Journal of the Formosan Medical Association (2016) 115, 531–538

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.jfma-online.com

ORIGINAL ARTICLE

Time trends in the prevalence and incidence of Parkinson's disease in Taiwan: A nationwide, population-based study

Weng-Ming Liu [a], Ruey-Meei Wu [a], Jou-Wei Lin [b,c], Ying-Chun Liu [d], Chia-Hsuin Chang [b,d,*], Chin-Hsien Lin [a,**]

[a] *Department of Neurology, National Taiwan University Hospital, Taipei, Taiwan*
[b] *Department of Medicine, College of Medicine, National Taiwan University, Taipei, Taiwan*
[c] *Cardiovascular Center, National Taiwan University Hospital Yun-Lin Branch, Dou-Liou City, Yun-Lin County, Taiwan*
[d] *Institute of Preventive Medicine, College of Public Health, National Taiwan University, Taipei, Taiwan*

Received 7 February 2015; received in revised form 18 May 2015; accepted 20 May 2015

KEYWORDS
incidence;
Parkinson's disease;
population study;
prevalence;
time trend

Background/purpose: Identifying trends in the prevalence and incidence of Parkinson's disease (PD) may yield information that supports public health goals. Our aim was to evaluate time-trend changes in the prevalence and incidence of PD in Taiwan between 2004 and 2011.
Methods: This retrospective, nationwide, longitudinal study used the Taiwan National Health Insurance Research Database to identify patients with PD from 2004 to 2011 based on having ICD-9-CM diagnostic codes, which were assigned by neurologists, and being prescribed PD medication. Annual incidence and prevalence were calculated, and time-trend analyses were estimated assuming a Poisson distribution.
Results: Over the study period, 19,302 patients in 2004 and 41,606 patients in 2011 fulfilling the study criteria for PD were included in the analysis. The average age-standardized prevalence of PD per 100,000 of population was 84.8 in 2004 and 147.7 in 2011, with a 7.9% yearly increase. Increasing prevalence trends of PD were statistically significant ($p < 0.001$) in all age groups, with the steepest rate among those aged $\geq$ 80 years. In contrast, the average age-standardized incidence of PD decreased steadily from 35.3 per 100,000 in 2005 to 28.8 per 100,000 in 2011. The incidence rate was higher in men than in women, and increased with age.

Conflicts of interest: The authors have no conflicts of interest relevant to this article.

* Corresponding author. Chia-Hsuin Chang, Department of Medicine, College of Medicine, National Taiwan University Hospital, No.7 Chung-Shan South Road, Taipei 100, Taiwan.
** Corresponding author. Chin-Hsien Lin, Department of Neurology, National Taiwan University Hospital, No.7 Chung-Shan South Road, Taipei 100, Taiwan.
E-mail addresses: chiahsuin123@yahoo.com.tw (C.-H. Chang), chlin@ntu.edu.tw (C.-H. Lin).

http://dx.doi.org/10.1016/j.jfma.2015.05.014

Conclusion: We identified an increasing trend in the annual prevalence rates of PD from 2004 to 2011; however, the substantial decline in the incidence of PD suggests that some major environmental risk factors for PD were removed from this population during this time period.

Introduction

Parkinson's disease (PD), a disorder of complex etiology including both genetic and environmental factors, is one of the most common neurodegenerative diseases.[1] The past decade has been characterized by a remarkable acceleration in the identification of genetic variants linked to a minority of PD cases;[2] however, penetrance is often incomplete. This observation suggests the importance of environmental risk factors, including exposure to certain agricultural chemicals that have also been associated with an increased risk of PD.[3]

Given that the population worldwide has aged dramatically in the past decade, the impact of PD on global society is a major concern. A key to unravelling the etiology of PD is to investigate its occurrence and distribution within communities and globally. Time trends in the incidence and prevalence of PD may help to generate new etiologic hypotheses and enable public health systems to project the future burden of these disabling conditions and plan medical services based on these projections.

Previous studies comparing prevalence rates across different regions have had conflicting results.[4–7] A recent meta-analysis of prevalence studies reported a stable prevalence rate in the UK in recent decades,[8] and a similar stable trend of the prevalence of PD was also observed in a US county over a 15-year period.[9] However, no population-based large-scale analyses have been published on the incidence and prevalence of PD over time in Asia. We therefore conducted time-trend analyses of the prevalence and incidence of PD in Taiwan from 2004 to 2011, comparing the sexes and different age groups, and report the findings in the context of previous results for Taiwan and western countries.

Methods

Data source

The Taiwanese government launched the National Health Insurance (NHI) program in March 1995, which covered >99% of the total population by the end of 2008.[10] The NHI Research Database was developed at the National Health Research Institute, with linked data from demographic and enrollment records, hospital claims, ambulatory care visits, and pharmacy-dispensing claims from hospitals, outpatient clinics, and community pharmacies. Every individual in Taiwan has a unique personal identification number. Data on patient identities are scrambled cryptographically by the National Health Research Institutes to protect patient privacy.

Our study was approved by the Research Ethics Committee of National Taiwan University Hospital. No informed consent from participants was required because the data were analyzed anonymously. We analyzed data from 2004 to 2011.

Study population

We searched the entire population in the Taiwan National Health Insurance Database from 2004—2011 to identify any outpatient visitor or hospitalized individual with PD as one of the diagnoses (International Classification of Diseases, 9th Revision, Clinical Modification; ICD-9-CM code: 332.0). Patients were classified as having PD and included in the analysis if they had at least one hospital admission or one neurologist outpatient visit using the PD diagnostic code, and if they received PD medication (including levodopa, carbidopa, bromocriptine mesylate, pergolide mesylate, amantadine, anticholinergics, selegiline, cabergoline, ropinirole, or pramipexole; Anatomical Therapeutic Chemical Classification System, N04) in any of the calendar years. To improve the diagnostic accuracy and to exclude patients with possible secondary parkinsonism, patients who had had a diagnosis of dementia, cerebrovascular diseases, head trauma, or psychotic disorders at the time of, or 1 year before the diagnosis of PD were excluded.

Incident and prevalent case ascertainment

An incident case was ascertained after confirming that the patient met the criteria for PD in the claims database with a minimum of 1 year. As a result, we could only identify incident cases after 2005. The hospital admission date or the first date of an outpatient visit that met our definition of PD, whichever came first, was used as the date of the incident event. Patients were classified as prevalent cases if they met the criteria for PD in each year of the study, but were not incident cases. Because no death records are in the database, we assumed that patients with PD had an unknown vital status if there was no claim for any health service in the database for >1 year, and they were not counted as prevalent cases after the date of the last record.

Statistical analysis

We calculated the annual incidence and prevalence of PD from 2004 to 2011 by dividing the number of patients by the