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DIABETES RESEARCH AND CLINICAL PRACTICE

Review

Prevalence, trends and risk factors for the diabetes epidemic in China: A systematic review and meta-analysis

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ABSTRACT

Aims: To describe the prevalence and trends of diabetes and to quantitatively assess its risk factors in mainland China.

Methods: Thirty-one epidemiological studies were identified by a systematic search of four databases. Prevalence estimates were mapped and summarized by meta-analysis in each region of China. The pooled ORs and 95% CIs of risk factors for diabetes were also calculated.

Results: There was a large geographical imbalance with regard to the prevalence of diabetes. Region-pooled prevalence was highest in the eastern region (8.0%, 95% CI: 6.1–10.0%) and lowest in the western region (4.6%, 95% CI: 3.3–6.0%), which was consistent with regional levels of economic development. The overall prevalence of diabetes has been increasing since 1980. Traditional risk factors such as age, family history of diabetes, obesity, hypertension and elevated triglycerides were found to be associated with diabetes. In addition, urban residence and being from ethnic minorities were also significantly associated.

Conclusion: Based on the meta-analyses, we found that the prevalence of diabetes is different in different parts of China but it has been increasing sharply during the last three decades. Some risk factors were quantitatively derived in the study, which are free from the diversity of a single sample.

Contents

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1. Introduction

The prevalence of diabetes has been steadily rising in recent years and it has reached epidemic proportions worldwide along with the acceleration of globalization and urbanization [1,2]. As the largest developing country in the world, China has experienced a sharp increase in the prevalence of diabetes and pre-diabetes in the past years. A recent nationwide diabetes epidemiological study indicated that the prevalence of diabetes has reached 9.7% in mainland China, translating into 92.4 million adults with diabetes [3]. China has become the top country with the largest number of people with diabetes in the world [4].

Recent dramatic urbanization and economic development in China has resulted in a nutrition transition and changes in lifestyle [5–7]. However, the prevalence of diabetes varies in different regions due to a considerable difference in socio-economic development during the transitional process.

China currently has a population of 1.34 billion [8]. Therefore the potential effect of diabetes on the global economy and society are very large. The Chinese government and researchers have conducted a number of population-based epidemiological studies on diabetes both nationwide and at regional levels during the last decade. Synthesis of these results can provide a better understanding of the situation and how it can be addressed. Although there have been previous comprehensive reviews focusing on various aspects of diabetes in China [9–14], they are mostly narrative and none performed a meta-analysis which can provide more precise and reliable effect estimates and the previous reviews did not give statistically combined results of comparable studies. Further mapping and quantitating the situation is of paramount importance. In this study, we conducted a systematic review and meta-analyses aiming to describe the prevalence and trends of diabetes as well as quantitatively assessing its risk factors in China.

2. Methods

2.1. Search strategy

We performed a systematic literature search through MED-LINE and ISI Web of knowledge databases for English-language literature, the China National Knowledge infrastructure (CNKI) and the Wanfang digital database for Chinese-language publications. The Medical Subject Heading (MeSH) terms and/ or key words included "diabetes", "China", "prevalence", "epidemiology" and each name of the 31 provinces/munici-palities/autonomous regions in mainland China. Titles and abstracts of the resulting literatures were screened for further review. The references of identified literature were checked as well if needed. Furthermore, we manually scanned reports and books in the relevant area. Only original reports of observational studies on diabetes epidemiology were considered for the review. Duplicate and overlapping publications were excluded. Two authors (HZ and ZS) independently did the literature search. Any disagreements were resolved after discussion. This systematic review was conducted following the quality standards for reporting meta-analyses [15].

2.2. Eligibility criteria

Studies were included if they meet the following criteria: (1) the studies were conducted in Mainland China after the year of 2002 and also published between Jan 1, 2002 and May 31, 2012; (2) population-based cross-sectional surveys published in peer-reviewed journals; (3) the study subjects were adults aged ≥18 years, including both men and women; (4) total effective sample size was more than 1000 persons; (5) representative for a certain range of the population, rather than for a very limited area (e.g. a county); (6) with information on the survey year, population characteristics, sample size of both men and women, diagnostic criteria and survey procedure; (7) articles with primary data. Studies were excluded if: (1) they reported type 1 diabetes or gestational diabetes; (2) only focused on a specific age group, or within a very limited area; (3) hospital-based study; (4) Case-control or randomized controlled trials; (5) editorials/letters, and review articles; (6) duplications of another study or geographically covered by a larger survey in the province level. In addition, we added four nationwide diabetes epidemiological surveys (1980, 1994, 1996 and 2001) in order to obtain a better trend analysis. Studies published in international peer-reviewed journals were given priority for inclusion if conflicts existed.

2.3. Data extraction

From each eligible study, we extracted the following data by means of a structured data extraction form: first author, region of study, year of survey, urban/rural residence, net-sample size (number of included men and women separately), age range, prevalence of diabetes, diagnostic method and diagnostic criteria. The year of completion was recorded if the survey was completed in the next year of initiation.

The diagnostic criteria for diabetes mellitus used in eligible studies were the 1999 WHO criteria [16], the 1997 criteria from the American Diabetes Association (ADA) [17] or its updates [18,19]. The criteria applied to this review were consistent except for study reference [20]. In that study diabetes was