

Risk of Epilepsy in Elderly Stroke Patients

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Background and aims: The incidence of epilepsy in elderly stroke patients has been significant attention because planning future needs for health services and improved primary and secondary prevention of stroke are important. We evaluated the relationship between stroke and the subsequent development of epilepsy within 10 years follow-up.

Methods: This retrospective, nationwide, longitudinal study used National Health Insurance Service –Senior cohort (NHIS-Senior) 2002-2013, which was released by the KNHIS in 2016, comprising 550,000 random subjects who were selected from over than 60 years old. This study included a cohort of 42,925 patients who were first diagnoses as stroke between 2004 and 2006. To match each stroke patient, 218,478 control subjects were selected from the data-base.

Results: In this cohort, the prevalence of stroke was higher in female(62%) than in male(38%). A higher prevalence of stoke was observed in the 60-70 years age and more than 80 years age group in urban area. The incidence of stroke was increased from 2002 to 2009, but decreased from 2010 to 2013. The diagnosis of epilepsy was done at averagely 20 months after the diagnosis of stroke. Cox regression analysis showed that the HR of epilepsy was 7.658 times greater for patients with stroke (95% CI: 7.402-7.923) than for control group after adjusting for other risk factors. The HR of epilepsy was 1.08 (95% CI: 1.045-1.116) in female patients, 1.66(95% CI: 1.607-1.715) in diabetic patients, 1.679(95% CI: 1.625-1.734) in hypertensive patients, 1.831(95% CI: 1.626-2.062) in chronic kidney disease and 1.647(95% CI: 1.593-1.703) in hypercholesterol patients.

Conclusions: Our findings suggest that stoke may be independent risk factor for epilepsy in elderly patients(HR 7.658, 95% CI: 7.402-7.923). So we need to control and pay attention to epilepsy in elderly stroke patients.

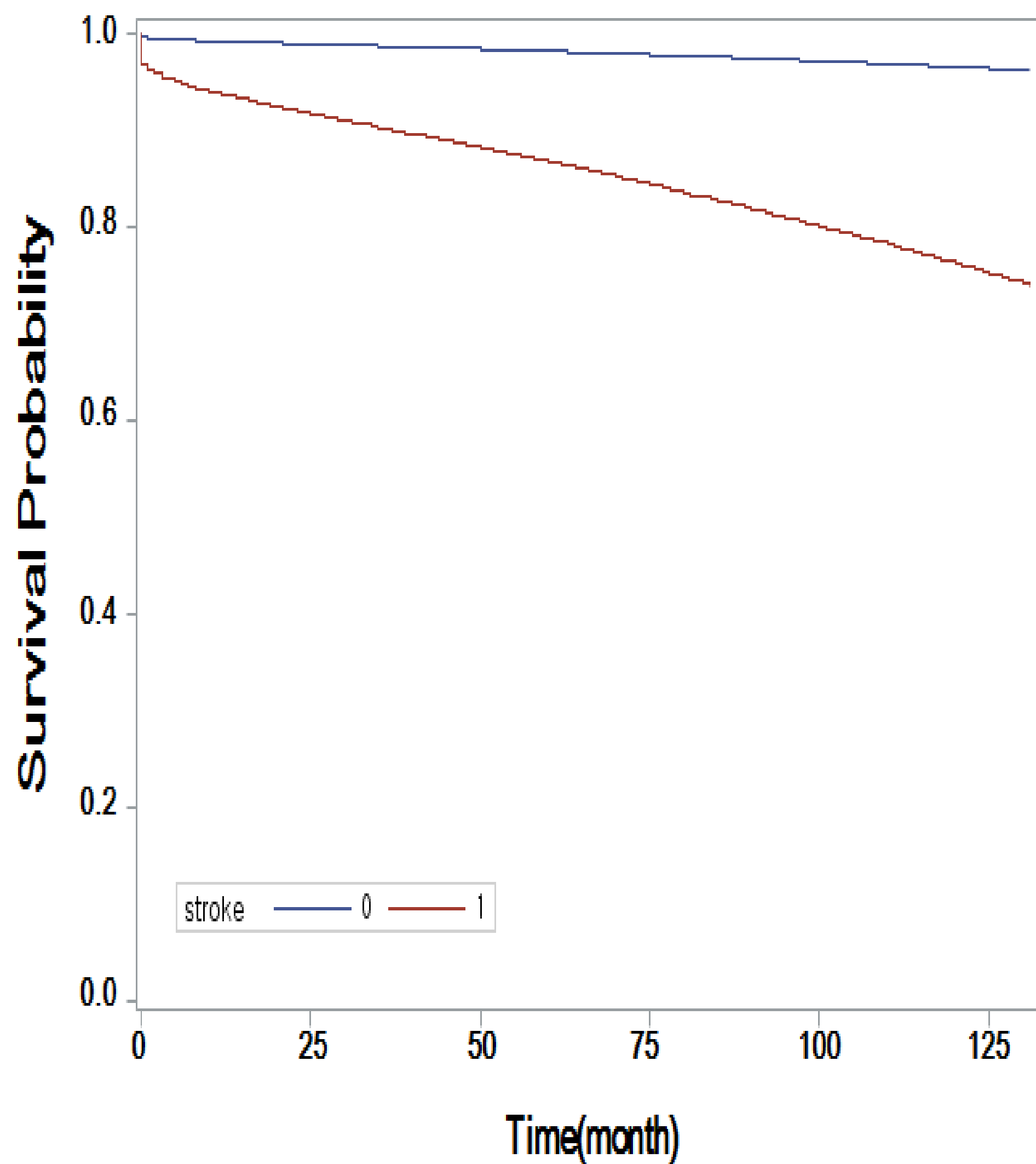
<Table 1> Basic Information of Patients

| Unit: % | | | | | |
|--------------------|-----------|--------|-------|--------|-------|
| | | 대조군 | % | 뇌졸중 환자 | % |
| Sex | Male | 75263 | 34.45 | 16269 | 37.90 |
| | Female | 143215 | 65.55 | 26656 | 62.10 |
| Age | ~ 70세 | 170500 | 78.04 | 33374 | 77.75 |
| | 70~75세 | 14057 | 6.43 | 2808 | 6.54 |
| | 75~79세 | 10042 | 4.60 | 2008 | 4.68 |
| | 80~84세 | 11798 | 5.40 | 2137 | 4.98 |
| | 85세 ~ | 12081 | 5.53 | 2598 | 6.05 |
| Home address | 서울특별시 | 39405 | 18.04 | 7473 | 17.41 |
| | 광역시 | 49800 | 22.79 | 8773 | 20.44 |
| | 경기도 | 36155 | 16.55 | 7616 | 17.74 |
| | 강원도 | 9232 | 4.23 | 1875 | 4.37 |
| | 충청북도 | 8397 | 3.84 | 1758 | 4.10 |
| | 충청남도 | 12523 | 5.73 | 2493 | 5.81 |
| | 전라북도 | 10929 | 5.00 | 2817 | 6.56 |
| | 전라남도 | 15176 | 6.95 | 3062 | 7.13 |
| | 경상북도 | 17786 | 8.14 | 3485 | 8.12 |
| | 경상남도 | 16333 | 7.48 | 3033 | 7.07 |
| | 제주도 | 2742 | 1.26 | 540 | 1.26 |
| Income | ~ 20% | 35806 | 17.69 | 6720 | 17.15 |
| | 20~40% | 27574 | 13.62 | 5327 | 13.59 |
| | 40~60% | 32165 | 15.89 | 6066 | 15.48 |
| | 60~80% | 46475 | 22.96 | 8802 | 22.46 |
| | 80% ~ | 60439 | 29.85 | 12275 | 31.32 |
| Disabled | No | 217252 | 99.49 | 42601 | 99.34 |
| | Yes | 1121 | 0.51 | 285 | 0.66 |
| Diabetes | No | 159775 | 73.13 | 26157 | 60.94 |
| | Yes | 58703 | 26.87 | 16768 | 39.06 |
| Hypertensi on | No | 119177 | 54.55 | 14848 | 34.59 |
| | Yes | 99301 | 45.45 | 28077 | 65.41 |
| CKD | No | 216482 | 99.09 | 42185 | 98.28 |
| | Yes | 1996 | 0.91 | 740 | 1.72 |
| HyperLD | No | 167707 | 76.76 | 28135 | 65.54 |
| | Yes | 50771 | 23.24 | 14790 | 34.46 |
| Alive or Pass away | Alive | 163904 | 75.02 | 29586 | 68.92 |
| | Pass away | 54574 | 24.98 | 13339 | 31.08 |
| Seizure | No | 210024 | 96.13 | 36308 | 84.58 |
| | Yes | 8454 | 3.87 | 6617 | 15.42 |
| Cancer | No | 217552 | 99.89 | 42076 | 99.48 |
| | Yes | 240 | 0.11 | 220 | 0.52 |
| Total | | 218478 | | 42925 | |

<Table 2> Risk of Epilepsy in elderly Stroke patients

| Analysis of Maximum Likelihood Estimates | | | | | |
|--|--------|-----------------|---------------------------------------|--------|------------|
| Parameter | | Hazard Ratio | 95% Hazard Ratio Confidence Limits | | Pr > ChiSq |
| | | | | | |
| Stroke | Yes | 7.658 | 7.402 | 7.923 | <.0001 |
| SEX | Female | 1.080 | 1.045 | 1.116 | <.0001 |
| age_g | 70-74 | 1.030 | 0.968 | 1.097 | 0.3446 |
| age_g | 75-79 | 0.815 | 0.752 | 0.884 | <.0001 |
| age_g | 80-84 | 0.517 | 0.471 | 0.568 | <.0001 |
| age_g | 85 ~ | 0.357 | 0.320 | 0.398 | <.0001 |
| Diabetes | Yes | 1.660 | 1.607 | 1.715 | <.0001 |
| Hypertensi on | Yes | 1.679 | 1.625 | 1.734 | <.0001 |
| CKD | Yes | 1.831 | 1.626 | 2.062 | <.0001 |
| HyperLD | Yes | 1.647 | 1.593 | 1.703 | <.0001 |
| dfab | Yes | 1.032 | 0.832 | 1.280 | 0.7751 |
| tumor_t | Yes | 33.574 | 30.583 | 36.858 | <.0001 |

[Figure 1] Survival Curve of Epilepsy in elderly Stroke patients



<Table 3> The number of new stroke patients by year

| year | Number | % | Accumulated | Accumulated |
|------|--------|-------|-------------|-------------|
| | | | Number | % |
| 2002 | 7731 | 3.71 | 7731 | 3.71 |
| 2003 | 10399 | 4.99 | 18130 | 8.70 |
| 2004 | 11179 | 5.36 | 29309 | 14.06 |
| 2005 | 16351 | 7.85 | 45660 | 21.91 |
| 2006 | 22262 | 10.68 | 67922 | 32.59 |
| 2007 | 22129 | 10.62 | 90051 | 43.21 |
| 2008 | 21619 | 10.37 | 111670 | 53.59 |
| 2009 | 21203 | 10.17 | 132873 | 63.76 |
| 2010 | 20397 | 9.79 | 153270 | 73.55 |
| 2011 | 19692 | 9.45 | 172962 | 83.00 |
| 2012 | 18342 | 8.80 | 191304 | 91.80 |
| 2013 | 17089 | 8.20 | 208393 | 100.00 |