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Secular trends of stroke incidence and mortality in China, 1990 to 2016: The Global Burden of Disease Study 2016

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Abstract

Background

The impact of socioeconomic developments on stroke incidence and mortality must be understood to target prevention strategies appropriately. We assessed the secular trends in stroke incidence and mortality in China based on data from the Global Burden of Disease Study 2016.

Methods

Trends of stroke incidence and mortality of China was described in different categories of age, sex and stroke type using the GBD study database. Also a comparative study was conducted between China and Japan, U.S. to find reasonable references for development. Secular trends in incidence and mortality (per 100,000 population) were assessed for

stroke, including ischemic and hemorrhagic stroke from 1990 to 2016. Population pyramid was used to illustrate changes in age- and sex-specific incidence and mortality rates.

Results

During the study period, stroke incidence in China increased from 204.52 to 403.08 and mortality increased from 122.09 to 130.94; the corresponding age-standardized rates changed from 335.63 to 353.70 and from 231.28 to 132.84, respectively. Among those aged 15–49 and 50–69 years, the incidence rates of ischemic stroke and hemorrhagic stroke both tended to increase, whereas the mortality rates tended to decline in all age groups. The incidence and mortality were highest among those aged ≥70 years. Compared with the U.S. and Japan, age-standardized rates of incidence and mortality were higher in China.

Conclusions

Although the incidence of stroke has increased in China, overall mortality has decreased. A priority of stroke prevention and control strategies will transition from reducing mortality to controlling the incidence in at-risk populations.

Introduction

Over recent decades, China has undergone rapid demographic and socioeconomic changes, and widespread discontent with the healthcare system has resulted in major reforms.[1] The resulting changes have affected the epidemiology of stroke, with incidence and mortality rates changing significantly for many diseases. The Sino-MONICA-Beijing study found that, from 1984 to 2004, the age-standardized incidence rate (ASIR) of stroke increased from 189.9 to 248.3 per 100,000 population.[2] According to the 2013 report from the Global Burden of Disease (GBD) study, the age-standardized mortality rate (ASMR) of stroke decreased from 199.66 per 100,000 population in 1990 to 157.29 per 100,000 population in 2013,[3] and overall mortality was 1,920,688 people in 2013.[4] It is important to study stroke burden by its major pathological types and its secular trends so that we can better target

health care interventions and prevention strategies. However, to date, there has been no systematic assessment of secular trends in stroke incidence and mortality in China.

In this study, we performed a comprehensive assessment of data from the GBD 2016 study to illustrate the secular epidemiological transition of stroke burden in China and to compare the identified secular trends with those of developed countries.

Section snippets

Overview

The data for this research were downloaded from the Global Health Data Exchange website of the GBD 2016 study. This database contained internally consistent estimates of disease-specific incidence rates for 328 diseases and injuries as well as cause-specific mortality rates for 264 causes, both globally and nationally, for the period 1990–2016.[5, 6] GBD study contains sparse and heterogenous health data sources with different quality. A Mathematical modeling tool DisMod-MR (for Disease…

Data analysis

Selection criteria of data was as follows: (1) Measure: incidence, deaths; (2) Age: all ages, age-standardized, 15–49 years, 50–69 years, 70+ years; (3) Year: 1990–2016; (4) Cause: stoke, ischemic stroke (IS), hemorrhagic stroke (HS); (5) Context: cause; (6) Location: China, Japan, United States, Global; (7) Sex: both, male, female; (8) Metric: number, rate.

We illustrated the secular transition trends in stroke incidence and mortality in China between 1990 and 2016. Incidence rates, mortality…

Secular trends in stroke incidence and mortality

Table 1 shows the number of strokes in China in 2016, together with the incidence and age-standardized incidence. As shown, IS was the main type of stroke in China, occurring at approximately double the incidence of HS; however, mortality rates were higher for HS than for IS.

The incidence of stroke (204.52 to 403.08), including IS (126.37 to 276.75) and HS (78.15 to 126.34), showed a general increasing trend, with the greatest contribution to the upward trend coming from IS (Fig. 1(a)). After…

Discussion

In China, the incidence of stroke increased as the mortality improved between 1990 and 2016. However, changes differed markedly by the type of stroke: for example, the ASIR for IS increased, whereas that for HS decreased, and the overall improvement in the ASMR was mainly explained by HS. The incidence of stroke also increased in young and middle-age groups, but the elderly still accounted for most of the incidence and mortality. Of note, the incidence and mortality of China was higher than…

Conclusions

The incidence of stroke increased and the mortality decreased between 1990 and 2016 in China. Although the incidence of stroke increased in the younger generation, the elderly population nevertheless remained the primary source of the stroke burden. We have shown that the observed secular trends in stroke incidence and mortality in China were most likely affected by population aging, risk accumulation, and advances in healthcare due to socioeconomic development. Based on the changed…

Declaration of Competing Interest

No potential conflict of interest was reported by the authors.…

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Ethical approval

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trend in recent years, which was because of the rapid socioeconomic, diet and lifestyle transition, and the ubiquitous PM pollution across China (Wang et al., 2020). Therefore, additional studies focusing on stroke morbidity are required to improve our understanding of the acute effects of exposure to PMs (PM1, PM2.5, and PM10) on stroke incidence.…

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