

Assessment of Hypertension Management Pattern and Factors Associated with Poor Treatment Outcomes among Hypertensive Patients at Asendabo and Omonada Training Health Centers, South west Ethiopia

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Abstract: Hypertension is an overwhelming global challenge which is a significant risk factor for cardiovascular morbidity and mortality resulting from target-organ damage to blood vessels in the heart, brain, kidney and eyes. Non-adherence with long-term medication and lifestyle modifications for conditions such as hypertension, dyslipidemia and diabetes are common problems that lead to compromised health benefits and serious economic consequences in terms of wasted time, money and uncured disease. This study aimed to assess hypertension management pattern and factors associated with poor treatment outcomes at Asendabo and Omo-Nada training health centers. A cross-sectional study was conducted and a convenience sampling technique was used to select 140 study subjects. A structured standard interview questionnaire and 8-item morisky medication adherence scale was used after some modifications. Verbal informed consent was obtained from study participants and confidentiality was maintained. Analysis was done using tally sheet, pen and pencil. Results displayed that only 43.6% of the study subjects were found to be adherent to their treatment. The major reasons for non-adherence among the study participants were found to be forgetfulness (56.4%), being busy and (40.0%) and un-affordability (33.6%) of the medications costs. Majority (73.6%) of the study participants have inadequate knowledge about hypertension and its treatment. Factors such as residence ($p = 0.000$), distance from health centers ($p = 0.000$), educational level ($p = 0.017$), income level ($p = 0.016$), occupation ($p = 0.002$), duration of treatment ($p = 0.007$), adherence level ($p = 0.000$) and Knowledge about HTN and its treatment ($p = 0.000$) were significantly associated with treatments outcome of HTN. The rates of adherence to medication and life-style changes were generally found to be low in these study participants. The major reasons for non-adherence among the study participants were found to be forgetfulness, being busy and forgot to take pills and un-affordability of the medications costs. Majority of the study participants have inadequate knowledge about hypertension and its treatment.

Key words: Hypertension • Adherence • Treatment Outcome • Omo-Nada • Asendabo

INTRODUCTION

Hypertension (HTN) or HBP (systolic blood pressure 140 mmHg and diastolic blood pressure 90 mmHg) is an overwhelming global challenge [1, 2]. It is one of the most significant risk factors for cardiovascular (CV) morbidity and mortality resulting from target-organ damage to blood vessels in the heart, brain, kidney and

eyes [3, 4]. Hypertension causes 7.1 million premature deaths each year worldwide and accounts for 13% of all deaths, globally [5]. Analysis of the global burden of hypertension revealed that over 25% of the world's adult population had hypertension in 2000 and the proportion is expected to increase to 29% by 2025 [1, 2]. Even though the burden of hypertension is currently centered in economically developed countries (37.3%), developing

countries will feel a greater impact due to their larger population proportion, a change in life style and sedentary life. Indeed, estimates indicate that up to three-quarters of the world's hypertensive population will be in economically developing countries by the year 2025 [5, 6].

In Africa, 15% of the population has hypertension [1, 2]. Although there is shortage of extensive data, 6% of the Ethiopian population has been estimated to have HTN. Approximately 30% of adults in Addis Ababa have hypertension above 140/90 mmHg or reported use of anti-hypertensive medication [2]. Medications to treat hypertension and other chronic conditions work and are widely available. However, the broad benefits of these drugs are not being realized because large proportion of patients are not taking these medicines the way they are prescribed and this indirectly raises the issue of therapeutic adherence among hypertensive persons [7].

The World Health Organization (WHO) defines adherence to long-term therapy as "the extent to which a person's behavior taking medication, following a diet and/or executing lifestyle changes corresponds with agreed recommendations from a health care provider" [8]. Other similar terms have been used instead of, adherence and the meaning is more or less identical [9]. Often, the terms adherence and compliance are used interchangeably. However, their connotations are somewhat different: adherence presumes the patient's agreement with the recommendations, whereas compliance implies patient passivity [8]. Recently, the term "Concordance" is also suggested to be used. Compared with "adherence", the term concordance makes the patient the decision-maker in the process and denotes patients-prescribers agreement and harmony. Although there are slight and subtle differences between these terms, in clinical practice, these terms are used interchangeably [9]. Measurement of medication adherence is challenging because adherence is an individual patient behavior. The following are some of the approaches that have been used: (1) Subjective measurements obtained by asking patients, family members, caregivers and physicians about the patient's medication use; (2) Objective measurements obtained by counting pills, examining pharmacy refill records, or using electronic medication event monitoring systems; and (3) Biochemical measurements obtained by adding a nontoxic marker to the medication and detecting its presence in blood or urine or measurement of serum drug levels [10, 11].

Therapeutic non-adherence occurs when an individual's health-seeking or maintenance behavior lacks congruence with the recommendations as prescribed by a healthcare provider [9]. Many factors affect patient's adherence with medication regimes. Pharmacists need to be knowledgeable about the risk factors for non-adherence in order to help identify these issues and assist their patients [11]. Many studies have been conducted to determine explanatory factors for "good" or "poor" adherence in order to explain predict and monitor patients' behaviors [12]. No single factor has been found to reliably predict patient non-adherence [11]. Factors determining the level of antihypertensive drug adherence have been identified as follows: (1) Factors linked to treatment: The complexity of the treatment and the drugs' side effects. (2) Factors linked to the doctor-patient interaction: The balance between established medical guidelines and their own convictions, Communication between patient and doctor, patient's satisfaction with the healthcare system. (3) Factors linked to the patient: Socio-economic factors, the cost of treatment, lack of medical insurance [11, 13, 14].

A healthy lifestyle remains the cornerstone of the management of hypertension at all levels of the disease. A healthy lifestyle decreases blood pressure, enhances antihypertensive drug efficacy and decreases total cardiovascular risk. The South African Hypertension Guidelines 2009 recommend lifestyle changes in all hypertensive patients. It is possible to prevent the development of hypertension and to lower blood pressure levels by simply adopting a healthy lifestyle [15]. The frustrations of advocating lifestyle changes are obvious to healthcare providers in clinical practice. Lifestyle modification, previously termed non-pharmacologic therapy, plays an important role in hypertensive as well as non-hypertensive individuals [16]. In hypertensive individuals, lifestyle modifications can serve as initial treatment before the start of drug therapy and as an adjunct to medication in persons already on drug therapy. In hypertensive individuals with medication-controlled BP, these therapies can facilitate drug step-down and drug withdrawal in highly motivated individuals who achieve and sustain lifestyle changes. In non-hypertensive, lifestyle modifications have the potential to prevent hypertension and more broadly to reduce BP and thereby lower the risk of BP related clinical complications in whole populations. Indeed, even an apparently small reduction in BP, if applied to an entire population, could have an enormous beneficial effect on

cardiovascular events. For instance, a 3-mmHg reduction in systolic BP should lead to an 8% reduction in stroke mortality and a 5% reduction in mortality from coronary heart disease [16].

Statement of the Problem: Non adherence to treatment medication and lifestyle modification, especially in chronic diseases, is a complicated issue affecting patients' health, health expenditure and resources' utilization while adherence to antihypertensive treatment (AHT) has been associated with improved blood pressure (BP), decreased hospitalizations rates and lower medical care costs [12, 15, 17]. It has also long-term survival advantages after acute myocardial infarction (AMI) appear to be class specific and correlated positively in a dose-response-type fashion [12].

Despite the availability of effective treatments, studies have shown that in many countries less than 25% of patients treated for hypertension achieve optimum blood pressure ($BP \leq 140/90$ mmHg [9]. Survey conducted 2003-2004 showed only 37% of hypertensive patients have their blood pressure controlled [1]. Uncontrolled high blood pressure indirectly raises the issue of therapeutic adherence among hypertensive persons [10]. WHO describes poor adherence as the most important cause of uncontrolled blood pressure and estimates that 50–70% of people do not take their antihypertensive medication as prescribed [6]. Non adherence rates for patients with hypertension are reported to be 50% after 1 year and 85% after 5 years [11]. Within the first year of treatment 16-50% of hypertensive patients discontinue their anti-hypertensive medications. Even among those who remain on therapy long term, missed medication doses are common [14].

The problem of non-adherence to medical treatment remains a challenge for the medical professions and social scientists [1]. Non adherence to treatment medication, especially in chronic diseases, is a complicated issue affecting patients' health, health expenditure and resources' utilization. This problem can constitute many forms, including not having a prescription filled, taking an incorrect dose, taking medications at incorrect times, forgetting to take doses, or stopping therapy before the recommended time [16]. As a result, substantial numbers of patients do not get the maximum benefit of medical treatment, resulting in poor health outcomes, lower quality of life and increased health care costs [1, 7].

Globally, "poor adherence has been estimated to cost approximately \$177 billion annually in total direct and indirect health care costs" [7]. It has been estimated that

non adherence to prescribed medications causes nearly 125, 000 deaths annually [16]. 10% of hospital and 23% of nursing-home admissions are due to medication non adherence [16]. One-third of all Prescriptions are never filled and over half of prescriptions that are filled are associated with incorrect administration. Non-adherence contributes to direct annual costs of \$100 billion to the U.S. health care system. Indirect costs exceed \$1.5 billion annually in lost patient earnings and \$50 billion in lost productivity [18].

Motivating patients to implement lifestyle changes is probably one of the most difficult aspects of managing hypertension. According to a review of literature in South Africa [19], there appear to be no studies that have comprehensively assessed patient hypertension knowledge and perceptions on the importance of lifestyle modification in controlling hypertension. In South Africa good lifestyle changes are further complicated by varying socio-economic conditions, education levels and poor health care deliver. It appears that there is a lack of knowledge about hypertension that leads to further serious complications. In general, non-adherence with long-term medications and lifestyle modifications for conditions such as hypertension, dyslipidemia and diabetes is a common problem that leads to compromised health benefits and serious economic consequences in terms of wasted time, money and uncured disease [20]. Therefore, the objectives of this study were to assess hypertension management pattern and factors associated with poor treatment outcomes and to assess the level of adherence to antihypertensive medication and lifestyle modification and to assess the knowledge of hypertensive patients toward controlling blood pressure in Asendabo and Omo-Nada Training health centers, South West Ethiopia.

MATERIALS AND METHODS

Study Area: This study was conducted in two health centers that are Asendabo and Omo Nada Training Health Centers. Health centers were selected based on simple random sampling method. These health centers are found in Omo Nada Woreda. Omo-Nada woreda (district) is located approximately 285 km South-west of the capital, Addis Ababa in Oromia Regional State, Ethiopia. It is located in the Eastern part of the Jimma Zone and the mean annual temperature ranges between 25°C and 33°C. Based on the 2007 census conducted by the central statistical of Ethiopia (CSA), the estimated population of OmoNada Woreda is 254 417, of whom 127 625 are male

and 126 792 are women; 12 958 or 5.09% of its population are urban dwellers. Language spoken include the Oromo (91.2%), the Yem (3.07%), the Amhara (1.65%), the Hadiya (1.32%) and the Kullo (1.1%); all other ethnic groups made up 1.66% of the population. The majority of the inhabitants were Muslim (95.64%) [21]. The area was selected because there was lack of studies done in recent years about the topic.

Study Design: The study was conducted using health institutional based cross-sectional study.

Study Population and Sources: All hypertensive patients who attended Asendabo and Omo-Nada training health centers during the study periods were included in this study. All adult hypertensive patients attending the facility on out-patient basis during the study period who fulfill the inclusion criteria and volunteered to take part in the study will be used for the study.

Selection and Excluding Criteria: Hypertensive patients who are on medications for at least six months, age greater than 18 years old, diabetic hypertensive patients were a part of the study proved that they are on anti-hypertensive medication and patients who were clinically and mentally stable were the inclusion criteria's. Whereas pregnancy induced hypertension patients, hypertensive urgency or emergency, patients with mental illnesses leading to confusion were excluded from participating in the study, e.g. delirium, dementia, psychosis, schizophrenia, etc. and not volunteer to respond the questionnaire were the exclusion criteria.

Sample Size and Sampling Technique: Patients found during the study period at the study area who fulfill the criteria were included in the study. The study was conducted using a convenience sample.

Data Collection Instrument: The data were collected using a questionnaire consisting of the 8- item morisky medication adherence scale self-reported medication adherence questions relating to medication use and major reasons for non-adherence. Accessory materials like pen, pencil, calculator, binder, eraser and sharpener was used.

Data Collection Technique: The data were collected by using interview technique using 8- item morisky medication adherence scale and other types of questionnaire. The questionnaire was prepared in English

and then translated to Amharic and Afan Oromo as necessary, as the study subjects mostly speak this language. The questionnaire was then translated back to English to check for consistency.

Quality Assurance: To assure the quality of the data the following measure was taken. Properly designed and pretested data collection checklist/format was used. Every day the collected data was reviewed and checked for completeness and consistency of response.

Data Processing and Analysis: All data collected were analyzed manually and presented in the form of frequency table, graphs & charts. A cut-off point was set at 4 and the respondents were categorized in to adherent and non-adherent groups, based on the total score of Morisky Medication Adherence Scale (MMAS). The respondents with a score of below 4 were considered as adherent and a score of above 4 were considered as non-adherent. This value was set from questionnaire characters because some of the questions contained similar concept.

Ethical Consideration: First an official permission and formal letter was received from Jimma University, college of public health and medical science, department of pharmacy and sent to Asendabo and Omo Nada health Center. Next, the reason why the data were collected from the patient was explained to them. After the patient understood, data collection proceeded accordingly by keeping privacy and confidentiality.

RESULTS

Socio-Demographic Characteristics of the Study

Subjects: A total of 140 hypertensive patients were interviewed out of 152 cases. Twelve of the respondents were excluded by the exclusion criteria that is patients with newly diagnosed for hypertension and medication initiation was less than six months. And also patients who were on lifestyle modification were not considered for the study. So that the response rate was 92.1%. From the whole respondents there is no age group below 30 years old and there were 41% male and 59% female cases. The mean age of the respondents was 53.29 years and standard deviation of 12.25years. About 127 (91%) respondents were Oromo by ethnicity. More than three fourth of the respondents 124 (88.5%) were Muslim by religion and 109 (77.9%) were married. Majority (72.9%) of the study participants were rural resident and (70.7%) travelled >5 Km to the health institution. More than half

Table 1: Socio-demographic characteristics of the study participants at Asendabo and Omo-Nada Training health centers, South West Ethiopia

Variables		Frequency	Percentage
Age (years)	30-34	5	3.60
	35-35	4	2.85
	40-44	13	9.28
	45-49	22	15.70
	50-54	26	18.50
	55-59	37	26.40
	60-64	11	7.80
	> 65	22	15.70
Sex	Male	59	41
	Female	83	59
BMI	< 18.5	2	1.4
	18.5 – 24.9	58	41.1
	25 - 30	73	52.2
	> 30	7	5
Residence	Urban	38	27.1
	Rural	102	72.9
Distance from the Health Centers	< 5 Km	41	29.3
	> 5 Km	99	70.7
Ethnicity	Oromo	127	91
	Amhara	5	3.5
	Yem	6	4.2
	Others	2	1.3
Marital status	Married	109	77.9
	Widowed	22	15.7
	Single	5	3.6
	Divorced	4	2.8
Education status	Illiterate	74	52.9
	Primary (1-8)	31	22.1
	Secondary (9-12)	23	16.4
	College and University	12	8.6
Income level	< 500 ETB	87	62.1
	500-1000 ETB	24	17.1
	1001-2000 ETB	16	11.4
	> 2000 ETB	13	9.4
Occupation	Farmer	68	48.6
	Employed	22	15.7
	Student	6	4.3
	Business Man or Woman	14	10
	Daily labor	7	5
	Others	23	16.4
Religion	Muslim	124	88.5
	Orthodox	8	5.7
	Protestant	5	3.5
	Others	3	2.1
Duration of Treatments	< 6 Months	24	17.1
	6 Months – 1 year	32	22.9
	1 year – 5 years	79	56.4
	> 5 years	5	3.6
Co-morbid Conditions	None	107	76.4
	One	30	21.5
	Two and Above	3	2.1

(52.9%) of the study participants were illiterate. Most of the participants (62.1%) have earned a monthly income of <500 Ethiopian birr (ETB), 24 (17.1 %) has Earn 500-1000 ETB. Out of the respondents 68 (48.6%) were farmers and 23 (16.4%) had given response of others being retired from governmental employment, un-employed and dependent on others due to aging. Among the study participants 79 (56.4%) were on their antihypertensive treatment for the past 1 to 5 years. More than three fourth (76.4%) of the respondents had no any of the co-morbidities like heart disease, diabetes mellitus, renal diseases and others (Table 1).

Medication Adherence Level of Respondents: Among the study participants 61 (43.6%) of the respondents had scored below the value expected to score in the study (scored a total MMAS less than 4) and hence they were adherent. 79 (56.4%) of the respondents had scored above the value expected to score in the study being non adherent to their antihypertensive medication (Table 2).

Reasons for Non-Adherence: The major reasons for non-adherence among the study participants were found to be forgetfulness (56.4%), being busy (40.0%) and un-affordability (33.6%) of the medications costs (Table 3).

Lifestyle Modification: All the factors were tabled and the respondents were given a score to determine their overall physical activity levels. The physical activity score was measured by assigning numbers to the different levels in section 3 of the questionnaire according to the participant's response, 1 for little or no activity and 5 for the most physically active. The numbers were then added for all the questions in the section to come up with the physical activity score. The results showed that 72.8% engaged in little or no activity at all, 22.2% engaged in occasional activity and only 5% took part in regular physical activity (Fig. 1).

From the table below, 55% of respondents did not eat cheese at all and 24.3% ate it rarely, 17.9% occasionally and 2.8% regularly. Respondents who ate eggs regularly were 15%, 30.7% occasionally and 45.7% rarely. With fish, a vast majority (77.9%) ate this rarely or not at all, with only 2.8% eating fish regularly. 72.2% used cooked salt regularly and 44.3% added salt regularly to their food. 87.9% used saturated fat on regular basis, 6.4% occasionally and only 5.7% used this rarely or not at all (Table 4).

Table 2: Medication Adherence Level of Respondents at Asendabo and Omo-Nada Training health centers, South West Ethiopia

Adherence Level	Frequency	Percentage
Adherent	61	43.6
Non-adherent	79	56.4
Total	140	100.0

Table 3: Reasons of non-adherence among the study participants at Asendabo and Omo-Nada Training health centers, South West Ethiopia.

Reasons for Non-adherence	Frequency	Percentage
Forgetfulness and carelessness	79	56.4
Being busy and forget it	56	40.0
Feeling well	38	27.1
Feeling sick, side effects	23	16.4
Can't afford the cost (drugs are expensive)	47	33.6
Drugs you are taking are too many?	19	13.6
Others	10	7.1

NB: Some patients had more than one reason for non-adherence

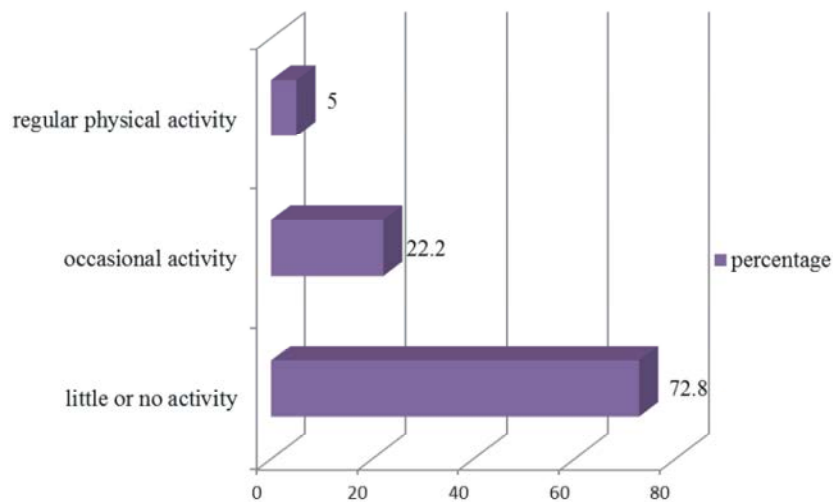


Fig. 1: Physical activity distribution of the study participants at Asendabo and Omo-Nada Training health centers, South West Ethiopia

Table 4: Nutrition information among the study participants at Asendabo and Omo-Nada Training health centers, South West Ethiopia

Nutrition	None No (%)	Rarely No (%)	Occasionally No (%)	Regularly No (%)
Cheese	77(55)	34(24.3)	25(17.9)	4(2.8)
Eggs	12(8.6)	64(45.7)	43(30.7)	21(15)
Cooked salt	9(6.4)	6(4.3)	24(17.1)	101(72.2)
Added salt	26(18.6)	15(10.7)	37(26.4)	62(44.3)
Fish	104(74.3)	5(3.6)	27(19.3)	4(2.8)
Fruits	19(13.6)	43(30.7)	69(49.3)	9(6.4)
Vegetables	31(22.1)	28(20.0)	74(52.9)	7(5.0)
Butters	12(8.6)	4(2.9)	95(68.9)	29(20.7)
Margarine	79(56.4)	19(13.7)	27(19.4)	16(11.5)
Saturated fat	5(3.6)	3(2.1)	9(6.4)	123(87.9)

Knowledge Levels: This study has shown that around three fourth (73.6%) of the study participants have inadequate knowledge about hypertension and its treatment (Fig. 2). A majority of respondents (68.6%) did not know what their ideal BP should be (Fig. 2).

Factors such as residence (p= 0.000), distance from health centers (p= 0.000), educational level (p= 0.017),

income level (p= 0.016), occupation (p= 0.002), duration of treatment (p= 0.007), adherence level (p= 0.000) and Knowledge about HTN and its treatment (p= 0.000) are significantly associated with treatments outcome of HTN. In contrast, age (p= 0.728), sex (p= 0.191) and co-morbid conditions are not significantly associated with treatments outcome of HTN (Table 5).

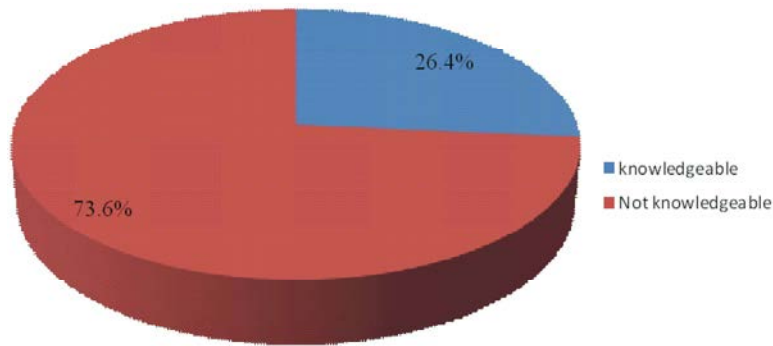


Fig. 2: Knowledge about hypertension by the study participants at Asendabo and Omo-Nada Training health centers, South West Ethiopia

Table 5: Effect of selected socio-demographic, clinical and other characteristics on treatments outcome among hypertensive patients at Asendabo and Omo-Nada Training health centers, South West Ethiopia

Variables		Treatment Outcome		X ²	P-value
		Good	Poor		
Age (years)	30-34	2	3	4.44	0.728
	35-39	1	3		
	40-44	4	9		
	45-49	3	19		
	50-54	8	18		
	55-59	11	26		
	60-64	5	6		
> 65	9	13			
Sex	Male	14	43	1.71	0.191
	Female	29	54		
Residence	Urban	26	12	34.8	0.000
	Rural	17	85		
Distance from Health Centers	< 5 Km	27	14	33.6	0.000
	> 5 Km	16	83		
Educational Level	Illiterate	19	55	10.2	0.017
	Primary (1-8)	6	25		
	Secondary (9-12)	11	12		
	College and University	7	5		
Income level	< 500 ETB	21	66	10.3	0.016
	500 -1000 ETB	6	18		
	1001-2000 ETB	9	7		
	> 2000 ETB	7	6		
Occupation	Farmer	17	70	18.5	0.002
	Employed	12	10		
	Student	4	2		
	Business man / woman	5	9		
	Daily labor	2	5		
	Others	3	20		
Duration of Treatment	< 6 month	14	10	12.2	0.007
	6 month -1 year	11	21		
	1-5 years	17	62		
	> 5 years	1	4		
Co-morbid Conditions	None	35	72	1.76	0.415
	One	8	22		
	Two and above	0	3		
Adherence Level	Adherent	37	24	45.5	0.000
	Non-adherent	6	73		
Knowledge Level	Knowledgeable	31	6	66.6	0.000
	Not Knowledgeable	12	91		

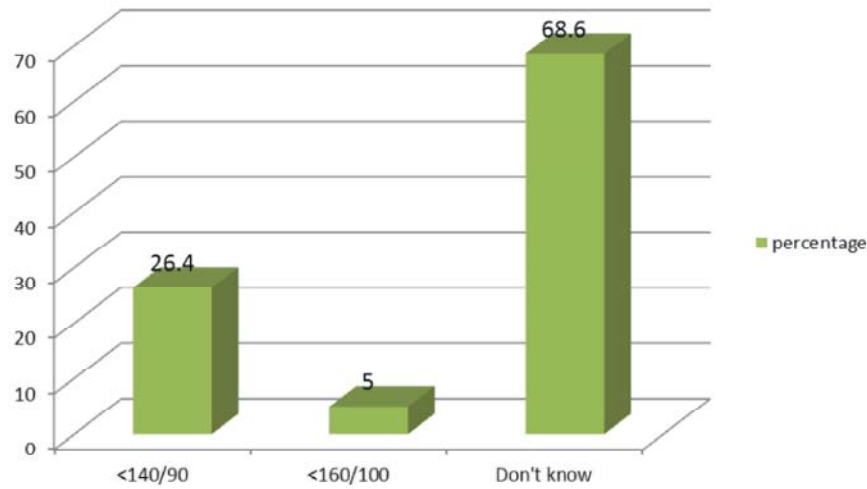


Fig. 3: Knowledge of ideal BP by the study participants at Asendabo and Omo-Nada Training health centers, South West Ethiopia

DISCUSSION

The mean age of the respondents was 53.29 years and standard deviation of 12.25 years. It is in line with what reported from Black Lion Hospital (BLH), Addis Ababa University and Gondar University Hospital (GUH), Gondar University, AKUH, Karachi, Pakistan and Family Health Units (USF) of Maceio, Brazil where the mean age of the respondents were 52 ± 13.03 , 56.9 ± 12.8 , 52.6 ± 11 and 57.18 ± 12.7 years [1, 2, 6, 21]. In contrary, this result revealed difference to the reports from the 9 VA facilities of U.S.A and LHU of Florence, Italy where the mean age of the respondents were 65 ± 11 and 60.2 ± 14.5 [17, 20].

Among the respondents, 59% were females whereas 41% were males. This result is similar with what reported from GUH, Gondar University and Black Lion Hospital (BLH), Addis Ababa University [1, 2]. In contrast it is dissimilar with what reported from, Aardex, Zug, Switzerland [4]. This could be because the study was conducted about dosing histories that have been electronically compiled by a medication event monitor system.

In this study, even though there was no significant association between sex ($p = 0.191$) and treatments outcome, poor treatments outcome was observed more commonly in males than in females. This finding is in line with a study done in GUH, Gondar University [1]. This can be explained by the fact that; as males would stay out door for most of their job activities, they might have forgotten taking medicines and even when they retrieved they could have no access to take the drugs. In addition, males commonly use alcohol and khat than

females which could also lead them not to take their medicines due to drug and these substances interactions

Majority of the study participants (72.9%) were rural resident and travelled > 5 Km to the health institution (70.7%). This result is dissimilar with what reported from GUH, Gondar University [1, 2]. The remaining 29.3 % travel short distance to get health care services. This could affect the treatments outcome of the patient in that travelling long distance would add cost to the patient especially where transportation facilities are inconvenient and the patient might miss their appointment. Longer distance was a big barrier for good treatment outcome especially when it was accompanied by poor infrastructure (e.g. lack of transportation) and poverty. Residence and distance from the health centers were found to be significantly and independently associated with treatment outcome of the respondents ($p = 0.000$). Those patients from rural and distant areas were less likely to have good treatments outcome as compared to study subjects who are closer. There was significant association between education status and treatment outcome ($p = 0.017$). Poor treatments outcome was found commonly in respondents of lower level of education (the illiterate and those had completed primary school). This could be due to lack of awareness about hypertension, its management and medications for this condition in this study area.

Income level was another variable found to be significantly and independently associated with the treatments outcome of the respondents ($p = 0.016$). Most of the study participants with poor treatments outcome had low and medium income. This might be the

result of the respondents' occupation where most of them were farmer, daily labor and others (retired from governmental employment or dependent on younger family relatives). This could cause poor adherence and leads to poor treatments outcome of the respondents. As reported in descriptive study conducted in Pakistan mean adherence showed an overall increase with increasing monthly income [6] which is similar to the current study.

Among the study participants 79(56.4%) were on their antihypertensive treatment for the past 1 to 5 years. The study had shown agreement with the previous reports from UMTH, Maiduguri, Nigeria [3] where most participants 36(45.0%) had been on treatment for 2-5 years. This study revealed that respondents who were on antihypertensive treatment for the past 1 to 5 years had significant associations with poor treatments outcome ($p = 0.007$). This might be because long use of drugs would burden the patient and lead to discontinue medication too. Beside once the patient BP had got stabilized they might felt to be in better condition. Along with this long term use of medicines might result in layman concept and the patient might tend to seek other herbal medicines than their AHT drugs.

Out of the respondents 107(76.4%) had no co-morbid condition and 30(21.4%) had one co-morbid condition. The rest had two or more co-morbid condition like diabetes mellitus, chronic kidney disease; rheumatic arthritis etc.-morbidity can worsen the conditions of the patient and make them unable to adhere to their antihypertensive medications and life-style changes. Patients with no and one co morbidities were more likely to have good treatment outcomes than those with two and above co-morbidities. Patients with more number of co morbidities could suffer from serious complications and complex treatment regimens which were favorable conditions not to adhere to their medications, diet and exercise recommendations and as a result could lead to poor treatments outcome.

Only 43.6% of the study subjects were found to be adherent to their treatment. This study have shown better adherence than what has been reported from Brazil (19.7%) and Kenya (31.8%) [22]. These studies differ in their methodology from this study in that they had considered BP measurements for the clients at their visits and categorized the clients' drug class while the current study did not.

The finding of medication adherence in the current study was significantly lower when compared with previous studies conducted in Nigeria 85.5%, Zambia

83%, Pakistan 80% and another part of Italy 74.3% [23-25]. This study have also shown less adherence than what has been reported from BLH, Addis Ababa University (69.2%) and GUH, Gondar University (64.6%), Malaysia (48.7%), USA (63%) and Ghana (68.8%) [1, 2, 11, 12, 26-28]. This might be due to better access and skilled health care professionals for the patients in these regions and countries. It could also be due to better knowledge toward hypertension and its management than the current study area.

The association between adherence level and treatments outcome is considered to be statistically significant ($p = 0.000$). Patients with better adherence level were more likely to have good treatments outcome. In contrast Patients with poor awareness were more likely to have poor treatment outcome.

The major reasons for non-adherence among the study participants were found to be forgetfulness (56.4%), being busy and (40.0%) and un-affordability (33.6%) of the medications costs. It has some similarities with what reported from USA the reasons for poor adherence to be forgetfulness, adverse effects and not liking to take medication [25]. It is in contrast to what has been reported from UMTH, Maiduguri, Nigeria where non adherence is mainly attributed to felt worse due to side effects of medications (60.0%), busy work schedule (22.2%), when felt better (22.2%) and when felt worse while taking medications (22.2%) [3]. This idea was thought to be true from what reported in Ho *et al.* [13] where non adherence to AHT medication was due to increased risk of morbidity and mortality.

In this study most (72.8%) of the respondents were leading sedentary lifestyles. Respondents with lower level of activity score had higher BMI's and uncontrolled hypertension and could lead to poor treatments outcome. The reasons used for not exercising varied from laziness, "not being used to it", pain during activity, no time to do physical activity and inability to do physical activity due to aging.

Ingestion of meals high in salt, saturated fat and low in vegetables, fruits and legumes is risk factor for uncontrolled BP. This study has shown that around three fourth (73.6%) of the study participants have inadequate knowledge about hypertension and its treatment. Right knowledge about HTN and its treatment creates a clear understanding and avoids confusion about the treatment and the disease condition. Knowledge about HTN and its treatment was found to be positively associated with treatments outcome ($p = 0.000$). Patients with better awareness were more likely to have

good treatments outcome. In contrast patients with inadequate knowledge about HTN and its treatment were found to be negatively associated with treatments outcome. Patients with poor awareness were more likely to be non-adhere to their treatment and had poor treatments outcome. This result is dissimilar with what reported from GUH, Gondar University [1].

Limitations of the Study: Although there were other nine governmental health centers available in Omo Nada Woreda, this study was limited to Asendabo and Omo-Nada Training health centers; South West Ethiopia, only due to financial problems. Therefore it could not be extended to other health centers in this woreda and other parts of the country. The other limitation in this study was lack of studies in the study area about the topic. In addition the study did not consider HTN patients who did not visit the health centers during the time of the study. Self-reporting was used as the only method of measuring treatments outcome. This method has the disadvantages of recall bias and eliciting only socially acceptable responses and hence, may lead to overestimation of some of the results, because they are self-reports by the patients which can be misleading.

CONCLUSIONS

The rates of adherence to medication and life-style changes were generally found to be low in these study participants. The major reasons for non-adherence among the study participants were found to be forgetfulness, being busy and forgot to take pills and un-affordability of the medications costs. Majority of the study participants have inadequate knowledge about hypertension and its treatment. Factors such as residence, distance from health centers, educational level, income level, occupation, duration of treatment, adherence level and Knowledge about HTN and its treatment are significantly associated with treatments outcome of HTN. Therefore, the following points are forwarded: Since this topic had not been investigated earlier, the following recommendation would be appropriate to following individuals, departments, organizations and institutions. For the sake of their wellbeing it is important for the clients to stick to their antihypertensive treatment and lifestyle changes. The clients should buy any of unavailable medicines at the health center pharmacy from private pharmacies as it is important for them. Practitioners should always look for poor adherence and poor treatment outcome and can

enhance adherence by emphasizing the value of a patient's regimen, making the regimen simple and customizing the regimen to the patient's lifestyle. Health care professionals should assist hypertensive patients develop systems that will remind them to take their medications. There should be total collaboration between all the health professionals in the institution to promote patient education and medication counseling. Pharmacists have the responsibility of counseling all hypertensive patients about their treatment and possible side effects of the drugs. Pharmacists should also advise the risk of not taking medications and they should counsel at each visit without being tired. They also should advise about non pharmacologic treatments of hypertension. The health center should make all medicines available for the patients timely as possible. The institution should assign competent and skilled health professional for all chronic care cases. Besides the health center should prepare place for pharmacists to counseling patients about their medications regimen and non-pharmacological regimens and their importance in daily activity. To direct their staff and next graduate students of this school to investigate this topic extensively in collaboration with the hospital staff.

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