Physical Activity and Its Associated Factors among Patients with Hypertension at Amhara Region Comprehensive Specialised Hospitals, Northwest Ethiopia: An Institutional Based Cross-Sectional Study

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ABSTRACT

Background Accurate evaluation of physical activity for patients with hypertension is important to determine patients’ health outcomes and intervention measures. Information about physical activity among patients with hypertension in Ethiopia is not well known.

Objective This study was aimed to assess the physical activity and associated factors among patients with hypertension.

Study design An institution-based cross-sectional study was conducted.

Study setting The study was conducted at the Tertiary Hospital Northwest, Ethiopia.

Outcome measures Physical activity was assessed by Global Physical Activity Questionnaire (GPAQ) which is an internationally accepted reliable and validated tool for cross-sectional studies worldwide.

Participants Four hundred and twenty patients with hypertension took part in the study; among those 233 were men and 187 were women. The study participants were chosen using a systematic random sampling method. SPSS V.20 statistical software was used to analyse the data.

Results Our study showed that 19.1% of study participants had inadequate physical activity, being old age with AOR: 10.27 (3.21 to 33.01), low or poor self-efficacy with AOR: 10.34 (4.89 to 21.84), poor self-rated health with AOR: 5.91 (1.73 to 20.13) and lack of adequate facilities with AOR: 4.07 (1.72 to 9.66) were significantly associated with physical activity.

Conclusion Inadequate physical activity was detected in one-fifth of the study participants, according to our research. Being elderly, having low self-efficacy, having inadequate facilities and having poor self-rated health were all linked to inadequate physical activity.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ To the best of investigators’ knowledge, this is the first study that assessed the level of physical activities and associated factors among patients with hypertension in the study area.
⇒ Physical activity of the study participants was assessed by using Global Physical Activity Questionnaire (GPAQ) which is an internationally accepted reliable and validated tool for cross-sectional studies worldwide.
⇒ Restriction of our analysis lies in the lack of information regarding time spent on inactivity. Even though there is a question to evaluate sitting time in the GPAQ short version, it is believed that this version possesses a low sensitivity for estimating this information.
⇒ Another limitation of the study is there may be some recall bias in the response of the respondents.
⇒ Another drawback is that the individuals in each of the categories may have additional health problems or some amount of minimal overlap of diseases because most of these conditions do not occur in isolation.

INTRODUCTION

Hypertension is becoming a major medical and public health problem in the world. It is the main risk factor for cardiovascular disease worldwide. The global burden of hypertension exceeds 1.4 billion people in 2010. The number of individuals with hypertension in developing countries was higher than in developed ones. That is 27% in Africa and 18% in America. The WHO reported that the prevalence of hypertension in Africa is high. Particularly in sub-Saharan regions, approximately 75% (1.04 billion) of people...
with hypertension live in low-income and middle-income countries.

People with hypertension can benefit from adequate physical activity. Increasing the recommended levels of physical activity could reduce the prevalence of the major non-communicable diseases (NCDs) by 6–10% such as coronary heart disease, hypertension, type 2 diabetes and breast and colon cancers. Contrarily, being inactive increases the risks of NCDs, comparing persons who are physically active to those who are not, people who are insufficiently active have a 20–30% higher risk of dying.

Increasing amounts of physical activity have been shown to favourably affect blood pressure in people with hypertension, independent of changes in body weight. It can attenuate systolic and diastolic blood pressure by ~11 and 8 mm Hg, respectively. And it helps to improve their physiological and mental health.

Despite the known benefits of regular physical activity, many studies showed that patients with hypertension performed less physical activity than healthy populations. The lack of physical activity contributes to 3.2 million deaths and 69.3 million disability-adjusted life years each year, due to the development of chronic diseases.

To the best knowledge of investigators, there is a dearth of literature available on the factors associated with the inadequacy of physical activity among patients with hypertension. So, there is a need to know how much physically inactive patients with hypertension are, and understand the factors related to it. Therefore, this study aimed to determine the inadequacy of physical activity and associated factors among patients with hypertension at the University of Gondar Comprehensive Specialized Hospital, Northwest Ethiopia.

METHODS AND MATERIALS

Study area and period

The study was conducted at the University of Gondar Comprehensive Specialized Hospital from March to June 2021. The hospital is in Gondar city administration Northwest, Ethiopia. It is located around 730 kilometres far from the Ethiopian capital city (Addis Ababa). The hospital is the first medical centre in Ethiopia. It has a hypertensive clinic for patients with hypertension and provides service for those patients 2 days per week. On average 105 patients with hypertension were treated per week in this clinic.

Study design and populations

An institutional-based cross-sectional study was conducted to assess the level of physical activity among patients with hypertension. Four hundred and twenty-three patients with hypertension were systematically selected to participate in the study based on eligibility criteria. Finally, 420 patients with hypertension participated in our study.

Patient and public involvement

None.

Sample size determination and sampling method

Because no study had been done with the same population and area. The sample size was calculated by using the assumptions of single population proportion formula \( n = \left( \frac{Z_\alpha/2}{\hat{p}(1-\hat{p})/d} \right)^2 \). The sample size was assumed to be 50% estimated population (p), 5% margin of error (d), 95% confidence level (alpha, =1.96). Therefore, the total sample size was obtained by adding a 10% non-response rate which was 423. The systematic random sampling method was used to select the study participants. The sample interval was determined by dividing the number of patients with hypertension (1240) divided by the sample size (423) of the study which resulted in a sample interval (K=3). The list of sample intervals was 1, 2 and 3. The initial study participant was chosen randomly by a lottery method approach from the list of sample intervals that was ‘1’, and the remaining study participants were selected systematically every third interval until the total sample size was reached.

Operational definitions

Physical activity

Defined as all body movements including during leisure time, for transport to get to and from places or as part of a person’s work. It also comprises routine daily tasks such as commuting, occupational tasks or household activities, as well as purposeful health-enhancing movements/activities. Then participants were classified into adequate physical activity and inadequate physical activity groups based on the overall cut-off point level of 600 metabolic equivalent tasks (MET)-min per week used. The total physical activity of ≥600 MET-min per week denotes adequate physical activity and an inadequate level of physical activity was represented by <600 MET-min per week according to the Global Physical Activity Questionnaire version 2 (GPAQ-2) grading criteria.

Attitude

The way patients with hypertension perceive physical activity is known from their attitude. A responder with a positive attitude is one who scored ≥4 out of 8 on the questionnaire’s questions about attitudes towards physical activity and those respondents who scored ≤4 on the 8-point scale for their attitude towards physical activity were considered to have a poor attitude.

Self-efficacy

A determination of one’s ability to perform at a specific level of physical activity. Respondents who scored ≥8 out of 15 on the self-efficacy scale for physical activity were considered to have high self-efficacy, while those who scored <8 out of 15 were considered to have low self-efficacy.

Eligibility criteria

Patients with hypertension who were older than 18 years were included. Patients with hypertension with serious mental illnesses, amputations, strokes, hearing impairments, pregnant women and people with physical...
disabilities were all excluded considering that various medical disorders have their own effects on physical activity.

Data collection tools and data quality control issues
A structured questionnaire was prepared to collect socio-demographic information (gender, age, religion, educational status, residence, monthly income and occupation of study participants), behavioural factors (smoking status, alcohol consumption), psychological and environmental factors (attitude, social support, self-efficacy, adequate facility and safe work environment to do physical activity) were gathered from different literature. The medical factors were collected from the patient’s medical records file.

Physical activity was measured using the GPAQ. Physical activity is undertaken in three domains. We created the following indicators using the GPAQ scoring protocol: total moderate to vigorous physical activity (MVPA) in MET-min and domain-specific MVPA MET-min (ie, work, transportation, recreation). The intensity of physical activity is commonly expressed in METs. When calculating a person’s overall energy expenditure using GPAQ,2 moderate-intensity activities during work, commuting and recreation are assigned a value of 4 METs; vigorous-intensity activities are assigned a value of 8 METs. The total MVPA MET-min score is computed as the sum of all MET-min per week from MVPA performed in work, commuting, and recreation.31

Study participants were asked if they had engaged in vigorous and moderate work and leisure-time activities continuously for at least 10 min. Transport-related activities include only moderate-intensity activities worked out continuously for at least 10 min. Participants responding affirmatively of their engagement in a specific activity were asked about the number of days engaging in each activity in a typical week, and the time spent in each activity in a typical day. The responses to the frequency and duration questions are used to calculate the total amount of time a person spent doing physical activity or MET-min per week. Vigorous-intensity activity is defined as an activity that makes an individual breath much harder than normal, and a moderate-intensity activity makes an individual breathe somewhat harder than normal. We used the generic GPAQ show cards to aid in obtaining consistent and valid measurements.32

In the GPAQ, sedentary behaviour was assessed through the question ‘How much time do you usually spend sitting or reclining on a typical day?’. Only activities with a duration of >10 min were included. The time spent on the three physical activities was truncated to a maximum of 180 min, and it was verified that there were >7 days per week.

Walking MET-min per week=4.0 × walking minutes × walking days, moderate MET min per week=4.0 × moderate-intensity activity minutes × moderate days and vigorous MET min per week=8.0 × vigorous-intensity activity minutes × vigorous-intensity days.

A combined total physical activity MET-min per week could be computed as the sum of walking+moderate-vigorous MET-min per week scores. Then participants were classified into adequate physical activity and inadequate physical activity groups based on the overall cut-off point level of 600 MET-min per week used. The total physical activity of ≥600 MET-min per week denotes adequate physical activity and an inadequate level of physical activity was represented by <600 MET-min per week. The height and weight of the participants were measured by the tape measure (in metres) and weighing scale (in kilograms) and when we measured the height and weight the study participants were not wearing their shoes.

Data quality control and data management
Five data collectors (two optometrists and three nurses) were trained by the principal investigator for 2 days before data collection. The study was pretested by trained data collectors with close supervision of the principal investigator to ensure the consistency of the questions and examination. The questionnaire was pretested at Felege Hiwot Comprehensive Specialized Hospital on 5% (15 participants) of the sample among patients with hypertension who were not included in the main study data in order to detect potential problems, unanticipated interpretations as well as to make an amendment and cultural issue to each question. The acquisition of quality of data random checks was carried out by the investigators and the questionnaire was modified and corrected based on the pretest result.

Data processing and analysis
Data were entered in Epi Info V.7 and transferred to SPSS V.20 for analysis. Descriptive statistics of the collected data were done for most variables in the study using statistical measurements. Binary logistic regression analysis was used to assess the association between dependent and independent variables. All independent variables with p value<0.20 in the bivariate logistic regression analysis were candidate variables for multivariate logistic regression to identify independently associated with the dependent variable in the final fitted model. The significance of the categorical variable was checked using the χ² test. The model fitness was checked using Hosmer and Lemeshow test (0.87). Multicollinearity among the independent variables was checked using the Variance Inflation Factor >1.0. The adjusted OR (AOR) was calculated using backward stepwise multivariate logistic regression. Finally, an AOR was used with a 95% CI and a p value <0.05 was considered statistically significant. The results of the study analysis were presented in descriptive statistics, frequency tables, graphs, percentages, means and standards.

RESULTS
Socio-demographic characteristics of the study participants
Out of 423 study participants, 420 have participated in the study with a response rate of 99.3%. Those three patients
with hypertension who were selected for a sample could not participate due to refusing to take the interview. The mean age of the study participants was 57.4±13.4. Among the total study participants, the majority of them, 233 (55.1%), were men, 348 (82.3%) were orthodox Christians and 142 (33.6%) were housewives (table 1).

**Behavioural characteristics of the study participants**

Seventeen participants (4%) declared that they were cigarette smokers and 58 (13.7%) of them were also alcohol consumers. Most of the participants, 215 (50.8%), were overweight, 168 (39.7%) were normal and 38 (9%) were obese (table 2).

### Psychological and environmental factors

From study participants, about 326 (77.1%) of respondents had high self-efficacy and almost all of respondents, 420 (99.3%) had a good attitude towards physical activity and also 136 (32.2%) had poor self-rated health.

Regarding the environmental factors, the majority of participants, 333 (78.7%), reported that they lack adequate facilities to do physical activity, as well as 240 (56.7%) of them have social support (table 3).

### Medical factors

Among the total participants 140 (33.1%) have comorbidities. As to comorbid diseases, 97 (30%) were diagnosed with diabetes mellitus (table 4).

### Physical activity among patients

Participants were categorised into adequate physical activity (active) or inadequate physical activity (inactive) based on accumulated METs per week. The overall inadequacy of physical activity among participants with hypertension was 19.1% at 95% CI (15.5 to 23.2) of them did achieve the weekly requirements of the WHO Physical Activity guideline.

### Factors associated with inadequate physical activity among patients

Explanatory variables that were significantly associated with bivariate logistic regression (p<0.20) were fitted to multivariate logistic regression analysis as physical activity was the outcome variable. After controlling potential confounders, variables such as age, self-efficacy, self-rated health and adequate facilities were significantly associated with inadequate physical activity among patients with hypertension (p<0.05), while variables such as educational status, occupation, monthly income, sex, safe sidewalks, comorbidities and residency were not significantly associated in multivariate analysis (p>0.5).

Participants whose age is 64 years and above were 10.29 times more likely to be physically inactive with AOR: 10.29, 95% CI (3.289 to 33.006) compared with the younger age.
Regarding the self-efficacy of participants towards physical activity, those respondents with low self-efficacy were 10.34 times more likely to be physically inactive with AOR: 10.34, 95% CI (4.89 to 21.84) than the high self-efficacy group. Regarding self-rated health, those respondents with poor self-rated health were 5.91 times more likely to be physically inactive with AOR: 5.91, 95% CI (1.73 to 20.13) than those who have good self-rated health. Participants who have no adequate facilities have 4.07 odds of being physically inactive than those who have adequate facilities with AOR: 4.07, 95% CI (1.72 to 9.66) (online supplemental table 1).

**DISCUSSION**

In this study outdoor walking was the most commonly reported physical activity practice among the respondents whereas recreational activities were the least commonly reported physical activity practice among the respondents. This may be due to the lack of adequate facilities to do physical activity, the cost of joining gym and exercise facilities, fear of injury by practicing high-intensity activities and self-belief like embarrassed to wear sportswear especially old age, and women. Our study found that the prevalence of inadequate physical activity among patients with hypertension was 19.1% at 95% CI (15.5 to 23.2), which is related to WHO guidelines, and which is lower than the study reported in the USA. This difference might be due to differences in methodologies, sample size and study subjects’ way of lifestyles. It was lower than the result of a study conducted in China which was 58.6%. The possible explanation might be due to differences in sociodemographic factors and lifestyle differences, the sample size and methodological differences. In developed countries like China people may spend most time being sedentary because of their industrial work. Whereas our study participants may perform different physical tasks to carefully balance or lead their way of life.

The results of this study were not comparable with a similar study conducted in South Africa which was 28.4%. The possible reasons could be different tools, methodologies, sample sizes and study populations. It was also lower than the reports of studies conducted in Nigeria which was 56.1% and studies conducted in Rwanda which was 69.44%. The lack of motivation, health conditions, lack of knowledge of the benefits of exercise, lack of time, limited financial resources and decreased their willingness to engage in physical activity all are possible reasons for higher prevalence compared with our study in which the majority of the populations working high demanding work use an active mode of transport due to financial constraints.

The prevalence of our study was also lower than the results of a similar study conducted in Kenya which was 63%. The possible reason for this difference might be variation in the study population, study setting and heterogeneity of the sample. In addition to this, the majority of study participants were urban residents and studies in the African context have shown that urban dwellers had inadequate physical activity. Another reason might be due to the limited sample size of some studies so
that it is difficult to make any definite conclusions for the small sample size of study participants.

Our study revealed that being older age participants were 10.29 times more likely to be physically inactive than younger patients with hypertension. It agreed with the previous studies conducted in Malaysia, South Africa and Nigeria. The possible reason for this might be the older age group of the study participants were mostly retired and their habit is a sedentary lifestyle after retirement. Furthermore, older people are reluctant to do physical activity due to their perception that hypertension weakens their bodies and causes them to have some demotivation effect to perform regular physical activity and tired feeling. But it contradicts with a previous study conducted in the USA that revealed that those >65 years of age did adequate physical activity compared with young patients with hypertension. This possible explanation might be reflective of adults staying in the workforce longer which may cause stress or time constraints that hinder incorporating physical activity into their lifestyle in the USA so those who retired at age 65 may have had more time to focus on structured activities to be more physically active, even if the study reports in the USA are contrary to the trend of declining physical activity level with increasing age.

In our study, the environmental factor that was social support was not associated with the level of physical activity which is contrary to similar previous studies conducted in the USA and Nigeria that revealed those patients with hypertension who have no social support performed inadequate physical activity. This difference might be related to the methodology and measuring tools.

Our study participants who had poor self-efficacy towards physical activity were 10.34 times more likely to be physically inactive compared with those who had good self-efficacy which is agreed with the previous studies done in China, South Africa, Nigeria and Rwanda that reported most of the patients with hypertension presented with low levels of physical activity have poor self-efficacy was a major barrier to physical activity among patients with hypertension.

The lack of adequate facilities had statistically positive significance with inadequate physical activity on patients with hypertension. The study participants who had no adequate facilities were 4.07 times more likely to be physically inactive compared with those who had adequate facilities. This is supported by previous studies which were conducted in the Netherlands and Rwanda. The possible reasons could be that both countries may not have adequate facilities to do physical activity for patients with hypertension.

Unlike other previous studies conducted in Rwanda, South Africa, Nigeria, Malaysia, the USA and North America, socio-demographic factors like sex, place of residence, marital status, occupational status and level of education were not associated in our study. The possible reason could be the diverse participants’ socio-economic circumstances, sociocultural backgrounds and geographical origin. For example, in our study, the residence was categorised into urban and rural. Whereas in another study the residence was categorised into rural, urban and city, which might have made these differences. Women residing in rural zones and those with low socioeconomic status might be engaging in sports less frequently.

Smoking cigarettes, alcohol consumption and body mass index were not significantly associated in our study that contradicts with the reports of previous studies conducted in Finland and Rwanda. The possible reasons could be the low prevalence of smokers and alcohol users in our study and the small sample size. For example, a study conducted in Rwanda has a sample size of 252 patients with hypertension which is small compared with our study sample size (n=420). As well as those who
were overweight and obese individuals being motivated to engage in physical activity to have weight loss.

Regarding self-rated health, the patients with hypertension with poor self-rated health were 5.91 times more likely to be physically inactive than good self-rated health patients with hypertension. It is supported by the previous similar studies reported from China and Rwanda. The possible explanation for similarity could be the study participants sensing unpleasant experiences gathered by patients throughout the course of their illness.

STRENGTHS AND LIMITATIONS OF THIS STUDY
Physical activity levels were assessed by using GPAQs which were inherited to recall bias. However, this instrument is an internationally accepted reliable and validated tool for cross-sectional study worldwide. Besides these limitations, it is an initial study in the study area which adds to the limited body of evidence by providing useful data for the hospital, health professionals and patients with hypertension. Another restriction of our analysis lies in the lack of information regarding time spent on inactivity even though there is a question to evaluate sitting time in the GPAQ short version. It is believed that this version possesses a low sensitivity for estimating this information. Another drawback is that the individuals in each of the categories may have additional health problems or some amount of minimal overlap of diseases because most of these conditions do not occur in isolation. However, there might be a possible recall bias for physical activity because of the frame of reference being a ‘typical week’. This could have resulted in overestimation or underestimation of physical activity.

CONCLUSION
The study revealed that one-fifth of the patients with hypertension were under inadequate physical activity level in the study areas. Being older age (>64 years old), low self-efficacy, poor self-rated health and lack of adequate facilities were significantly associated with inadequate physical activity. Patients with hypertension with inadequate physical activity levels were advised to engage in regular physical exercise based on their age, medical status and income. When planning and implementing comprehensive care for patients with hypertension factors that influence physical activity engagement must be considered

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