

Knowledge on Stroke Warning Signs and Associated Factors Among Hypertensive Patients, Northwest Ethiopia: An Institution-Based Cross-Sectional Study

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Introduction: Stroke is one of the leading causes of death globally and is a major cause of disability worldwide. It is a preventable and treatable disease by the prevention of modifiable risk factors and early recognition of warning signs, respectively.

Objective: To assess knowledge on stroke warning signs and associated factors among hypertensive patients at South Gondar Zone Comprehensive Specialized Hospital, Northwest Ethiopia, 2020.

Methods: An institution-based cross-sectional study was conducted in South Gondar Zone Comprehensive Specialized Hospital from June 1–30, 2020. A systematic random sampling technique was used and data were collected through face to face interviews. Data were entered into Epi data version 4.6.0.0 and exported to SPSS version 25 for cleaning and analysis. Bivariate and multivariable logistic regression analysis was used and variables with $p < 0.05$ in the multivariable analysis were considered as statistically significant.

Results: Two hundred and fifty-three hypertensive patients completed the questionnaire with a response rate of 100%. Among the total respondents, 15% (95% CI: 10.7, 19.4) of participants had good knowledge of stroke warning signs. Younger age (AOR: 2.82; 95% CI: 1.18, 6.74), urban residence (AOR: 2.9; 95% CI: 1.04, 8.11), being educated (AOR: 2.6; 95% CI: 1.09, 6.23) and having long duration hypertension follow up (AOR: 2.7; 95% CI: 1.25, 5.81) were significantly associated with good knowledge of stroke warning signs.

Conclusion: This study revealed that participants had poor knowledge of stroke warning signs. Younger age, urban residence, being educated and having long duration hypertension follow up were predictors of good stroke warning signs knowledge. Health information dissemination needs to be strengthened for hypertensive patients, particularly for older, rural residents, the non-educated and those having short duration of hypertension follow up.

Keywords: hypertension, knowledge, stroke, warning signs, Ethiopia

Introduction

Stroke is one of the leading causes of death globally and is a major cause of disability worldwide. About 70% of strokes and 87% of both stroke-related deaths and disabilities occur in low- and middle-income countries.¹ It is a preventable and treatable disease by the prevention of modifiable risk factors and early recognition of warning signs, respectively.² People with hypertension are four times more likely to have a stroke than those with normal blood pressure.³ Hypertension (HTN) is the most common modifiable risk factor for stroke, with blood pressure (BP) reduction being associated with a reduced rate of stroke recurrence.⁴ About 80% of people who have their first stroke have high blood pressure.⁵

Stroke is an enormous financial burden not only for patients but also for society as a whole by placing a great demand on family members and caregivers. Therefore, public stroke knowledge is the key point in stroke prevention.⁶

A study conducted in Turkey and Pakistan among hypertensive patients revealed that the knowledge of stroke warning signs was poor.^{7,8} Whereas studies conducted in Nepal, Saudi Arabia, and two settings in Nigeria showed that the knowledge of hypertensive patients was good.^{9–12} Another study conducted in Ethiopia among hypertensive patients showed the knowledge of participants regarding stroke warning signs was poor.¹³

Even though the burden of stroke in Ethiopia is increasing over time, there is limited research showing the knowledge of stroke warning signs among patients with hypertension. Therefore, to prevent the occurrence of stroke and its burden, assessing the knowledge of hypertensive patients about warning signs of stroke is crucial. So this study intended to assess knowledge on stroke warning signs and associated factors among hypertensive patients at South Gondar Zone Comprehensive Specialized Hospital, Northwest Ethiopia.

Methods

Study Design, Setting and Period

An institution-based cross-sectional study design was used at the chronic follow up clinic of South Gondar Zone Comprehensive Specialized Hospital from June 1–30, 2020.

Source Population

All hypertensive patients who had to follow up at SGCSH chronic illness follow up clinic.

Study Population

All hypertensive patients who came during the data collection period.

Inclusion Criteria

All hypertensive patients who were aged >18 years.

Exclusion Criteria

All hypertensive patients who were seriously ill and who would not be able to give information.

Sample Size Determination

The size of participants that were recruited in the study was estimated by using a single population proportion formula by considering the proportion of participants having good knowledge as 18.3% which was taken from the previous study conducted at Bahir Dar,¹³ a confidence level of 95% and margin of error of 5% to get the maximum sample size.

$$n = Z (\alpha/2)^2 * p (1-p) / d^2$$

Where:

n – is the estimated sample size,

p – is the proportion of patients who had good knowledge of stroke warning signs,

d – is the margin of error.

$$\text{Then, } n = (1.96)^2 * 0.183(1-0.183) / (0.05)^2 = 230$$

Then by adding 10% non-response rate the final sample size was 253.

Finally, from the calculated sample size the number of participants that had been recruited in the study was 253 which was the highest among the calculated samples.

Dependent Variables

Knowledge of stroke warning signs.

Independent Variables

Socio-demographic characteristics (age, sex, religion, residence, occupational status, educational status, marital status, income status).

Clinical and behavioral factors (duration of hypertension, previous history of stroke, family history of stroke, having DM, living with HIV/AIDS, alcoholism, chewing and cigarette smoking).

Operational Definition

Knowledge on stroke warning signs: was assessed by requesting the participants to respond to 10 stroke warning signs questions. Each correct answer was recorded as 1, and an incorrect answer recorded as 0. The mean (4.01) value of the answers was considered to categorize the participants as having good and poor stroke warning signs knowledge.

Good knowledge of stroke warning signs included those participants who had responded to the mean value and above of stroke warning signs knowledge questions.¹⁰

Sampling Methods and Procedures

The study was conducted at SGCSH chronic illness follow up clinic by using a systematic random sampling technique. To select the study participants, the estimated number of hypertensive patients in the data collection period was calculated first. So, the average number of hypertensive patients that can be seen in the data collection period was 856. Then, to determine the interval (k- value) this average number was divided by the calculated sample size and participants were selected with every 3 intervals. The first participant was selected by using lottery method; this was the first hypertensive patient who came first in the follow-up clinic during the first day of data collection.

Data Collection Techniques and Tools

A structured closed-ended questionnaire that has been adopted from previous studies^{10,13–15} was used and data were collected through face to face interviews. Face validity was checked by three academic opinions (one Assistant Professor and two Lecturers).

The questionnaire comprises four parts: part I, socio-demographic factors; part II, clinical and behavioral factors; part III, stroke information sources and risk factors of stroke; and part IV, hypertensive patient's knowledge on stroke warning signs. Three data collectors (BSc nurses) and one supervisor (MSc nurse) participated in the data collection.

Data Quality Control Measures

Both the data collectors and the supervisor were trained for one day on the objective, methodology and data collection approach of the research. All the questionnaires were prepared in English and translated to the Amharic language then back-translated to English by two senior academics from English language and Adult Health Nursing departments to check its consistency. Pre-test was conducted on 5%¹³ of the samples at Mekane Eyesus Primary Hospital to see the consistency and applicability of the instrument. Also, the reliability of the tool was tested with Cronbach alpha coefficient and it was 0.706.

Finally, data were checked for completeness before entry to computer software for analysis.

Data Processing and Analysis

Data were entered and coded in to Epi data version 4.6.0.0 and exported to SPSS version 25.0 for cleaning and analysis. Descriptive statistics was computed and the results

have described in percentage and frequency using tables and figures. Bivariate and multivariable logistic regression analysis was done to show association of independent variables with knowledge on stroke warning signs. Associations between independent variables and dependent variable were analyzed first using bivariate logistic regression analysis to identify factors which are associated with the outcome variable. Then, those variables with a significance level (p-value) of <0.2 in the bivariate analysis were entered into multivariable analysis. Model fitness was checked through Hosmer–Lemeshow goodness of fit test and it was fitted. In multivariable analysis, the association between independent variables with the outcome variable was measured using adjusted odds ratios, 95% confidence interval (CI) and p values of less than or equal to 0.05 was considered as statistically significant.

Results

Socio-Demographic Characteristics of Study Participants

Two hundred and fifty-three hypertensive patients were recruited for the study with a response rate of 100%. Among the respondents, 65.6% of them were male patients. The mean age of participants were 56.7 with S.D. \pm 8.9 years. Majority of the participants (87.7%) were orthodox Christians. Most (66%) of the respondents were urban residents and 83.8% of them were married. Approximately 56.5% of the respondents were educated and the majority (30.8%) of them were merchants (Table 1).

Clinical and Behavioral Factors

One hundred and seventy-one (67.6%) of the participants were diagnosed with hypertension in the past 5 years. Most (98.8%) of the respondents had no previous history of stroke. Moreover, 19 (7.5%) of the respondents had a family history of stroke and 4.3% of them had diabetes mellitus concomitantly. About 24.5% of the participants chew chat and drink alcohol, and 13% of them smoke cigarettes (Table 2).

Stroke Information Sources of Respondents

The majority (91%) of the respondents had heard stroke information from health-care professionals, followed by television (34%) and radio (19%) as the second and third sources of stroke information. Only 9% of hypertensive patients had received stroke information from their friends (Figure 1).

Table 1 Socio-Demographic Characteristics of Respondents at South Gondar Zone Comprehensive Specialized Hospital, Northwest Ethiopia, from June 1–30, 2020 (n = 253)

Variables	Category	Frequency	Percent (%)
Sex	Male	166	65.6
	Female	87	34.4
Age	< 45	44	17.4
	> 45	209	82.6
Residence	Urban	167	66.0
	Rural	86	34.0
Religion	Orthodox	222	87.7
	Muslim	31	12.3
Educational status	Unable to read and write	110	43.5
	Educated	143	56.5
Marital status	Single	15	5.9
	Married	212	83.8
	Widowed	26	10.3
Occupational status	Government worker	70	27.7
	Merchant	78	30.8
	Farmer	67	26.5
	Housewife	23	9.1
	Retired	10	4.0
	Labor worker	3	1.2
Income status	< 5000 ETB	186	73.5
	> 5000 ETB	67	26.5

Risk Factors of Stroke Responded by Participants

About 96.8% of the respondents identified high blood pressure as the risk factor for stroke. Heart disease (64%), excessive alcohol consumption (62.5%), smoking (60.5%), diabetes mellitus (58.1%), obesity (32.4%), and physical/emotional stress (26.9%) were also under the highly responded risk factors by the participants. The least identified risk factor by the respondents was sexual intercourse (2%) (Table 3).

Stroke Warning Signs Questions Responded by Participants

Sudden difficulty in swallowing (80.6%), sudden loss of memory (78.3%), and sudden difficulty in speaking (76.7%) were the major warning signs identified by the participants. Sudden onset of severe headache (33.6%) was the least warning sign which was identified by the respondents (Table 4).

Table 2 Clinical and Behavioral Factors of Respondents at South Gondar Zone Comprehensive Specialized Hospital, Northwest Ethiopia, from June 1–30, 2020 (n = 253)

Variables	Category	Frequency	Percent (%)
Duration of hypertension	< 5 years	171	67.6
	> 5 years	82	32.4
Previous history of stroke	Yes	3	1.2
	No	250	98.8
Family history of stroke	Yes	19	7.5
	No	234	92.5
Having diabetes mellitus	Yes	11	4.3
	No	242	95.7
Living with HIV/AIDS	Yes	44	17.4
	No	209	82.6
Chat chewing	Yes	62	24.5
	No	191	75.5
Cigarette smoking	Yes	33	13.0
	No	220	87.0
Alcoholism	Yes	62	24.5
	No	191	75.5

Knowledge of Respondents on Stroke Warning Signs

Among the total study participants, only 15% of them had good knowledge and the remaining 85% had poor knowledge on stroke warning signs (Figure 2).

Factors Associated with Knowledge on Stroke Warning Signs

To identify factors associated with knowledge of stroke warning signs among patients with hypertension, bivariate logistic regression analysis was done. On this analysis, age, residence, educational status, duration of hypertension, family history of stroke, having diabetes mellitus comorbidity, living with HIV/AIDS and alcoholism were the significant variables associated with knowledge of stroke warning signs.

In multivariable logistic regression analysis, younger patients were 2.8 times more likely to had good stroke warning signs knowledge compared with older individuals (AOR: 2.82; 95% CI: 1.18, 6.74).

Urban residents were 2.9 times higher than patients from a rural area to have good stroke warning signs knowledge (AOR: 2.9; 95% CI: 1.04, 8.11).

Hypertensive patients who are educated were 2.6 times more likely to have good stroke warning sign knowledge

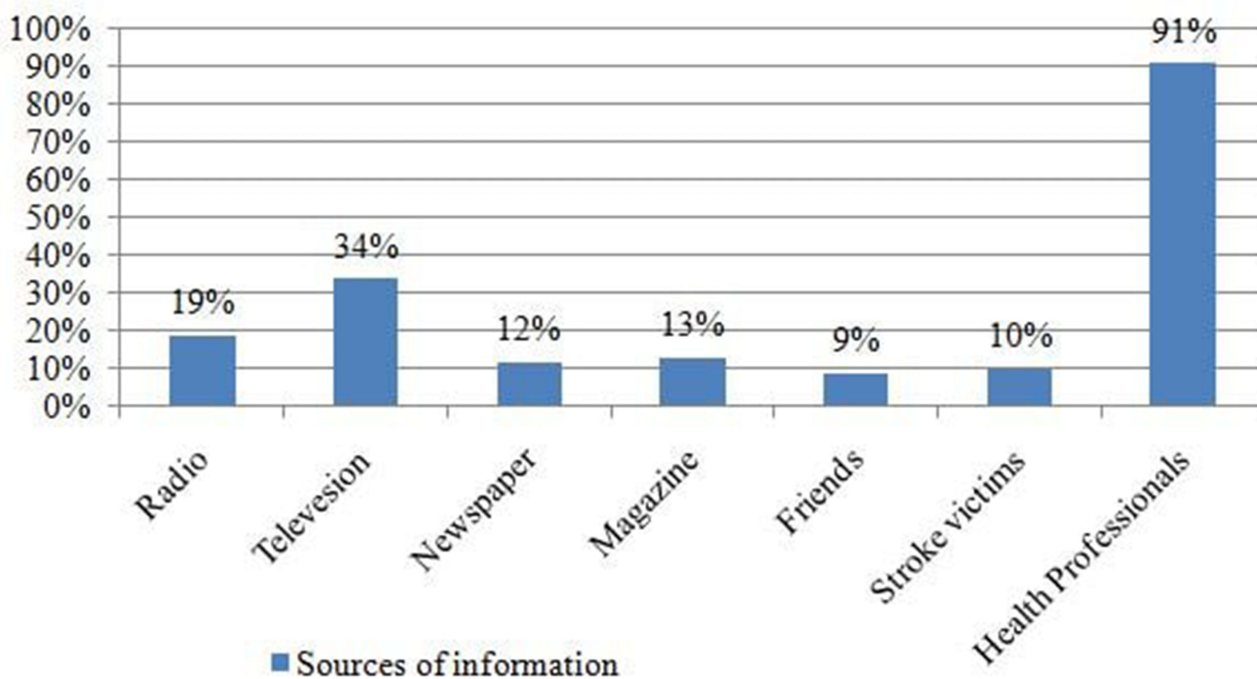


Figure 1 Stroke information sources of respondents at South Gondar Zone Comprehensive Specialized Hospital, Northwest Ethiopia, from June 01 to 30, 2020 (n=253).

compared with those non-educated patients (AOR: 2.6; 95% CI: 1.09, 6.23).

Patients that had been diagnosed with hypertension 5 years ago were 2.7 times more likely to have good stroke warning symptoms knowledge compared with those who had been diagnosed within the past 5 years (AOR: 2.7; 95% CI: 1.25,5.81) with a p-value of < 0.05 (Table 5).

Discussion

Worldwide, stroke is one of the leading causes of death and disability. Moreover, it is a major cause of death with hypertension being identified as an important modifiable risk factor.

Hypertensive patients are at high risk of developing stroke and suffering from its consequences. Knowledge of hypertensive patients on warning signs of stroke is essential to prevent stroke morbidity and mortality.

In this study, 15% (95% CI: 10.7, 19.4) of the participants had good knowledge about stroke warning signs. This was lower than the study conducted at Felege Hiwot Referral Hospital of Bahir Dar.¹³ This difference might be due to differences in institutional awareness creation for the target group as well as a better living standard of the target groups to access information at Felege Hiwot study.

However, it is lower than studies conducted in two settings in Nigeria (Benin and Sokoto), Saudi Arabia, Nepal and Pakistan.^{7,9-11} Despite this, the study was higher than the study conducted in Iraq.² This discrepancy

might be due to differences in socio-economic, socio-demographic factors, the difference in sample size and accessibility of health-care delivery systems of those countries.

In this study age was a significant predictor of good knowledge of stroke warning signs; the odds of good stroke warning signs knowledge were 2.8 times higher in younger age patients than older age. This is consistent with studies reported from Bahir Dar and Nigeria in which older age was associated with poor warning signs knowledge.^{11,13} This might be due to the fact that younger patients are highly active in joining technological advancements to access information regarding to stroke warning signs.

However, it contradicts the study done in Turkey that older age was associated with good stroke warning signs knowledge.⁸ This might be due to the reason that older patients have long-term experience with the problem which allows them to have more information access throughout the duration, since it is more common in older individuals.

The odds of good stroke warning signs knowledge were 2.9 times higher in urban residents than those from rural areas. This is consistent with the study done at Bahir Dar.¹³ This might be due to the fact that patients from urban areas had more information access about stroke than rural residents.

Educational status was the significant variable that affected knowledge of stroke warning signs; showing

Table 3 Risk Factors of Stroke Responded by Participants at South Gondar Zone Comprehensive Specialized Hospital, Northwest Ethiopia, from June 1–30, 2020 (n = 253)

Variables	Category	Frequency	Percent
High BP	Yes	245	96.8
	No	8	3.2
Diabetes mellitus	Yes	147	58.1
	No	106	41.9
Heart disease	Yes	162	64.0
	No	91	36.0
Abnormal blood cholesterol level	Yes	30	11.9
	No	223	88.1
Unhealthy diet/excess fat in the diet	Yes	52	20.6
	No	201	79.4
Smoking	Yes	153	60.5
	No	100	39.5
Obesity	Yes	82	32.4
	No	171	67.6
Drinking excessive alcohol	Yes	158	62.5
	No	95	37.5
Physical/emotional stress	Yes	68	26.9
	No	185	73.1
Sedentary lifestyle	Yes	39	15.4
	No	214	84.6
Sexual intercourse	Yes	5	2.0
	No	248	98.0
Sudden exposure to cold weather	Yes	61	24.1
	No	192	75.9

that the odds of good stroke warning sign knowledge was 2.6 times higher in those patients who are educated compared with individuals who were not educated. This is consistent with studies conducted in Ethiopia, Nigeria, Saudi Arabia, Turkey, and Spain.^{2,8,10,12,13,16} This might be due to the reason that educated individuals have easy access for stroke-related information due to better interaction with the community and access to different medias such as magazines and internet. In addition, the way they access and understand health information is better in those educated individuals than non-educated ones.

Duration of hypertension was another significant predictor of good stroke warning signs knowledge. The odds of good stroke warning signs knowledge was 2.7 times higher in those who were diagnosed to have hypertension 5 years ago than those who were diagnosed with hypertension within the past 5 years. This is similar to a study conducted

Table 4 Stroke Warning Signs Questions Responded by Respondents at South Gondar Zone Comprehensive Specialized Hospital, Northwest Ethiopia, from June 1–30, 2020 (n = 253)

Variables	Category	Frequency (N)	Percent (%)
Sudden onset of severe headache	Yes	85	33.6
	No	168	66.4
Sudden dizziness or loss of balance or coordination	Yes	163	64.4
	No	90	35.6
Sudden loss of memory	Yes	198	78.3
	No	55	21.7
Sudden loss of vision	Yes	121	47.8
	No	132	52.2
Sudden difficulty in speaking	Yes	194	76.7
	No	59	23.3
Sudden difficulty in swallowing	Yes	204	80.6
	No	49	19.4
Sudden loss or reduced sensation on one side of the body	Yes	154	60.9
	No	99	39.1
Sudden loss or reduced sensation all over the body	Yes	146	57.7
	No	107	42.3
Sudden weakness or paralysis on one side of the body	Yes	126	49.8
	No	127	50.2
Sudden weakness or paralysis all over the body	Yes	125	49.4
	No	128	50.6

in Iraq.² This might be because having long adherence for the problem results in redundant access of information from the clinicians and seeking attention for the problem after the diagnosis resulting in further searches for information.

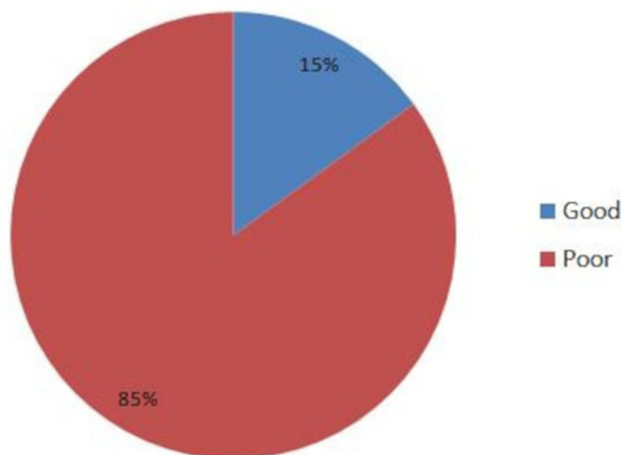


Figure 2 Knowledge of respondents on stroke warning signs at South Gondar Zone Comprehensive Specialized Hospital, Northwest Ethiopia, from June 1–30, 2020 (n = 253).

Table 5 Factors Associated with Stroke Knowledge on Warning Signs at South Gondar Zone Comprehensive Specialized Hospital, Northwest Ethiopia, from June 1–30, 2020 (n = 253)

Variables	Category	Knowledge of Stroke Warning Signs		COR (95% CI)	AOR (95% CI)	P-value
		Good	Poor			
Age	< 45	11	33	2.25 (1.02–4.97) I	2.82 (1.18–6.74) I	0.02*
	> 45	27	182			
Residence	Urban	33	134	3.99 (1.497–10.63) I	2.9 (1.04–8.11) I	0.042*
	Rural	5	81			
Educational status	Unable to read & write	8	102	I 3.39 (1.48–7.72)	I 2.6 (1.09–6.23)	0.031*
	Educated	30	113			
Duration of hypertension	< 5 years	20	151	I 2.12 (1.05–4.28)	I 2.7 (1.25–5.81)	0.011*
	> 5 years	18	64			
Family history of stroke	Yes	5	14	2.18 (0.74–6.44) I		
	No	33	201			
Living with HIV/AIDS	Yes	10	34	1.9 (0.85–4.27) I		
	No	28	181			
Alcoholism	Yes	13	49	1.76 (0.84–3.70)		
	No	25	166			

Notes: I, reference group, *statistically significant.

Limitations of the Study

One of the limitations of this study was lack of causal association since the study was cross-sectional. In addition the study used non-standardized close-ended questions, which might limit the participants' responses for their knowledge. Furthermore, the study might not be representative of the community's knowledge since it was an institutional-based study.

Conclusions

The study showed that hypertensive patients' knowledge on stroke warning signs was poor. Being a young age, urban residence, being educated and long duration of hypertension follow up were the predictors of good stroke warning signs knowledge. Among those stroke warning signs sudden difficulty in swallowing (80.6%) was the commonest one indicated by the participants.

This finding provides a good opportunity for hypertensive patients to obtain appropriate intervention based on the problems identified in the study and it will serve as baseline information for health-care workers to determine knowledge of their clients about stroke warning signs. Furthermore, it will show the magnitude of the problem for governmental and non-governmental organizations and

it has a great role to give baseline information for researchers who intend to conduct further studies.

Abbreviations

AIDS, Acquired Immune Deficiency Syndrome; AOR, Adjusted Odds Ratio; CI, Confidence Interval; COR, Crude Odds Ratio; DM, Diabetes Mellitus; ETB, Ethiopian Birr; HIV, Human Immune Virus; HTN, Hypertension; SD, Standard Deviation; SGZCSH, South Gondar Zone Comprehensive Specialized Hospital; WHO, World Health Organization.

Data Sharing Statement

Data will be available upon request from the corresponding author.

Ethical Approval and Consent to Participate

Ethical clearance was obtained from the College of Medicine and Health Science's Ethical Review Board on behalf of Wollo University. Verbal consent was obtained from all study participants before the interview. The verbal informed consent was acceptable and approved by the Ethical review board on the behalf of Wollo University

and this study was conducted under the Declaration of Helsinki. A formal letter of cooperation was written to South Gondar Zone Comprehensive Specialized Hospital administrative office from Wollo University and permission was obtained from the hospital administrative office. Study participants were informed about the purpose and their right to refuse the study.

Acknowledgments

The authors would like to thank the University for its financial support. Besides, we want to acknowledge data collectors and supervisors for their commitment to collect the data accurately.

Author Contributions

All authors made substantial contributions to conception, design, acquisition of data, or analysis and interpretation of data and took part in drafting the article or revising it critically for important intellectual content; agreed to submit to the current journal; gave final approval of the version to be published, and agree to be accountable for all aspects of the work. All authors have read and approved the final manuscript.

Funding

This research did not receive any grant from any funding agency in the public, commercial, or not-for-profit sectors.

Disclosure

The authors report no conflicts of interest in this work.

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