Undiagnosed Hypertension and Its Associated Factors Among Adult People Living in Southern Ethiopia: Discovery From Gunchire Woreda of Gurage Zone

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Abstract

Background: Hypertension is defined as two or more readings of systolic blood pressure measurement of 130 mm Hg or higher or diastolic blood pressure measurement of 80 mm Hg or higher (1). Globally, around one billion people are affected by hypertension and it is predicted to increase to 1.5 billion by 2025 (2). Symptoms of hypertension (HTN) are often not detectable at early stages and because of this many people with the disease are mostly left undiagnosed. Undiagnosed HTN is the one that increases the risk of complications such as renal failure, heart failure, myocardial infarction, stroke and premature death. There is no report concerning undiagnosed hypertension in the area. This study is aimed to assess prevalence of undiagnosed hypertension and its associated factors among adult peoples.

Method: Community based Cross-sectional study design was conducted. English version questionnaire was used to collect data from 574 households. The data was collected and analyzed by SPSS version.23. The association between dependent and independent variables was tested by using multivariate regression at P-value less than 0.05 and 95% CI.

Result: Out of 590 participants, 108 (18.8%) respondents were cigarette smokers and 143 (24.9%) were khat chewers. About 106 (18.5%) of respondents have sedentary lifestyle. A total of 260 (45.3%) of respondents were identified as having undiagnosed hypertension. Respondents having sedentary life style had about 2.24 time’s higher risk of undiagnosed HTN than those who didn’t have sedentary life style. BMI, sedentary life style, cigarettes smoking, health seeking behavior, dietary habit and monthly income were significant predictors of undiagnosed HTN.

Conclusion: Based on the identified high prevalence of undiagnosed hypertension, the finding suggests awareness creation for community members about undiagnosed hypertension, its symptoms and ways of managing it.

Keywords: undiagnosed hypertension, factors, adult people, Ethiopia

1. Introduction

Hypertension is defined as two or more readings of systolic blood pressure measurement of 130 mm Hg or higher or diastolic blood pressure measurement of 80 mm Hg or higher (1). Globally, around one billion people are affected by hypertension and it is predicted to increase to 1.5 billion by 2025 (2). Symptoms of HTN are often not detectable at early stages and because of this many people with the disease are undiagnosed (3, 4).

Undiagnosed HTN is increasing the risk of complications such as renal failure, heart failure, myocardial infarction, stroke and premature death (5). Undiagnosed hypertension is defined as individuals who were hypertensive but did not report having been told by a health professional that they have hypertension. It is an important risk factor for development of chronic kidney disease, cardiovascular disease and all-cause mortality (6).

In 2007, around 50% of the world populations were living with undiagnosed hypertension (7). One out of three adults have hypertension and more than 50% of them are unaware of their status (8).The burden of undiagnosed hypertension increases with age increases, it ranges from 6.0% in the age group of 18–19 years to 28.7% in the age group of 65–69 years (9). Its prevalence is also significantly higher in the rural areas 20.7% compared to urban areas 16.1% and regarding sex it is higher in males 18.6% than in females 15.6% (10). A 75% of people with HTN are...
living in low and middle-income countries. Those people are often having low awareness in relation to HTN, its treatment methods and control measures to be used (11). This leads to low healthcare seeking behavior, which results in a high prevalence of undiagnosed HTN in those populations. The prevalence of undiagnosed HTN is about 30% in sub-Saharan Africa (SSA) countries. Out of those with HTN, 73% were unaware about their HTN; only 18% were received treatment and about 7% had a controlled blood pressure measurement (12). In Ethiopia there is rapid economic development, nutrition transition and globalization that lead to a rapid change in the lifestyles of its peoples that paramount the risk of hypertension (13). In Ethiopia, the magnitude of undiagnosed hypertension is 15.6% and only a very small percentage of people had been aware of their high blood pressure (14).

Globally, around one billion people are affected by hypertension and it is predicted to increase to 1.5 billion by 2025 (2). In 2007, around 50% of the world populations were living with undiagnosed hypertension (7). One out of three adults has hypertension and more than 50% of them are unaware of their status (8). Ethiopia NCD STEPS study reported that in 2016, 76.6% of the total population never measures their blood pressure per year. Studies also indicated that there was a high prevalence of undiagnosed hypertension among working-age groups which requires urgent preventive and curative action (13, 15). Study done at Dabat in northern Ethiopia showed 16.4% of patients with HTN were on antihypertensive treatment, but about 83.4% had not diagnosed or treated for HTN (16). The prevalence of undiagnosed HTN was 13.3% in Gulele Sub-city, Addis Ababa, Ethiopia (17). More than 80% of patients with HTN had no awareness of their HTN status (18). Study conducted at Gondar in northern Ethiopia identified that among people with HTN about 37.0% did not know that they had HTN (19).

The burden of undiagnosed hypertension increases with age increases, it ranges from 6.0% in the age group of 18–19 years to 28.7% in the age group of 65–69 years (9). Its prevalence is also significantly higher in the rural areas 20.7% compared to urban areas 16.1% and regarding sex it is higher in males 18.6% than in females 15.6% (10). Factors such as harmful alcohol consumption, obesity and high salt intake were significantly associated with undiagnosed HTN based on study done in northern India. In the same study, age, being male, socioeconomic status and marital status were also identified as risk factors which predicted prevalence of undiagnosed HTN (20). Based on the study conducted in Hawassa in southern Ethiopia, the prevalence of undiagnosed HTN among the respondents was 12.3% (21). Also, based on the study conducted in Amhara region in Ethiopia the prevalence of undiagnosed hypertension among bank workers was 24.8% (22).

High age and illiteracy were also identified as risk factor for undiagnosed HTN in a rural community in Sudan (23). In Nigeria, undiagnosed HTN was significantly associated with being older, married and obese traders. Age, occupation and marital status were also significantly predicting undiagnosed HTN in Gulele Sub-city, Addis Ababa, Ethiopia (24).

Study shows being male, people with a family history of HTN, people who chewed khat, overweight or obese individuals and people with diabetes mellitus had a higher risk of undiagnosed HTN than their counterparts (21). Also, it is studied that age, being male, having moderate knowledge, having poor knowledge, and being physically inactivity were variables significantly associated with undiagnosed hypertension (22).

The prevalence of HTN was higher among khat chewers than among non-chewers in Nekemte town in western Ethiopia (25). Khat chewing was also associated with increased systolic and diastolic blood pressure in Gurage Zone, southern Ethiopia (26). Ethiopia NCD STEPS study reported that in 2016 there was 76.6% that never had their blood pressure measured among total population. Studies identified a high prevalence of undiagnosed HTN among adolescents (25, 27). To the best of our knowledge, there is no report concerning undiagnosed hypertension in the area in Gurage Zone, Ethiopia. This study extracted the prevalence of undiagnosed hypertension and its associated factors among adults in the study area.

2. Methods

This study will be conducted in Enemor Woreda. Enemor is one of the woredas in Gurage Zone of SNNPR in Ethiopia. It is 172 km far away from Addis-Ababa, Capital city of Ethiopia and 42 kilometers from Welkite, capital town of Gurage Zone. Based on the report of Woreda administration there is a total population of 22,735 of which 10,892 are males and 11,336 are females in the woreda. There are four Kebeles in the Woreda and there are 4,639 households in the Woreda. Among the total households, 1074 are found in Kuchira Kebele, 701 in Gunchira Mazoria Kebele, 1313 in Gunchure 01 Kebele and 1551 in Gunchure 02 Kebele. Community based cross-sectional study was conducted on purposively selected Gunchure 01 and 02 Kebeles on August 2021. A total of 574 respondents were participated.

A multi stage sampling method was used to select study participants. Purposive sampling method was used to select
Enemor Woreda of Gurage zone for this study. To have enough sample size and to make our study more representative the four Kebeles were included in this study. Households were selected by systematic random sampling method from each Kebele. The sample size was proportionally allocated based on the number of households to the Kebeles which were selected for this study. By systematic sampling technique households were included in the study.

The survey instrument is adapted from the documents “Ethiopian NCD STEPS25” and a “modified WHO STEP-wise approach surveillance instrument version 3.26”. The instrument consists of three main sections: socio-demographic characteristics, knowledge or perception towards HTN and behavioral characteristics such as tobacco smoking, alcohol consumption and physical inactivity. It was prepared in English, then translated into Gurage and Amharic language and then retranslated back to English to check the consistency in meaning.

Using a pretested questionnaire, a face-to-face interview was conducted. After completing the interview, the weight, height and blood pressure of the study participant was measured. We calibrated instruments and standardized techniques to take the measurements. Weight was measured using an electronic scale. The instrument were checked and adjusted to zero for each measurement. Height was measured in the standing position. Blood pressure was measured three times in a sitting position using a standard mercury sphygmomanometer. The study participant took rest for 3–5 minutes between the consecutive measurements. The measurement was taken after confirming that the study participant are not smoked or drunk any caffeinated beverage within 30 minutes before measuring the blood pressure. The average of the three blood pressure measurements was calculated to determine the blood pressure of the participant.

Data entry and analysis was performed using SPSS version 23 statistical software. Descriptive statistics was computed to describe frequency distributions. Bivariate logistic regression analysis was carried out to identify candidate variables for multivariable logistic regression analysis. All factors with a $P$-value of $\leq 0.05$ in the bivariate logistic regression analysis were included in the multivariable model. A multivariable logistic regression model was used to identify the independent predictors of undiagnosed HTN. Odds ratios (ORs) with 95% confidence intervals (CI) can be calculated. The result can declare statistically significant if the $P$-value was below 0.05 and the 95% CI couldn’t cross the null value. The Hosmer–Lemeshow goodness-of-fit statistic was used to assess whether the necessary assumptions for the application of multiple logistic regression are fulfilled.

Ethical clearance was obtained from Wolkite University ethical board committee. During data collection, the purpose of the study was clearly explained to the participants and informed verbal consent was obtained from each study participant for the data collection. Issues of rights, privacy and confidentiality were ensured during data collection period. Confidentiality was kept by making anonymous and assuring information will not be accessible to anyone. Privacy was maintained by arranging silent and comfortable place to the interviewer and study subject. Participants have the right to participate or not and to withdraw at any time when they feel discomfort.

The findings of this study was submitted and presented to Wolkite University, department of Nursing. Effort will be made to present this study in different symposiums.

3. Result

3.1 Socio-demographic Characteristics

From 590 total sample size 574 households were participated in this study with a response rate of 97.3%. About 289 (50.3%) of respondents are within the age range of 30-49 years. Among the respondents majority 362(63.1%) were females and only 34 (5.9%) were unable to read and write. The marital status of respondents indicates that 538 (93.7%) were married. Two hundred four (35.3%) of the respondents were followers of Orthodox Christianity followed by Muslims which accounts 160 (27.9%). Regarding their monthly income, 321(55.9%) of the respondents have income level of 2000 and above Ethiopian birr. Out of total respondents 302 (52.6%) were from rural areas (see Table 1).
Table 1. Socio-demographic characteristics of study participants (n = 574)

| Characteristics               | Number | Percentage (%) |
|-------------------------------|--------|----------------|
| **Sex**                       |        |                |
| Male                          | 212    | 36.9           |
| Female                        | 362    | 63.1           |
| **Age**                       |        |                |
| 18-29                         | 117    | 20.4           |
| 30-49                         | 289    | 50.3           |
| ≥50                           | 168    | 29.3           |
| **Religion**                  |        |                |
| Orthodox                      | 204    | 35.5           |
| Muslim                        | 160    | 27.9           |
| Protestant                    | 156    | 27.2           |
| Catholic                      | 54     | 9.4            |
| **Marital status**            |        |                |
| Married                       | 538    | 93.7           |
| Divorced                      | 36     | 6.3            |
| **Level of education**        |        |                |
| Unable to read and write      | 34     | 5.9            |
| Able to read and write        | 281    | 49             |
| Primary school                | 223    | 38.9           |
| High school and above         | 36     | 6.3            |
| **Occupation of mothers**     |        |                |
| Farmer                        | 176    | 30.7           |
| Non-employee                  | 291    | 50.7           |
| Employed                      | 35     | 6.1            |
| Other                         | 72     | 12.5           |
| **Monthly income**            |        |                |
| Less than 2000                | 253    | 44.1           |
| Greater or equal to 2000      | 321    | 55.9           |
| **Residence**                 |        |                |
| Urban                         | 302    | 52.6           |
| Rural                         | 272    | 47.4           |

3.2 Physical Activity Status of Study Participants

The vigorous activities ≥10 minute/day: 396 (69%) sawing hardwood, 163 (28.4%) ploughing, 37 (6.4%) playing football and 75 (13.1%) weight lifting >20kg as daily physical activities. The study participants involved in moderate activities at least 10 minute/day were mainly 412 (71.8%) washing clothes by hand, 401 (69.9%) drawing (Fetching) water and 537 (93.6%) walking. The prevalence of sedentary life style or physically inactive was 24 (4.2%) (See Table 2).
Table 2. Daily physical activities among study participants in selected household

| Variables          | Category                | ≤ 10 minute | >10 minute |
|--------------------|-------------------------|------------|------------|
|                    | No. (%)                 | No. (%)    | No. (%)    |
| Vigorous activities| Sawing hardwood         | 108 (18.8) | 70 (12.2)  | 396 (69)  |
|                    | Ploughing               | 303 (52.8) | 108 (18.8) | 163 (28.4) |
|                    | Playing football        | 431 (75.1) | 106 (18.5) | 37 (6.4)  |
|                    | Weight lifting (>20kg)  | 443 (77.2) | 56 (9.8)   | 75 (13.1) |
| Moderate activities| Gardening               | 127 (22.1) | 219 (38.2) | 228 (39.7) |
|                    | Washing clothes by hand | 63 (11)    | 99 (17.2)  | 412 (71.8) |
|                    | Drawing (Fetching) water| 80 (13.9)  | 93 (16.2)  | 401 (69.9) |
|                    | Walking                 | 24 (4.2)   | 13 (2.3)   | 537 (93.6) |
|                    | Riding pedal bicycle    | 550 (95.8) | 11 (1.9)   | 13 (2.3)  |

3.3 Behavioral and Personal Characteristics Including Family History of Participants

About 108 (18.8%) of the study participants were current cigarette smokers and 143 (24.9%) were khat chewers. Regarding alcohol consumption, 110 participants (19.2%) had drunk alcohol in the previous year. A sedentary lifestyle was seen in 106 (18.5%) of the studied people. The BMI for 88 (21.9%) of the study participants was 25 kg/m² or more. A total of 260 (45.3%) of respondents were identified by this study as having undiagnosed hypertension (See Table 3).

Table 3. Behavioral characteristics, personal and family history of morbidities of the study participants

| Variables          | Number | Percentage (%) |
|--------------------|--------|----------------|
| History of hypertension |       |                |
| Yes                | 180    | 31.4           |
| No                 | 394    | 68.6           |
| Cigarette smoking  |        |                |
| Yes                | 108    | 18.8           |
| No                 | 466    | 81.2           |
| Alcohol drinking   |        |                |
| Yes                | 110    | 19.2           |
| No                 | 464    | 80.8           |
| Chat Chewing       |        |                |
| Yes                | 143    | 24.9           |
| No                 | 431    | 75.1           |
| Sedentary life style|       |                |
| Yes                | 106    | 18.5           |
| No                 | 468    | 81.5           |
| Dietary habit      |        |                |
| Enjera with wotsi  | 217    | 37.8           |
| Qocho              | 357    | 62.2           |
| BMI                |        |                |
Among the interviewed people, about 325 (56.5%) seeks treatment for HTN symptoms. About 144 (25.1%) of respondents, responded that HTN can be prevented, while 252 (43.9%) knew that HTN could cause complications. Moreover, 253 study participants (44.1%) perceived their susceptibility to HTN. Majority of respondents, 324 (56.4%) had good knowledge towards hypertension. The number of people who said stressful life situation is a reported cause of hypertension was 475 (82.8%), whereas all respondents said that regular blood pressure measurement is important (See Table 4).

Table 4. Knowledge, perception and practice of the study participants towards hypertension

| Variables                                           | Number | Percentage (%) |
|-----------------------------------------------------|--------|----------------|
| **Reported causes of hypertension**                 |        |                |
| Stressful life situation                            | 475    | 82.8           |
| High salt and fat diet                              | 57     | 9.9            |
| Sedentary lifestyle                                 | 42     | 7.3            |
| **Knew symptoms of hypertension**                   |        |                |
| Yes                                                 | 261    | 45.5           |
| No                                                  | 313    | 54.5           |
| **Hypertension can be prevented**                   |        |                |
| Yes                                                 | 144    | 25.1           |
| No                                                  | 430    | 74.9           |
| **Hypertension causes complication**                |        |                |
| Yes                                                 | 252    | 43.9           |
| No                                                  | 322    | 56.1           |
| **Regular blood pressure measurement is important** |        |                |
| Yes                                                 | 574    | 100            |
| **Seek care for hypertension symptoms**             |        |                |
| Yes                                                 | 325    | 56.6           |
| No                                                  | 249    | 43.4           |
| **Ever had blood pressure measurement**             |        |                |

3.4 Knowledge, Attitude and Practice of Study Participants on Hypertension
3.5 Risk Factors for Undiagnosed Hypertension

The association between dependent and independent variables was checked by using bivariate logistic regression at p< 0.25 and then candidates were selected for analysis by multivariable binary logistic regression. In a bivariate analysis, level of educational, BMI, sedentary life style, cigarettes smoking, health seeking behavior, dietary habit and monthly income showed significant statistical association with undiagnosed HTN. The strength of association between the dependent and independent variables was determined by calculating the odds ratio. Finally, the variables which have significant association were identified on the basis of AOR with 95% CI and p< 0.05 in multivariable logistic regression. In a multivariate analysis, however, level of educational, BMI, sedentary life style, cigarettes smoking, health seeking behavior, dietary habit and monthly income maintained the significance in predicting undiagnosed HTN.

Respondents having sedentary life style had about 2.24 times higher risk of undiagnosed HTN (AOR=2.24, 95% CI 1.37, 3.67; P<0.001) than those who did not. People who had BMI of 25 and above had 2.42 times an increased risk of undiagnosed HTN compared to those below 25 (AOR=2.42, 95% CI 1.43, 4.09; P<0.001). On the other hand, compared to respondents who smoke, those respondents who did not smoke were 0.45 times less likely to have undiagnosed HTN [AOR:0.45 (0.28,0.73)]. In the same way, compared to those who did not have health seeking behavior, those who had were 0.41 times less likely to have undiagnosed HTN [AOR:0.41 (0.25, 0.66)]. Also, compared to respondents who have monthly income less than 2000 Ethiopian birr, those who have above were 0.68 times less likely to have undiagnosed HTN [AOR: 0.68 (0.48,0.97)]. Also, compared to those who eat Enjera with Wotsi, those who eat Qocho were 0.57 times less likely to have undiagnosed HTN [AOR: 0.57 (0.40, 0.83)]. Similarly, compared to those who have poor knowledge towards hypertension, those who have good knowledge were 0.27 times less likely to have undiagnosed HTN [AOR: 0.27 (0.15, 0.46)] (See Table 5).

Table 5. Logistic regression analysis result for association between variables

| Characteristics         | Undiagnosed Hypertension | COR(95% CI) | AOR(95% CI) |
|-------------------------|--------------------------|-------------|-------------|
|                         | No                        | Yes         |             |             |
|                         | No. (%)                   | No. (%)     |             |             |
| Sedentary life style    |                           |             |             |             |
| Yes                     | 70(12.2)                  | 36(6.3)     | 1.79(1.15,2.77) | 2.24(1.37,3.67) |
| No                      | 244(42.5)                 | 224(39)     | P-value=0.01 | P<0.001     |
| Level of education      |                           |             |             |             |
| Illiterate              | 11(1.9)                   | 23(4)       | 0.75(0.59,0.95) | 0.83(0.64,1.07) |
| Read and write          | 152(26.5)                 | 129(22.5)   | P-value=0.02 | P-value=0.15 |
| Primary school          | 128(22.3)                 | 95(16.6)    |             |             |
| High school and Above   | 23(4)                     | 13(2.3)     |             |             |
| Cigarette smoking       |                           |             |             |             |
4. Discussion

Our study shows a total of 260 (45.3%) of respondents were identified by as having undiagnosed hypertension. Our study identified that factors like level of education, BMI, sedentary lifestyle, cigarettes smoking, health seeking behavior, dietary habit and monthly income maintained the significance in predicting undiagnosed HTN.

About 45.3% of respondents had undiagnosed HTN in this study which is lower than 70% of people with HTN in Indonesia that had undiagnosed HTN (28), higher than report in Vietnam found a prevalence of 17.4% (29), higher than prevalence of undiagnosed HTN 22.0% in the USA (30), higher than prevalence of undiagnosed HTN 22.0% in the USA (30), higher than prevalence of undiagnosed HTN in Lebanon (35) and higher than prevalence of undiagnosed HTN in a rural community in Sudan 38.2% (36). Our prevalence is also lower than study conducted in Hawassa showing Undiagnosed HTN of 47 (12.3%) of the study participants (21).

About 108 (18.8%) of our study participants were cigarette smokers which is lower than study conducted in Hawassa in Ethiopia stated that 14 (3.7%) were cigarette smokers (21) and 143 (24.9%) were khat chewers in this study which is higher than 48 (12.5%) were khat chewers (21). This study shows 110 participants (19.2%) had drunk alcohol in the previous year which is higher than other study showing 63 participants (16.4%) had drunk alcohol in the previous year (21). A sedentary lifestyle was identified from 106 (18.5%) of the studied people in our study which is lower than 148 (38.6%) of the studied people (21). The body mass index (BMI) for 88 (21.9%) of the study participants was 25 kg/m² or more which is lower than 84 (21.9%) of the study participants was 25 kg/m² or more (21).

This study showed that people who had BMI of 25 and above had 2.42 times an increased risk of undiagnosed HTN compared to those below 25 (AOR=2.42, 95% CI]. The strength our study is slightly lower than a study that noted people with higher BMI had an increased risk of having undiagnosed HTN (AOR=3.5, 95% CI) (21). The result of this study is also slightly lower in strength than other study showing BMI 25 Kg/m² and above or over weight/obesity had about 3 times more exposed to develop undiagnosed hypertension with [AOR 3.06, 95% CI] when compared to their counterparts.

Our study also shows respondents having sedentary lifestyle had about 2.24 times higher risk of undiagnosed HTN (AOR=2.24, 95% CI] than those who did not. On the other hand, compared to respondents who smoke, those respondents who did not smoke were 0.45 times less likely to have undiagnosed HTN [AOR:0.45, 95% CI]. In the same way, compared to those who did not had health seeking behavior, those who had were 0.41 times less likely to
have undiagnosed HTN [AOR:0.41, 95% CI]. Also, compared to respondents who have monthly income less than 2000 Ethiopian birr, those who have above were 0.68 times less likely to have undiagnosed HTN [AOR: 0.68, 95% CI]. Also, compared to those who eat Enjera with Wotsi, those who eat Qoc ho were 0.57 times less likely to have undiagnosed HTN [AOR: 0.57, 95% CI].

Our study shows that when compared to those who have poor knowledge towards hypertension, those who have good knowledge were 0.27 times less likely to have undiagnosed HTN [AOR: 0.27, 95% CI] and other study also indicated that those who had moderate knowledge about hypertension were 3.81 times more likely to have undiagnosed hypertension as compared with those who had good knowledge with (AOR = 3.81, 95% CI).

5. Conclusion
According to this study one out of two respondents were found to have undiagnosed hypertension. BMI, sedentary life style, cigarettes smoking, health seeking behavior, dietary habit and monthly income maintained the significance in predicting undiagnosed HTN. This study was done both in rural and urban area and further separate studies on both areas are needed.

Awareness creation by healthcare professionals in a community and at healthcare institutions should be needed for community members about the importance identifying undiagnosed hypertension and was of managing it. Disseminating health information to community members to know in detail about undiagnosed hypertension and contributing factors.

Conflict of interest
The authors declare that they have no conflict of interest.

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