HHS Public Access

Author manuscript

*Acta Neurol Scand*. Author manuscript; available in PMC 2018 December 01.

Published in final edited form as:

*Acta Neurol Scand*. 2017 December ; 136(6): 617–623. doi:10.1111/ane.12766.

# Prevalence and predictors of anxiety in an African sample of recent stroke survivors

**A. Ojagbemi**[1], **M. Owolabi**[1], **R. Akinyemi**[1], **O. Arulogun**[1], **J. Akinyemi**[1], **O. Akpa**[1], **F. S. Sarfo**[2], **E. Uvere**[1], **R. Saulson**[3], **S. Hurst**[4], and **B. Ovbiagele**[3]

[1]College of Medicine University of Ibadan, Ibadan, Nigeria

[2]Kwame Nkruma University, Kumasi, Ghana

[3]Medical University of South Carolina, Charleston, SC, USA

[4]University of California, San Diego, CA, USA

## Abstract

**Objectives—**Studies considering emotional disturbances in the setting of stroke have primarily focused on depression and been conducted in high-income countries. Anxiety in stroke survivors, which may be associated with its own unique sets of risk factors and clinical parameters, has been rarely investigated in sub-Saharan Africa (SSA). We assess the characteristics of anxiety and anxiety-depression comorbidity in a SSA sample of recent stroke survivors.

**Materials and methods—**We assessed baseline data being collected as part of an intervention to improve one-year blood pressure control among recent (≤1 month) stroke survivors in SSA. Anxiety in this patient population was measured using the Hospital Anxiety and Depression Scale (HADS), while the community screening instrument for dementia was used to evaluate cognitive functioning. Independent associations were assessed using logistic regression analysis.

**Results—**Among 391 participants, clinically significant anxiety (HADS anxiety score≥11) was found in 77 (19.7%). Anxiety was comorbid with depression in 55 (14.1%). Female stroke survivors were more likely than males to have anxiety (OR=2.4, 95% CI=1.5–4.0). Anxiety was significantly associated with the presence of cognitive impairment after adjusting for age, gender and education (OR=6.8, 95% CI=2.6–18.0).

**Conclusions—**One in five recent stroke survivors in SSA has clinically significant anxiety, and well over 70% of those with anxiety also have depression. Future studies will need to determine what specific impact post-stroke anxiety may have on post-stroke clinical processes and outcomes.

### Keywords

anxious; psychiatry; risk factors

Correspondence: A. Ojagbemi, World Health Organization (WHO) Collaborating Centre for Research and Training in Mental Health, Neuroscience, and Substance Abuse, Department of Psychiatry, College of Medicine, University of Ibadan, Ibadan, Nigeria. drakinjagbemi@yahoo.com and akinojagbemi@gmail.com.

**CONFLICT OF INTEREST**

None of the authors have conflict of interest to declare.

## 1 | INTRODUCTION

Stroke is now the leading cause of disease and disability in sub-Saharan Africa (SSA).[1] As stroke survivor populations are diverse, and interaction between illness and contextual factors is important in determining the clinical course of diseases,[2] the characteristics of stroke patients can be expected to differ between SSA and more developed parts of the world.

Along with cognitive impairment, both anxiety and depression are the foremost complications prioritized by stroke survivors and carers.[3] Anxiety and depression have been linked to poorer clinical outcomes and quality of life after stroke because they adversely influence compliance with recommended post-stroke therapies.[4] Yet, studies on emotional disturbances after stroke have mostly focused on depression.

Rates of anxiety reported in stroke survivors are far higher than those in the general population,[5] and the prevalence and severity of post-stroke anxiety (PSA) are similar to those reported for post-stroke depression (PSD) across the clinical course after stroke.[6] Also, depression and anxiety are highly comorbid conditions in stroke survivors,[7,8] both being the most responsive complications of stroke to pharmacological and psychosocial interventions, [9] including multifaceted risk factors optimization strategies.[10]

Studies identifying factors associated with anxiety among stroke survivors in SSA may provide valuable information that will stimulate the development and use of locally relevant interventions to mitigate emotional sequelaes of stroke. In this study, we assessed the characteristics of anxiety and anxiety-depression comorbidity in a sample of recent (<1 month) stroke survivors in SSA.

## 2 | MATERIALS AND METHODS

### 2.1 | Sites

We evaluated a data set comprising baseline information collected as part of a ongoing study of an intervention to improve 1-year blood pressure control among recent (<1 month) stroke survivors who were discharged from four hospitals in Nigeria. These hospitals are the University College Hospital (UCH) which receives referrals from all over Nigeria and West Africa, Blossom Neurorehabilitation Hospital (WFNR-Blossom) a referral centre providing occupational therapy, physiotherapy, speech therapy and physiotherapy services, Federal Medical Center (FMC) Abeokuta which is a regional tertiary hospital receiving referrals from neighbouring states and the Sacred Heart Hospital, a catholic hospital providing secondary health services to a densely populated inner city community in south-western Nigeria.

### 2.2 | Ethical approval

Ethical approval was obtained from the institutional review boards of the University of Ibadan/UCH joint ethics committees (which cover the WFNR-Blossom), FMC Abeokuta, and Sacred Heart Hospital. Participants provided written, informed consent before interviews were conducted.

### 2.3 | Subjects

The subjects comprised consecutive adult ischaemic or haemorrhagic stroke survivors. The diagnosis of stroke was confirmed based on neuroimaging and clinical examination criteria.[11]

Patients were informed about the study, and the procedure was explained to them in their home language. We excluded patients with severe communication difficulties (N=34) or aphasia (N=42), and those with severe conditions that could limit participation in follow-up assessments (N=94). This included those with severe cognitive impairments or dementia [(Modified Community Screening Instruments for Dementia (CSID)≤20)], global disability [(Modified Rankin Scale (MRS)≥3)], and those with significant comorbid medical illnesses (eg chronic kidney disease).[12]

### 2.4 | Measures

Stroke survivors meeting study criteria underwent baseline assessments within the first month of stroke.

Anxiety was ascertained using the anxiety subscale of the Hospital Anxiety and Depression Scale (HADS-A). [13] The HADS was developed for the assessment of emotional disturbances in non-psychiatric patients within a hospital setting. It includes a total of 14 items each with a score of between 0 and 3. One half of the items are related to anxiety while the other half is specific for depression. The developers of the scale recommend a cut-off ≥11 for the ascertainment of "*probable*" cases in research. This score is also often used in the determination of clinically significant anxiety. Lower scores of between 8–10/11 are recommended for less severe anxiety symptoms. The HADS has been previously validated in Nigeria[14] where the HADS-A was found to have a sensitivity ranging 85.0%–92.9% and a specificity of 86.5%–90.0%.

Cognitive functioning was assessed using the CSID.[15] The instrument includes a global cognitive test and informant account of patient's ability to cope with activities of daily life. The CSID has been validated in Nigeria,[16] where a total score of ≤23.9 validly suggests cognitive impairment. The Yoruba (Nigerian) version of the CSID is widely used to screen for cognitive functioning in the general and older adults population, including stroke survivors.[17]

### 2.5 | Other data collection

The following information was obtained from all participants using a standardized questionnaire: demographic data, personal history of smoking, alcohol consumption, and physical activities, medical history of hypertension, diabetes, hyperlipidaemia and heart disease, the use of medications for these conditions, and family history. Information on dietary patterns was obtained using the food frequency questionnaire. The severity of stroke was ascertained using the National Institute of Health Stroke Scale and Stroke Levity Scale.[18] The average of two blood pressure (B.P) measurements was recorded. Each B.P measurement was obtained using an Omron HEM-907 XL 26 blood pressure monitor and the readings recorded according to standardized protocol provided by the manufacturers.

Along with the blood pressure and pulse rates, anthropometric measurements of weight, height, waist and hip circumferences were also undertaking. Records of other relevant risk factors for stroke were also made. This includes fasting blood sugar, lipid profile, electrocardiogram, carotid Doppler and echocardiography.

### 2.6 | Statistical analyses

Stroke survivors with clinically significant anxiety were those who had a score of 11 or more on the HADS-A instrument. Survivors meeting criteria for clinically significant anxiety, but also had a score of ≥11 in the depression subscale of the HADS, were categorized as having anxiety and depression comorbidity. Frequencies and proportions were used to summarize discrete variables. We also examined the prevalence of milder forms anxiety (ie which may not be the focus of clinical attention). For this analysis, we determined the frequency of stroke survivors who scored between 8 and 11 in the HADS-A. [13]

We next examined the association of anxiety with demographic and other stroke risk factor variables. These associations were conducted by first comparing stroke survivors with anxiety with those who were anxiety free using the $chi^2$ test for categorical variables. We estimated odds ratios of the associations using logistic regression analyses. The same method was used in the investigation of the association of anxiety with cognitive impairment. We note that this particular analysis was exploratory and did not set out to build a definitive model for predicting post-stroke cognitive impairment. As such the ratio of the number of events per variable was smaller than often recommended.[19]

We adjusted for the effect of age, gender and education in all regression models. The results of the associations are presented as odds ratios with 95% confidence intervals (CI). Analyses were conducted using Stata MP version 14.0 (StataCorp, College Station, TX, USA).[19] Values of $P<.05$ were considered significant.

## 3 | RESULTS

### 3.1 | Subject characteristics

There were 249 males and 142 females in the study sample (Table 1). Their mean age was 57.3 (±11.7) years. There was no significant difference in the mean age for men (57.4±12.2) and women (57.0±10.8). Over 90% of the subject had at least 6 years of formal education. Nearly all participants in this study had either mild or moderate stroke (Table 1).

### 3.2 | Anxiety

A total of 77 (19.7%) stroke survivors had clinically significant PSA. About 71.4% of participants with PSA also had comorbid depression. Milder forms of anxiety were present in over one half of participants in our sample (Table 2). Female participants were significantly more likely to be anxious in both unadjusted and adjusted analyses (Table 3).

### 3.3 | Anxiety and cognitive impairment

Twenty four (6.1%) participants in the study were cognitively impaired. Those who had cognitive impairment were mostly depressed (81.1%) male (75%) participants. Having cognitive impairment was significantly associated with PSA (Table 4).

## 4 | DISCUSSION

We found a prevalence of 19.7% for PSA and 14.1% for anxiety and depression comorbidity among recent stroke survivors in this SSA setting. Being female independently predicted PSA. Anxiety in stroke survivors was associated with cognitive impairment.

There are no studies of anxiety in survivors of a recent stroke, diagnosed using standard neuroimaging criteria,[11] in SSA to which our results could be meaningfully compared. However, we identified one previous community-based study of 51 self-reported stroke survivors[20] in rural Tanzania who were assessed for anxiety between 6 months and 6 years post-stroke. That study[20] reported an unusually low prevalence of 5.9% for clinically significant PSA. Our results are more reflective of the pattern reported in studies from other parts of the world where methodologies similar to those of the present investigation have been used. In the most recent systematic review of all such studies (N=11), Campbell Burton and colleagues[6] reported an overall prevalence of 18% for PSA. Anxiety prevalence rates of 21% were reported in assessments conducted at less than 1 month,[21] and 24% when anxiety was ascertained at 1 month post-stroke. [22] In this study, PSA was ascertained in survivors within 1 month of the stroke.

Given rates such as 4.1%[23] and 5.6%[24] reported for any anxiety in the general Nigerian population, the suggestion from our study is that having a recent stroke in the country context leads to a fourfold increase in clinically significant anxiety. As in physical disorders, some variations in the rates of mental health disorders can be expected in studies conducted in different countries and across cultures. For example, assessment instruments may perform differently as cultural nuances may affect the likelihood that respondent will endorse some of the symptoms required to make diagnoses of anxiety disorders.[25] An important requirement for the ascertainment of anxiety in the HADS is the endorsement of excessive worry. By convention,[26] the diagnoses of anxiety may not be clinically valid when this degree of worry is justifiable. In recent stroke survivors living in LMICs, especially those in SSA where there is widespread poverty and deprivation,[27] and access to both physical and mental healthcare is determined by personal financial resources,[28] undue worry as a result of these disadvantages may be interpreted as justifiable. In line with this observation, a previous study investigating the prevalence of mental health disorders among 4984 persons drawn from the general south-western Nigerian population using a stratified multistage cluster sampling[23] did not identify persons with generalized anxiety disorders and post-traumatic stress disorders which are among the most commonly reported anxiety disorders in higher income countries.

We have other reasons to suspect that the prevalence of criterion-diagnosed PSA found in the present study is likely to be an underestimation of the true picture in this SSA n setting. First, in ascertaining clinically significant anxiety, which is anxiety of sufficient severity to

warrant specific interventions, we have focused on the more stringent diagnostic cut-off scores for the HADS, and as recommended by the developers of the instruments. Some reports from the general Nigeria population[29] suggest that many persons with milder severity of anxiety have levels of anxiety-related disability that overlap with those of anxiety syndromes diagnosed using stricter criteria. Second, a suggestion of mental illness is still associated with perceived stigma in the Nigerian context.[30] As such, it is possible that some of the respondents in the present study may have been too embarrassed to admit to some of the anxiety-related symptoms. Others may especially find it unusual to reveal health information to non-clinician assessors. Third, stroke survivors in the present study were identified as part of a randomized controlled trial (RCT). Persons who were too ill to provide subsequent follow-up information were excluded, thus, suggesting that the sample for the present study may not be typical of the full spectrum of stroke survivor population in the study setting. For example, nearly all participants in the present study had stroke of mild or moderate severity. It is reasonable to expect that persons with more severe stroke may likely to have more physical and mental health morbidity.

Most of the risk factors we investigated were not associated with anxiety in our stroke survivors. The association between female gender and anxiety found in this study has been inconsistently reported in both stroke[6] and general Nigerian population studies.[23] However, over 70% of persons with PSA in our sample also had comorbid depression of equivalent severity. As it is well established in both general[31] and stroke populations globally[32] that depression is commoner in women, we suspect that gender differential in the prevalence of PSA in our study is the result of very high overlap between anxiety and depression in the studied sample.

Similar to gender, the finding in the present study of an association between PSA and cognitive impairment is inconsistently reported in the literature.[7,33] However, along with the high overlap between depression and PSA in our sample, over 80% of those with cognitive impairment were also depressed. We were, thus, not surprised about the association of PSA (which is over 70% PSD in our sample) with cognitive impairment found in the present study.

This study has a few limitations. First, because of its cross-sectional nature of the analyses, we were unable to differentiate whether the anxiety in our sample of recent stroke survivors predated the stroke event or were incident cases. We note the possible bidirectional relationship between emotional disorders such as anxiety and stroke, with each serving as important risk factor for the other.[34] Cross-sectional analyses are inadequate in providing robust evidence for the direction of associations between health conditions. Second, even though the HADS is widely used with good validity in stroke populations across cultures, it is unable to make substantive diagnoses of anxiety disorders. Finally and as previously stated, the present sample was drawn from a RCT and is unlikely to represent the entire spectrum of stroke survivors.

In conclusion, we have found in this relatively large sample of recent stroke survivors from SSA that about one in five had clinically significant anxiety, and well over 70% of those with anxiety also have depression. We suspect that these estimates are conservative because

of cultural and study-design peculiarities. Future studies in SSA will need to determine, prospectively, the specific impact of anxiety on clinical processes and stroke outcomes in the population.

## Acknowledgments

**Funding information**

National Institutes of Neurological Disorders and Stroke, Grant/Award Number: U01 NS079179

National Institutes of Neurological Disorders and Stroke U01 NS079179. MO and BO are also supported by U54HG007479 - Stroke Investigative Research and Education Network (SIREN).

## References

1. Moran A, Forouzanfar M, Sampson U, Chugh S, Feigin V, Mensah G. The epidemiology of cardiovascular diseases in sub-Saharan Africa: the global burden of diseases, injuries and risk factors 2010 study. Prog Cardiovasc Dis. 2013; 56:234–239. [PubMed: 24267430]
2. World Health Organization. International Classification of Functioning Disability and Health. Geneva: WHO; 2001.
3. Pollock A, St George B, Fenton M, Firkins L. Top ten research priorities relating to life after stroke. Lancet Neurol. 2012; 11:209. [PubMed: 22341029]
4. van Mierlo ML, Schroder C, van Heugten CM, Post MW, de Kort PL, Visser-Meily JM. The influence of psychological factors on health-related quality of life after stroke: a systematic review. Int J Stroke. 2014; 9:341–348. [PubMed: 24148550]
5. Cumming TB, Blomstrand C, Skoog I, Linden T. The high prevalence of anxiety disorders after stroke. Am J Geriatr Psychiatry. 2016; 24:154–160. [PubMed: 26601725]
6. Campbell Burton CA, Murray J, Holmes J, Astin F, Greenwood D, Knapp P. Frequency of anxiety after stroke: a systematic review and meta-analysis of observational studies. Int J Stroke. 2013; 8:545–559. [PubMed: 23013268]
7. Ayerbe L, Ayis SA, Crichton S, Wolfe CD, Rudd AG. Natural history, predictors and associated outcomes of anxiety up to 10 years after stroke: the South London Stroke Register. Age Ageing. 2014; 43:542–547. [PubMed: 24375225]
8. Lamers F, van Oppen P, Comijs HC, et al. Comorbidity patterns of anxiety and depressive disorders in a large cohort study: the Netherlands Study of Depression and Anxiety (NESDA). J Clin Psychiatry. 2011; 72:341–348. [PubMed: 21294994]
9. Mancini M, Perna G, Rossi A, Petralia A. Use of duloxetine in patients with an anxiety disorder, or with comorbid anxiety and major depressive disorder: a review of the literature. Expert Opin Pharmacother. 2010; 11:1167–1181. [PubMed: 20402555]
10. Ihle-Hansen H, Thommessen B, Fagerland MW, et al. Multifactorial vascular risk factor intervention to prevent cognitive impairment after stroke and TIA: a 12-month randomized controlled trial. Int J Stroke. 2014; 9:932–938. [PubMed: 23205666]
11. Sacco RL, Kasner SE, Broderick JP, et al. An updated definition of stroke for the 21st century: a statement for healthcare professionals from the American Heart Association/American Stroke Association. Stroke. 2013; 44:2064–2089. [PubMed: 23652265]
12. Owolabi MO, Akinyemi RO, Gebregziabher M, et al. Randomized controlled trial of a multipronged intervention to improve blood pressure control among stroke survivors in Nigeria. Int J Stroke. 2014; 9:1109–1116. [PubMed: 25042605]
13. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. Acta Psychiatr Scand. 1983; 67:361–370. [PubMed: 6880820]
14. Abiodun OA. A validity study of the Hospital Anxiety and Depression Scale in general hospital units and a community sample in Nigeria. Br J Psychiatry. 1994; 165:669–672. [PubMed: 7866683]

15. Hall KS, Hendrie HC, Rodgers DD, Osuntokun BO, Postl BD. The development of a dementia screening interview in two distinct languages. Int J Methods Psychiatric Res. 1993; 3:1–28.
16. Hall KS, Gao S, Emsley CL, Ogunniyi AO, Morgan O, Hendrie HC. Community screening interview for dementia (CSI 'D'); performance in five disparate study sites. Int J Geriatr Psychiatry. 2000; 15:521–531. [PubMed: 10861918]
17. Akinyemi RO, Allan L, Owolabi MO, et al. Profile and determinants of vascular cognitive impairment in African stroke survivors: the CogFAST Nigeria Study. J Neurol Sci. 2014; 346:241–249. [PubMed: 25238666]
18. Owolabi MO, Platz T. Proposing the Stroke Levity Scale: a valid, reliable, simple, and time-saving measure of stroke severity. Eur J Neurol. 2008; 15:627–633. [PubMed: 18474078]
19. StataCorp. Stata Statistical Software: Release 13. College Station, TX: StataCorp LP; 2013.
20. Jones MP, Howitt SC, Jusabani A, et al. Anxiety and depression in incident stroke survivors and their carers in rural Tanzania: a case-control follow-up study over five years. Neurol Psychiatry Brain Res. 2012; 18:12–128.
21. Field EL, Norman P, Barton J. Cross-sectional and prospective associations between cognitive appraisals and posttraumatic stress disorder symptoms following stroke. Behav Res Ther. 2008; 46:62–70. [PubMed: 18005937]
22. Morrison V, Pollard B, Johnston M, MacWalter R. Anxiety and depression 3 years following stroke: demographic, clinical, and psychological predictors. J Psychosom Res. 2005; 59:209–213. [PubMed: 16223623]
23. Gureje O, Lasebikan VO, Kola L, Makanjuola VA. Lifetime and 12-month prevalence of mental disorders in the Nigerian survey of mental health and well-being. Br J Psychiatry. 2006; 188:465–471. [PubMed: 16648534]
24. Mapayi B, Makanjuola RO, Mosaku SK, et al. Impact of intimate partner violence on anxiety and depression amongst women in Ile-Ife, Nigeria. Arch Womens Ment Health. 2013; 16:11–18. [PubMed: 22936117]
25. Halbreich U, Alarcon RD, Calil H, et al. Culturally-sensitive complaints of depressions and anxieties in women. J Affect Disord. 2007; 102:159–176. [PubMed: 17092564]
26. American Psychiatric Association. Diagnostic and Statistical Manual of Mental disorders: 4th Edition (DSM IV) Text Revision (ed). 4. Washington DC: American Psychiatric Association; 1994. Text revision ed
27. Central Bank of Nigeria. Annual Report and Statement of Accounts for the year Ended 31st December 2011. 2011.
28. Uwakwe R, Ibeh CC, Modebe AI, et al. The epidemiology of dependence in older people in Nigeria: prevalence, determinants, informal care, and health service utilization. A 10/66 dementia research group cross-sectional survey. J Am Geriatr Soc. 2009; 57:1620–1627. [PubMed: 19682135]
29. Gureje O. Psychological disorders and symptoms in primary care. Association with disability and service use after 12 months. Soc Psychiatry Psychiatr Epidemiol. 2002; 37:220–224. [PubMed: 12107713]
30. Ikwuka U, Galbraith N, Manktelow K, et al. Ideological vs. instrumental barriers to accessing formal mental health care in the developing world: focus on South-eastern Nigeria. J Health Care Poor Underserved. 2016; 27:157–175. [PubMed: 27763463]
31. Gureje O, Kola L, Afolabi E. Epidemiology of major depressive disorder in elderly Nigerians in the Ibadan Study of ageing: a community-based survey. Lancet. 2007; 370:957–964. [PubMed: 17869636]
32. Towfighi A, Ovbiagele B, El Husseini N, et al. Poststroke depression: a scientific statement for healthcare professionals from the American Heart Association/American Stroke Association. Stroke. 2017; 48:e30–e43. [PubMed: 27932603]
33. Barker-Collo SL. Depression and anxiety 3 months post stroke: prevalence and correlates. Arch Clin Neuropsychol. 2007; 22:519–531. [PubMed: 17462857]
34. Pan A, Sun Q, Okereke OI, Rexrode KM, Hu FB. Depression and risk of stroke morbidity and mortality: a meta-analysis and systematic review. JAMA. 2011; 306:1241–1249. [PubMed: 21934057]

## TABLE 1

Characteristics of stroke survivors in the study

| Variables | Overall sample (n=391) | Anxiety (n=77) | Anxiety-depression (n=55) |
|---|---|---|---|
| Mean age | 57.3 (11.7) | 58.8 (12.7) | 59.0 (12.7) |
| Age (years) | | | |
| ≤45 | 60 (15.4) | 11 (14.3) | 8 (14.6) |
| 45–65 | 236 (60.4) | 42 (54.6) | 29 (52.7) |
| >65 | 95 (24.3) | 24 (31.2) | 18 (32.7) |
| Gender | | | |
| Male | 249 (63.7) | 36 (46.8) | 26 (47.3) |
| Female | 142 (36.3) | 41 (53.3) | 29 (52.7) |
| Education | | | |
| None | 34 (8.7) | 9 (11.7) | 6 (10.9) |
| Primary | 73 (18.7) | 15 (19.5) | 11 (20.0) |
| Secondary | 108 (27.6) | 16 (20.8) | 15 (27.3) |
| Higher | 176 (45.0) | 37 (48.1) | 23 (41.8) |
| Occupation | | | |
| Skilled/professional | 117 (29.9) | 28 (36.4) | 16 (29.1) |
| Semi-skilled | 52 (13.3) | 10 (13.0) | 9 (16.4) |
| Manual | 110 (28.1) | 20 (26.0) | 17 (30.9) |
| Retired | 89 (22.8) | 14 (18.2) | 10 (18.2) |
| Others | 23 (5.9) | 5 (6.4) | 3 (5.5) |
| Stroke severity: NIHSS | | | |
| Mild (≤15) | 389 (99.5) | 76 (98.7) | 55 (100.) |
| Moderate (16–20) | 2 (0.5) | 1 (1.3) | 0 (0.0) |
| Severe (21–42) | - | - | - |
| Stroke severity: SLS | | | |
| Mild (11–15) | 315 (81.4) | 56 (72.7) | 41 (77.4) |
| Moderate (6–10) | 66 (17.1) | 19 (24.7) | 11 (20.8) |
| Severe (0–5) | 6 (1.5) | 2 (2.6) | 1 (1.9) |
| Total | | 77 (19.7) | 55 (14.0) |

## TABLE 2

Analyses showing participants with milder forms of anxiety in the sample

| Variables | Anxiety free (n=106) | Mild (n=208) |
|---|---|---|
| Age (years) | | |
| ≤45 | 18 (17.0) | 31 (14.9) |
| 45–65 | 62 (58.5) | 132 (63.5) |
| >65 | 26 (24.5) | 45 (21.6) |
| Gender | | |
| Male | 77 (72.6) | 136 (65.4) |
| Female | 29 (27.4) | 72 (34.6) |
| Education | | |
| None | 3 (2.8) | 22 (10.6) |
| Primary | 13 (12.2) | 45 (21.6) |
| Secondary | 37 (34.9) | 55 (26.4) |
| Higher | 53 (50.0) | 86 (41.4) |
| Occupation | | |
| Skilled/professional | 33 (31.1) | 56 (26.9) |
| Semi-skilled | 17 (16.0) | 25 (12.0) |
| Manual | 22 (20.8) | 68 (32.7) |
| Retired | 32 (30.2) | 43 (20.7) |
| Others | 2 (1.9) | 16 (7.7) |
| Stroke severity: NIHSS | | |
| Mild (≤15) | 106 (100.0) | 207 (99.5) |
| Moderate (16–20) | 0 (0.0) | 1 (0.4) |
| Severe (21–42) | - | - |
| Stroke severity: SLS | | |
| Mild (11–15) | 88 (85.4) | 171 (82.6) |
| Moderate (6–10) | 13 (12.6) | 34 (16.4) |
| Severe (0–5) | 2 (1.9) | 2 (1.0) |

**TABLE 3**

Association of stroke risk factors and post-stroke anxiety in the study

| Variables | No Anxiety (n=314) | Anxiety (n=77) | Test statistic | P-values | OR (95% CI) |
|---|---|---|---|---|---|
| Demographic factors | | | | | |
| Age (years) | | | | | |
| ≤45 | 49 (15.6) | 11 (14.3) | | | 1.00 |
| 45–65 | 194 (61.8) | 42 (54.6) | | | 0.96 (0.46–2.01) |
| >65 | 71 (22.6) | 24 (31.2) | 2.471 | .291 | 1.51 (0.68–3.35) |
| Gender | | | | | |
| Male | 213 (67.8) | 36 (46.8) | | | 1.00 |
| Female | 101 (32.2) | 41 (53.3) | 11.882 | .001* | 2.40 (1.45–3.99)* |
| Education | | | | | |
| None | 25 (8.0) | 9 (11.7) | | | 1.00 |
| Primary | 58 (18.5) | 15 (19.5) | | | 0.72 (0.28–1.86) |
| Secondary | 92 (29.3) | 16 (20.8) | | | 0.48 (0.19–1.22) |
| Higher | 139 (44.3) | 37 (48.1) | 2.843 | .416 | 0.74 (0.32–1.72) |
| Occupation | | | | | |
| Skilled/professional | 89 (28.3) | 28 (36.4) | | | 1.00 |
| Semi-skilled | 42 (13.4) | 10 (13.0) | | | 0.76 (0.34–1.70) |
| Manual | 90 (28.7) | 20 (26.0) | | | 0.71 (0.37–1.35) |
| Retired | 75 (23.9) | 14 (18.2) | | | 0.59 (0.29–1.21) |
| Others | 18 (5.7) | 5 (6.5) | 2.439 | .655 | 0.88 (0.30–2.59) |
| Vascular risk factors | | | | | |
| Smoking (ever) | 71 (22.7) | 9 (11.7) | 4.582 | .032* | 0.45 (0.21–0.95)* |
| Pulse rate<60 | 15 (4.8) | 1 (1.4) | 1.81 | .404 | 0.27 (0.04–2.09) |
| Pulse rate>100 | 32 (10.3) | 8 (10.8) | | | 1.02 (0.45–2.31) |
| Obesity[a] | 48 (18.5) | 15 (25.9) | 1.826 | .401 | 1.50 (0.77–2.92) |
| Hypertension | 153 (48.7) | 37 (48.1) | 0.011 | .916 | 0.97 (0.59–1.60) |
| Diabetes mellitus | 7 (2.2) | 1 (1.3) | 0.261 | .61 | 0.58 (0.07–4.79) |

*Acta Neurol Scand*. Author manuscript; available in PMC 2018 December 01.

| Variables | No Anxiety (n=314) | Anxiety (n=77) | Test statistic | P-values | OR (95% CI) |
|---|---|---|---|---|---|
| Diet | | | | | |
| Low fish | 20 (6.4) | 6 (8.0) | 0.251 | .616 | 1.27 (0.49–3.29) |
| Low vegetables | 23 (7.4) | 7 (9.2) | 0.298 | .585 | 1.28 (0.53–3.11) |
| Low fruits | 45 (14.4) | 13 (17.11) | 0.346 | .556 | 1.22 (0.62–2.41) |
| Alcohol | | | | | |
| Former | 138 (44.1) | 30 (39.0) | 1.622 | .445 | 0.76 (0.45–1.28) |
| Current | 24 (7.7) | 4 (5.2) | | | 0.59 (0.19–1.78) |
| Never | 151 (48.2) | 43 (55.8) | | | 1.00 |
| Exercise during leisure time | 30 (9.6) | 4 (5.2) | 1.513 | .219 | |
| Medications for stroke | | | | | 0.52 (0.18–1.51) |
| Compliant | 25 (8.0) | 6 (7.8) | 0.005 | .943 | |
| Non-compliant | 43 (13.7) | 5 (6.5) | 3.005 | .083 | 0.97 (0.38–2.45) |
| Stroke severity: SLS | | | | | 0.44 (0.17–1.14) |
| Mild (11–15) | 259 (83.6) | 56 (72.7) | | | 0.43 (0.08–2.42) |
| Moderate (6–10) | 47 (15.2) | 19 (24.7) | | | 0.81 (0.14–4.79) |
| Severe (0–5) | 4 (1.2) | 2 (2.6) | 4.841 | .089 | 1.00 |

[a]Denominator (present=260, absent=58).

*$P<.05$.

**TABLE 4**

Independent association of post-stroke anxiety and cognitive impairment in the sample of recent stroke survivors

| | Anxiety vs no anxiety |
|---|---|
| **Variables** | **OR (95% CI)[a]** |
| Age (years) | |
| ≤45 | 1.00 |
| 45–65 | 0.77 (0.35–1.69) |
| >65 | 1.32 (0.55–3.19) |
| Gender | |
| Male | 1.00 |
| Female | 2.88 (1.64–5.03) * |
| Education | |
| None | 1.00 |
| Primary | 1.04 (0.37–2.93) |
| Secondary | 0.73 (0.27–1.99) |
| Higher | 1.19 (0.46–3.09) |
| Cognitive impairment | 6.84 (2.59–18.04) * |
| Stroke severity: SLS | |
| Mild (11–15) | 1.00 |
| Moderate (6–10) | 1.57 (0.82–3.03) |
| Severe (0–5) | 3.49 (0.56–21.68) |

[a]Adjusted for age, gender and education.

*$P$<.05.