Hypertensive patients compliance for clinician counseling in dessie city, Ethiopia

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ABSTRACT
Introduction: Clinicians counsel patients on medication adherence and behavioral risk factors to achieve optimal blood pressure levels and reduce the risk of hypertension-related complications. There has been little research on the risk of health-related quality of life and perceived social support in hypertensive patients' compliance with clinician counseling. As a result, the purpose of this study is to assess hypertensive patients' compliance to clinician counseling.

Methods: A cross-sectional study was conducted of 384 hypertensive patients during their clinical visit using simple random sampling. An interview-administered questionnaire was employed as a means of data collection tools. The poor compliance status of hypertensive patients was computed from poor medication adherence, sedentary lifestyle, smoking, drinking alcohol, ‘Khat’ chewing, and high salt intake. The adjusted odds ratio with a 95% confidence interval was used to calculate the strength of the association between poor compliance with clinicians’ counseling and independent predictors using logistic regression analysis. In multivariable logistic regression analysis, a P-value of less than 0.05 was judged statistically significant.

Findings: A total of 368 study participants were included in this study. The prevalence of poor compliance towards clinicians counseling in hypertensive patients with a 95% CI was 83.2% [78.93 – 86.83]. In a multivariable analysis adjusted odds ratio with 95% CI being self-employed 2.68 (1.19 – 6.03), the psychological domain of health-related quality of life 0.89 (0.83 – 0.96) and low social support 3.85 (1.34–10.64) were the predictors of poor compliance towards clinician counseling.

Conclusion: Most hypertensive patients on antihypertensive treatment had poor compliance towards clinician counseling. Self-employed, psychological domains, and social support are the factors that affect poor compliance towards clinician counseling.

1. Introduction

Hypertension is leading global cause of illness and mortality is the World [1]. Sub-Saharan Africa shares the largest burden in the world [2]. In Ethiopia, there has been an increasing trend of hypertension and its complication over the last three decades [3]. High blood pressure is the fifth driving risk factor for death and disability combined effect in Ethiopia [4].

One’s hypertensive patients’ diagnosis, patients treated with pharmacological therapy and non-pharmacological therapy [5, 6] Physicians/clinicians mostly focus on medication adherence and appointment schedule [7]. Medication adherence plays a central role in controlling blood pressure and reducing the risk of hypertension-related complications [8]. But this is not the only factor for controlling blood pressure levels and reducing the risk of hypertension-related complications [6].

The behavioral risk factors (sedentary lifestyle, smoking, drinking alcohol, ‘Khat’ chewing, and high salt intake) are the most common risk factors counseled by clinicians in Ethiopia [6, 9]. Counseling on these behavioral risk factors has great importance in controlling the blood pressure control of hypertensive patients, but patients do not comply with counseling [10, 11]. In Ethiopia, dietary modification is uncommon rather salt restriction is the most frequently recommended option for dietary modification. Dietary modification is the most difficult modifiable factor in the context of Ethiopia, so the salt restriction is the one that is amenable for patients to modify their behavior. ‘Khat’ chewing is one
of the commonest practices that affect the health of the people in Ethiopia.

Hypertensive patients with poor compliance to one or more of the components of counseling increases the risk of hypertension-related complications due to poor control of their blood pressure [12]. Medical insurance, being diabetics, body mass index (BMI), age, level of adherence, and patient-clinician relationship make a great contribution to the compliance of clinician counseling [13, 14]. The patients’ perceived social support and health-related quality of life were not taken into account in the earlier studies as potential factors in their low compliance with the advice of clinicians. Many studies were conducted to address these factors separately. But compiled and comprehensive assessment and analysis are limited in hypertensive patients. Therefore, this study aims to assess the compliance status of hypertensive patients towards clinician counseling.

2. Methods

2.1. Study design and settings

A cross-sectional survey was employed in March 2021 among adults aged 18 years old and older hypertensive patients in Dessie City. In Dessie City, eight public health institutions provide hypertension care and treatment. One Comprehensive Specialized Hospital, one Generalized Specialty Hospital, and six health centers are located inside the city. At the end of January 2021, the city had about 2109 hypertensive patients under treatment. The national guideline recommendation that hypertension patients visit the health facility regularly, with blood pressure checked at each visit and medicines modified in accordance with the approved guidelines [15]. Before recruiting study participants, all adult hypertensive patients were screened for exposure to counseling within the last six months for all packages of the behavioral risk factors. All adult hypertensive patients with exposure to counseling for behavioral risk factors were eligible for this study. Whereas, Adult hypertensive patients with confirmed cognitive impairments or mental health disorders were excluded from this study.

2.2. Sample size and study participants

Due to limited evidence on the comprehensive compliance for medication adherence, salt restriction, and substance use, this study uses 50% of non-compliance of hypertensive patients with a 95% level of confidence and a 5% margin of error. The final sample size for this study was 384 hypertensive patients. Adult hypertensive patients were screened for counseling a month ago, which was before the actual data collection period. Thus, study participants were recruited using simple random sampling methods from prior screening registers on the exposure to counseling through their serial numbers using a lottery method.

2.3. Data collection method and measurements

The data were collected using structured and pre-coded questionnaires. The socio-demographic, clinical profile, and lifestyle aspects of the tool were adopted from previous articles [3, 5, 6]. The questionnaire contains the health-related quality of life BREF-26, which is found on the WHO website, and the perceived social support related questionnaire was employed from the Multidimensional Scale of Perceived Social Support (MSPSS) -12 item checklist [16] both were validated with a similar population. Each of these items was scored from 1 to 5 on a response scale, which agreed as a five-point Likert scale. Assessment of anthropometric measurements for height (cm) and weight (kg) were measured for all participants using standard methods [17]. Furthermore, the body mass index (BMI) was calculated by dividing the weight (kg) by the square of the person’s height (in meters). Chat/Khat: In some parts of East Africa, the khat plant (Catha edulis Forsk) is a tree of the Celastraceae family that is frequently cultivated [18]. For the pleasant moderate stimulant effect, they are chewed regularly by a large proportion of the adult population in various regions of Ethiopia, particularly in the study area. Health-related quality of life: Health-related quality of life-related questionnaire is adopted from the WHOQOL-BREF -26 Items validated [19] check list, which consists of four domains: physical health (7 items), psychological health (6 items), social relationships (3 items), and environmental health (8 items), and two items not included in any domains were the overall perception of QOL and general health perception. On a response scale, often known as a five-point Likert scale, each of these items was given a score between 1 and 5 (20). Cigarette smokers: A smoker is defined as someone who regularly or infrequently uses any tobacco product, according to WHO's Smoking and Tobacco Use Policy [21]. Current alcohol use: It is defined as any use of alcohol in the past 30 days [22]. Physical activity: Adults who do at least 150–300 min of moderate-intensity aerobic physical activity, or at least 75–150 min of vigorous-intensity aerobic physical activity, or an equivalent combination of moderate-intensity and vigorous-intensity activity throughout the week are physically active; [23]. Co-morbidity: Two or more medical conditions exist simultaneously regardless of their causal relationship [24]. Perceived social support: perceived social support was assessed by (MSPSS), the multi-dimensional scale of perceived social support. This self-report scale comprises 12-items, rated on a 4-point Likert scale [16]. General counseling session include most healthy behavioral practices (physical activity, medication adherence, salt restriction, ‘Khat’ chewing, alcohol consumption, and smoking status): Patients who reported a full compliant with the healthy behaviors (exercise regularly, have never smoked or used to smoke, adhere the prescribed medication, never drink any alcohol, restrict their salt intake and avoid ‘Khat’ chewing) in hypertensive patients were defined as a good compliant towards clinician counseling [6, 25, 26, 27]. Whereas patients, who were having poor medication adherence, high salt intake, no regular physical exercise, smokers, ‘Khat’ chewers, and alcohol consumers, were considered poor compliance patients. Thus, the compliance status of the patients was computed as poor compliance for patients missing one of the healthy behavioral practices. While good compliance for patients, who were compliance for all components of the clinician counseling.

2.4. Data management and statistical analysis

After being verified to be complete, the data were input into Epi Data version 3.1 and exported to STATA/SE 14.0 for additional analysis. Additionally, the data were cleaned, coded, and investigated to find outliers, discrepancies, and missing values using tabulation and graphical display. Average imputation was done for missing values in the social domain of the health-related quality of life of hypertensive patients. Reverse coding was done on negative items in the physical and psychological domain of the outcome variables and then computing a raw score of each domain. The WHO-BREF scores of the physical, social, psychological, and environmental domains were changed 0–100 transformed scores using the WHO-BREF scoring guideline [20]. Using the tertile of their computed raw scores, the perceived social support was also divided into three categories. Low, moderate, and high social supports, respectively, were assigned to the lowest, middle, and highest tertiles [16]. The compliance status was computed from all six variables (smokers, poor medication adherence, unable to restrict their salt intake, ‘Khat’ chewers, alcohol consumers, and inadequate/no physical exercise) at least one component was considered poor compliance towards clinician counseling and otherwise good compliance. The data were presented using texts and tables. Continuous variables were described in terms of mean with their standard deviation or median with their interquartile range. Categorical data were described in terms of frequencies and percentages. All necessary assumptions of binary logistic regression were checked and fulfilled. Then, multivariable logistic regression analysis was done and those variables whose p-value was less
than 0.05 at a 95% confidence interval were declared statistically significant.

2.5. Ethical considerations

Ethical clearance was obtained from the Ethical Review Committee of Wollo University College of Medicine and Health Sciences with a reference number CMHS 753/13/13. The respondents were informed about the purpose of the study and written informed consent was obtained from each participant. The data were collected as per the Helsinki declaration. The respondents’ rights to refuse or withdraw from the participation in the interview were fully maintained and the information provided by each respondent was kept strictly confidential.

3. Results

3.1. Characteristics of the study participants

A total of 368 study participants were included in this study. The median age of the participants was 55 years, with an interquartile range (IQR) of 17 years. More than half of the participants (201 (54.6%)) were female and 162 (44.02%) were unable to read and write. The marital status and occupational status of 249 (67.66%) and 158 (42.93%) were married and unemployed, respectively. Nearly two-thirds of the study participants were urban dwellers [Table 1].

3.2. Clinical characteristics of the study participants

The median duration of patients with hypertension since diagnosis and treatment were 7 and 6 years with an IQR of 7 years for both, respectively. Nearly two-thirds of the study participants were taking two or more drug regimens. Most of the study participants (237 (64.4%)) were taking diuretics. Only a few of the study participants (1 (0.7%)) were taking Angiotensin Receptor Blockers. The median score of the systolic blood pressure was 137.5 with an IQR of 18 mmHg. The median (IQR) diastolic blood pressure was 83 (10) mmHg. The mean Body Mass Index (BMI) status of participants was 23.59 kg/m² with a median (IQR) diastolic blood pressure was 83 (10) mmHg. The mean score of quality of life in physical, social, psychological, and environmental domains were 43.04, 57.47, 51.97, and 48.33 with a standard deviation of 19.04, 20.15, 20.36, and 16.29, respectively. The mean score of perceived social support was 37.8, with an SD of 10.3 for the computed score [Table 3].

3.3. Health-related quality of life and perceived social support

The mean score of quality of life in physical, social, psychological, and environmental domains were 43.04, 57.47, 51.97, and 48.33 with a standard deviation of 19.04, 20.15, 20.36, and 16.29, respectively. The mean score of perceived social support was 37.8, with an SD of 10.3 for the computed score [Table 3].

3.3.1. Compliance for clinician counseling

Among the components of compliance 258 (70.1%) were not compliant with the physical exercise. Medication adherence of the patients 30 (8.2%) participants had good adherence. Most of the participants 52 (14.1%) were able to restrict their salt intake to the recommended dose. On behavioral risk factors of the study participants 15 (4.1%), 21 (5.7%), and 35 (9.5%) were smokers, alcohol consumers, and Khat chewers, respectively. Overall, 306 (83.2%) with 95% CI

### Table 1. Characteristics of hypertensive patients for clinician counselling in dessie city, Ethiopia, 2021.

| Variable            | Category                     | Frequency | Percentage |
|---------------------|------------------------------|-----------|------------|
| Sex                 | Female                       | 208       | 56.5       |
| Educational Status  | Unable to read and write     | 162       | 44.0       |
|                     | Able to read and write       | 68        | 18.5       |
|                     | Primary School               | 38        | 10.3       |
|                     | Secondary and Preparatory    | 62        | 16.9       |
|                     | College and above            | 38        | 10.3       |
| Marital Status      | Single                       | 23        | 6.2        |
|                     | Married                      | 249       | 67.7       |
|                     | Widowed                      | 64        | 17.4       |
|                     | Separate                     | 32        | 8.7        |
| Occupation          | Employed                     | 86        | 23.4       |
|                     | Private Employed             | 107       | 29.1       |
|                     | Unemployed*                  | 158       | 42.9       |
|                     | Others**                     | 17        | 4.6        |
| Residence           | Urban                        | 264       | 71.7       |
|                     | Others                       | 104       | 28.3       |

*Daily Laborer, House Wife **- Student, pension.

### Table 2. Type of Hypertensive Medication of hypertensive Patients in Dessie City, Ethiopia, 2021.

| Variables            | Categories                     | Frequency | Percentage |
|----------------------|--------------------------------|-----------|------------|
| Antihypertensive Drugs | Diuretics                     | 237       | 64.4       |
|                      | Angiotensin Converting Enzyme inhibitor | 159       | 43.2       |
|                      | Calcium Channel Blockers      | 220       | 59.8       |
|                      | Beta Blockers                 | 17        | 4.6        |
|                      | ARB*                          | 1         | 0.7        |
| HTN Related Symptoms | Yes                           | 310       | 84.2       |
|                      | Headache                      | 201       | 54.6       |
|                      | Fatigue                       | 292       | 52.5       |
|                      | Blurred Vision                | 103       | 28.0       |
|                      | Insomnia                      | 67        | 18.2       |
|                      | Dizziness                     | 28        | 7.6        |
|                      | Facial Flushing               | 14        | 3.8        |
|                      | Tinnitus                      | 30        | 8.2        |
|                      | Others                        | 2         | 0.5        |
| Complications        | Yes                           | 135       | 36.7       |
|                      | Stroke                        | 19        | 5.2        |
|                      | Heart Failure                 | 67        | 18.2       |
|                      | Pulmonary Edema               | 8         | 2.2        |
|                      | Vision Loss                   | 14        | 3.8        |
|                      | Kidney Damage                 | 37        | 10         |
|                      | Others*                       | 7         | 2          |
| Comorbidities        | Yes                           | 134       | 36.4       |
|                      | No                            | 234       | 63.6       |
| Number of drugs      | Only one drug                 | 126       | 34.2       |
|                      | Two or more drugs             | 242       | 65.8       |

* Angiotensin receptor antagonists (ARBs).
** Multiple responses were possible.

### Table 3. Health-related quality of life and social support of hypertensive patients in dessie city, Ethiopia, 2021.

| Variables          | Mean       | Standard Deviation |
|--------------------|------------|--------------------|
| Physical Domain    | 43.04      | 19.04              |
| Social Domain      | 57.47      | 20.15              |
| Psychological Domain | 51.97  | 20.36              |
| Environmental Domain | 48.33 | 16.29              |
| The overall rate of quality of life | 2.46 | 0.79 |
| Health Satisfactions | 2.47 | 0.92 |
| Perceived Social Support | 37.83 | 10.3 |
[78.93–86.83] of hypertensive patients had poor compliance towards clinicians’ counseling [Table 4].

3.3.2. Factors affecting non-compliance for clinician counseling

Age, occupational status, perceived social support, the number of antihypertensive drugs, the experience of complications, psychological domain of Health-related quality of life, and body mass index were eligible for multivariable logistic regression. In multivariable logistic regression Self-employed Occupational status, psychological domain quality of life, and low social support were statistically significant factors for poor compliance with clinician counseling [Table 5].

Being self-employed 2.7 times more likely to have poor compliance towards clinicians counseling compared with government-employed. A one-unit increase in computed score psychological domain of health-related quality of life of hypertensive patients reduces poor compliance by 11% towards clinician counseling. Having a low perceived social support is 3.85 times more likely to poor compliance towards clinician counseling in adult hypertensive patients compared with high social support patients [Table 5].

4. Discussion

Compliance with clinicians’ counseling [including behavioral risk factors, medication adherence, and dietary habits] is a critical issue in the successful control of hypertension and prevention of complications.

Most adult hypertensive patients had poor compliance with clinicians’ counseling. This demonstrates that numerous obstacles exist between clinicians’ perceptions and patient action. There are several barriers to successful lifestyle change with counseling, these include lack of time, knowledge, forgetfulness, and orientation about patient compliance towards counseling [28, 29]. Most of the patients also did not recall the counseling as well utilized behavioral and lifestyle therapy for clinician counseling [30, 31]. Furthermore, while physicians may deliver counseling on certain lifestyle changes, they may not counsel all of their hypertensive patients on the same subject at every appointment [32]. Patients may have a poor understanding of the perceived risk, severity, susceptibility, and lack of motivation of complications related to poor compliance towards clinicians’ counseling [29, 33]. Physician or clinician lifestyle and patient-physician relations also influenced the type of counseling towards their patients, this leads to improper utilization of counseling [34, 35]. Therefore, the clinician should consider tailored, patient-centered, and comprehensive counseling for hypertensive patients for modifiable behavioral risk factors.

Being self-employed is more likely to have poor compliance towards clinicians counseling compared with government-employed. This finding is in contradiction with a study done in Ghana in which government-employed are more non-compliant than non-employed [33]. This may be due to the discrepancy in the national level of literacy for occupation and category of occupational classifications. The reason for poor compliance for self-employed is that most self-employed are less educated. Education had a great impact on communication and acceptance of counseling. Self-employed also had more strain on achievement than government employed [36]. Because the majority of the research participants were in primary school or below, the characteristics of the study participants may have also been impacted.

A psychological domain of health-related quality of life of hypertensive patients had poor compliance towards clinician counseling. Health-related quality of life affects hypertensive patients’ compliance with clinician counseling [37, 38]. Patients with a low score in the psychological domain have a high level of loneliness, stress, low self-esteem, thinking, learning and memory loss so, these patients will have low cooperation, and finally, they will have poor implementation of clinicians’ effort during counseling [39]. Orientation and concentration had a great effect on sessions of counseling and memory loss also had a great impact on the implementation of the counseled patients. Therefore, the clinician should focus on patient-centered counseling and link to a psychiatric clinic for further counseling for patients will with memory loss and poor concentration during counseling.

Low social support is the factors for poor compliance towards clinician counseling in adult hypertensive patients. This is consistent with a study conducted in Nigeria in which social support was one of the determinant factors for compliance [40]. Patients with low social support are less motivated for counseling, have low family support, and have less trust for the counseling to attend from clinicians [14]. Poor compliance is regarded as low social support since having social support is important to assist in positive compliance towards clinicians’ counseling [40]. These findings imply that, in addition to improving disease-related behaviors, other coping strategies, such as establishing a support network with family and health professionals, are necessary to improve self-care compliance. Even though these people are vulnerable and require considerable social and institutional support to improve self-care compliance, this study reveals a gap between health services and local community support programs.

Table 4. The compliance Status of patients for Clinician counseling of hypertensive Patients in Dessie City, Ethiopia, 2021.

| Variables                  | Frequency | Percentage |
|----------------------------|-----------|------------|
| Medication Adherence       |           |            |
| Good                       | 338       | 91.8       |
| Poor                       | 30        | 8.2        |
| Salt Intake                |           |            |
| Restricted                 | 316       | 85.9       |
| Non-restricted             | 52        | 14.1       |
| Physical Exercise          |           |            |
| Yes                        | 110       | 29.9       |
| No                         | 258       | 70.1       |
| Smoking                    |           |            |
| Yes                        | 15        | 4.1        |
| No                         | 353       | 95.9       |
| Alcohol                    |           |            |
| Yes                        | 21        | 5.7        |
| No                         | 347       | 94.3       |
| Khat Chewing               |           |            |
| Yes                        | 35        | 9.5        |
| No                         | 333       | 90.5       |
| Overall Compliance         |           |            |
| Good                       | 62        | 16.8       |
| Poor                       | 306       | 83.2       |

Table 5. Factors Affecting Poor Compliance for Clinician Counseling in hypertensive Patients in Dessie City, Ethiopia, 2021.

| Variables                        | AOR | 95% CI | p-value |
|----------------------------------|-----|--------|---------|
| Age                              | 1.02| (0.99–1.05) | 0.166   |
| Occupation                       |     |        |         |
| Government Employed              | 1   |        |         |
| Private employed                 | 2.59| (0.97–6.92) | 0.058*  |
| Self Employed                    | 2.68| (1.19–6.03) | 0.017** |
| Unemployed                       | 1.45| (0.61–3.62) | 0.384   |
| Psychological domain             | 0.89| (0.83–0.96) | 0.003***|
| Social Support                   |     |        |         |
| High Social Support              | 1   |        |         |
| Medium Social Support            | 0.84| (0.35–2.04) | 0.698   |
| Low Social Support               | 3.85| (1.34–10.64) | 0.009***|
| Number of Antihypertensive Drugs |     |        |         |
| Only one drugs                   | 1   |        |         |
| Two or More Drugs                | 1.54| (0.84–2.82) | 0.162   |
| Experience of Complications      |     |        |         |
| Yes                              | 1.81| (0.92–3.56) | 0.084*  |
| Body Mass Index                  |     |        |         |
| Underweight                      | 1   |        |         |
| Normal                           | 0.29| (0.03–2.39) | 0.247   |
| Overweight                       | 0.44| (0.05–3.99) | 0.465   |

* * * p < .01, * * * p < .05, * p < .1, AOR = Adjusted Odds Ratio.
4.1. Limitations of the study

This study addressed the comprehensive counseling package in Ethiopia for hypertensive patients, but it lacks nutritional components of the counseling packages. Since nutritional counseling in resource-limited setting depends on the availability of food items used frequently, it was difficult to measure across all patients with uniform measurement.

5. Conclusion

Most hypertensive patients on antihypertensive treatment had poor compliance towards clinician counseling. Being self-employed, the low score in psychological domains of health-related quality of life, and low social support are the factors that affect poor compliance towards clinician counseling.

In the future, studies should be conducted to address all aspects of clinicians' counseling, including nutritional counseling and their daily consumption compliance status, as well as their effect on blood pressure control.

References

[1] GBD 2019 Risk Factors Collaborators, Global burden of 87 risk factors in 204 countries and territories, 1990-2019: a systematic analysis for the global burden of disease study 2019, Lancet 396 (10258) (2020) 1223–1249.
[2] H.N. Gouda, F. Charlson, K. Sorsdahl, S. Ahmadzada, A.J. Ferrari, H. Erskine, et al., Diabetes complications among type 2 diabetes patients in Gaza Strip, Palestine: a cross sectional study, J. Health Popul. Nutr. 36 (1) (2017) 1–11.
[3] Hassan N.A.G.M., Gunaid IMM-L A.A., Khat(Chata edulis): health aspect of khat chewing, East. Mediterr. Health J. 13 (2007) 706–717.
[4] R.A. Bell, R.L. Kravitz, Physician counseling for hypertension: What do doctors really do? Patient Educ Couns. 72 (2008) 115–121.
[5] A. Marcinkiewicz, M. Plewka, W. Hanke, P. Kahuzy, M. Wszyniewska, A. Lipinski-Ojrzanowska, et al., Is it possible to improve compliance in hypertension and reduce therapeutic inertia of physicians by mandatory periodic examinations of workers? Kardiol. Pol. 76 (3) (2018) 554–559.
[6] R.P. Nolan, R. Feldman, M. Dawson, J. Kaczorowski, H. Lynn, S.L. Barr, et al., Randomized Controlled Trial of E-Counseling 11; Circ Cardiovasc Qual Outcomes Orig, 2018, pp. 1–10.
[7] B. Vrijens, S. Antoniou, M. Burnier, A. de la Sierra, M. Volpe, Current situation of medication adherence in hypertension, Front. Pharmacol. 8 (MARC) (2017) 1–4.
[8] O. Abdu, Blood pressure control among hypertensive patients in university of gondar hospital, northwest Ethiopia: a cross sectional study, Clin. Med. Res. 6 (3) (2017) 99.
[9] R.A. Bell, R.L. Kravitz, Physician counseling for hypertension: What do doctors really do? Patient Educ Couns. 72 (2008) 115–121.
[10] A. Marcinkiewicz, M. Plewka, W. Hanke, P. Kahuzy, M. Wszyniewska, A. Lipinski-Ojrzanowska, et al., Is it possible to improve compliance in hypertension and reduce therapeutic inertia of physicians by mandatory periodic examinations of workers? Kardiol. Pol. 76 (3) (2018) 554–559.
[11] R.P. Nolan, R. Feldman, M. Dawson, J. Kaczorowski, H. Lynn, S.L. Barr, et al., Randomized Controlled Trial of E-Counseling 11; Circ Cardiovasc Qual Outcomes Orig, 2018, pp. 1–10.
[12] H. Alex, et al., Behavioral counseling interventions to promote a healthy diet and physical activity for cardiovascular disease prevention in adults with cardiovascular risk factors US preventive services task force recommendation statement, Clin Rev Educ 324 (20) (2020) 2069–2075.
[13] L. Lopez, E.F. Cook, M.S. Horng, L.S. Hicks, Lifestyle modification counseling for hypertensive patients: results from the national health and nutrition examination, Surveyor 22 (3) (2009), 1998 – 2004.
[14] G. Sekar, P. Novi, P. Sari, N. Indah, S. Laura, P. Ritzy, et al., The effect of counseling on the adherence of therapeutic hypertension patients, J Keperawatan 11 (2) (2020) 110–120.
[15] MOH, Guidelines on clinical and programmatic management of major non communicable diseases, ResearchGate (2016) 220.
[16] G.D. Zimet, S.S. Powell, G.K. Farley, S. Werkman, K.A. Berko, Psychometric characteristics of the Multidimensional Scale of Perceived Social Support (MSPSS) - Scale Items and Scoring Information, Pers Assess, 2016.
[17] A.H. el Bilbeisi, S. Hosseini, K. Djafarian, Association of dietary patterns with diabetes complications among type 2 diabetes patients in Gaza Strip, Palestine: a cross sectional study, J. Health Popul. Nutr. 36 (1) (2017) 1–11.
[18] Hassan N.A.G.M., Gunaid IMM-L A.A., Khat(Chata edulis): health aspect of khat chewing, East. Mediterr. Health J. 13 (2007) 706–717.
[19] K. Reba, B.W. Birhane, H. Gutema, Validity and reliability of the Amharic version of the world health organization’s quality of life questionnaire (whoqol-bref) in patients with diagnosed type 2 diabetes in felege hivos referral hospital, Ethiopia, J. Diabetes Res. (2019).
[20] WHO, Introduction,administration,scoring and Generic Version of the Assessment, 2016.
[21] MOH, Guidelines on clinical and programmatic management of major non communicable diseases, ResearchGate (2016) 220.
[22] E. Park-lee, J.D. Porter, M.R. Pemberton, P. Tice, Key Substance Use and Mental Health Indicators in the United States: Results from the 2015, National Survey on Drug Use and Health, 2015.
[23] F.C. Bull, S.S. Aj, S. Biddle, K. Borodulin, M.P. Busman, G. Cardon, et al., World Health Organization 2020 Guidelines on Physical Activity and Sedentary Behaviour 54, BMJ Publishing Group, 2020, pp. 1451–1462.
[24] M. Jakovljevic, L. Ostojic, Comorbidity and multimorbidity in medical today: challenges and opportunities for bringing separated branches of medicine closer to each other, Psychiatr. Danub. 25 (Suppl 1) (2013) 18–28.
[25] T. Melaku, L. Chelkeba, Z. Mekonnen, Clinical care & blood pressure control among hypertensive people living with human immune deficiency virus: prospective cohort study, Ann Med Surg 54 (November 2019) (2020) 114 [Internet] 24.
[26] A.O. Adeagbo, O.E. Omosanya, A.D. Ayodapo, S.O. 1 Elegbede Ot, Knowledge of salt intake and blood pressure control among hypertensive patients in a tertiary hospital, J. Biomed Res Clin Pract 2 (1) (2019) 14–18.
[27] H.L. Rose, P.M. Miller, L.S. Nemeth, R.G. Jenkins, P.J. Nietert, A.M. Wessell, et al., Alcohol screening and brief counseling in a primary care hypertension population: a quality improvement intervention, Addiction 103 (8) (2008) 1271–1280.
[28] JM de Souza Neto, P.H. guerra, E.A. Rufino, FF da Costa, isolated and simultaneous perceived barriers to physical activity counseling, Rev Bras Atividade Física Saúde. 24 (2020) 1–8.
[29] B. Mbeke, A. Peter, N. Fon, R. Chefofor, Knowledge of hypertension and compliance with therapy among hypertensive patients in the bamenda health district of Cameroon: a cross-sectional study, CardioTher 6 (1) (2017) 53–67.
[30] J.D. Newman, J.S. Berger, J.A. Ladapo, Underuse of medications and lifestyle counseling to prevent cardiovascular disease in patients with diabetes, Diabetes Care 42 (5) (2019) E75–E76.
[31] J.D. Newman, J.S. Berger, J.A. Ladapo, Underuse of prevention and lifestyle counseling in patients with peripheral artery disease, Physiol. Behav. 176 (12) (2017) 139–148. NPS.
[32] O.Y. Hung, N.L. Keenan, J. Fang, Physicians’ health habits are associated with lifestyle counseling for hypertensive patients, Am. J. Hypertens. 26 (2) (2013) 201–208.
[33] Y. Obirikorang, C. Obirikorang, E. Acheampong, E.O. Anto, D. Gyam, Blood pressure control among hypertensive patients in a tertiary district of Cameroon: a cross-sectional study, Cardiol Ther 6 (1) (2017) 53–67.
[34] F. Yiannakopoulou, J.S. Papadopulos, D.V. Cokkinos, T.D. Mountokalakis, Adherence to Antihypertensive Treatment: A Critical Factor for Blood Pressure Control Adherence to Antihypertensive Treatment: a Critical Factor for Blood Pressure Control 12, Eur J Cardiovasc Prev Rehabil., 2018.
[35] G.S. Srihari, N.P. Sari, N.S. Setianti, L.P.R.L. Tobing, A.R. Adrian, N.R. Ayu, et al., The effect of counseling on the adherence of therapeutic hypertension patients, J Keperawatan 11 (2) (2020) 110–120.

Author contribution statement

Zinabu Fentaw; Kidist Adamu: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

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Data availability statement

Data will be made available on request.

Declaration of interest’s statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

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J. Pan, L. Wu, H. Wang, T. Lei, B. Hu, X. Xue, et al., Determinants of hypertension treatment adherence among a Chinese population using the therapeutic adherence scale for hypertensive patients, Medicine (Baltim.) 98 (2019) 1–7.

G.M. Muldayeva, A.B. Kuzgibekova, I.A. Leyla, K.K. Berik, S.K. Sholpan, T.A. Kenzhetayeva, Quality of life of patients with hypertension and treatment compliance, Australas. Med. J. 10 (1) (2017) 1–6.

S.M. Khayyat, M.M.A. Mohamed, S.M. Saeed, K. Raghda, S.H. Alhazmi, et al., Association between medication adherence and quality of life of patients with diabetes and hypertension attending primary care clinics: a cross-sectional survey, Qual. Life Res. 28 (2018).

N.M. Adidja, V.N. Agbor, J.A. Aminde, C.A. Ngwasiri, K.B. Ngu, L.N. Aminde, Non-adherence to Antihypertensive Pharmacotherapy in Buea, Cameroon: a Cross-Sectional Community-Based Study 18, BMC Public Health, 2018, pp. 1–9.

P.E. Osamor, B.E. Owumi, Factors associated with treatment compliance in hypertension in southwest Nigeria, J. Health Popul. Nutr. 29 (6) (2011) 619–628.