

Depressive Symptoms and Its Associated Factors Among Primary Caregivers of Stroke Survivors at Amhara Regional State Tertiary Hospitals: Multicenter Study

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Background: Stroke is one of the leading causes of severe disability and functional limitation, which are reasons for being dependent on their family for daily activities and participation in social affairs. After discharge from the hospital, most stroke survivors require physical, psychosocial, and financial support from caregivers at home, which is one of the most stressful events for families. The stroke survivors and their caregivers may influence each other during the caregiving process and social life. The stroke survivor's disability and depressive symptoms affect the quality of life of the survivor and their caregivers. Therefore, the purpose of this study was to assess the prevalence and associated factors of depression among caregivers of stroke survivors.

Methods: An institution-based, cross-sectional study was conducted in Amhara regional state tertiary hospitals. A systematic random sampling technique was employed to select 424 participants. The data were collected using an interviewer-administered and chart-reviewed structured questionnaire. The Patient Health Questionnaire-9 (PHQ-9) was used to assess depression. Univariable and multivariable logistic regression analyses were performed to identify factors associated with depression. Adjusting the odds ratio with the corresponding 95% confidence interval and variables with a P-value < 0.05 was considered significantly associated with depression.

Results: The overall prevalence of depressive symptoms was 65.6% (95% CI: 60.8–69.8). Being female, older than 40, having no formal education, having a low family monthly income, being the son or daughter, and spending more than six hours per day were associated with depression.

Conclusion: We found that depression was prevalent among primary caregivers of stroke survivors. To reduce the risk of developing depression, policymakers should fully recognize the role of caregivers in caring for stroke patients. More attention should be given to caregivers who are female, elderly, have a low income, are sons or daughters, and spend a long time caring per day.

Keywords: depression, caregivers, stroke, Ethiopia

Background

Stroke is the second-leading cause of death and the third-leading cause of disability globally.¹ Due to the chronic nature and disabling conditions that highly affect the functional performance as well as the daily activities of stroke patients, there is a high burden on the caregivers of the survivors, which leads to depression in the long term.² Not only the stroke survivors, but depression is also a commonly reported problem in the caregivers or families of the stroke survivors.³ It is greater than the depression of stroke patients sometimes,⁴ and it is associated with negative health outcomes such as anxiety, psychological impairments, morbidity, and mortality.⁵

Stroke is a major source of mental health problems for both stroke survivors and caregivers, particularly those who provide care for prolonged periods of time due to their exposure to physiological, psychological, and financial

pressure.^{6,7} These days, caregivers play a significant role in the healthcare system. For example, the report of the National Center shows that family caregivers hold first place in stroke survivors care more than other formal agencies, which make up the largest healthcare providers in the US and share the largest market value by exceeding the spending on nursing home care and other formal care expenditures.⁸ They have a crucial role in maintaining the body's function, facilitating recovery, and preventing post-stroke complications.⁹ In addition, since caregivers have a significant role in providing physical and emotional support, the long-term functional outcome and quality of life of stroke survivors are dependent on the caregivers' commitment, readiness, and physical and psychological well-being.^{10,11}

The stroke survivors and their caregivers may influence each other during the caregiving process and social life. The stroke survivor's disability and depressive symptoms affect the quality of life of the survivor and their caregivers.¹² It was reported that the burden of depression among caregivers of stroke survivors ranges from 23% to 57%,^{13–16} and its global pooled prevalence is 40.2%.¹⁷ The problems are expected to increase in low- and middle-income countries like Ethiopia as the burden of stroke increases progressively among stroke survivors.¹⁸ As different studies show in Ethiopia, about 27.5% to 49.6% of stroke survivors suffer from post-stroke depression.^{19–21} Despite this, only a handful of studies have been done on the burden of caregiver depression in Africa, and none in Ethiopia. Based on the findings in developed countries, much of our knowledge regarding the problem is based on studies done in developed countries, which have significant differences in the major contributing factors to caregiver depression. Caregiver depression has a direct relationship with stroke survivors' health outcomes. The negative mental status of caregivers adversely affects the quality of life, social status, psychology, and prognosis of stroke survivors.²² Several factors have been identified as predictors of caregiver depression, including sociodemographic factors such as gender, age, education, income, caregiving duration, and relationship with the patient,^{23–25} as well as clinical and care situation factors.^{26,27}

Considering that to know the burden and address the problem of depression and the consequences among stroke survivor caregivers, a baseline assessment of the magnitude in the local context is mandatory. As a result, the purpose of this study was to determine the prevalence of depression and its associated factors among caregivers of stroke survivors in Ethiopia. The present study will paint a clearer picture of the mental health problem of stroke caregivers, identify the factors affecting it, and determine the extent of the problem in Ethiopia. This study will contribute to addressing the psychosocial problems of the caregivers and play its role in enhancing stroke rehabilitation, especially for community-dwelling stroke survivors, as well as the health system through identifying relevant predictors of depression.

Method

Study Design and Setting

An institution-based, cross-sectional study was conducted from April to June 2022 in Amhara regional state tertiary hospitals. The University of Gondar Specialized Hospital (UOGSH), Felege Hiwot Specialized Hospital (FHS), Tibebe Ghion Specialized Hospital (TGSH), and Dessie Specialized Hospital (DSH) were randomly selected for this study from the six specialized hospitals in the region. Those hospitals are found in Gondar, Bahir Dar, and Dessie City. Gondar City is situated in northwest Ethiopia, 662 km from Addis Abeba and about 175 km from Bahir Dar City, the capital of the Amhara region. The UOGSH is the main tertiary care center for more than 7 million people from different Gondar zones, such as central Gondar, north Gondar, west Gondar, south Gondar, and northwest Gondar (setit humera wolkaite Tegede).

Both TGSH and FHCSH are found in Bahir Dar city, the capital of Amhara national regional state, 560 km from Addis Abeba. These hospitals provide tertiary-level healthcare services as a major referral center for more than 5 million people from six different zones (Bahir Dar city administration, West Gojjam, East Gojjam, Awi, South Gondar, and Central Gondar zones) and the neighboring Benishangul Gumuz region.

DSH is found in Dessie town, the capital of the south Wollo zone, 401 km from Addis Abeba, and is the only tertiary care center in the south Wollo zone that provides service for more than 5 million people from south Wollo, north Wollo, Oromia special zone, and the neighboring Afar region.

Source Population, Study Population Inclusion and Exclusion Criteria

All primary caregivers of the stroke survivors who attend medical wards and outpatient physiotherapy clinics in selected hospitals were included in this study.

Primary caregivers who are willing to participate, aged 18 years or above, being able to communicate, being a principal caregiver for at least two weeks, and not being paid for the care provided.

Primary caregivers who have been providing care for at least two weeks and are aged 18 or older were included in the study.

The caregivers who had known intellectual or psychiatric impairments, disabilities, or underlying medical conditions were excluded from the study.

Sample Size Determination and Sampling Procedures

The sample size the study was calculated using a single population proportion formula by considering 50% prevalence of caregiver burden, 95% confidence interval and 5% margin of error. Finally, the sample of 424 was obtained by addition of 10% non-response rate.

$$n = \frac{(Z_{\alpha/2})^2 * P(1 - P)}{d^2} = \frac{(1.96)^2 * 0.5(1 - 0.5)}{(0.05)^2} = 384.16 \sim 385$$

Where n=samples, P-prevalence d-margin of error.

The study participants were allocated proportionally from each specialized hospital according to the report obtained from each hospital from medical record (registration book). According to the monthly report obtained from each hospital, the average number of stroke survivors admitted to each hospital ranges from 65 to 80. Taking this into account, the average number of primary caregivers admitted in University of Gondar Specialized Hospital (UOGSH), Tibebe Ghion Specialized Hospital (TGS), Felege Hiwot Specialized Hospital (FHS), and Dessie Specialized Hospital (DSH) per three months was 218; 207; 228; and 218 respectively. Therefore, during the three-month data collection period, 871 primary caregivers of stroke survivors visited the selected hospitals. Thereafter, the skipping interval k^{th} was calculated by dividing the three-month report by the calculated sample size (871/424), which resulted in 2. The study participants were selected every 2nd interval. The first case was selected randomly using a lottery method. Finally, a systematic random sampling technique was used to select all eligible caregivers of stroke survivors using the K interval. The participants included from UOGSH, TGS, FHS, and DSH were 106, 101, 111, and 106, respectively.

Data Collection Tools and Procedures

The data was collected using a structured interviewer administered questionnaire that was developed from different literature sources.^{5,17,28-30} The data collection instruments have three sections. The first section covered the socio-demographic characteristics of the participants, including sex, age, marital status, residence, educational level, occupation, family income, and relationship with the stroke survivors. The second section included the clinical characteristics of the participants, such as the duration of the stroke, duration of caregiving from onset, and caregiving hours per day.

The dependent variable, depression, was measured using the patients' health questionnaire (PHQ-9) depression scale. Depression in the primary caregivers of the stroke survivors was assessed using the PHQ-9 depression assessment tool. The questionnaire was prepared in English and then translated into the local language, Amharic. The scale has been validated in Ethiopia with a sensitivity of 88%.^{31,32} According to the tool, the caregivers who scored greater than or equal to 10 were considered to have positive depression symptoms, whereas those scoring less than 10 were considered to have no depression.³³

The data were collected by four trained physiotherapists, one from each hospital, and training was given to them by supervisors about the purpose of the study, how to approach the study participants, and data collection procedures.

Definition of Variables

The primary caregiver was defined as the person (family or non-family member) who spent most of the time providing daily care for the stroke survivors or the person who took on the main caregiving tasks.³⁴

Anxiety disorder- is a 7-item instrument developed to identify generalized anxiety disorder in informal care patients. A score of 10 or greater on the GAD-7 represents a cut point for identifying GAD.³⁵

Data Quality Assurance and Management

The data were collected through a pretested face-to-face interview using an interview-administered questionnaire, and the patient's medical record was reviewed to confirm the duration of stroke. The pretest A pretest was done on 5% of the sample size at Debre Tabor Referral Hospital to check the response and language clarity. The questionnaire was checked for accuracy, completeness, and consistency daily by the study supervisor and principal investigator.

Data Processing and Analysis

The data were entered, cleaned, and analyzed using SPSS version 23. The frequencies, tables, proportions and cross tabs were used to present the deceptive findings. Univariable and multivariable logistic regression analysis was employed to identify the factors associated with depression. Variables with p-values less than 0.25 were chosen for multivariable analysis. The strength of association was presented by the odds ratio with a 95% confidence interval (CI). A p-value of less than 0.05 was considered statistically significant in the multivariable analysis of the study. There was no problem of multicollinearity, and the fitness of the model was checked by using the Hosmer-Lemeshow test.

Ethical Consideration and Consent to Participant

The ethical clearance obtained from the ethical review committee of the school of medicine under the delegation of the ethical review board of the university of Gondar with reference number (SOM/1546/2022). An official letter of support was received from the University of Gondar and sent to the clinical directors of the respective hospitals. Before the data collection, the purpose of the study, the potential indirect benefits, and the right to refuse were explained to each study participant. Finally, written informed consent was obtained from each study participant. The confidentiality of the information was assured throughout the data collection. The study was done in compliance with the Helsinki Declaration.

Result

Sociodemographic Characteristics of Primary Caregivers of Stroke Survivors

A total of 424 participants were included in this study. All the caregivers agreed to participate in the study, with a 100% response rate. The mean age of the participants was 40.2406 (SD± 10.95) years. More than half of the caregivers were female (54.2%) and aged 40 or younger (58.5%). Most of them were married (65.3%) and from urban residents (69.1%). More than one third of the participants had only primary education or had formal education, with 18.2% and 21.7%, respectively. See [Table 1](#)

Clinical and Care Situation Characteristics of Primary Caregivers of Stroke Survivors

The majority of the stroke survivors (64.4%) had a duration of more than three months, and a majority of the caregivers (63.2%) were providing care for more than three months. More than one third of the caregivers (37.5%) spend more than six hours per day. See [Table 2](#)

Prevalence of Depression Among Caregivers of Stroke Survivors

The prevalence of depression among caregivers of stroke survivors was found to be 65.6% (95% CI: 60.8–69.8). Among respondents with depression, 80.9% were female, 71% were over the age of 40, and nearly 85% had a family monthly income of less than 3000 ETB.

Factors Associated with Depression Among Caregivers of Stroke Survivors

Variables with a p-value < 0.25 in univariable logistic regression analysis were exported to multivariable logistic regression analysis. Among these variables, being female, being older than 40 years, having no formal educations, low

Table 1 Sociodemographic Characteristics of Characteristics of Primary Caregivers of Stroke Survivors in Amhara Regional State Tertiary Hospitals, (n=424)

Variables	Category	Frequency (%)
Sex	Male	194 (45.8)
	Female	230 (54.2)
Age	≤40	248 (58.5)
	>40	176(41.5)
Marital status	Married	277(65.3)
	Unmarried	147(34.7)
Residence	Urban	293(69.1)
	Rural	131 (30.9)
Educational level	No formal education	92(21.7)
	Primary	77(18.2)
	Secondary	119(28.1)
	Diploma and above	136(32.1)
Occupation	Governmental employee	103(24.3)
	Non-government	70(16.5)
	Farmer	133(31.4)
	Merchant	118(27.80)
Family income	<3000	162(38.2)
	3000–6000	157(37)
	>6000	105(24.8)
Relationship	Sibling	138(32.5)
	Son/daughter	128(30.2)
	Spouse	158(37.3)

Table 2 Clinical and Care Situation Characteristics of Primary Caregivers of Stroke Survivors in Amhara Regional State Tertiary Hospitals, (n=424)

Variables	Category	Frequency (%)
Duration of stroke	≤3 months	151(35.6)
	>3 months	273(64.4)
Duration of caregiving from onset	≤3 months	156(36.8)
	>3 months	268(63.2)
Caregiving hours per day	≤6 hours	265(62.5)
	>6 hours	159(37.5)
Anxiety symptoms	Yes	207(48.8)
	No	217(51.2)

family income, being sons or daughters, and caregiving time were significantly associated with depression in multi-variable logistic regression analysis.

The odds of being a female were four times more likely to have depression compared to males (AOR = 4.01, 95% CI (2.41, 6.66)). The odds of being older than 40 were two times more likely to develop depression compared to being 40 or younger (AOR = 1.98, 95% CI (1.096, 3.661)). The odds of having no formal education are 0.43 times less likely to have depression than those who have a diploma and above (AOR = 0.43, 95% CI (0.204, 0.899)). The odds of having

Table 3 Multivariate Logistic Regression of Factors Associated with Depression Among Primary Caregivers of Stroke Survivors in Amhara Regional State Tertiary Hospitals, (n=424)

Variables	Category	Depression		COR (95% CI)	AOR (95%)	p
		Yes	No			
Sex	Male	92(47.4)	102(52.60)	Ref		
	Female	186(80.9)	44(19.1)	4.84 (3.135, 7.48)	4.006 (2.409, 6.661)	0.000
Age	≤40	153(61.7)	95(38.3)	Ref	1	
	>40	125(71)	51(29)	1.52(1.01, 2.3)	1.977(1.096, 3.566)	0.024
Marital status	Married	189(68.2)	88(31.8)	1.4(0.923, 2.123)	1.66(0.907, 3.02)	0.101
	Unmarried	89(60.5)	50(39.5)	Reference	1	
Educational level	No formal education	51(55.4)	41(44.6)	0.62(0.357, 1.06)	0.43(0.204, 0.899)	0.025
	Primary	60(77.9)	17(22.1)	1.75(0.915, 3.33)	1.49 (0.662, 3.33)	0.337
	Secondary	76(63.9)	43(36.1)	0.87(0.52, 1.466)	0.52 (0.271, 1.008)	0.053
	Diploma and above	91(66.9)	45(33.1)	Ref	1	
Family monthly income	<3000	137(84.6)	25(15.4)	4.62(2.6, 8.19)	5.9 (2.857, 12.106)	0.000
	3000–600	84(53.5)	73(46.5)	0.97(0.59, 1.59)	0.81(0.44, 1.48)	0.49
	>6000	57(54.3)	48(45.7)	Ref	1	1
Relationship	Son/daughter	73(52.9)	65(47.1)	3.25(1.959, 5.384)	2.5 (1.26, 4.867)	0.008
	Sibling	81(63.3)	47(36.7)	1.54(0.94, 2.51)	1.26 (0.7, 2.273)	0.44
	Spouse	124(78.5)	34(21.5)	1	1	1
Duration of care	≤3 months	90(57.7)	66(42.3)	1	1	1
	>3 months	188(70.1)	80(29.9)	1.723(1.142, 2.601)	1.234(0.745, 2.043)	0.414
Time spent for caregiving	≤6 hours	131 (82.4)	28(17.6)	Ref	1	
	>6 hours	147(55.5)	118(44.5)	3.76 (2.327, 6.036)	2.8(1.564, 4.917)	0.000

Abbreviations: COR, crude odds ratio; AOR, adjusted odds ratio.

a monthly income of less than 3000 ETB 6 times more likely to develop depression as compared to caregivers who have a family monthly income of more than 6000 ETB (AOR = 5.9, 95% CI (2.856, 12.106)). Being a son or daughter is 2.5 times more likely to develop depression compared with being a spouse (AOR = 2.5, 95% CI (1.26, 4.867)). Caregivers who spent more than 6 hours per day were three times more likely to develop depression compared with caregivers who spent less than 6 hours per day (AOR = 2.8, 95% CI (1.56, 4.91). See [Table 3](#)

Discussion

The aim of this study was to assess the prevalence and associated factors of depression among primary caregivers of stroke survivors in Amhara regional state tertiary hospitals. The study showed that the overall prevalence of depression was reported to be 65.6% (95% CI: 60.8–69.8).

The finding of the present study was higher than that of Indonesia 56.7%,³⁶ United States, 47.9%,³⁷ Pakistan, 47.1%,⁵ Helsinki, 31 to 33%,²⁴ Nigeria, 46.1%,³⁸ Netherlands 23%,³⁹ and Malaysia, 20.3%,⁴⁰ and systematic review and meta-analysis of 12 studies 40.2%.¹⁷ The discrepancy of results might be due to the assessment tool, study design, sample size, the health care delivery system, economic status, life style and other sociodemographic factors. For instance, studies done in Nigeria, Helsinki, and Malaysia used the Beck depression inventory tool, whereas a study in Pakistan used the HAM-D-U scale to assess depression. The other reason for the difference may be that in the Nigerian study, most of the caregivers were male and relatively younger than those in our study, which found participants in the age range of 19 to 39 years. In the Netherlands, a small sample size was used, and only stroke patients with subarachnoid subtypes were included. In Helsinki, a different study design, the prospective follow-up study, was used, and depression was assessed at different points in time in the acute phase, at 6 months and 18 months, and additionally, most of the study participants were males, who are less likely to develop depression than females. The cultural and lifestyle differences, the quality of health care delivery, and the educational and economic factors could be contributing factors to the variation in findings. In comparison to other nations,

Ethiopia's health policy prioritizes disease prevention and control, with less emphasis on rehabilitation. These could be the factors that contribute to the burden and mental health problems of stroke survivors' families.

The second objective of this study was to identify factors associated with depression among primary caregivers of stroke survivors. Being female, being older, having no formal education, having low family income, being a daughter, and spending long caregiving hours were significantly associated with depression.

Female caregivers were 4.01 times more likely to have depression than male caregivers (AOR = 4.01, 95% CI (2.41, 6.66)). This is supported by the studies conducted in Ethiopia with caregivers of cancer,⁴¹ epilepsy,⁴² and mental illness^{43,44} survivors. A systematic review and meta-analysis also revealed that female caregivers were significantly associated with a higher prevalence of depression among caregivers of stroke survivors.¹⁷ Although there is no clear evidence that shows the clear relationship why females were more likely to develop depression than males, females have more internalized symptoms, whereas males have more externalized symptoms;⁴⁵ And also, the hormonal changes after premenstrual and menopausal transition, which are associated with a decrease in estrogen, may be another potential factor that would increase the risk of developing depression.⁴⁶ Another possible explanation is that many people, particularly in Ethiopia, perceive female caregivers as more caring and trustworthy than male caregivers. Women's numerous duties and obligations, such as child care, meal preparation, and homework, will raise their vulnerability to depression, especially in Ethiopian women.

The odds of developing depression among caregivers over the age of 40 were 1.98 times more likely compared with caregivers younger than 40 (AOR = 1.98, 95% CI (1.09, 3.66)). This was consistent with other studies conducted in Malaysia,⁴⁰ and Pakistan.⁵ The possible explanation could be that everyone needs social connections to survive and thrive, but the elderly spends most of their time alone and socially isolated. Loneliness and social isolation are closely associated with a high burden of depression.⁴⁷

Caregivers who have no formal education were 0.43 times less likely to develop depression as compared with those who have a diploma or higher (AOR = 0.43, 95% CI (0.204, 0.899)). In contrast with the previous studies, which revealed the education level of the caregiver was a protective factor for depression.^{5,19,48} Possible reasons are that although stroke is a leading cause of severe disability and poor quality of life, participants who have no formal education may have limited knowledge about the poor prognosis, the possible complications, and the psychosocial and economic impact it has on the survivors and their families, which could increase the risk of developing depression.

Caregivers with an average family income less than 3000 ETB were 5.9 times more likely to develop depression than those with an average family income greater than 6000 ETB (AOR = 5.9, 95% CI (2.857, 12.106)). This finding is consistent with the studies done in Ethiopia on caregivers of cancer survivors.⁴¹ Possible reasons include unexpected medication, food, and other related costs during care, but Ethiopia's health insurance is not sufficient to cover the high costs of treatment. As a result, family and caregiver involvement is required, and more money is needed to cover the necessary expenses.

Being son or daughter of the stroke survivors are 2.5 times more likely to develop depression compared with caregivers who are spouses (AOR = 2.5, 95% CI (1.26, 4.867)). The spouses may have several additional commitments at home, which increase the possibility of developing depression, as reported in several previous studies. In contrast to this, our study reported that caregivers who are the sons or daughters of stroke survivors are more likely to develop depressive symptoms than caregivers who are spouses. The possible reasons could be that sons and daughters are young in their age, which may make them less experienced in coping with such a stressful situation, and since they are economically dependent on the family, the economic crisis is also one of the other factors contributing to depressive symptoms.

Caregivers who spent more than 6 hours per day were 2.8 times more likely to develop depression compared with caregivers who spent less than 6 hours per day (AOR = 2.8, 95% CI (1.56, 4.91)). This is in line with studies conducted in Malaysia,⁴⁰ Indonesia,³⁶ Ethiopia.⁴⁴ The possible reasons could be that the longer duration spent on care provision increases the physical and mental load from caregiving activities, which causes fatigue, reduces quality of life, and is more likely to increase the risk of having depressive symptoms. This may also be due to the long care time per day occupying too much private time for the caregivers and thus reducing their work, social, and entertainment time.

Strength and Limitation

To the best of our knowledge, this is the first study in Ethiopia that examines the prevalence of depression and related variables among carers of stroke survivors.

The causal relationship could not be established since the study was cross-sectional. In Ethiopia, more prospective research with a large sample size, including the control group, is needed to establish the causal relationship. Furthermore, the research used different assessment tools to evaluate depression, so making valid comparisons across the various studies is difficult.

Conclusion

We found that depression was prevalent among primary caregivers of stroke survivors. Being female, older than 40, having no formal education, having a low average family income, and spending prolonged hours on caregiving were factors significantly associated with depression. The results of this study have several clinical implications for health services and policymakers. Because of the high prevalence of depressive symptoms among the caregivers of stroke survivors, mental health screening is needed not only for survivors but also for their caregivers. Prompt referral to mental health professionals and early intervention reduce the severity of depression in caregivers. Physicians and physical therapists caring for stroke survivors should pay particular attention to the mental health of caregivers who are women, over 40, low-income, and long-term caregivers.

Abbreviations

ETB, Ethiopian birr; SD, Standard deviation; ORs, Odds Ratios; CIs, Confidence Intervals; PHQ-9, Patient Health questionnaire-9; UOGSH, University of Gondar Specialized Hospital; TGSH, Tibebe Ghion Specialized Hospital; FHSH, Felege Hiwot Specialized Hospital; DSH, Dessie Specialized Hospital.

Data Sharing Statement

Please contact the corresponding author for data requests.

Ethical Approval and Consent to Participate

The ethical clearance was obtained from the ethical review committee of the school of medicine under the delegation of the University of Gondar institutional review board. Before enrollment, all participants provided written informed consent.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, and interpretation, or in all these areas; took part in drafting, revising, or critically reviewing the article; gave final approval of the version to be published; agreed to the journal to which the article has been submitted; and agreed to be accountable for all aspects of the work.

Disclosure

The authors declare that they have no competing interests.

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