Journal of
Hypertension and Management

RESEARCH ARTICLE

Undiagnosed Hypertension and Its Associated Factors among Adult People Living in Southern Ethiopia: Evidence 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 mmHg or higher or diastolic blood pressure measurement of 80 mmHg or higher. In the early stages, symptoms of hypertension (HTN) are often not detectable and thus many people with the disease are left undiagnosed. Undiagnosed HTN increases the risk of complications such as renal failure, myocardial infarction, heart failure, stroke and premature death. There is paucity of data concerning undiagnosed hypertension in southern Ethiopia. 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 were collected and analyzed by SPSS version.23. The association between "blood pressure and socio-demographic characteristics', life style factors, behavioral factors..." was tested by using multivariate logistic regression at P-value less than 0.05 and 95% CI.

Result: Out of 574 participants, 108 (18.8%) of the study participants were current cigarette smokers and 143 (24.9%) were khat chewers. A sedentary lifestyle was seen in 106 (18.5%) of the studied people. Undiagnosed HTN was observed in 47 (15.3%) of the study participants. A total of 260 (45.3%) of respondents were identified as having undiagnosed hypertension. Body mass index (BMI), sedentary life style, cigarettes smoking, health seeking behavior, dietary habit and monthly income were significant predictors of undiagnosed HTN.

Conclusion: Almost 50% of the adult population in the southern of Ethiopia shows undiagnosed hypertension and this is significantly correlated with body mass index (BMI), sedentary life style, cigarettes smoking, health seeking behavior, dietary habit and monthly income.

Keywords

Undiagnosed hypertension, Factors, Adult people, Ethiopia

Introduction

Hypertension is defined as two or more readings of systolic blood pressure measurement of 130 mmHg or higher or diastolic blood pressure measurement of 80 mmHg or higher [1]. Globally, around one billion people are affected by hypertension. It is predicted to increase to 1.5 billion by 2025 [2]. In the early stages, symptoms of HTN are often not detectable and thus many people with the disease are left undiagnosed [3,4].

Undiagnosed HTN increases the risk of complications such as renal failure, myocardial infarction, heart failure, 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 [6]. One out of three adults have hypertension and more than 50%

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of them are unaware of their status [7]. 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 [8]. 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% [9]. About 75% of people with HTN live in low- and middle-income countries. People in such settings often have low awareness related to HTN, its treatment and control measures [10]. This may lead to low healthcare-seeking behavior, which in turn results in a high prevalence of undiagnosed HTN in these populations. The prevalence of undiagnosed HTN was found to be 30% in the Sub-Saharan Africa (SSA). Of those with HTN, 73% were unaware of their HTN; only 18% received treatment and 7% had a controlled blood pressure measurement [11]. Ethiopia as a developing country, there are economic development, industrialization, nutrition transition and globalization that lead to a rapid change in lifestyles that paramount the risk of hypertension [12]. 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 [13].

Globally, around one billion people are affected by hypertension. 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 [6]. One out of three adults has hypertension and more than 50% of them are unaware of their status [7]. The study reports of Ethiopia NCD STEPS, 2016 indicate that 76.6% of the total population never been measured for blood pressure per year. Some studies indicate there was a high prevalence of undiagnosed hypertension among working-age groups that were major health problem which requires urgent action [12,14]. In Dabat, northern Ethiopia, only 16.4% of patients with HTN were on antihypertensive treatment, while 83.4% had not been diagnosed and/or treated for HTN [15]. The prevalence of undiagnosed HTN was 13.3% in Gulele Sub-city, Addis Ababa, Ethiopia [16]. Over 80% of patients with HTN had no awareness of their status [17]. In Gondar, northern Ethiopia, among people with HTN, 37.0% did not know that they had HTN [18].

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 [8]. 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% [9]. Harmful alcohol consumption, obesity and high salt intake were the risk factors significantly associated with undiagnosed HTN in northern India. In the same study, age (45-69-year age group), male gender, socioeconomic status and marital status were other risk factors which predicted having undiagnosed

HTN [19]. Based on the study conducted in Hawassa in southern Ethiopia, the prevalence of undiagnosed HTN among the respondents was 12.3% [20]. Also, based on the study conducted in Northern Ethiopia the prevalence of undiagnosed hypertension among bank workers was 24.8% [21].

High age and illiteracy predicted undiagnosed HTN in a rural community in Sudan [22]. In Nigeria, undiagnosed HTN was significantly higher among older, married and obese traders. Age, occupation and marital status were significantly associated with undiagnosed HTN in Gulele Sub-city, Addis Ababa, Ethiopia [16].

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 [20]. 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 [21].

The prevalence of HTN was higher among khat chewers in the past year than among non-chewers in Nekemte town in western Ethiopia [23]. Chronic khat chewing was associated with increased systolic and diastolic blood pressure in Gurage Zone, southern Ethiopia [24]. The report from Ethiopia NCD STEPS in 2016 indicated that 76.6% of the total population had never had their blood pressure measured. There was a high prevalence of undiagnosed HTN among adolescents [12,23]. 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.

Methods

This study will be conducted in Enemor Woreda. Enemor is one of the wored as 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 to 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 ≤ 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-Lemes how 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.

Result

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 (Table 1).

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 > 20 kg 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%) (Table 2).

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 body mass index (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 (Table 3).

Knowledge, attitude and practice of study participants on hypertension

Among the interviewed people, about 325 (56.5%)

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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

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		
< 25	486	84.7
≥ 25	88	15.3
Diabetic mellitus		
Yes	107	18.6
No	467	81.4
Health seeking behavior		
Yes	466	81.2
No	108	18.8
Blood pressure measurement		
No undiagnosed hypertension	314	54.7
Undiagnosed hypertension	260	45.3

Table 2: Daily physical activities among study participants in selected household.

Variables	Category	No	≤ 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 (> 20 kg)	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)

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

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

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		
Yes	107	18.6
No	467	81.4
Perceived susceptibility to hypertension		
Yes	253	44.1
No	321	55.9
Knowledge		
Good	324	56.4
Poor	250	43.6

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 (Table 4).

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, body mass index (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% CI1.37, 3.67; P < 0.001) than those who did not. People who had body mass index (BMI) of 25 and above had 2.42 times an increased risk of undiagnosed HTN compared to those below 25 (AOR = 2.42, 95% CI1.43, 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 had 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)] (Table 5).

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 life style, 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 [25], higher than report in Vietnam found a prevalence of 17.4% [26], higher than prevalence of undiagnosed HTN 22.0% in the USA [27], higher than 31.7% in Sri Lanka [28], higher than 10.1% in a rural population in India [12], higher than 26% in western India [19,29], higher than 42.7% of study participants had undiagnosed or uncontrolled HTN in Lebanon [30] and higher than prevalence of undiagnosed HTN in a rural community in Sudan 38.2% [22]. Our prevalence is also lower than study conducted in Hawassa showing Undiagnosed HTN of 47 (12.3%) of the study participants [20].

About 108 (18.8%) of our study participants were current cigarette smokers which is lower than study conducted in Hawassa in Ethiopia stated that 14 (3.7%) were current cigarette smokers [20] and 143 (24.9%) were khat chewers in this study which is higher than 48 (12.5%) were khat chewers [20]. Regarding alcohol consumption, our study shows 110 participants (19.2%)

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Table 5: Logistic regression analysis result for association between variables.

Characteristics	Undiagnosed hypertension		COR (95% CI)	AOR (95% CI)
	No No. (%)	Yes 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				
Yes	45 (7.8)	63 (11)	0.52 (0.34, 0.80)	0.45 (0.28, 0.73)
No	269 (46.9)	197 (34.3)	*P* < 0.001	*P* < 0.001
Health seeking behavior				
Yes	240 (41.8)	226 (39.4)	0.49 (0.31, 0.76)	0.41 (0.25, 0.66)
No	74 (12.9)	34 (5.9)	*P* < 0.001	*P* < 0.001
Dietary habit				
Enjera with wotsi	102 (17.8)	115 (20)	0.61 (0.43, 0.85)	0.57 (0.40, 0.83)
Qocho	212 (36.9)	34 (5.9)	*P* < 0.001	*P* < 0.001
Body mass index (BMI)				
Less than 25	278 (48.4)	208 (36.2)	1.93 (1.22, 3.06)	2.42 (1.43, 4.09)
Greater or equal to 25	36 (6.3)	52 (9.1)	P-value = 0.01	*P* < 0.001
Monthly income				
Less than 2000	126 (22)	127 (22.1)	0.70 (0.50, 0.98)	0.68 (0.48, 0.97)
Greater or equal to 2000	188 (32.8)	133 (23.2)	P-value = 0.04	P-value = 0.03
Knowledge on hypertension				
Good	147 (25.6)	177 (30.8)	0.41 (0.29, 0.58)	0.27 (0.15, 0.46)
Poor	167 (29.1)	83 (14.5)	*P* < 0.001	*P* < 0.001

COR: Crude odds ratio; AOR: Adjusted odds ratio

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 [20]. A sedentary lifestyle was seen in 106 (18.5%) of the studied people in our study which is lower than 148 (38.6%) of the studied people [20]. The BMI for 88 (21.9%) of the study participants was 25 kg/m^2 or more which is lower than 84 (21.9%) of the study participants was 25 kg/m^2 or more [20].

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 1.43, 4.09; *P* = 0.000). 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 1.7, 7.3; *P* = 0.001) [20]. The result of this study is also slightly lower in strength than other study showing BMI 25 Kg/m^2 and above or over weight/

obesity had about 3 times more exposed to develop undiagnosed hypertension with [AOR 3.06, 95% CI: 1.41, 6.65] when compared to their counterparts.

Our study also shows 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. 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 had 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

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times less likely to have undiagnosed HTN [AOR: 0.57 (0.40, 0.83)].

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 (0.15, 0.46)] 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: 2.29-6.34) [21].

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.

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.

Acknowledgments

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