

Dietary Adherence and Associated Factors among Hypertensive Patients in Bahir Dar City Administration, Ethiopia, 2020

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Abstract

Introduction: Hypertension is considered one of the most challenging public health problems worldwide. Adherence to the recommended diet has a key role to reduce uncontrolled hypertension and hypertension-related complications. A study on dietary adherence among hypertensive patients and associated factors are limited in Ethiopia. So, this study aimed to assess dietary adherence and associated factors among hypertensive patients in Bahir Dar city governmental hospitals, Bahir Dar, Ethiopia.

Method: A cross-sectional study was conducted at Bahir Dar city governmental hospitals from February-March 2020. Proportional allocation and systematic random sampling techniques were used to select 386 individuals with hypertension. The logistic regression model was used to assess the association between predictors and dietary adherence. The association was interpreted using the odds ratio and 95% confidence interval.

Result: In this the proportion of dietary adherence was 32.8% (CI: 28.0, 37.6). Educational level college and above (AOR=3.0, CI=1.26, 7.08), received nutritional education (AOR=1.9, CI=1.05, 3.62), knowledgeable about hypertension (AOR=2.5, CI=1.36, 4.58), who had no co-morbidities (AOR=2.8, CI=1.49, 5.20), who lived two to four years with hypertension (AOR=2.4, CI=1.17, 5.07), and who had strong social support (AOR=7.1, CI=2.85, 17.46) had significantly association with dietary adherence.

Conclusion and recommendations: This study demonstrated that low proportion of hypertensive individuals were adhered to recommended diet. Therefore, availed a social network of family and friends; providing dietary education to address the participants' knowledge of hypertension, promote survival skill to new diagnosed and considered co-morbidities are an integral part of overall health in people with hypertension.

Introduction

Dietary approach is the best alternative and primary intervention of non-pharmacologic therapies to people with hypertension (1). Fruits, vegetables, low-fat dairy products and low cholesterol are the diet of choice for the prevention and management of people with high blood pressure (2). The above listed diet groups are lower blood pressure, prevent the the occurrence of hypertension, and reduce the risk of hypertension-related complications (3). It is rich in potassium, magnesium, calcium, and dietary fiber while limiting the intake of total fat, saturated fat, and cholesterol. Individual with hypertension no more than 1,500 mg of sodium daily used (4, 5).

Adherence to recommended diet is the agreement between an individual's medication-related behaviors and following nutritional and lifestyle changes recommended by health care providers (6). Recommended diet can lower blood pressure, prevent the development of hypertension, and reduce the risk of hypertension-related complications (2, 3). So, to reduce the burden of blood pressure-related complications, efforts that focus on nutritional and individual behavioral changes that encourage and promote healthier food choices are warranted (3, 7).

Adherence to recommended diet is among the major challenge to control hypertension and prevent complication (8, 9). Adherence to recommended diet is decreased the Systolic Blood Pressure (SBP) by 11 mm Hg, and the Diastolic Blood Pressure (DBP) by 3 mm Hg. Adherence to recommended diet is decreased cardiovascular events. For instance, a three mmHg reduction in systolic blood pressure could lead to an 8% reduction in stroke mortality and a 5% reduction in mortality from coronary heart disease. (10).

The proportion of adherence to recommended diet vary from nation to nation. Previous studies reported that adherence to recommended diet were 22.5% in Pakistan (11), 36.3% in America (12), 30% in Finland (13), 50% in Israel (14), 58% in Jordan (15), 11.8% in Saudi Arabia (16), and 65% in Turkey (17), 35.5% in Korea (18), 20% in Benin (20) (19), and 64.7%- 69.1% in Ethiopia (20, 21).

Previous studies documented that socio-demographic, clinical, behavioral and psychosocial factors contributing to the level of adherence to recommended diet among people with hypertension. Socio-demographic factors that were significantly associated with adherence to recommended diet in people with hypertension were; age (11, 16), sex (19), marital status (19, 20, 22, 23), educational level (16, 24), occupational status (24) and household income (16, 25). A clinical factors which were linked to adherence to recommended diet in people with hypertension were receive nutritional education (17, 18, 20, 26, 27), duration of living with hypertension (29), obesity (24), present of comorbidity (16, 20) and knowledgeable towards hypertension (19) (18).

Behavioral related factors that were significantly influenced co-morbid depression in diabetes patients were undertaking regular physical exercise (17, 24, 28), smoking (24), alcohol consumption (28). Psychosocial factors also influence people living with hypertension. For instance, number of social support (29), number of counseling sessions by doctors and family members, received written instructions about diet (11, 29). The most neglected causes of uncontrolled HTN are unhealthy dietary habit. Few studies have been conducted to show the gap and magnitude of self-management adherence. As far as our knowledge, there are limited studies done in Ethiopia on adherence to recommended diet among people with hypertension particularly in the study area. Therefore, our study aimed to investigate adherence to recommended diet and associated factors among people with hypertension in Bahir Dar city administration, Northwest Ethiopia.

Methods And Materials

Study Area, Design and Period

A cross-sectional study was conducted from February 23 to March 23 /2020 at Bahir Dar city governmental hospitals. The city has three governmental hospitals namely: Felege Hiwot Comprehensive Specialized Hospital (FHCSH), Addis-Alem General Hospital, and Tibebe Gihon Specialized Teaching Hospital (TGSTH). These hospitals are opened for 24 hours for emergency service. They provide promotive, preventive, curative, and rehabilitative services. Around 2700 people with hypertension were registered for follow-up in the previous year in Bahir Dar governmental hospitals. Those people with

hypertension were used to collect their medication on every two to three-month basis. In the outpatient chronic follow up department, approximately 790 adult people with hypertension (450 in FHCSH, 240 in Addis Alem, and 100 in TGSH) were seen monthly.

All people with hypertension aged 18 years and older, and who had been regular follow up appointments regardless of ethnicity and religions were participating in the study. Hearing and/or verbalize impairment, and severe illness and recently diagnosed during data collection were excluded from the study. Participants who are comprised hearing and/or verbalizing impairment; those who did not provide consistent answers to the demographic questions. The participant; that serious illness to difficult participate who had a severe medical or psychiatric illness to complete the study questionnaire in one sitting, that did request to stop the interview for medical reasons, or the data collectors perceived that the participant was too sick to participate. Participants were newly diagnosed means that they diagnosed before six months of the actual data collection periods. This was by considering those participants could be perceived as a lack of experience of the disease to obtain complete information.

Sample size determination and Sampling procedure

The sample size was determined by using a single population proportion formula by considering the following assumptions: 95% (1.96) confidence interval (CI), 64.70% for adherence to recommended diet

(20), and 5% (0.05) of marginal error ($n = \frac{\left(\frac{z\alpha}{2}\right)^2 p * q}{d^2}$). This yields an initial sample size of 351. By considering adjustment for expected non-response rate (10%), the final sample size was 386 people with hypertension. The samples were proportionally allocated to each hospital. A systematic sampling technique was used to select study participants. After the first respondent drawn by the lottery method then every two intervals were interviewed until the sample size reached.

Data were collected by using face to face interviews with structured questionnaires to acquire demographic information, behavioral factors, hypertension knowledge, Body Mass Index (BMI), social support, and adherence to the recommended diet. To assess clinical related data: co-morbidity, duration of HTN since diagnosis and blood pressure measurement was collected from the clients' chart by using checklists.

Body weight was measured with the participant wearing light clothing without shoes using a Seca weight scale to the nearest 0.1 kilogram (kg) and height was measured in centimeters (cm) using a stadiometer while the participant was standing in an upright position without wearing shoes. Body mass index (BMI) was calculated as weight in kg divided by height in meters squared. The BMI classification as follows: underweight (BMI ≤ 18.49 kg/m²), normal weight (BMI = 18.50–24.99 kg/m²), overweight (BMI = 25.00–29.99 kg/m²), or obese (BMI ≥ 30.00 kg/m²)

Adherence to recommended diet questionnaire was developed based on existing literature (14, 19–21, 23, 30–33). This questionnaire had six components of diets (1) fruits, (2) vegetables, (3) grains, (4) low-fat dairy products, (5) saturated fat and oil, and (6) sodium salts. Each item was a 5-point Likert scale (ranging from none =1, rarely =2, sometimes =3, most times =4, all times =5). In the case of saturated fat and sodium salt intake were given as reverse scoring (none =5, rarely =4, sometimes =3, most times =2, all times =1).

The dietary fruits, vegetables, whole grain, and low-fat dairy consumption were evaluated by asking how many times in the previous 7 days did the respondents eat the above-listed items. Those who responded “all times” and “most times” were adherent while those who responded “sometimes”, “rarely” or “none” were non-adherent

Dietary saturated fat and oil consumption was inquired how many times in the previous 7 days did the respondents eat. Those participants who responded “sometimes”, “rarely”, and “none” were considered adherent while those who responded “all times” and “most time” were non-adherent.

Salt consumption also was evaluated in the previous 7 days by inquiring about the addition of raw table salt in addition to the one who used to prepare the food item during meal times. Those who responded “rarely” and “none” were considered adherent to recommended salt, whereas “all times”, “most times” and “sometimes” were considered non-adherent to recommended dietary salt (33). As a result, the lowest and highest total scores were 6 and 30, respectively.

Knowledge of hypertension was assessed by hypertension knowledge-level scale (HK-LS) questionnaires (34). This scale has 22 items that were used to assess respondents’ knowledge. The tool contains parts of the definition, treatment, drug adherence, diet, lifestyle, and complications. The definition, lifestyle, diet, and complication part of the questioner was used to assess the knowledge of hypertensive individuals. The tool contains selected-response items with yes and no response; the right answer coded as “1” and wrong answer as “0”.

People with hypertension who have supported by their families or friends or neighbors scored was assessed by the “Oslo 3-items social support scale (OSSS-3)”. The score ranged from 3-14 (35). Participant who scored OSSS-3, (1) from 3-8 were considered poor socials support, (2) from 9-11 were considered moderate support, and (3) from 12-14 were considered strong support.

Three BSc degree holders nurses for the data collection (one for each hospital) and three BSc degree holders supervision (one for each hospital) were recruited during the data collection period (both the data collectors and the supervisors were not from the same hospitals). At each hospital the aim of the study was clearly explained to the study participants before they interviewed. The data collectors and supervisors were trained in one day on how to facilitate the data collection process and prevent errors. Questionnaires were reviewed and checked for completeness, accuracy, and consistency by supervisors and the research team every day during the data collection period.

All the questions were prepared in English and translated into the Amharic language by an expert who was fluent by both languages and back-translated to English to see its consistency. Two weeks before the actual data collection, the questionnaires were pre-tested on 5% of the total sample among people with hypertension who had follow-up at Debre Tabor hospital to evaluate the consistency and applicability of the questionnaire. The reliability of the questionnaire was evaluated using Cronbach's alpha test ($\alpha = 0.76$). Data collection was preserved in a secure environment to avoid loss and breach of confidentiality. The supervisor and principal investigator closely followed the data collection process. Appropriate times to complete the questionnaire were allocated for the participants and the completed questionnaires were collected timely.

Data Analysis

The collected data were entered, coded and edited into EPI-data version 3.1, and export to SPSS version 23 for analysis. Descriptive statistics were used to illustrate the means, standard deviations, medians, and frequencies of the study variables. Bivariate analysis was computed and those variables whose p-values are less than or equal to 0.2 were fitted into the backward stepwise multivariate logistic regression model. The Hosmer and Lemeshow goodness of fit test for the model were checked (0.885). Finally, the degree of association was interpreted by using odds ratio with 95% confidence interval. The P-value ≤ 0.05 was considered statistically significant.

Results

Socio-demographic characteristics of participants

Of the total of 386 individuals with hypertensive invited, 375 participated in our study with a response rate of 97%. Of these 210 (56%) were males. The mean age of the participants was 52.80 with the SD ± 11.52 . Almost all, 359 (95.7%) of participants were Amhara ethnicity and 310 (82.7%) were Orthodox Tewahido religious followers. The majority of the participants, 318 (84.8%) were lived in the urban areas (Table 1).

Table 1
Socio-demographic characteristics of participants in chronic follow up units
governmental hospitals in Bahir Dar, Ethiopia, 2020 (n=375)

Variable	Categories	Frequency	percent
Sex	Male	210	56.0
	Female	165	44.0
Age	18-39	44	11.7
	40-59	209	55.7
	≥60	122	32.5
Religion	Orthodox Tewahido	310	82.7
	Muslim	45	12.0
	Protestant	20	5.3
Ethnicity	Amhara	359	95.7
	Tigre	12	3.2
	Other*	4	1.1
Marital status	Single	16	4.3
	Married	286	76.3
	Divorced	42	11.2
	Widowed	31	8.3
Educational level	Unable to read and write	93	24.8
	Able to read and write only	52	13.9
	Primary	54	14.4
	Secondary	58	15.5
	College and above	118	31.5
Occupational status	Farmer	51	13.6
	Housewife	73	19.5
	Governmental employee	100	26.7
	Private employee	37	9.9
	Merchant	75	20.0
	Retired	33	8.8

Variable	Categories	Frequency	percent
	Other**	6	1.6
Average monthly income	≤999	24	6.4
	1000-1999	52	13.9
	2000-2999	68	18.1
	≥3000	231	61.6
Residence	Rural	57	15.2
	Urban	318	84.8

Clinical characteristics of respondents

Out of the total 375 respondents, 153(40.8%) were lived with hypertension for four and above years and 277 (73.9%) of patients had no family history of hypertension. Of the total respondents, 196 (52.3%) of them were received hypertensive nutritional education and 166 (44.3%) were overweight. One hundred (50.7%) of the participants were found to be knowledgeable about hypertension and the mean score for knowledge was found to be 7.25. Out of total cases, 170 (45.3%) respondents have comorbid diseases, of which, 49 (28.8%) of respondents were found to be more than one comorbidities. One hundred fifty-four (41.1%) participants had moderate social support. The mean of SBP and DBP were 131.7 ± 16.95 and 80.5 ± 10.38 respectively (Table 2).

Table 2

Clinical characteristics of respondents in chronic follow up unit at governmental hospitals in Bahir Dar, Ethiopia, 2020 (N=375)

Variables	Categories	Frequency	Percent
Family history of HTN	No	277	73.9
	Yes	98	26.1
Duration of HTN	Less than two years	93	24.8
	Two to four years	129	34.4
	Four and above years	153	40.8
Received nutritional education	No	179	47.7
	Yes	196	52.3
Have you family /friends to follow the recommended diet	No	115	30.7
	Yes	260	69.3
Knowledge of hypertension	Poor-knowledge	185	49.3
	Good-knowledge	190	50.7
Comorbidity	Yes	170	45.3
	No	205	54.7
Type of comorbidities	DM	43	25.3
	Stroke	24	14.1
	Renal disease	15	8.8
	Cardiac disease	27	15.9
	More than one	49	28.8
	Others*	12	7.1
Frequency of BP measurement	Daily	20	5.3
	Weekly	61	16.3
	Monthly	137	36.5
	During a symptom of HTN	75	20.0
	Only appointment date	82	21.9
Blood pressure status	Controlled	200	53.3
	Uncontrolled	175	46.7

Variables	Categories	Frequency	Percent
Body mass index	Underweight	2	0.5
	Normal weight	167	44.5
	Overweight	166	44.3
	Obese	40	10.7

Behavioral and social characteristic of study participants

Of the total participants, 121 (32.3%) were reported that they had strong social support. Regarding physical exercise, three fourth (75%) of participants were reported engage regular physical exercise as recommended. In smoking status 5 (1.3%) of respondents were smokers. Overall, 90.9% of participants adhered to moderation consumption of alcohol. From a total of 375 respondents, 75 (20%) of respondents drank alcohol. Out of 75 respondent those who drank alcohol, 58% of them never had a history of drink 8 for men and 6 for women alcohol in one occasion, 89.3% never had a history of inability to remember what happened when drank the night before, 85% not failed because of drinking and 76% of respondents confirmed that a relative/friend/health care providers were concerned about their drinking and advised them to cut down on their drinking on one occasion. Overall, 90.9% of respondents adhered to moderation of alcohol consumption (Table 3).

Table 3
Behavioral and social characteristics of study participants in Bahir Dar governmental hospitals, Northwest Ethiopia, 2020 (N=375).

Variables Categories		Frequency	Percent
Do you perform physical- exercise at all	No	150	40.0
	Yes	225	60.0
How often do you exercise?	< 3 times per week	23	10.2
	≥3 times per week	202	89.8
For how long do you exercise per session	<30min per day	54	24
	≥30 min per day	171	76
Alcohol adherence	No	33	8.8
	Yes	342	91.2
Smoking status	Yes	5	1.3
	No	370	98.7
Social support	Poor	100	26.6
	Moderate	154	41.1
	Strong	121	32.3

Recommended dietary adherence

From the total study participants, 32.8% (95% CI: 28-37.6) were adherent to the recommended diet. In this study 128 (34.1%) were adhere to fruit, 174 (46.3%) were adherent to vegetable, 270 (72.0%) were adherent to whole grain, 51 (13.6%) were adherent to low-fat dairy, 338 (90.1%) were adherent to saturated fat and oil and 299 (79.7%) were adherent to sodium salt as shown in (Figure 1).

Factors associated with adherence to recommended diet

After adjusting potential confounders of other covariates, educational level, duration of hypertension, nutritional education, co-morbidity, knowledge about the hypertension, and social support were found to be significantly associated with recommended dietary adherence. Respondents those who had college and above educational level were 3 times more likely to adhere to recommended diet than those who were unable to read and write (AOR =3.0, CI: (1.26, 7.08), P=0.013). Respondents who lived with hypertension for two to four years were 2.4 times more likely to adhere to the recommended diet compared to less than two-years diagnosis of hypertension (AOR=2.4, CI: (1.17, 5.07), P=0.017). Respondents who had gotten nutritional education were 1.9 times more likely adherent to recommended diet as compared to those who hadn't gotten dietary education (AOR=1.9, CI: (1.05, 3.62), P=0.035). Those respondents who had good knowledge were 2.5 times more likely to be adherent as compared to

those who had poor knowledge (AOR=2.5, CI: (1.36, 4.58), P=0.003). Those respondents who had strong social support were 7.1 times more likely to be adherent to the recommended diet as compared to poor social support (AOR=7.1, CI: (2.85, 17.46), P<0.000). Participants who had no co-morbidities were 2.8 times more likely to be adherent to the recommended diet than those who had co-morbidities (AOR=2.8, CI: (1.49, 5.20), P=0.001) (Table 4).

Table 4

Bivariable and multivariable logistic regression analysis model in Bahir Dar city governmental Hospitals, Bahir Dar, Ethiopia, 2020 (N=375)

Variable	Dietary adherence		Bivariable	Multivariable	
	Adherent	Poor-adherence	COR (CI)	AOR (CI)	P-value
Age					
18-39	17 (38.6%)	27 (61.4%)	1	1	0.708
40-59	83 (39.7%)	126 (60.3%)	1.1 (0.54, 2.04)	1.3 (0.55, 3.18)	0.541
≥60	23 (18.9%)	99 (81.1%)	0.4 (0.173, 0.79)	1.6 (0.52, 4.93)	0.408
Educational level					
Can't read and write	11 (11.8%)	82 (88.2%)	1	1	0.030
Can read and write	8 (15.4%)	44 (84.6%)	1.4 (0.51, 3.62)	1.3 (0.42, 3.78)	0.689
Primary	12 (22.2%)	42 (77.8%)	2.1 (0.87, 5.23)	1.1 (0.37, 3.09)	0.899
Secondary	25 (43.1%)	33 (56.9%)	5.7 (2.5, 12.77)	2.6 (1.01, 6.72)	0.048
College and above	67 (56.8%)	51 (43.2%)	9.8 (4.73, 20.26)	3.0 (1.26, 7.08)	0.013
Occupational status					
Farmer	5 (9.8%)	46 (90.2%)	1	1	0.898
Housewife	15 (20.5%)	58 (79.5%)	2.4 (0.8, 7.0)	1.4 (0.39, 4.77)	0.634
Government employee	56 (56.0%)	44 (44.0%)	11.7 (4.29, 31.95)	1.1 (0.27, 4.73)	0.878
Private employee	13 (35.1%)	24 (64.9%)	5.0 (1.59, 15.64)	0.9 (0.18, 4.08)	0.840
Merchant	26 (34.7%)	49 (65.3%)	4.9 (1.73, 13.79)	0.9 (0.23, 3.25)	0.824
Retired	8 (24.2%)	25 (75.8%)	2.9 (0.87, 9.96)	0.6 (0.12, 2.86)	0.501
Other©	0 (0.0%)	6 (100.0%)	.000 (.000.)	0.000 (.000)	0.999
Place of residence					

Variable	Dietary adherence		Bivariable	Multivariable	
	Adherent	Poor-adherence	COR (CI)	AOR (CI)	P-value
Rural	7 (12.3%)	50 (87.7%)	1	1	
Urban	116 (36.5%)	202(63.5%)	4.1 (1.80, 9.34)	1.2 (0.34, 4.47)	0.743
Family history of HTN					
No	80 (28.9%)	197 (71.1%)	1	1	
Yes	43 (43.9%)	55 (56.1%)	1.9 (1.20, 3.10)	1.1 (0.58, 2.16)	0.746
Duration of HTN in- years					
<2	21(22.6%)	72 (77.4%)	1	1	0.019
2-4	66 (51.2%)	63 (48.8%)	3.6 (1.98, 6.52)	2.4 (1.17, 5.07)	0.017
≥4	36 (23.5%)	117(76.5%)	1.1 (0.57, 1.95)	1.7 (0.80, 3.67)	0.170
Received nutritional education					
No	28 (15.6%)	151 (84.4%)	1	1	
Yes	95 (48.5%)	101 (51.5%)	5.1 (3.10, 8.29)	1.9 (1.05, 3.62)	0.035
Frequency of BP- measurement					
Daily	9 (45.0%)	11 (55.0%)	1	1	0.913
Weekly	33 (54.1%)	28 (45.9%)	1.6 (0.58, 4.27)	1.2 (0.31, 4.53)	0.804
Monthly	44 (32.1%)	93 (67.9%)	0.6 (0.25, 1.65)	0.8 (0.24, 3.00)	0.789
Sign of HTN					
Only appointment date	21 (28.0%)	54 (72.0%)	0.5 (0.18, 1.310)	1.2 (0.30, 4.63)	0.823
Only appointment date	16 (19.5%)	66 (80.5%)	0.3 (0.11, 0.836)	1.1 (0.26, 4.26)	0.939
Family/friends follow the recommended diet					
No	20 (17.4%)	95 (82.6%)	1	1	

Variable	Dietary adherence		Bivariable	Multivariable	
	Adherent	Poor-adherence	COR (CI)	AOR (CI)	P-value
Yes	103 (39.6%)	157 (60.4%)	3.1 (1.81, 5.36)	0.9 (0.42, 1.81)	0.703
Table 4: (continued) bivariable and multivariable logistic regression analysis model in Bahir Dar city governmental Hospitals, Bahir Dar, Ethiopia, 2020 (N=375)					
Knowledge					
Poor-knowledge	26 (14.1%)	159 (85.9%)	1	1	
Good knowledge	97 (51.1%)	93 (48.9%)	6.4 (3.86, 10.55)	2.5 (1.36, 4.58)	0.003
Social support					
Poor	8 (8.0%)	92 (92.0%)	1	1	0.000
Moderate	39 (25.3%)	115 (74.7%)	3.9 (1.74, 8.76)	2.3 (0.94, 5.46)	0.067
Strong	76 (62.8%)	45 (37.2%)	19.4 (8.63, 43.7)	7.1(2.85, 17.46)	<0.001
Presence of- comorbidities					
Yes	28 (16.5%)	142 (83.5%)	1	1	
No	95 (46.3%)	110 (53.7%)	4.4 (2.69, 7.15)	2.8 (1.49, 5.20)	0.001
Alcohol adherence					
No	6 (17.6%)	28(82.4%)	1	1	
Yes	117(34.3%)	224(65.7%)	2.44 (0.98, 6.05)	1.8 (0.58, 5.56)	0.306
Exercise adherence					
Poor-adherent	63 (28.9%)	155 (71.1%)	1	1	
Adherent	60 (38.2%)	97 (61.8%)	1.5 (0.99, 2.35)	1.1 (0.59, 1.91)	0.844

Discussion

This hospital-based cross-sectional study measured the proportion of dietary adherence among hypertensive patients. Overall, 32.8% (CI: 28.0-37.6) of participants adhered to the recommended diet.

This study was consistent with a study done in America (36.3%) (12), Korea (35.5%) (18), Finland 30% (13), and 34.6% in Jimma, Ethiopia (36). This study is relatively lower than a study done in Turkey (65%) (17), Israel (50%) (14), Jordan (58%) (15) and Addis Ababa (64.7-69.1%) (20, 21). The inconsistency of this study and the two local studies in Addis Ababa, Ethiopia could be explained by the variation in the settings of the study, the difference in socioeconomics, as well as the difference in the types of foods available in the two cities. While other studies from Turkey, Israel, and Jordan could be due to the difference between the dietary habits of the countries, the residence of study participants, measurement tools, and sample size. Studies in Jordan, Turkey, and Israel adherence to the recommended diet was explored in one question that was: do you follow special diet for your hypertension? For this question, patients generally tend to say yes without one actually knows what they respect as advice and what is not. So measurement tool was the variations to adherence result. In case of sample size, studies in Jordan (15) and Israel (14) 1000 and 1360 number of participants were participated respectively. A study in Turkey the inclusion criteria were diagnosed with hypertension for at least 1 year but in this study, individual having at least two follow-up visits was included.

However, this proportion also much higher than that of studies done in Benin (20%) (19), Saudi Arabia (11.8%) (16) and Pakistan (22.5%) (11). This discrepancy could be due to variation in the study population, sample size, adherence measurement tool, and dietary habits of the country. Pakistani culture, majority of the social gatherings involve basically "eating out" with friends and family members (11). Studies in Benin (19) and Saudi Arabia (16) small sample size was used to collect data (150 and 144 individuals were participated respectively). This could be the difference to adhered to the recommended diet.

In our study, recommendations regarding adequate consumption of fruits, vegetables, and low- fat dairy products (most times and all times within a week) failed to meet the recommended diet. Indeed, only 34.1% and 46.3% of participants had adequate consumption of fruits and vegetables respectively. This was agreed to the study done in Ghana which was 47% of participants ate vegetable and 37% of participants ate fruit as recommended (37).

This study indicated that socio-demographic related characters (educational level), clinical- related characters (duration of hypertension, co-morbidity, knowledge of hypertension and received nutritional education), and social support were significantly associated with recommended dietary adherence among individuals with hypertension.

Educational level is one of the socio-demographic associated factors to the recommended dietary adherence. Respondents who had more educated (college level and above) were more likely to adhere to the recommended diet. This is in line with a Study in the USA (24) and Saudi Arabia (16) showed that increased educational level is significantly associated with recommended dietary adherence. This possibly explained that educated participants can easily understand and agree with providing information about the disease and recommended management. Moreover, highly educated participants

have a better chance to come across considerable information on the disease and respective interventions from different informational sources (social media, printed document, and internet).

In this study individuals living with two to four years with hypertension are adherence to recommended diet. This is supported by studies done in China (10). The experience of living with HTN can take a significant role in the well-being of individuals in terms of the success of survival skills with the disease chronicity. Individuals with hypertension who lived a long time with hypertension realize, master the basic skills and information, acquiring in-depth and advanced hypertension knowledge occurs throughout their lifetime, both formally through programs of continuing education and informally through experience and sharing of information with other hypertensive individuals. These individuals are developing positive coping strategies such as confrontation tend to be more proactive in learning to manage their disease.

Respondents who had good knowledge on hypertension increased the likelihood of recommended diet adherence. This was consistent with results found by Korea (18), Benin (19). Knowledge towards hypertension facilitated the knowledge, skill, and ability necessary for recommended dietary adherence. This is having a positive impact on individuals with hypertension access, utilization, and outcomes of the recommendation.

In this study respondents who received nutritional education or information from health care providers significantly associated with recommended dietary adherence. This was supported by studies done in Black Lion hospital, Addis Ababa (20), Benin (19), Turkey (17) and Korea (18). This might be due to the fact that patients who have received intensive dietary education are more likely to have increased knowledge about the benefit of dietary management in hypertension control and prevent its complications.

In the present study respondents who had one or more co-morbidities were less likely to be adherent to dietary adherence. This study was supported by a study done in the USA, which was adherence to the recommended diet was significantly lower among respondents with co-morbidity (24). Studies in Saudi Arabia and Addis Ababa also co-morbidities had significantly associated with poor dietary adherence (16, 20). This could be Patients with co-morbidity are often on complex medication regimens as well as complex dietary recommendations.

The results of this study identified that social support was significantly associated with recommended dietary adherence. Participants who had strong social support from their families, neighbors, and friends were adhered to the recommended diet. This finding was similar to the studies conducted in Pakistan and Italy (11, 29). This might be social support can to improve emotional well-being (receiving love and empathy) and practical help (gifts of money, family commitments to prepare and buy the recommended diet, and care assistance).

Conclusion

Generally, this finding revealed that low proportion of participants had adhered to the recommended diet. Educational level, knowledge of hypertension, co-morbidities, duration of hypertension, and social support have a significant factor in order to adhere to the recommended diet. This suggests health care providers aggressively emphasize on recommended dietary adherence by segmenting the participants based on educational status, social support, hypertension knowledge, intervene co-morbidities, promote survival skill to new diagnosed participants to motivate adherence to recommended diet.

Strength

The study could be considered as a base for further similar and large scale studies. The strength of this study also a significant contribution to the body of knowledge in general and more specifically for health care professionals and the participants themselves. Additionally, rather than having to rely on self-report, we were able to use information from participants medical diaries and physical measurement (BP and BMI) to gather information about the presence of co-morbidity, BMI and BP levels. Also we were using reasonable sample size.

Limitations

Due to the cross-sectional design of this study, it is not possible to draw any conclusion regarding causality. We also assessed level depression and other independent variables by using self-reported questionnaires to limit this study. Carefully analyzing longitudinal data and mixed design both qualitative and quantitative approaches are the best alternative in the future.

Abbreviations

BMI; Body Mass Index, BP; Blood Pressure, CI; Confidence Interval, CVD; Cardio Vascular Disease, DASH; Dietary Approach to Stop Hypertension, DBP; Diastolic Blood Pressure, ESC; European Society of Cardiology, FHCSH; Felege Hiwot Comprehensive Specialized Hospital, SBP; Systolic Blood Pressure, HTN; Hypertension, SPSS; Statistical Package of Social Science, TGSTH; Tibebe Gihon Specialized Teaching Hospital, WHO; World Health Organization

Declarations

Funding

This study has no funding source. The corresponding author had full access to all data in the study and had responsibility for the decision to send for publication.

Availability of data and materials

All data are available in the manuscript.

Ethics approval and consent to participate

To follow the ethical and legal standards of scientific investigation, this study was conducted after approval of the proposal by Bahir Dar University college of medicine and health sciences institutional review board committee by protocol number of 0045/2020. Ethical approval and clearance were obtained from this board. before the actual data collection permission and the supportive letter were obtained from Amhara public health institute and hospitals medical director office. Participation was voluntary and information also collected anonymously after obtained written consent from each respondent by assuring confidentiality throughout the data collection period.

Consent for publication

Not applicable.

Competing interests

We declare that we have no competing interests.

Author Contributions

All authors made important contributions to the manuscript preparation in terms of design, literature search, literature review, data interpretation, and data analysis. Teshager Weldegiorgis Abate and Muluaem Gete wrote the manuscripts, Moges Wubneh, Tamru Alene, Henok Biresaw and abebu tegenaw critical review and revised the manuscript. All authors read and approved the final version of the manuscript.

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Figures

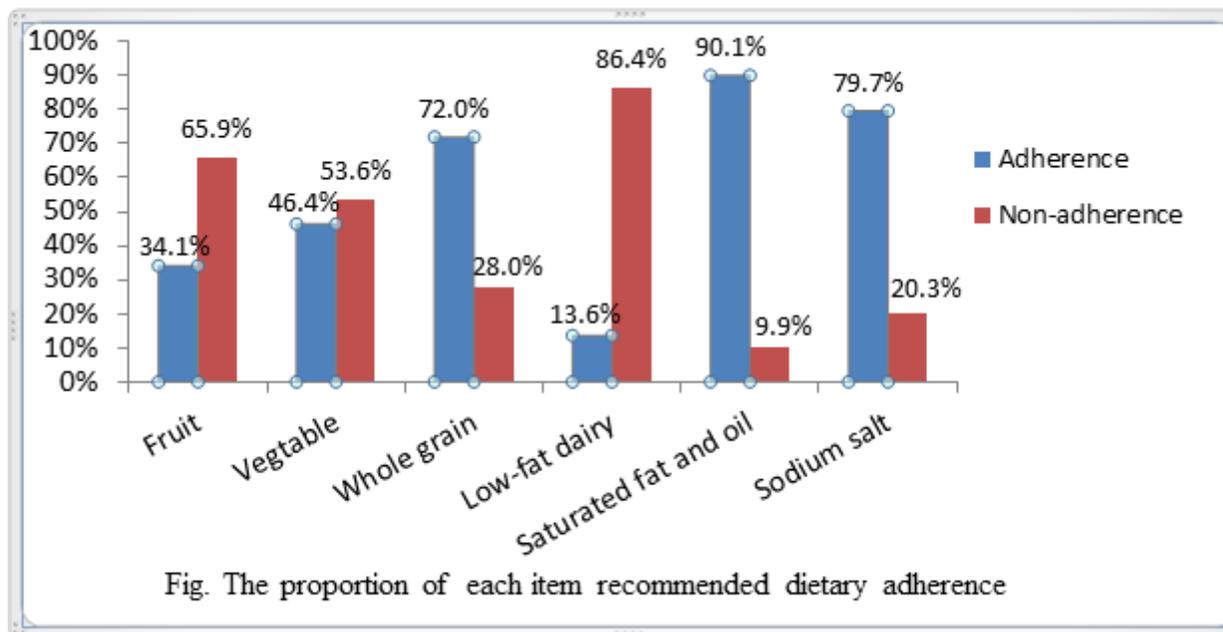


Figure 1

Level of each item recommended dietary adherence among hypertensive patients in Bahir Dar city governmental hospitals, Bahir Dar, Ethiopia, 2020 (N=375)