

## Original Paper

# Spontaneous Intracerebral Hemorrhage: Patient's Activities before the Onset of Stroke and Localization of Intracerebral Hemorrhage in Black Africans

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Received: August 6, 2017

Accepted: August 20, 2017

Online Published: May 16, 2019

doi:10.22158/rhs.v4n2p101

URL: <http://dx.doi.org/10.22158/rhs.v4n2p101>

### Abstract

**Background:** Some published studies on the patient's activity before the stroke occurrence indicate that there is an increased risk of the onset of acute stroke during these activities. In our community, these data are not yet assessed. The purpose of this pilot study was to examine whether intracerebral hemorrhage may be linked to patient's physical activity before the onset and to carry out any relationship with location of the hemorrhage.

**Methods:** The patient's activity before the onset of stroke and location of hemorrhage in 58 patients (40 men and 18 women, aged 39 to 81 years) admitted with spontaneous intracerebral hemorrhage seen by CT in Kinshasa, Democratic Republic of the Congo, from 2012 to 2015, were recorded and analyzed using logistic regression models.

**Results:** In 31% of the case, the onset developed after emotional factors, in 24% in the lavatory, in 15% during housework and in 12% during sexual activity ( $X^2 = 8.319$ ,  $p\text{-value} = 0.081$ ). There was no significant difference between those activities and the site of intracerebral hemorrhage ( $p > 0.05$ ).

**Conclusion:** *Most patients in this series seemed to be stricken by the hemorrhagic stroke during some physical activity. It is less certain that location of intracerebral hemorrhage was linked with these activities.*

**Keywords**

*Intracerebral hemorrhage, Activity, Ictus onset, Black Africans*

**1. Background**

The study of Tsementzis et al. (1985) suggest that subarachnoid hemorrhage (SAH) occurred more frequently in the lavatory, during sexual and sporting activity. Intracerebral hemorrhage (ICH) occurred more commonly during driving or consuming alcohol and cerebral infarction (CI) frequently during sleep or was occurred on walking. No differences were found for the other activities they examined. And for Kamei et al. (1998), both ICH and SAH were likely to occur frequently in the lavatory, while bathing or during meals. ICH also occurred frequently during physical work, while SAH occurred as frequently during mental work or housework as during hard physical labor. In a more recent study (Luciana et al., 2017), authors suggest that the daily occurrence of stroke is significantly influenced by the circadian clock that determines biorhythms, the circadian fluctuations of vital and physiological parameters, and the subjects' activities.

Cerebrovascular disease is the major cause of morbidity, disability, and mortality in both developed and developing countries (Manfredini et al., 1997; Stein et al., 2012). And in our current clinical practice, CT scan shows that ICH type (52%) / CI type (48%) ratio is closed to 1 (Longo-Mbenza et al., 2008). Whereas ICH constitutes only 10-15% of all stroke in the United States of America (Broderick et al., 1993; Taylor et al., 1998) and in Europe (Milosevic et al., 2010). A better understanding of the underlying pathophysiologic mechanisms of stroke could provide more effective insights for both preventive strategies and optimization of therapeutic approach.

The purpose of this pilot study was twofold: to investigate the physical activity of the patient before or during the onset of ICH, and to determine whether or not there is any relationship between these subject's activities before the symptom onset and location of ICH in black Africans of central Africa.

**2. Methods**

Institutional Review Board approval and informed consent of patients or their representative were obtained for all aspects of this study. This short prospective study was carried out at Kinshasa, Democratic Republic of the Congo, between January 2012 and December 2015. There were 58 patients, 40 men and 18 women (sex ratio of 2 men : 1 woman), aged 39 to 81 years.

Admissions fulfilling  $\geq 1$  of the following criteria were excluded: patients with hemorrhage secondary to a brain tumor, trauma, hemorrhagic transformation of cerebral infarction, aneurismal or vascular malformations.

A structured questionnaire was used to collect information regarding physical activities close to the stroke onset and CT location of ICH. The questionnaire was administered anonymously and the information obtained was transcribed in the privacy of patients. The spouse or a relative gave the information about the patient physical activity before the onset of stroke.

CT examinations at admission were performed within the 48 hours of onset, using a Toshiba SDCT Xpress/GX machine (Toshiba, Tokyo, Japan). ICH, a spontaneous bleeding into the brain parenchyma was hyperdense on CT scan relative to gray matter (Figure 1). Topographic classification of the hematoma was defined as localized in the grey nucleus as caudate nucleus, putamen or in thalamus and or in the cerebellum (Table 1).

In this study, emotional factors include dispute, watching the football game in live on television...

### 2.1 Statistical Analysis

#### 2.1.1 Univariable Statistical Analysis

Comparisons of proportions (%) for categorical variables between groups were made using the Chi-square test. Continuous variables were expressed as means  $\pm$  standard deviations (SD), and compared using Student t-test or the Mann-Whitney U test as appropriate.

#### 2.1.2 Multivariable Analysis

Logistic regression analysis was used to find the best predictive model as the dependent variable. The variables that were significantly related to the activity of the patient, site of the ICH in univariate analysis were entered into the logistic regression model using a forward stepwise selection. Significant level was defined for the tolerance level at  $P < 0.05$ . Statistical analysis was performed using SPSS software version 16 (SPSS Inc., Chicago, IL, USA).

## 3. Results

Out of 58 patients with ICH in this study, Table 1 presents activities and the number of patient, and Table 2 shows the distribution of patient's activity and ICH localization.

**Table 1. Distribution of Activities and Number of Patient before the Onset of Stroke**

Activities	n (%)	p-value
After emotional factors	18 (31.03)	0.0806
In the lavatory	14 (24.14)	
During housework	9 (15.52)	
During sexual activity	7 (12.07)	
Others	10 (17.24)	

**Table 2. Distribution of Patients Activities and Main Site of ICH**

Variables	Total	Putamen	Thalamus	Others	p-value
Emotional factors	18	12 (66.67%)	4 (22.22%)	2 (11.11)	0.0009
In Bathroom	14	11 (78.57%)	2 (14.29%)	1 (7.14)	5.829e-05*
Housework	9	7 (77.78%)	2 (22.22%)		0.059
Sexual activity	7	3 (42.86%)	3 (42.86%)	1 (14.28)	0.625 <sup>+</sup>

\* = 0.0001, + = Binomial test

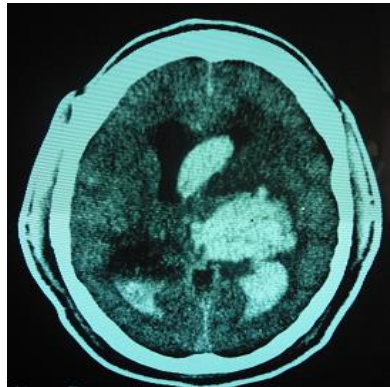
#### 4. Discussion

Much has been written about the relation of patient's activity before the symptom onset of stroke (Tsementzis et al., 1985; Kamei et al., 1998). Those physical activities may be risk factors in most of the patients (Luciana et al., 2017). Thus, the identification of the potentially life-threatening activities may help by matching vulnerable patients with hypertension. In this study, potential risk activities close to the occurrence of ICH are emotional factors, activity in the bathroom, activity of housework and sexual activity (Table 1). Prior studies realized in developed countries (Tsementzis et al., 1985; Kamei et al., 1998) did not evocate emotional factors in the patient activity before the onset of stroke. In Kinshasa City, a huge town with a low resource settings, patients with uncontrolled chronic hypertension (Longo-Mbenza et al., 2008) are frequently stricken by spontaneous brain hemorrhage during emotional factors such as dispute or when watching the football game in live. It is well known that patients with chronic hypertension will develop three vascular lesions that proponents have claimed are relatively specific and diagnostic of hypertension: fibrinoid necrosis, miliary aneurysms of Bouchard-Charcot and lipohyalinosis (Fischer, 1971; Bouchard, 1990). In 1992, Dechef working longtime at the neuropsychiatric hospital in Kinshasa, found microaneurysms when he was performing cerebral angiography in the community population. And emotional factors by increasing catecholamine and cortisol secretion may cause a rapid and persistent rise of blood pressure with rupture of brain vasculature involved with these three lesions (Kraft et al., 1995).

The occurrence of ICH in the lavatory is well known and it is interesting to see that the possible dangers surrounding a patient prone to stroke, while taking a bath, were already noticed over 2000 years ago (van de Goot et al., 2001). What happened exactly in the bathroom? Two hypotheses may be evocated. The rising of intracranial pressure during Valsalva maneuver of voiding or defecation or the contact of the body with cold water? In this study, we didn't investigate the exact physical activity of patient in the bathroom: bathing, defecating or urinating. Relatives were not aware of the exact activity on the bathroom, and the patients could not tell us.

The life-threatening acute ICH event was also seen during housework in this study. In this population with uncontrolled chronic hypertension and microanerysm, rupture can be seen at all time of the day, during normal activity such as homework and also during sexual activity. We didn't found any

statically difference between those physical activities ( $p>0.05$ ). And for Japanese authors (Omama et al., 2006), these activities were considered simply as being “in the waking state”.



**Figure 1. CT Image of Hyperdense Lesion of ICH in Left Thalamus with Intraventricular Rupture during Sexual Activity**

The location of the ICH in relation with activity before the symptom onset was also analyzed. Putaminal and thalamic localizations of ICH (Figure 1) were the most site found in this series with emotional and lavatory activities (Table 2) as seen in general population (Tshikwela et al., 2011; Tshikwela et al., 2012).

In this study, we did not found any relationship between location of ICH and physical activity of patient before the onset of the symptoms ( $p>0.05$ ). Previous studies (Tsementzis et al., 1985; Kamei et al., 1998) did not access this relationship.

### 5. Limitations of the Study

Given the small size of patients in this hospital based study, the potential causal association cannot be definitely ascertained. Also, the vascular lesion in chronic hypertension patients can rupture at any moment even with normal physical activity. Further investigations are necessary to elucidate the role of the possible causal association. Meanwhile, patients with chronic hypertension have to avoid emotional factors such as dispute and effort on the bathroom identified as most potential dependant risk factor activities associated with the onset of HIC seen in our study.

### 6. Conclusion

This is a small prospective study evaluating the association between patient's activities before ICH onset and CT location of ICH in black Africans in Central Africa. This pilot study suggests a potential causal role of emotional factors and bathroom or lavatory activities close to the onset of the symptoms of ICH. And it is less certain that localization of ICH may be linked with the physical activity before the hemorrhagic stroke occurrence.

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