This supports findings by Buford[21] who concur that the presence of hypertension and an increase in age jointly contribute to easily forgetting to take medication. Furthermore, previous studies have reported hypertension or uncontrolled blood pressure as being linked to bringing changes to brain and cognitive health of individuals.[22] This may be one reason that several studies, together with this study, found forgetfulness as one of the causes for non-adherence. Another reason for forgetting medication can be that respondents failed to remember to take their medication when engaging in domestic responsibilities or preoccupied at work.

The second leading reason for non-adherence noted was that the respondents of this study were found to skip antihypertensive medication when they feel better. Ma[4] has stated that lack of symptoms is one factor which may lead patients to neglect their prescribed medications. Thus, it can explain why patients in this study tend to miss taking medications for blood pressure when they feel better.

Patient-doctor relationship was the strongest predictor of medication adherence in this study. Seventy nine respondents in this study with a high patient-doctor relationship were found to adhere to their medication (Table 2). The result is consistent with previous study[6] which reported high patient-doctor relationship increased adherence to antihypertensive medication. In essential hypertension, patients may be unaware of the disease condition as they may be asymptomatic. Thus, for these patients, doctors can play an important role in explaining the effect of unhealthy lifestyle and irregular use of antihypertensive drugs, emphasizing on the importance of medication adherence in controlling blood pressure and prevention of complications. Hence, if the patient has a good, trusting relationship with their doctor, they are more likely to follow the advice given by the doctor. Furthermore, when doctors discuss information with patients in a way they understand, apart from building a good trusting relationship, it helps improve patients' medication adherence.

Conversing to the scores of the PDRQ questionnaire, the highest scoring items were "I feel content with my doctor's treatment" with mean score 4.06 (SD = 1.22), followed by item "I trust my doctor" with mean score 4.01 (SD = 1.05), indicating that participants was satisfied

with their doctor's treatment and they trusted their treating doctor. In the current study, the majority of the respondents consulted Maldivian doctors, thereby removing any language barrier, minimizing misinterpretations of doctor's advice by the patient, thus enabling the development of a positive patient-doctor relationship. The importance of this relationship is consistent with previous studies which reported patient satisfaction[23] and a trusting relationship between doctor-patient[24] as a significant contributing factor to medication adherence.

Another factor which significantly predicted medication adherence in patients with essential hypertension was level of health literacy. In this study, sufficient and excellent health literacy were significant predictors of medication adherence (p = .01 and p = .05). However, the statistical significance of excellent health literacy was very marginal (Table 3). Previous research has also reported health literacy as having a significant and direct effect on medication adherence.[25] However, the integrative review by Du, et al.[8] reported inconsistent evidence on the relationship between health literacy level and medication adherence.

According to the scores of HLS-EU-Q16 in the current study, the respondents believed that they are given enough information about their prescribed medications by their physician, nurse and pharmacist. In the Maldives, patients are explained about the prescribed medications at the time of consultation. In addition, verbal and written instructions are given by the pharmacists when medications are dispensed.

Further, in the Maldivian community, extended-families live under the same roof, so the care of elderly is undertaken by the younger generation. As such, family members play an important role in the life of the patient in relation to; educating patients about their disease condition, assessing and monitoring patient's health care. Thus, both health care providers and family members can help improve patients' health literacy which in turn can impact medication adherence.

Complexity of regimen had a significant association with medication adherence in this study. Increasing complexity of regimen, usually from antihypertensive and comorbid medication, was found to decrease the odds of medication adherence in the study respondents. This result conforms to results from a previous study.[5] However, contradicting results have been reported in some previous studies which found no relationship between complexity of regimen and medication adherence.[2,6] The researchers of the current study found (1) dissimilar definitions of complexity of regimen and (2) instruments used to measure complexity of regimen differed between this study and previous studies. In some studies, the complexity of regimen was defined and measured either based on the number of medicines the patients were prescribed[27] or the dosing frequency of the prescribed medicines.[4]

In contrast to previous studies, in this study, family support could not predict medication adherence. Also, there was no significant difference between family support received by the adherent and non-adherent groups (p > .05) (Table 2). This might be because

non-adherence among the study participants was merely related to the individual's own decision, rather than the support they got from the family members. Further, 55.8% of the participants were employed, indicating they were capable of taking care of themselves independently. According to the Modified Family Support and Conflict Scale for patients with hypertension, the highest mean score was for the item "I think my family understands why exercising is important for individuals with hypertension" ($\overline{X}$ = 4.54, SD = 0.75). A higher score here can be indicative of the way the family supports hypertensive patients, other than direct adherence to medication. Similar argument is made in the study by Shen, et al.[28] which reported family members-based supervision to increase physical activities in patients with hypertension. In the Maldives, regular exposure of the general population to health information via different media has risen the awareness on importance of regular exercise.[2]

In this study, duration of antihypertensive drug use could not predict medication adherence. This result contradicts the study findings of Pan, et al.,[7] Mekonnen, et al.[6] and Pan, et al.[9] which reported duration of treatment to have a significant and direct effect on medication adherence. According to these researchers, patients' attitude and behavior towards medication taking change slowly over time as patients become more educated and well-informed about the disease and importance of taking the medications, thus improving their medication adherence.[6,9] However,

in the current study, medication taking behavior of respondents could have been affected by forgetfulness and carelessness, regardless of their duration of antihypertensive drug use. Moreover, 51.8% of the respondents reported a duration of treatment less than 5 years. Thus, the shorter duration of antihypertensive drug use could not have made a difference in the adherence behavior of the patients. Additionally, doctors usually emphasize on the importance of regular intake of medication even if the patient has controlled blood pressure or is asymptomatic, regardless of the duration of treatment.

Conclusion and Recommendations

The findings of this study have provided fundamental knowledge of antihypertensive medication adherence in patients with essential hypertension in the Maldives. Healthcare team members need to assess the health literacy level of the patients and focus on establishing a trusting relationship with the patient. In patients who have complex medication regimens, health care professionals need to assess challenges faced by patients to adhere to prescribed medications. Subsequently help by simplifying the medication regimen whenever possible. Hospitals and clinical settings could implement nurse-based interventions, such as counselling and short educational sessions on patients' medication adherence, for patient and patient family.

This study explained only 36.1% variance of medication adherence in patients with essential hypertension. Therefore, future studies can include

other factors from the WHO Multidimensional Adherence Model, which may better explain the variance in medication adherence, such as presence of comorbidity, severity of symptoms and knowledge of hypertension. Future research can start with a qualitative study to explore the causes of medication non-adherence and uncontrolled blood pressure in patients with essential hypertension.

Limitations

The findings of this study cannot be generalized beyond the study sample, thus further research, including other settings, is needed to generalize the findings to all Maldivian patients with essential hypertension.

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