Estimation of the Incidence of Kawasaki Disease in Taiwan. A Comparison of Two Data Sources: Nationwide Hospital Survey and National Health Insurance Claims

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\textbf{Key Words}
Kawasaki disease; incidence of KD; nationwide questionnaire hospital survey; National Health Insurance claims; Taiwan

\textbf{Background:} Kawasaki disease (KD), first described by Dr. Tomisaku Kawasaki in 1967, was found for the first time in Taiwan in 1976. It continued to occur in increased numbers. For the study of incidence rates and epidemiological features of KD, we conducted five nationwide hospital surveys (NHS) in 1987, 1992, 1994, 2001 and 2008, respectively. We estimated also the annual incidence rates of KD during 1996–2007, based on the National Health Insurance (NHI) database, which had been implemented since 1995, covering 98% of the population in Taiwan.

\textbf{Methods:} The annual incidence rates of KD during the twelve years, from 1996 to 2007, estimated by the NHS and the NHI claims were compared, analyzed and discussed.

\textbf{Results:} During 1996–2007, a total of 9,938 cases of KD were reported by the Departments of Pediatrics of all hospitals surveyed, and a total of 11,849 cases of KD were claimed in the NHI database. The annual number of cases and incidence rates of KD based on NHI claims constantly surpassed those by the NHS. The ratio of the two incidence rates varied from 1.10 to 1.33. They were well correlated ($r = 0.902, p < 0.001$) with a linear equation, $\text{NHI} = 16.07 + 0.93\times\text{NHS}$. The changes in annual incidence rate by the NHI were mean 1.149, $p = 0.07$, 95% CI 0.082–2.382, and those by the NHS were mean 1.562, $p < 0.001$, CI 0.656–2.468.

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1. Introduction

Taiwan is an island country with a population of 23 million and an area of 35,680 Km². Kawasaki disease (KD), first described by Dr. Tomisaku Kawasaki in 1967, was first encountered in Taiwan in 1976. For the study of the incidence and epidemiological features of KD in Taiwan, we carried out five nationwide questionnaire hospital surveys (NHS), as designed by Japan Kawasaki Disease Research Committee, in 1987, 1992, 1994, 2001 and 2008, respectively. Utilizing the Taiwan National Health Insurance (NHI) database, which had been implemented since 1995, covering 98% of the population in Taiwan, we also estimated the annual incidence rates of KD during the period from 1996 to 2007. The number of cases and incidence rates of KD estimated from the NHS and those from the NHI database during the 12 years, from 1996 to 2007, are compared, analyzed and discussed in this communication.

2. Methods

A questionnaire survey form, designed for a retrospective study of KD patients was sent with a personal request letter to the chairs of pediatric departments of all hospitals with 100 or more beds, as listed by the Taiwan Pediatric Association, together with a copy of the diagnostic guidelines for KD and coronary artery lesions, proposed by the Japan Kawasaki Disease Committee, the Council of Cardiovascular Disease in the Young, American Heart Association, and our Study Group. There were 40 hospitals in 1996 and 94 in 2007. All the hospitals responded to our request, and submitted their duly filled forms to us for the analysis. From the database of the Taiwan NHI, which had been implemented since 1995, covering 98% of the population in Taiwan, we collected the number of KD cases, based on the reimbursement claims made by all physicians for KD patients less than 20 years of age, who were hospitalized with a major diagnosis and/or second diagnosis of KD (ICD-9-CM code 446.1), and coronary artery aneurysm (ICD-9-CM code 414.11). The number of KD-associated hospitalizations each year was thus obtained, and was divided by the total number of children below 5 years of age each year in Taiwan from 1996 to 2007 (Taiwan census data). The annual incidence rate of KD was then calculated as the number of KD-associated hospitalizations per 100,000 children less than 5 years of age.

2.1. Statistical analysis

Analysis of data was carried out using statistical package SPSS (version 20.0) for Windows. Significance was set at \( p < 0.05 \). Linear regression was used for analysis of the correlation and changes in annual incidence rates.

3. Results

During the 12 years from 1996 to 2007, a total of 9938 KD cases were diagnosed and reported to us by the chairs of the pediatric departments of the surveyed hospitals, and physicians claimed NHI reimbursement for a total of 11,849 KD cases. The annual incidence rates of KD each year estimated from both the NHI and the NHS are listed in Table 1. The number of cases and incidence rates of KD estimated from the NHS and those from the NHI database during the 12 years, from 1996 to 2007, are compared, analyzed and discussed in this communication.

4. Discussion

KD is a febrile illness of unknown etiology, mainly affecting children younger than 5 years of age. In Taiwan, since the first case of KD was diagnosed in 1976, the disease has continued to occur in increasing numbers. The increase in Table 1 Annual incidence rates of Kawasaki disease estimated from National Health Insurance claims and nationwide questionnaire hospital surveys in Taiwan, 1996–2007.

<table>
<thead>
<tr>
<th>Year</th>
<th>National Health Insurance claims</th>
<th>Nationwide questionnaire hospital surveys</th>
<th>A/B ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No. of cases</td>
<td>Incidence* (A)</td>
<td>No. of cases</td>
</tr>
<tr>
<td>1996</td>
<td>999</td>
<td>59.0</td>
<td>750</td>
</tr>
<tr>
<td>1997</td>
<td>847</td>
<td>52.0</td>
<td>677</td>
</tr>
<tr>
<td>1998</td>
<td>1149</td>
<td>72.0</td>
<td>846</td>
</tr>
<tr>
<td>1999</td>
<td>1047</td>
<td>68.0</td>
<td>801</td>
</tr>
<tr>
<td>2000</td>
<td>1103</td>
<td>69.0</td>
<td>804</td>
</tr>
<tr>
<td>2001</td>
<td>1160</td>
<td>76.0</td>
<td>1018</td>
</tr>
<tr>
<td>2002</td>
<td>1000</td>
<td>71.0</td>
<td>860</td>
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<tr>
<td>2003</td>
<td>872</td>
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<tr>
<td>2004</td>
<td>916</td>
<td>66.9</td>
<td>838</td>
</tr>
<tr>
<td>2005</td>
<td>969</td>
<td>74.8</td>
<td>897</td>
</tr>
<tr>
<td>2006</td>
<td>931</td>
<td>77.1</td>
<td>871</td>
</tr>
<tr>
<td>2007</td>
<td>856</td>
<td>70.0</td>
<td>816</td>
</tr>
<tr>
<td>Total</td>
<td>11,849</td>
<td>--</td>
<td>9938</td>
</tr>
</tbody>
</table>

* Per 100,000 children less than 5 years of age.
the number of cases could be due to the actual occurrence of the disease, and also to physicians' increasing awareness of the disease.

In Japan, nationwide epidemiological surveys of KD have been carried out every two years since 1970, by the Japan Kawasaki Disease Research Committee, using a survey form and diagnostic guidelines sent to all pediatric departments of hospitals with 100 or more beds.14,15

The methodology of KD surveillance varies in each country, mostly reviewing the hospital records in particular regions from time to time. The passive KD surveillance system used since mid-1970s in the United States consisted of two components: (1) standardized case reports form by clinicians, and the state and local health departments from selected regions, and (2) periodic reviews of national hospitalization records.18

The hospitals we surveyed covered all the pediatric services of major hospitals in Taiwan. The number of hospitals increased from 40 to 94, along with the population growth and health care developments in Taiwan.

The annual incidence rates of KD which we estimated based on the NHI claims and the classic NHS in this study proved to be closely correlated. The numbers of KD cases based on the NHI claims constantly surpassed those by the NHS, indicating that some pitfalls, inherent in the health insurance claims, such as over-diagnosis, superfluous claims, and duplication of patients might exist. It is concluded that, in Taiwan, the annual incidence rates of KD can be estimated from the NHI database, which has the great advantage of near universal coverage.

Conflicts of Interest

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

References


