Published in final edited form as:

Gend Med. 2011 October ; 8(5): 312–319. doi:10.1016/j.genm.2011.08.001.

Gender Differences in Presenting Signs and Symptoms of Acute Ischemic Stroke: A Population-Based Study

Nivedita U. Jerath, MD^{1,*}, Chandan Reddy, MD², W. David Freeman, MD³, Aarti U. Jerath, MD MA⁴, and Robert D. Brown, MD, MPH⁵

⁽¹⁾Mayo Clinic College of Medicine Department of Neurology, Mayo Clinic Rochester 200 First St. S.W. Rochester, MN 55905

⁽²⁾Department of Neurosurgery, Mayo Clinic Rochester 200 First St. S.W. Rochester, MN 55905

⁽³⁾Department of Neurology, Mayo Clinic Jacksonville 4500 San Pablo Road Jacksonville, FL 32224

⁽⁴⁾Harbor-UCLA Medical Center Harbor-UCLA Medical Center 1000 W. Carson Street, Box 2 Torrance, CA 90509

⁽⁵⁾Department of Neurology, Mayo Clinic Rochester 200 First St. S.W. Rochester, MN 55905

Abstract

Background and Purpose—There are few population-based data regarding gender differences in signs and symptoms of acute ischemic stroke. Previously reported data have been inconsistent and conflicting. This study addresses these gender differences in a population-based study.

Methods—All patients with first ischemic stroke occurring in Rochester, MN residents during 1985-1989 were identified. Signs and symptoms were collected via review of the comprehensive medical records. Differences were identified by Pearson's Chi-square test.

Results—Symptoms at ischemic stroke presentation differed between men and women as follows: Women more commonly presented with generalized weakness ($p=0.005$) and mental status change ($p=0.0001$). Men more commonly presented with paresthesia ($p=0.003$), ataxia ($p=0.006$), and double vision ($p=0.005$). Signs at ischemic presentation of stroke differed between men and women as follows: Men more commonly presented with nystagmus ($p=0.002$) on exam. Significant trends were that women more commonly presented with fatigue ($p=0.02$), disorientation ($p=0.04$), and fever ($p=0.02$), and men more commonly presented with sensory abnormalities ($p=0.02$).

Conclusions—There are differences by gender in signs and symptoms at presentation of ischemic stroke. In addition to selected focal symptoms, women more commonly present with diffuse symptoms of generalized weakness, fatigue, disorientation, and mental status change.

Keywords

gender; stroke; signs; symptoms; population-based study

© 2012 Excerpta Medica Inc. All rights reserved.

*Corresponding Author njerath@post.harvard.edu .

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Stroke is the third leading cause of death and disability in the United States (1). More than half (62 percent) of all stroke deaths in the United States occur in women despite having a somewhat lower occurrence of stroke compared to men because women live longer and at older ages have a higher mortality rate than men (2, 3). Women are reported to delay three times longer than men in seeking care for stroke symptoms because more women live alone and have perceived control over their symptoms (4). The delay of treatment could lead to lack of emergency treatment thus leading to worse outcomes (3-8). Not only do women delay seeking care, but they also have experienced longer delays with longer door-to-doctor times and longer door-to-image times when presenting in the Emergency Department with an acute stroke (9).

Gender differences in acute stroke presentation could provide important discriminators for prompt recognition, diagnostic testing, and proper stroke treatment (10). Available data regarding gender differences in acute stroke presentation and treatment are limited and controversial, and few population-based studies are available (2, 11-14). The results of current research regarding gender differences in stroke symptoms are varied. Some studies highlight that women present with less traditional warning signs such as pain or altered mental status (3,9,14-15). Labiche et al in 2002 reported that among 1,189 strokes, women presented with more nontraditional symptoms that included pain and change in level of consciousness and disorientation (14). In 2009, Stuart Shor et al discovered that women were as likely as men to report weakness, clumsiness, traditional and non traditional symptoms at the onset of acute stroke, but they noticed that women were more likely than men to report at least one nonspecific or somatic symptom, which in their study was defined as the presence of headache, change in behavior, difficulty understanding, nausea, feeling “funny”, fatigue, or malaise. In 461 patients reported by Lisabeth et al in 2009, women presented with altered mental status more often than men (20).

The previous three studies reported women presenting more often with non traditional symptoms; however, there are studies reporting that women more often present with more traditional symptoms when compared to men. In a prospective study of 505 patients, no gender difference was found between symptoms of numbness, visual deficits or language, but there was a greater proportion of women who presented with weakness when compared to men (28). Another study of 4499 patients resulted in women presenting with coma, paralysis, aphasia, swallowing problems, and urinary incontinence more frequently than men (12).

Because of lack of insight into gender-related differences in the presenting signs and symptoms of acute ischemic stroke, women may delay seeking treatment and thus not receive appropriate emergency diagnostic and therapeutic intervention.

Subjects and Methods

The Rochester Epidemiology Project Medical Record Linkage System provides the mechanism for identification of virtually every new case of stroke for those living in Rochester, MN. This population is served by the Mayo Clinic and its two hospitals, along with the Olmsted Medical Center, which consists of a smaller group practice and a hospital (16). Diagnoses for a patient are entered into a master sheet and then into a central computer index, which includes other medical practices such as the University of Minnesota and the Veterans Administration Hospital in Minneapolis (16-17).

Using the resources of the Rochester Epidemiology Project, all ischemic strokes occurring in residents of Rochester, MN were identified and entered into the Rochester Stroke Registry. Ischemic strokes had been confirmed by the history, physical exam, and a head CT scan.

Available medical record data for all patients in the Registry includes detailed inpatient and outpatient data, emergency department data, neurology examination records, nursing home notes, and autopsy information (17).

During the time period of the study, 96 percent of the Rochester population was Caucasian with 51 percent being female (18). This project was approved by the Mayo Foundation Institutional Review Board.

Four hundred and forty-nine patients had previously been identified as having a first ischemic stroke during 1985-1989 (17). The medical records were reviewed in detail, and the signs and symptoms at the onset of stroke were recorded. A data collection sheet of greater than 80 symptoms and signs was created to facilitate this process. The symptoms were collected from a variety of sources, but mainly were determined by review of what the patient or collateral historian provided as documented in the medical records of the stroke registry. The signs were collected from the neurological exam; this is specifically the neurological exam recorded by the neurologist. Three hundred and one patients (67 percent) had an exam performed by a neurologist. If a neurologist's exam did not exist, the signs were collected from other sources including the neurological and physician exam as documented in the primary-care physician records, emergency department data, or inpatient hospital records. The data from these other sources were of excellent quality as there was a template used to record the signs/symptoms. Although a neurological exam performed by a neurologist may not have been available for 33 percent of the subjects, the multi-disciplinary and comprehensive medical records from the stroke registry provided information that was sufficient as that which non-neurology physicians typically would perform and record as a neurological exam. For those patients who were unable to provide presenting symptoms, this was recorded as "unknown." There was also an "Other" section for signs and symptoms that were not on the data-collection form.

After the data collection, categories of symptoms and signs were created. The categories of paresthesia and weakness included facial, arm, and leg paresthesia or weakness respectively. Ataxia as a symptom included arm, leg, and gait ataxia along with any symptom of unsteadiness or imbalance. The pain category included facial, neck, chest, and leg pain. The category of disorientation and confusion was combined with the category of difficulty with memory. Visual disturbances included blurry vision, difficulty focusing, photophobia, and visual hallucinations. Nausea was combined with vomiting. The categories of migrainous and non-migrainous headaches were merged into headache along with tinnitus and pulsatile tinnitus being merged into tinnitus. Language disorders as both signs and symptoms were combined to include expressive aphasia, receptive aphasia, agraphia, and alexia. Weakness as a sign included facial palsy, weakness of the right and left extremity, along with tongue weakness. Ataxia as a sign included both limb and gait ataxia. Sensory abnormalities involved both sensory loss, sensory extinction and inattention.

The signs and symptoms between men and women were compared using Pearson's Chi-square. Age was a continuous variable and was analyzed using the student's t-test. Significance was taken at $\alpha = 0.01$ and $\alpha = 0.05$ was used as an indicator of a possible difference suggesting a significant trend..

Results

Four hundred and forty-nine cases of first ischemic stroke were defined among Rochester, MN residents during 1985-1989. Two hundred and sixty-eight (60 percent) were women. Women on average presented with stroke at a later age, with a mean age of 79 years

compared to 70 years for men ($p=0.0001$). A neurological record was documented by a neurologist for 79 percent of men and 59 percent of women ($p=0.0001$).

The differences in symptoms between men and women are presented in Table 1. Women more commonly presented with generalized weakness ($p=0.005$), and mental status change ($p=0.0001$). Men more commonly presented with paresthesia ($p=0.003$), ataxia ($p=0.006$), and double vision ($p=0.005$).

The differences in signs between men and women are presented in Table 2. Signs at ischemic presentation of stroke on exam differed between men and women as follows: men more commonly presented with nystagmus ($p=0.002$).

Significant trends were that women more commonly presented with fatigue ($p=0.02$), disorientation ($p=0.04$), and fever ($p=0.02$), and men more commonly presented with sensory abnormalities ($p=0.02$).

There was no significant difference between men and women in symptoms such as headache, pain, weakness, language disorder, loss of vision, vertigo, nausea or vomiting, seizure, dysarthria, diaphoresis, tinnitus, shortness of breath, dysphagia, or incontinence. There was no significant difference in signs including loss of consciousness, gaze preference, extra-ocular movement deficit, weakness, ataxia, orthostatic blood pressure drop, anisocoria, tremor, or personality change (Tables 1 and 2).

Discussion

Because research has been limited, there is great encouragement to focus on the gender differences in the signs and symptoms of acute ischemic stroke (3,19). Few population-based data have evaluated gender differences in the presenting signs and symptoms of acute ischemic stroke.

Previous studies of gender differences in heart disease suggest that women present with more diffuse symptoms and signs (15). Similarly, our data suggest that women are more likely to present in an acute ischemic stroke with diffuse symptoms such as disorientation, generalized weakness, fatigue, and mental status change. The presentation of diffuse symptoms has been confirmed in multiple previous studies. A study of 1,124 patients further confirmed that women with acute ischemic and hemorrhagic stroke presented with diffuse symptoms or what was termed as “non-traditional” symptoms such as headache, face pain, limb pain, disorientation, generalized weakness, nausea, change in level of consciousness, and chest pain (14). Another study analyzed presenting symptoms of 1107 subjects who were hospitalized for stroke and discovered that women present with more somatic complaints including headache, change in behavior, difficulty understanding, nausea, change in vision, feeling odd, fatigue, or malaise (3). It has been in general agreement that women more often present with pain and less often with a traditional warning sign (9). Lisabeth et al discovered that there was a high prevalence of nontraditional symptoms among both genders with women more likely than men to report nontraditional symptoms such as altered mental status (20).

Our results are significant because women who arrive in the emergency department with an acute stroke take longer to be seen by a doctor and to get imaging. Gargano et al. conclude that this delay is not attributed to a difference in stroke signs and symptoms (9). Although this paper focuses on individual signs and symptoms, women usually present with both traditional and nontraditional symptoms, which would impact delay times and treatment less, thus suggesting a multifactorial cause for the delay.

Many studies have failed to find a gender difference in traditional signs and symptoms (3, 21). However, our study indicated that women could possibly present more often in our study with fever. Although this is not a “traditional” sign, perhaps the presentation of a fever along with other signs and symptoms can help women to obtain treatment without delay. Fever is associated with poor outcome in those with acute ischemic stroke and proper treatment and workup should be done (23).

Dysphagia may be another common sign that can have a gender preference. Although our study reported that women had a slightly greater presentation of dysphagia, this result was not significant. In a European study involving 4499 patients, however, women presented with dysphagia more frequently than men (12).

Our study reported that women more commonly presented with focal weakness on physical exam, but this result was not statistically significant. Another study reported that women presented with focal weakness more often than men, but the study found this observation difficult to explain (24).

Men in our study presented with traditional focal neurological symptoms such as sensory abnormalities, ataxia, and double vision. Similarly a previous study confirmed that men present with more traditional symptoms, but these differ from our study except for sensory abnormalities (3, 14).

Our study has a similar distribution of the presenting age of stroke in women when compared with other studies (13-14 25-27).

Limitations of this study include incomplete and missing data; this analysis relies on the fact that the missing data was not statistically significant. Incomplete and missing data included an “unknown variable” for those patients for whom the presence or absence of a sign or symptom was unable to be confirmed from the medical record. Less than 10% of subjects had an unknown variable which was automatically deleted in the analysis. Another limitation was that only 67 percent of the patients had a neurological exam, including more men than women. However, if a neurologist’s exam was not available, other detailed data were used such as emergency department records, exams performed by a non-neurology physician, or nursing home records. Lastly, our sample population was mostly Caucasian (96 percent), and thus our results may not potentially be applicable to all ethnicities. Although the discussion focuses on sex differences in signs and symptoms of ischemic stroke, one may wonder how the prevalence of these symptoms of weakness, ataxia, and disorientation would compare to prevalence in the general population. What makes these symptoms unique to the select population is that they occurred suddenly at the time of an ischemic stroke. One may also wonder how or why there are gender differences in the presentation of acute ischemic stroke. Further studies should be performed to investigate this as these differences could be attributed to multiple etiologies including women’s attentions to bodily states or women’s perceptions of stroke symptoms and signs.

Delays in recognition and treatment of stroke can result in poorer outcomes for women and long-term damage from stroke. The results of this study indicate that health care providers and women need to be aware that men and women may present differently with acute ischemic stroke; a key difference is that women present with non-traditional symptoms such as generalized weakness, fatigue, mental status change, and disorientation. These data are crucial because health care providers need to work with women to treat acute ischemic stroke expeditiously.

Acknowledgments

Supported in part by an Alpha Omega Alpha Carolyn L. Kuckein Student Research Fellowship

References

1. The CDC: Division for Heart Disease and Stroke Prevention. Heart Disease and Stroke Prevention; < <http://www.cdc.gov/DHDS/P/>>. Published October 29, 2008
2. Smith MA, Lisabeth LD, Brown DL, Morgenstern LB. Gender Comparisons of Diagnostic Evaluation for Ischemic Stroke Patients. *Neurology*. 2005; 65(6):855–8. [PubMed: 16186523]
3. Stuart-Shor E, Wellenius GA, DelloIacono DM, Mittleman MA. Gender Differences in Presenting and Prodromal Stroke Symptoms. *Stroke*. 2009
4. Mandelzweig L, Goldbourt U, Boyko V, Tanne D. Perceptual, social, and behavioral factors associated with delays in seeking medical care in patients with symptoms of acute stroke. *Stroke*. 2006; 37:1248–1253. [PubMed: 16556885]
5. Menon S, Pandey D, Morgenstern L. Critical Factors Determining Access to Acute Stroke Care. *Neurology*. 1998; 51:427–432. [PubMed: 9710014]
6. Williams JE, Rosamond WD, Morris DL. Stroke symptom attribution and time to emergency department arrival: the delay in accessing stroke healthcare study. *Acad Emerg Med*. 2000; 7:93–96. [PubMed: 10894250]
7. Williams LS, Bruno A, Rouch D, Marriott DJ. Stroke patients' knowledge of stroke influence on time to presentation. *Stroke*. 1997; 28:912–915. [PubMed: 9158624]
8. Moser DK, Kimble LP, Alberts MJ, Alonzo A, Croft JB, Dracup K, Evenson KR, Go AS, Hand MM, Kothari RU, Mensah GA, Morris DL, Pancioli AM, Riegel B, Zerwic JJ. Reducing delay in seeking treatment by patients with acute coronary syndrome and stroke: a scientific statement from the American Heart Association Council on Cardiovascular Nursing and Stroke Council. *Circulation*. 2006; 114:168–182. [PubMed: 16801458]
9. Gargano JW, Wehner S, Reeves MJ. Delays Among Patients With Acute Stroke. Do Presenting Symptoms Explain Sex Differences in Emergency Department? *Stroke*. 2009; 40:1114–1120. [PubMed: 19211483]
10. Gage B, Boechler M, Doggette A, Fortune G, Flaker GC, Rich MW, Radford MJ. Adverse Outcomes and Predictors of Underuse of Antithrombotic Therapy in Medicare Beneficiaries with Chronic Atrial Fibrillation. *Stroke*. 2000; 31:822–827. [PubMed: 10753982]
11. Bousser MG. Stroke in Women: the 1997 Paul Dudley White International Lecture. *Circulation*. 1999; 99:463–7. [PubMed: 9927389]
12. Di Carlo A, Lamassa M, Baldereschi M, Pracucci G, Basile AM, Wolfe CD, Giroud M, Rudd A, Ghetti A, Inzitari D. Gender Differences in the Clinical Presentation, Resource use, and 3-month Outcome of Acute Stroke in Europe: Data from a Multicenter Multinational Hospital-based registry. *Stroke*. 2003; 34:1114–1119. [PubMed: 12690218]
13. Roquer J, Campello AR, Gomis M. Gender Differences in First-ever Acute Stroke. *Stroke*. 2003; 34:1581–5. [PubMed: 12805490]
14. Labiche L, Chan W, Saldin K, Morgenstern L. Sex and Acute Stroke Presentation. *Ann Emerg Med*. 2002; 40:453–460. [PubMed: 12399786]
15. Heim LJ, Brunsell SC. Heart Disease in Women. *Prim Care*. 2000; 27:741–766. [PubMed: 10918678]
16. The Mayo for Medical Education and Research. Rochester Epidemiology Project. Mayo Clinic; <http://mayoresearch.mayo.edu/mayo/research/rep/>
17. Brown RD Jr, Whisnant JP, Sicks J, O'Fallon WM, Wiebers DO. Stroke incidence, prevalence, and survival: secular trends in Rochester, Minnesota through 1989. *Stroke*. 1996; 27:373–380. [PubMed: 8610298]
18. Petty GW, Brown RD Jr, Whisnant JP, Sicks JD, O'Fallon WM, Wiebers DO, et al. Ischemic Stroke Subtypes: A Population-based Study of Incidence and Risk Factors. *Stroke*. 1999; 30:2513–2516. [PubMed: 10582970]

19. Bushnell CD, Hurn P, Colton C, Miller VM, del Zoppo G, Elkind MS, Stern B, Herrington D, Ford-Lynch G, Gorelick P, James A, Brown CM, Choi E, Bray P, Newby LK, Goldstein LB, Simpkins J. Advancing the study of stroke in women: summary and recommendations for future research from an NINDS-Sponsored Multidisciplinary Working Group. *Stroke*. 2006; 37:2387–2399. [PubMed: 16857945]
20. Lisabeth LD, Brown DL, Hughes R, Majersik JJ, Morgenstern LB. Acute stroke symptoms: comparing women and men. *Stroke*. 2009; 40:2031–6. [PubMed: 19228858]
21. Hochner-Celnikier D, Manor O, Garbi B, Chajek-Shaul T. Gender gap in cerebrovascular accidents: comparison of the extent, severity, and risk factors in men and women aged 45–65. *Int J Fertil Womens Med*. 2005; 50(3):122–8. [PubMed: 16279505]
22. Hier DB, Yoon WB, Mohr JP, Price TR, Wolf PA. Gender and Aphasia in the Stroke Data Bank. *Brain and Language*. 1994; 47(1):155–167. [PubMed: 7922475]
23. Koennecke HC, Leistner S. Prophylactic antipyretic treatment with acetaminophen in acute ischemic stroke: A Pilot Study. *Neurology*. 2001; 57:2301–2303. [PubMed: 11756615]
24. Barrett KM, Brott TG, Brown RD Jr, Frankel MR, Worrall BB, Silliman SL, Case LD, Rich SS, Meschia JF. Sex differences in stroke severity, symptoms, and deficits after first-ever ischemic stroke. *J Stroke Cerebrovasc Dis*. Jan-Feb; 2007 16(1):34–9. [PubMed: 17689390]
25. Appelros P, Stegmayr B, Terént A. Sex Differences in Stroke Epidemiology. A Systematic Review. *Stroke*. 2009 doi: 10.1161/STROKEAHA.108.540781.
26. Lewsey JD, Gillies M, Jhund PS, Chalmers JWT, Redpath A, Briggs A, Walters M, Langhorne P, Capewell S, McMurray JJV, MacIntyre K. Sex Differences in Incidence, Mortality, and Survival in Individuals With Stroke in Scotland, 1986 to 2005. *Stroke*. 2009
27. Niewada M, Kobayashi A, Sandercock PA, Kaminski B, Czlonkowska A. Influence of gender on baseline features and clinical outcomes among 17370 patients with confirmed ischaemic stroke in the International Stroke Trial. *Neuroepidemiology*. 2005; 24:123–128. [PubMed: 15637449]
28. Barrett KM, Brott TG, Brown RD Jr, Frankel MR, Worrall BB, Silliman SL, Case LD, Rich SS, Meschia JF, Ischemic Stroke Genetics Study Group. Sex differences in stroke severity, symptoms, and deficits after first-ever ischemic stroke. *J Stroke Cerebrovasc Dis*. Jan-Feb; 2007 16(1):34–9. [PubMed: 17689390]

Cover Letter

You have followed recommendations of the previous reviewer by eliminating all discussion of your findings that did not meet the Bonferroni correction. The reviewer did NOT suggest you omit all discussion of the other potential differences, but rather to consult a statistician to see how to consider them. You have some interesting “trends” in your data set that in this revision are now lost. It is possible to report significant differences AND trends. I strongly suggest that you consult a statistician or work out a way to reinstate into your discussion some consideration of the “trends” that you observed as evidenced in you tables; otherwise you risk unfortunate Type II errors.

Dr. James Torner, an expert in neuro-epidemiology from the University of Iowa has responded to your comments below:

“I suggest stating that 0.05 was used as an indicator of a possible difference and a 0.01 was used for significance at the univariate level. For most epidemiological studies we don’t use a Bonferroni correction rather except with a huge number of comparisons such as genetic epidemiology. The reasons are that the interpretation of a finding depends on the number of other tests performed, the likelihood of type II errors is also increased, so that truly important differences are deemed non-significant. It is best to describe the purpose of the comparisons, ie. hypothesis generation and a method to determine the significant subset of variables.”

We have included his statements to this paper and have not used a Bonferroni correction. Instead, we will use 0.05 as indicator for possible difference and trends, and 0.01 for significant levels. Please let us know if you have any questions. We have greatly appreciated your comments and feedback.

Table I

Gender differences among symptoms of acute ischemic stroke.

SYMPTOMS	Women (%) N = 268	Men (%) N= 181	P
Paresthesia (face, arm, leg)	24.2	37.9	0.003*
Generalized weakness	32.9	20.7	0.005*
Weakness (face, arm, leg)	81.8	76.3	0.17
Ataxia (arm, leg, gait ataxia or imbalance)	61.4	74.7	0.006*
Headache, non-migrainous and migrainous	16.0	17.0	0.80
Pain (face, neck, chest, leg)	5.3	8.7	0.18
Language disorder (expressive aphasia, receptive aphasia, agraphia, alexia)	45.8	37.4	0.09
Disorientation and confusion or difficulty with memory	44.4	34.7	0.04**
Loss of vision	10.3	15.8	0.10
Double vision	1.7	7.1	0.005*
Visual disturbances (blurry vision, difficulty focusing, photophobia and visual hallucinations)	6.6	12.3	0.05**
Fatigue, drowsiness, or lethargy	31.2	21.1	0.02**
Dizziness, non-vertigo	15.9	16.5	0.88
Vertigo	3.3	5.9	0.21
Nausea or vomiting	12.4	12.9	0.86
Seizure	4.9	2.9	0.33
Dysarthria	37.1	36.8	0.95
Dysphagia	6.5	5.8	0.80
Tinnitus, including pulsatile	0.41	2.3	0.07
Diaphoresis	1.9	4.4	0.11
Agitated or fidgety	7.1	4.4	0.24
Shortness of breath or cyanotic	3.7	5.0	0.52
Incontinence	11.0	6.4	0.12
Mental status change	44.2	24.1	0.0001*

* Statistically significant difference, $p < .01$

** Indicator for possible difference, $p < 0.05$

Table II

Gender differences among signs of acute ischemic stroke.

SIGNS	Women (%with signs) N=268	Men (%with signs) N=181	P
Loss of Consciousness	32.7	27.3	0.23
Gaze preference	22.8	14.6	0.05**
Visual field loss	22.7	20.9	0.67
Weakness (face, arm, leg, tongue)	74.5	78.8	0.08
Ataxia (limb or gait)	46.2	51.5	0.30
Sensory abnormality (loss or extinction and inattention)	33.0	44.4	0.02**
Dysarthria	35.2	38.1	0.56
Extra-ocular movement deficit	4.7	3.5	0.54
Anisocoria	9.3	5.8	0.19
Nystagmus	4.6	12.9	0.002*
Dysphagia	2.9	4.1	0.52
Fever	12.1	5.3	0.02**
Perseveration	4.1	2.8	0.45
Language disorder (expressive aphasia, receptive aphasia, agraphia, alexia)	46.7	36.6	0.05**
Orthostatic BP drop	1.8	4.3	0.13
Personality change	12.5	9.0	0.27
Tremor	5.3	3.7	0.45
Extensor plantar response	39.3	38.4	0.84

* Statistically significant difference, $p < .01$

** Indicator for possible difference, $p < 0.05$