African Journal of Neurological Sciences 2011 - Vol. 30, No 2

NEUROEPIDEMIOLOGY/NEUROEPIDEMIOLOGIE

PREVALENCE AND TYPES OF COGNITIVE IMPAIRMENT AMONG PATIENTS WITH STROKE ATTENDING A REFERRAL HOSPITAL IN UGANDA

PREVALENCE ET TYPES DE DEFICIT COGNITIF CHEZ LES PATIENTS ADMIS POUR AVC DANS UN HOPITAL DE REFERENCE EN OUGANDA

MUKISA Robert [1]
DDUMBA Edward [2]
MUSISI Seggane [3]
M KIWUWA Steven [4]

1. Department of Medicine, Makerere University College of Health Sciences, School of Medicine, Kampala, Uganda
2. Department of Medicine, Mulago National Referral Hospital, Kampala, Uganda
3. Department of Psychiatry, Makerere University College of Health Sciences, School of Medicine, Kampala, Uganda
4. Clinical Epidemiology Unit, Department of Medicine, Makerere University College of Health Sciences, School of Medicine, Kampala, Uganda

E-Mail Contact - MUKISA Robert : robertmukisa (at) yahoo (dot) com

Keywords: *post stroke cognitive impairment*

ABSTRACT

Background
Cognitive impairment is associated with short and long term adverse outcomes in stroke patients that may impair functional recovery during their rehabilitative process.

Aims
This study determined the prevalence, grades and demographic factors associated with cognitive impairment among patients with stroke attending Mulago National Referral Hospital in Uganda, a teaching hospital for Makerere University College of Health Sciences.

Methods
This was a cross-sectional descriptive study conducted from Mulago National Referral Hospital between June 2006 and March 2007. Eighty five patients with stroke confirmed by brain computed tomography scan, consenting either by themselves or by their guardians, were consecutively recruited from the Medical wards, Neurology clinic and the Physiotherapy department. A standardized questionnaire was interviewer administered, to obtain demographic and clinical data, and the Mini-Mental State Examination instrument was used to screen and grade cognitive impairment.

Results
Of the 85 patients evaluated, 70 (82.4%) had infarct and 15 (17.6%) hemorrhagic stroke. Fifty-four (63%, 95% confidence interval (CI): 53 - 73) had cognitive impairment; of which 23 (27%) and 14 (16%) had mild and moderate cognitive impairment respectively accounting for 43% of the cognitively impaired but with no dementia, and 17 (20%) had severe cognitive impairment (dementia). The only socio-demographic factor associated with cognitive impairment was age ≥ 40 years (odds ratio (OR) 4, 95% CI 1.2 - 13.4, P = 0.024).

Conclusions
The prevalence of cognitive impairment among patients with stroke is high. Increasing age is significantly associated with cognitive impairment. There is need for neurocognitive assessment programs among stroke patients and the introduction of rehabilitation services should target to maximize their functional recovery.

BACKGROUND

Deficits in cognitive function are among the more serious of the sequalae of stroke, delaying and often seriously compromising attempts at rehabilitation. Such elements in the clinical picture may be less instantaneously obvious than the hemiplegia or other gross physical handicaps, yet they often prove to be the factors which are responsible for failure to regain full function (1, 2). Diseases of the vascular system contribute greatly to total burden of neurocognitive disability mainly as a result of stroke (11). Cerebrovascular disease is the second most common cause of cognitive deficit in the elderly after Alzheimer's disease (AD) (9).

In Africa there is limited data on prevalence, grades and demographic factors associated with cognitive impairment among stroke patients. However elsewhere, the prevalence of cognitive impairment after stroke is high, varying from 11.6% to 56.3% in various hospital based studies done (15). In Austria it was found to be 56.3% (10) while in Finland it was 61.7% (16). In another study done in Singapore, the overall prevalence of cognitive impairment after stroke was 54.5% (19). The prevalence of severe cognitive impairment (dementia) in Finland was found to vary from 18.4% to 25.5% (16) while in Italy it was 13.6% (4). Cognitive impairment with no dementia was found to be 40% among stroke patients in a study done in Singapore (22). Cognitive impairment was associated with older age, disability including impairment in activities of daily living, higher chances of institutionalization, poor long-term outcomes and death (15). According to the Global Burden of Disease study over 80% of all stroke deaths occur in low income and middle-income regions of the world (12). In neighboring Tanzania, an adult study established a 5.5% prevalence of deaths attributable to stroke in three regions comprising of a total population of 307,820 inhabitants (23). To date, there is paucity of data about cognitive impairment among stroke patients in Uganda and a standardized protocol for their management. This study was therefore undertaken to determine the prevalence, grades and demographic factors associated with cognitive impairment among patients with stroke attending Mulago National Referral Hospital, so as to make recommendations for its improved management.

METHODS

Study Site

Mulago National Referral Hospital is a tertiary health care institution for Uganda. It offers specialized medical services as well as a teaching hospital for Makerere University College of Health Sciences, located in Kampala, the capital city. The study departments were the Emergency and General medical wards, which admit patients on a daily basis who either seek emergency care on their own or are referred from other health facilities including the Neurology clinic which runs every Wednesday and attends to patients referred for follow up and/or further assessment of risk factors after discharge from the medical wards and other health facilities. Patients were also recruited from the Physiotherapy department which provides rehabilitation services for stroke patients every Tuesday and Thursday each week, once referred from the medical wards or other health facilities. The hospital healthcare personnel comprise of Specialists, General and Intern doctors, Nurses, Allied health Workers and Medical students. This study site was chosen because of its high patient turnover and the presence of a Computed tomography scan facility at the Radiology department and its ancillary support services.

Ethical Considerations

Institutional consent was obtained from the Faculty Research and Ethics Committee of the Medical School of Makerere University College of Health Sciences.

Study Design and Sampling Procedure

This was a cross-sectional analytic descriptive study. The study population consisted of 85 prevalent cases of stroke recruited consecutively from the study site during the period June 2006 to March 2007.

Study Population

Inclusion Criteria

Patients were included in the study if they were 18 years or older, had stroke confirmed by brain computed tomography scan and had either given informed consent or a guardian/legal representative had consented to participate in the study.

Exclusion Criteria

Patients were excluded if they had a history of cognitive impairment prior to the episode of stroke, known Human Immunodeficiency Virus (HIV), a medical history of psychiatric disorders like epilepsy, bipolar affective disorder, schizophrenia, depression, delirium, alcohol dependency, and unconscious or aphasic patients.

Data Collection Methods

Given that the occurrence of stroke in this population is less well documented either as a result of low incidence or under reporting implies that it was not possible to identify a sufficient sample of respondents who had experienced stroke within the same time frame. However sampling of patients with varying durations of incident stroke, allows us to asses the effect of the duration of stroke on the development of cognitive impairment. The principal investigator and trained research assistants pilot tested the data collection methods and study tools that were used to screen all the potential participants during the study period. The diagnosis of stroke was confirmed by a brain computed tomography scan done at the Radiology department or other health facilities. Those who fulfilled the inclusion criteria received verbal and written information about the purpose and procedure of the study before providing written informed consent to participate in the study.

Patients with Human Immunodeficiency Virus, depression, alcohol dependency and delirium were excluded by carrying out Routine HIV Counseling and Testing, the Hamilton depression and anxiety scale, the CAGE scale and the Confusion Assessment Method Instrument respectively. Upon enrolment a pre-coded, pre-tested and standardized interviewer administered semi structured questionnaire in either English or the translated Luganda version (the most commonly spoken local dialect) was used to collect sociodemographic data which included age, sex, level of education, marital status and occupation; and clinical data including duration of the stroke and type of stroke found on brain computed tomography scan. The degree of cognitive impairment was assessed using the Mini-Mental State Examination (MMSE) instrument (5). Although the MMSE is a simple reliable and practical instrument that can be used for assessment of cognitive function in clinical practice (6), it has some limitations in particular age and education status may influence MMSE results (14). However, the instrument retains good reliability and validity in some study populations (3, 7).

Data Management and Analysis

Data was analyzed using the SPSS software version 14.0 statistical analysis package. Questionnaires were cross-checked daily for completeness of the data coding by the principal investigator and double entered into a computer to ensure consistency. Age was presented as means and standard deviation. Sex, highest level of education attained, marital status and occupation were presented as frequencies and percentages. Cognitive impairment scores were graded as; normal = 25 - 30, mild = 20 - 24, moderate = 15 - 19 (mild and moderate constitute cognitive impairment with no dementia) and severe (dementia) < 15 (5, 6, 8). Association between levels of cognitive impairment and socio-demographic variables were done using the Chi-square test statistic. The mean ages between groups were compared using the independent t-test. Statistical significance was taken as P - value ≤ 0.05. A Multivariate binary logistic regression model that included socio-demographic factors: age, gender, highest level of education attained, marital status and occupation were used to determine the independent predictors of cognitive impairment after stroke. Odds ratios and 95% confidence interval are presented.

RESULTS

Four hundred and twenty three patients were approached and screened to participate in the study, of which 85 fulfilled the selection criteria and consented to participate in the study Table 1 shows that the male to

female ratio was 1:1.1. The mean age of the participants was 55.8 standard deviation (SD) ± 17.9 years. The mean age did not differ when females were compared to males 57.6 (SD) ± 18.5 versus 53.9 (SD) ± 17.2 years respectively (P = 0.344). The largest age group was the 40 to 49 years 19 (22.4%). The commonest level of education attained was up to primary, which is equivalent to 7 years of education in 46 (54.1%) of the participants. The majority of the participants were married 52 (61.2%) and 45 (52.9%) were gainfully employed. Fifty-four study participants (63%; 95% CI: 53 - 73) were found to have cognitive impairment. The median duration of the incident stroke since diagnosis to the time of assessment of cognitive impairment was 0.5 months, interquatile range (0.2 - 2.1 months). Eighty two percent had experienced their incident stroke in the previous three months. There was no association between the duration since diagnosis of stroke and cognitive impairment (Mann-Whitney test P value = 0.136).

Figure 1 shows that cognitive impairment increases with age. It was highest among the 80+ age group 7 (77.8%). Table 2 indicates that the proportion of cognitive impairment was higher among females 29 (65.9%), those who never attained formal education 13 (92.9%), the unmarried 22 (66.7%) and the unemployed 27 (73.0%).

Table 3 shows that among the 85 stroke patients evaluated for cognitive impairment, 54 (63%) had cognitive impairment of which the mild form was most common representing 23 (27%) of the cases. The cognitively impaired with no dementia were more than those with dementia contributing 43% and 20% respectively of the stroke patient study population. Table 4 shows that stroke patients who were aged 40 years or older were 3.3 times more likely to have cognitive impairment compared to those who were younger OR 95%CI; 3.3 (1.3 - 10.0), P = 0.018. Patients who had not attained post primary education were 2.7 times more likely to have cognitive impairment compared to those with higher education levels OR 95%CI; 2.7 (1.1 - 6.7), P = 0.031. Gender, marital status and occupation did not appear to have any association with cognitive impairment. There appeared to be a trend of increasing cognitive impairment with age (Chi-square test for linear trend P = 0.017). Multivariate binary logistic regression model analysis that included socio-demographic variables found age above 40 years as the only factor associated with cognitive impairment OR 95%CI; 4 (1.2 - 13.4), P = 0.024.

DISCUSSION

This study sought to establish the prevalence, grades and demographic factors associated with cognitive impairment among patients presenting with stroke at Mulago National Referral Hospital. The stroke cases investigated in this study revealed that the peak ages occurred from the 5th to 8th decades of life, which is similar to the findings of a study done in Zimbabwe (13, 18). To note however there are no ideal stroke incidence studies in Sub-Saharan Africa, because such studies require considerable resources and rigorous methods employing standard case definitions. Our study is one of such first preliminary studies done in Uganda to establish the burden of stroke at a tertiary care facility.

The prevalence of cognitive impairment among this group of stroke patients was 63%. This study confirms the high prevalence of cognitive impairment after stroke as observed elsewhere in studies done in Finland (16), Austria (10) and Singapore (19) where the prevalence was found to be 61.7%, 56.3% and 54.5% respectively.

The prevalence of severe cognitive impairment (dementia) among our stroke patient study population was 20.0%, which is similar to studies done in Finland where it was found to be 18.4% to 25.5% (16) and Italy where it was found to be 13.6% (4). However this is likely to be an underestimate of the true levels of cognitive impairment due to referral filter bias and lack of standard screening programs in resource limited settings. Cognitive impairment in the absence of dementia was present in 43% of our stroke patients as is similar to findings from a study done in Singapore (22) where it was 40%. The prevalence of cognitive impairment in our stroke patients increased with age. This study confirms the previous association of post stroke cognitive impairment with increasing age as described elsewhere in the United States of America (21), Singapore 19), China (24) and Netherlands (17). However, in this study there was no association between post stroke cognitive impairment with low educational level as this is related to the performance of the MMSE instrument. Other socio-demographic variables like female gender was not associated with post stroke cognitive impairment as shown by a study done in China (20).

Limitations of this study:

The MMSE is both an Emergency room/bedside and a clinic/office level tool. There is no normative data for MMSE that could have been used for this study sample, which we acknowledge that it could be affected by age and educational status, however, this tool provides a baseline assessment of cognitive impairment across education level strata. Additional studies are needed to evaluate whether norms are useful in populations worldwide. Due to the scarcity of information on post stroke sequalae, this study provides us with aspects of post stroke morbidity events, thus underscoring the importance of rehabilitation support services.

CONCLUSION

The prevalence of cognitive impairment among patients with stroke is high. Increasing age is significantly associated with cognitive impairment. There is need for neurocognitive assessment programs among stroke patients and the introduction of rehabilitative services should be targeted to maximize their functional recovery.

Acknowledgements
The authors wish to thank all the staff of Mulago National Referral Hospital who participated in the study particularly the Department of Radiology where the Brain Computed Tomography Scans were done.

Table 1. Socio demographic characteristics of the participants

Characteristics	Number	Percentage (n = 85)
Age distribution		
20-29	8	9.4
30-39	6	7.1
40-49	19	22.4
50-59	11	12.9
60-69	16	18.8
70-79	16	18.8
80+	9	10.6
Gender		
Female	44	51.8
Highest education level attained		
Never been to school	14	16.5
0 to 7 years	32	37.6
8 to 12 years	23	27.1
More than 12 years	16	18.8
Marital status		
Never married	6	7.1
Married	52	61.2
Divorced	17	20.0
Widowed	10	11.8
Occupation		
Student	3	3.5
Unemployed	37	43.5
Employed	45	52.9

Table 2. Prevalence of cognitive impairment according to socio- demographic variables

Dempgraphics	Number (N)	n (%)
Gender		
Female	44	29 (65.9)
Male	41	25 (61.0)
Highest Education level attained		
No formal Education	14	13 (92.9)
0 to 7 years	32	21 (65.6)
8 to 12 years	23	11 (47.8)
More than 12 years	16	9 (56.3)
Marital status*		
Married	52	32 (61.5)
Unmarried	33	22 (66.7)
Occupation		
Student	3	0 (.0)
Unemployed	37	27 (73.0)
Employed	45	27 (60.0)

* Unmarried includes divorced, widowed and never married.

Table 3. Grades of cognitive impairment among the stroke patients

Grade	Number (n)	Percentage (%)
No cognitive impairment	31	37
Mild	23	27
Moderate	14	16
Severe (Dementia)	17	20

Table 4: Socio-demographic characteristics associated with cognitive impairment

Variable	Impaired n (%)	Normal n (%)	OR (95%CI)	P-Value
Age (Years)				
Mean (±SD)	58.9 (16.3)	50.3 (19.4)		0.032*
20-39	5 (35.7)	9 (64.3)	1.0	
> 40 years	49 (69.0)	22 (31.0)	3.3 (1.3-10.0)	0.018*
Gender				
Male	25 (61.0)	16 (39.0)	1.0	
Female	29 (65.9)	15 (34.1)	0.8 (0.3 - 2.0)	0.637
Education level				
8 years and more	20 (51.3)	19 (48.7)	1.0	
To 7 years	34 (73.9)	12 (26.1)	2.7 (1.1 - 6.7)	0.031*
Marital status				
Married	32 (61.5)	20 (38.5)	1.0	
Single	22 (66.7)	11 (33.3)	0.8 (0.3-2.0)	0.632
Occupation				
Employed	27 (60.0)	18 (40.0)	1.0	
Unemployed	27 (67.5)	13 (32.5)	0.7 (0.3-1.8)	0.473

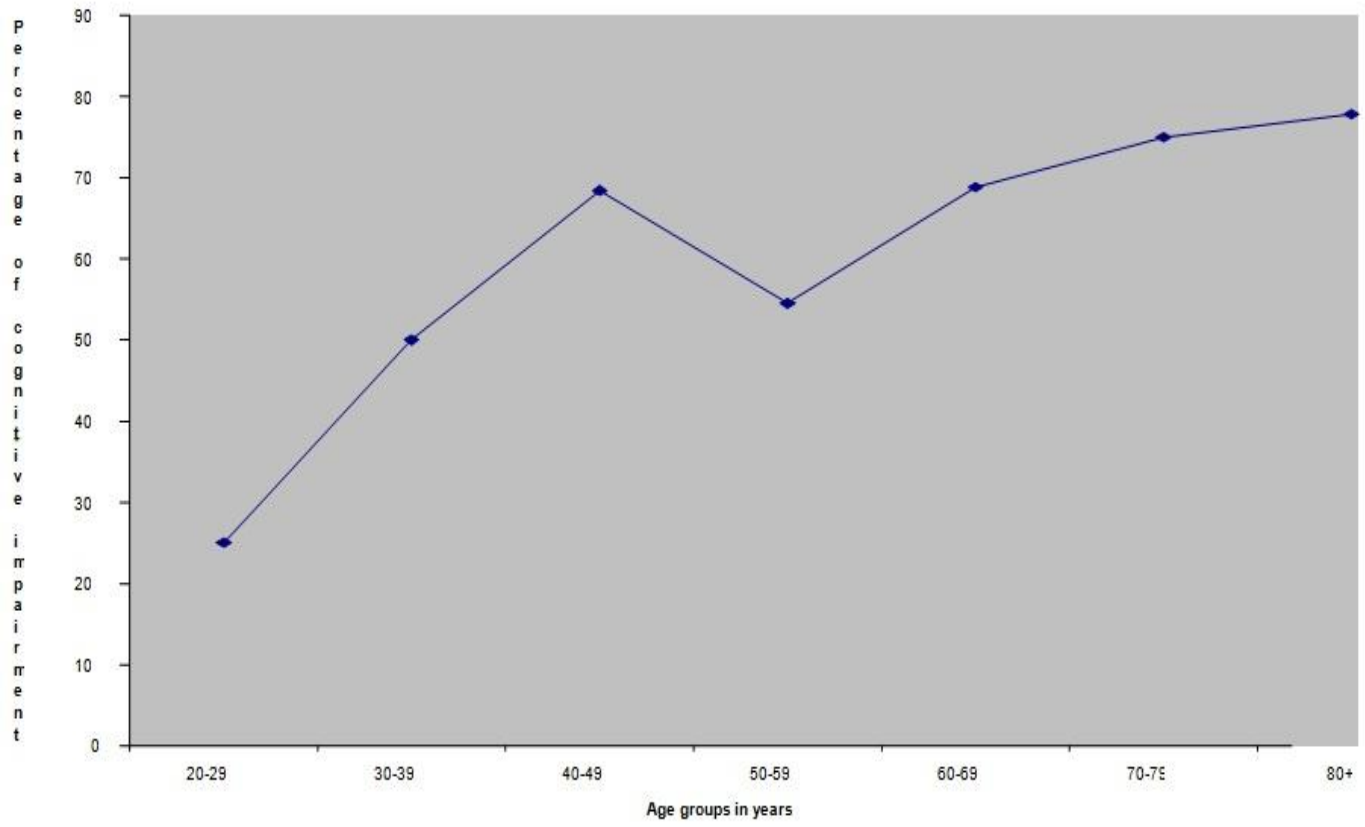

Figure 1
Prevalence of cognitive impairment by age group,
(*) trend indicates percent cognitively impaired

REFERENCES

1. ADAMS GF H.L. Cerebrovascular Disability in the Aging Brain (Edinburgh & London, Camden Town United Kingdom, 1974. Churchill Livingstone).
2. ADAMS G.F., HURWITZ, L.J. 1963, Mental Barriers to Recovery from Strokes. Lancet 2, 533-537.
3. APPELROS P. Characteristics of Mini-Mental State Examination 1 year after stroke. Acta Neurol Scand 2005;112, 88-92.
4. CENSORI B., MANARA O., AGOSTINIS, C., CAMERLINGO M., CASTO L., et al Dementia after first stroke. Stroke 1996;27, 1205-1210.
5. CRUM R.M., ANTHONY J.C., BASSETT S.S., FOLSTEIN M.F. Population-based norms for the Mini-Mental State Examination by age and educational level. JAMA 1993; 269, 2386-2391.
6. FOLSTEIN M.F., FOLSTEIN S.E., MCHUGH P.R. "Mini-mental state". A practical method for grading the cognitive state of patients for the clinician. J Psychiatr Res1975; 12, 189-198.
7. GUNGEN, C., ERTAN, T., EKER, E., YASAR, R., ENGIN, F. [Reliability and validity of the standardized Mini Mental State Examination in the diagnosis of mild dementia in Turkish population]. Turk Psikiyatri Derg 2002;13, 273-281.
8. JUBY, A., TENCH, S., BAKER, V. 2002, The value of clock drawing in identifying executive cognitive dysfunction in people with a normal Mini-Mental State Examination score. CMAJ 2002;167, 859-864.
9. KALARIA R.N., BALLARD C. Stroke and cognition. Curr Atheroscler Rep 2001;3, 334-339.
10. LADURNER, G., ILIFF, L.D., LECHNER, H. Clinical factors associated with dementia in ischaemic stroke. J Neurol Neurosurg Psychiatry 1982;45, 97-101.
11. LISHMAN, W. Organic psychiatry: the psychological consequences of cerebral disorder (Oxford, 1998 Wiley-Blackwell).
12. LOPEZ, A.D., MATHERS, C.D., EZZATI, M., JAMISON, D.T., MURRAY, C.J. Global and regional burden of disease and risk factors-: systematic analysis of population health data. Lancet 2006;367, 1747-1757.
13. MATENGA, J. Stroke incidence rates among black residents of Harare—a prospective community-based study. S Afr Med J 1997;87, 606-609.
14. NAUGLE, R.I., KAWCZAK, K. Limitations of the Mini-Mental State Examination. Cleve Clin J Med 1989;56, 277-281.
15. PATEL, M.D., COSHALL, C., RUDD, A.G., WOLFE, C.D. Cognitive impairment after stroke: clinical determinants and its associations with long-term stroke outcomes. J Am Geriatr Soc 2002;50, 700-706.
16. POHJASVAARA, T., ERKINJUNTTI, T., VATAJA, R., KASTE, M., , Dementia three months after stroke. Baseline frequency and effect of different definitions of dementia in the Helsinki Stroke Aging Memory Study (SAM) cohort. Stroke 1997;28, 785-792.
17. RASQUIN, S.M., VERHEY, F.R., VAN OOSTENBRUGGE, R.J., LOUSBERG, R., LODDER, J., Demographic and CT scan features related to cognitive impairment in the first year after stroke. J Neurol Neurosurg Psychiatry 2004;75, 1562-1567.
18. ROSMAN, K.D. The epidemiology of stroke in an urban black population. Stroke 1986; 17, 667-669.
19. SAXENA, S.K., Prevalence and Correlates of Cognitive Impairment in Stroke Patients in a Rehabilitation Setting. The International Journal of Psychosocial Rehabilitation 2006 :10, 37-47.
20. TANG W.K., CHAN S.S., CHIU H.F., UNGVARI G.S., WONG K.S., KWOK T.C., MOK, V.,et al.Frequency and clinical determinants of poststroke cognitive impairment in nondemented stroke patients. J Geriatr Psychiatry Neurol. 2006 ;19 :65-71.
21. TATEMICHI, T.K., DESMOND, D.W., MAYEUX, R., PAIK, M., STERN, Y., SANO, M., REMIEN, R.H. et al., Dementia after stroke: baseline frequency, risks, and clinical features in a hospitalized cohort. Neurology 1992 ;42 :1185-1193.
22. THAM, W., AUCHUS, A.P., THONG, M., GOH, M.L., CHANG, H.M., WONG, M.C., CHEN, C.P. Progression of cognitive impairment after stroke: one year results from a longitudinal study of Singaporean stroke patients. J Neurol Sci , 2002 ;203 ;49-52.
23. WALKER, R.W., MCLARTY, D.G., KITANGE, H.M., WHITING, D., MASUKI, G., MTASIWA, D.M., et al Stroke mortality in urban and rural Tanzania. Adult Morbidity and Mortality Project. Lancet 2000 ;355 :1684-1687.
24. ZHOU, D.H., WANG, J.Y., LI, J., DENG, J., GAO, C., CHEN, M.Frequency and risk factors of vascular cognitive impairment three months after ischemic stroke in china: the Chongqing stroke study. Neuroepidemiology 2005 ;24 :87-95.