Stroke in young versus elderly clinical characteristic and in hospital mortality a retrospective cross-sectional study

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Background and purpose
About 10-15% of all ischemic strokes occur in young adults, limited researches have specifically addressed stroke in the young, also, the etiology of ischemic stroke in the young are heterogeneous and can be relatively uncommon the purpose is to identify different risk factors of stroke in young and elderly and predictors of in hospital mortality

Patient and method: consecutive 197 patient with acute ischemic stroke admitted to neurology department, Sohag university hospital subdivided into two groups according to the age and the cut of point between young and elderly is 50-year, clinical characteristics, risk factors and hospital mortality was compared in both groups

Results: The prevalence of Rheumatic heart disease is common in ischemic stroke in young adult than elderly while hypertension is the most prevalence vascular risk factor, Charlson comorbidity index is independent predictor of hospital mortality of ischemic stroke in elderly

Conclusion: Rheumatic heart disease still prevalent in young adult in a sample of Egyptian population, hypertension is the most important modifiable risk factor Charlson comorbidity index and Scandinavian stroke scale on admission are predictors of hospital mortality in elderly and young adult respectively

Keywords: Rheumatic heart disease, stroke in young, hospital mortality

List of abbreviation
PFO; patent foramen oval, IHD; ischemic heart disease, RHD; rheumatic heart disease, mRS; modified Ranking Scale, SSS; Scandinavian stroke scale, CMI; Charlson Comorbidity Index.

Introduction:
Stroke is the disease of old age and about 10% of stroke patients are young, the incidence of ischemic stroke in young is increasing, the causes of this increase is uncertain, stroke in young has a significantly higher risk of early death in comparing to early death in general populations

Traditional stroke risk factors are known, many studies for stroke in a young, large study found that prevalence of hypertension is 39%, hyperlipidemia 60%, and smoking 44%. Another study revealed a high prevalence of conventional stroke risk factors

Assessment of the patient with ischemic stroke at young age firstly need assessment like a stroke in the elderly furthermore need evaluation for other risk factors as cervical artery dissection, hypercoagulable state, patent foramen oval, vasculitis and hereditary blood disorders, dissection of arterial blood vessels is common it represents about 2% of ischemic stroke .dissection on cervical arteries is either primary or
secondary to trauma, and may be associated with connective tissue diseases like Marfan syndrome and Ehler Danlos syndrome type 4 and others.\textsuperscript{5,6} The incidence of arterial dissection per year is 1.72 per 100,000 for carotid vessels while 0.97 per 100,000 for vertebral vessels,\textsuperscript{7} the fifth decade is the highest incidence and about 10% of cases are intracranial, multiple vessels in about 16% of cases.\textsuperscript{8} Recent analysis conclude that clinical characteristics, risk factors and also functional outcome are different in comparing internal carotid with vertebral dissection.\textsuperscript{9,10} Dissection of the cervical artery may be due to intimate tear followed by intramural hematoma or primarily intramural hematoma without intimate tear.\textsuperscript{11} Superficial temporal artery wall abnormalities suggests that arteriopathy affection of adventitia and intima is important in the pathogenesis of the dissection.\textsuperscript{12} Arterial dissection is multifactorial, dissection is associated with either major or minor trauma, or coughing or sneezing among other people.\textsuperscript{13} This study aims to clarify the difference between stroke in young and elderly and predictors of in-hospital mortality.

**Patient and methods**

A consecutive 197 patients admitted to the Department of Neurology, Sohag University Hospitals, were screened with an acute ischemic stroke (AIS) diagnosis between May 2012 and May 2014. Figure 1 the eligibility criteria for involvement in the study is an acute ischemic stroke diagnosis admitted within the first 24 hours following the onset of the symptoms. Ischemic disorders including shock, renal failure, documented inflammatory or malignant disease were omitted if patients had a clinical record of the previous documentation. Young adult is less than 50 years according to international classification.\textsuperscript{24}

**Ethical consideration**

The ethical committee of the Sohag Faculty of Medicine approved our study. All patients signed written consent. Acute ischemic stroke was defined according to World Health Organization definition.\textsuperscript{26} Patient charts were abstracted for different variables, including age, sex, and vascular risk factors, and active smoking, the residence was defined as urban or rural. Charlson Comorbidity Index [CMI].\textsuperscript{15} used for comorbidities in elderly group study. Stroke severity (as measured by the Scandinavian Stroke Scale [SSS] on admission and modified Rankin Scale [mRS] at discharge.

**Statistical analysis**

Analytical data have been analyzed for the Social Sciences Statistics Packages for the windows and by Graph Pad Prism 7.0 (Graph Pad Software Inc., La Jolla, California, USA). Continuous data as a mean ± standard deviation, and categorical data as numbers and percentages were presented. The Student T-test for the continuous data Chi-square test for categorical data carried out analyses of disparities between young and old stroke patients. Instead of a Pearson Chi square test, we used Fisher Exact test when the data is non-parametric. Statistically important P values less than or equal to 0.05 were considered.
Results

The mean age of a young adult is 38±9.88 and for elderly 65±9.3, female is relatively common than male in both young and elderly and most of the cohort are from rural residence with no statistically significant difference History of old stroke or Transient Ischemic Attack is non significantly higher in elderly than young Regarding vascular risk factors, hypertension is statistically significantly higher in elderly than young (p-value = 0.03) Figure 2A diabetes millets and IHD in non- significantly higher in elderly (p-value =0.78) and (0.92) respectively RHD is statistically significantly higher in young adult (p-value =0.003) Figure 2B, CMI is statistically significantly higher in elderly (p-value ≤0.001) and SSS is statistically higher among young (p-value =0.047) MRS is near significant higher in elderly (p-value =0.063) Table 1

<table>
<thead>
<tr>
<th>Variable</th>
<th>Young (n=30)</th>
<th>Elderly (n=167)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age mean ±SD</td>
<td>38±9.88</td>
<td>65±9.3</td>
<td>≤0.001</td>
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<tr>
<td>Sex, Male,n (%)</td>
<td>10(5.1)</td>
<td>70(35.5)</td>
<td>0.37</td>
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<tr>
<td>Female, n (%)</td>
<td>20(10.2)</td>
<td>97(49.2)</td>
<td></td>
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<tr>
<td>residence, Urban, n (%)</td>
<td>13(6.7)</td>
<td>65(33.7)</td>
<td>0.72</td>
</tr>
<tr>
<td>Rural, n (%)</td>
<td>17(8.8)</td>
<td>98(50.8)</td>
<td></td>
</tr>
<tr>
<td>Active smoking, n (%)</td>
<td>3(1.5)</td>
<td>21(10.7)</td>
<td>1</td>
</tr>
<tr>
<td>History of stroke (%)</td>
<td>5(2.5)</td>
<td>37(18.8)</td>
<td>0.49</td>
</tr>
<tr>
<td>History of TIA,n (%)</td>
<td>2(1)</td>
<td>13(6.6)</td>
<td>1</td>
</tr>
<tr>
<td>Hypertensive, n (%)</td>
<td>7(3.6)</td>
<td>74(37.6)</td>
<td>0.03</td>
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<tr>
<td>Diabetic, n (%)</td>
<td>4(2)</td>
<td>48(24.4)</td>
<td>0.78</td>
</tr>
<tr>
<td>IHD,n(%)</td>
<td>5(2.5)</td>
<td>29(14.7)</td>
<td>0.92</td>
</tr>
<tr>
<td>RHD,n(%)</td>
<td>3(1.5)</td>
<td>0(0)</td>
<td>0.003</td>
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<td>CMI</td>
<td>2.4±0.5</td>
<td>4.89±1.2</td>
<td>≤0.001</td>
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<tr>
<td>SSS</td>
<td>39±19</td>
<td>32±18</td>
<td>0.047</td>
</tr>
<tr>
<td>mRS</td>
<td>2.9±9.8</td>
<td>3.6±1.76</td>
<td>0.063</td>
</tr>
<tr>
<td>Died</td>
<td>5(2.5)</td>
<td>32(16.2)</td>
<td>0.74</td>
</tr>
</tbody>
</table>

Table 1: Clinical characteristics and risk factors of both groups.

*IHD; ischemic heart disease, RHD; rheumatic heart disease, mRS; modified Ranking Scale, SSS; Scandinavian stroke scale, CMI; Charlson Comorbidity Index*
Table 2: Univariate and Multivariate logistic regression analysis of clinical predictors of hospital mortality in young and elderly.

<table>
<thead>
<tr>
<th></th>
<th>Odd ratio</th>
<th>CI</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Univariate in young</strong></td>
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<tr>
<td>SSS</td>
<td>0.85</td>
<td>0.733-0.988</td>
<td>0.034</td>
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<tr>
<td><strong>Univariate in elderly</strong></td>
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<tr>
<td>SSS</td>
<td>0.92</td>
<td>0.89-0.95</td>
<td>0.000</td>
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<td>CMI</td>
<td>1.96</td>
<td>1.33-2.88</td>
<td>0.001</td>
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<td><strong>Multi variate logistic regression analysis of clinical predictors of mortality in elderly</strong></td>
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<tr>
<td>SSS</td>
<td>0.94</td>
<td>0.91-0.98</td>
<td>0.004</td>
</tr>
<tr>
<td>CMI</td>
<td>1.7</td>
<td>1.08-2.7</td>
<td>0.021</td>
</tr>
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</table>

SSS; Scandinavian stroke scale, CMI; Charlson Comorbidity Index

Discussion

Cardiac disease, hypertension, and diabetes mellitus are the most common risk factors among elderly people and that corresponds to our results. Another research identified hyperlipidemia then smoking, and finally hypertension as the most common vascular risk factors. Another review article explains the increased risk of cerebral infarction in young adults with traditional vascular risk factors is noted, especially in developing states because of increased smoking levels and urbanization, and this is not alien in our conclusion and this may be due to ethnic differences in stroke risk factors as well and the differences explained by the small number of adult patients of our cohort.

In another study by Putaala and colleagues, Current smoking (49%), and hypertension (36%) were the three most common risk factors and this in line with our finding also common in young stroke patients in the People's Republic of China and New Zealand were classical vascular risk factors, including hypertension, dyslipidemia and cigarette smoking. And this not in line with our finding as we found Rheumatic heart diseases is statistically significant in young age groups and this can be due to prevalence of rheumatic heart disease in developing countries rather than other, Scandinavian stroke scale is a predictor of stroke mortality in both young and adult while Charlson comorbidity index is an independent
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predictor of hospital mortality in elderly this is in line with previous studies\cite{19,20} a recent review article conclude that In the past, stroke in has been viewed as a disease with different risk factors and etiology and usually a better prognosis comparing to stroke in older patients. However, this view may be challenged. Traditional vascular risk factors in young adults with stroke have been somewhat neglected in the literature, which seems unjustified given their high prevalence\cite{21,22}.

**Limitation of the study** the limitations of our study is the retrospective nature.

**Conclusion** valvular heart dissections are still an important etiology of stroke in young age in a sample of the upper Egyptian population, other vascular risk factors are common in also in both young and elderly population, hypertension is the commonest vascular risk factor of stroke in the elderly, admission Scandinavian stroke scale is a predictor of hospital mortality of stroke patient, Charlson comorbidity index is a clinical independent predictor of hospital mortality in elderly stroke patients.

**Funding** None

**Acknowledgment** Not applicable

**Conflict of interest** None

**References**

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