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Economic Impact of Diabetes in Japan

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Abstract

Purpose of review The economic burden of diabetes in Japan is already serious and will become greater in the future. We review the economic impact of diabetes in Japan to examine viable options for mitigating its effects.

Recent findings Medical costs for diabetes have been increasing by US $1 million annually, reaching US $11 million in 2009, of which US $7 million was accounted for by people aged 65 years or older. The quality of treatment of diabetes in Japan is higher than in other regions in the world. This can be more effective for achieving glycemic control, but is also more expensive compared with conventional treatment.

Summary Because of the high cost of diabetes in Japan, a coordinated response is needed. Intervention trials for people with prediabetes aimed at preventing the occurrence of diabetes seem to be the most cost-effective method for lowering the medical costs of diabetes, rather than the use of new, expensive antidiabetic drugs in patients with established diabetes.

Keywords Diabetes · Economic impact · Intervention trial · Japan · Medical cost

Introduction

The incidence of diabetes has been increasing worldwide over the past four decades. Data from the International Diabetes Federation showed that diabetes affected 382 million people worldwide in 2013, and this number is expected to grow to 592 million by 2035. The estimated global prevalence of diabetes in 2013 was 8.3% in people aged 20–79 years. There seems to be an especially growing prevalence among Asian countries, particularly China and India, which have reached rates between 9% and 10%, corresponding to 65 million and 100 million people, respectively [1].

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Japan has proved to have one of the highest rates of diabetes in the world. The Health and Welfare Statistics Association, which is a Japanese-based statistics association and provides the nation's health trends each year, reported in 2016 that 10 million Japanese people were estimated to have diabetes, which is a prevalence of 12.1% (12.2% male and 12.1% female). The prevalence increased significantly between 1997 and 2007 and decreased moderately from 2007 to 2016. Among people with diabetes in Japan, 76.8% of individuals receive medical care at a clinic or hospital, while 33.2% do not visit any medical institution and are untreated [2•].

Diabetes is a major health problem and contributes significantly to the global economic burden [3]. Diabetes is also highly prevalent in Japan [2•]. However, there are few reports on the impact of the medical costs of diabetes on the Japanese economy. Therefore, we review the economic impact of diabetes in Japan in order to examine viable options for mitigating its effects.

Medical Costs of Diabetes

The economic burden of diabetes on individuals and caregivers, as well as on the health care system, consists of both direct and indirect costs. Direct costs include the cost of resources used for the treatment of diabetes. Indirect costs include the value of

resources lost due to the illness and its complications, including lost productivity and earnings due to mortality [4].

Previous studies have assumed that most medical costs for diabetes are limited to direct costs [5–8] or have studied regions or countries other than Japan [9–11]. Although a few reports considered indirect costs at the global level, not all relevant cost components were covered. Nonetheless, medical costs are a large burden on patients with diabetes. We assume that patients with type 1 diabetes have a greater economic burden from direct costs than those with type 2 diabetes, because the management of the former involves insulin products that are more expensive than oral hypoglycemic drugs, along with administration fees for insulin injections and the use of products for self-monitoring of blood glucose. A relatively common current treatment for type 1 diabetes is intensive insulin therapy with multiple daily injections of insulin analogues or continuous subcutaneous insulin infusion (CSII). These treatment options are more expensive than conventional therapy.

Regional Economic Impact

The regional economic impact of diabetes has been studied extensively. Most studies are from Latin American, the Caribbean, and European countries, followed by the USA and Canada. There are few reports from Asia or Africa [12•].

Seuring et al. [12•] reviewed the societal cost of type 2 diabetes, estimated using direct and indirect costs based on previously published literature. They then examined the relationship between diabetes costs of care and per capita gross domestic product (GDP) and found that per capita GDP explained one-third of the variation in cost estimates. There was a strong relationship between per capita GDP and expenditures for type 2 diabetes. The USA had the highest cost per capita, while Japan, like the European countries, had very high direct costs for type 2 diabetes, although there was wide variation in the estimated costs for countries studied. The results also showed that the estimated costs seemed to be consistently higher than expected on the basis of the per capita GDP in high-income regions such as the USA, Europe, and Japan [12•]. As in other studies, this study found that a larger share of total costs comprised direct costs. This was particularly true for high-income countries.

In addition, Bommer et al. [13••] reported the GDP-relative economic burden in individuals aged 20–79 years using epidemiological and demographic data in 184 countries, projected from 2015 for 2030. North America was projected to have the highest absolute costs in 2015 (US $499.90 billion [95% CI 478.53–523.03]) and was projected to maintain this position through 2030. Based on past trends, East Asia and the Pacific region were projected to be the largest contributors to the global economic burden of diabetes by 2030 (US $796.11 billion [756.97–881.03]). Japan is projected to have the highest absolute cost as a percentage of GDP by 2030.

From these studies, it is hypothesized that the economic burden of diabetes in Japan is already serious and will become heavier in future.

The Economic Impact of Diabetes in Japan

Health Insurance System in Japan

Health insurance is compulsory for everyone residing in Japan for 3 months per year or longer, and there are two systems [14] under the control of the national government. Although the majority of the population holds some form of private health insurance, it plays only a supplementary or complementary role. It developed historically as a supplement to life insurance and provides additional income in case of sickness, mainly in the form of lump-sum payments when insured persons are hospitalized or diagnosed with cancer or another specified chronic disease, or through payment of daily amounts during hospitalization over a defined period. Since the early 2000s, the number of standalone medical insurance policies has increased (https://international.commonwealthfund.org/countries/japan/).

One insurance system, Employees' Health Insurance or Social Health Insurance, is for employees and their dependents and covers 35% of the Japanese population. The second system is the National Health Insurance and covers insurance for self-employed individuals such as farmers, fishermen, and retirees and their dependents, which is approximately 65% of the Japanese population. These insurance systems cover all medical treatments, including diagnostic examinations, medications, surgery, supplies and materials, physician care, and other personal costs, at any clinic or hospital throughout Japan. They also cover home care services provided by physicians and nurses, but do not cover nursing home care. While insurance covers 70% of the total medical costs, the patients pay the remaining 30% [15, 16].

Current Status of Medical Costs for Diabetes in Japan

Figure 1 shows changes in medical costs for diabetes during the period from 1999 to 2009 in Japan [16]. Medical costs for diabetes have been increasing by US $1 million annually, reaching US $11 million in 2009, of which US $7 million was for people aged 65 years or older (64%) and US $4 million was for people under 65 years (36%). The increase in costs for patients with diabetes over 65 years of age is significant. A major cause for this increase was the cost of treating diabetic complications, such as cardiovascular disease and renal impairment, which leads to a longer duration of treatment. Medical costs for patients with a diabetic complication are estimated to be US $1000 more than patients without diabetes complications [17]. Treatment for complications has contributed to lower rates of mortality for diabetes in Japan. These costs are likely even higher for patients with multiple

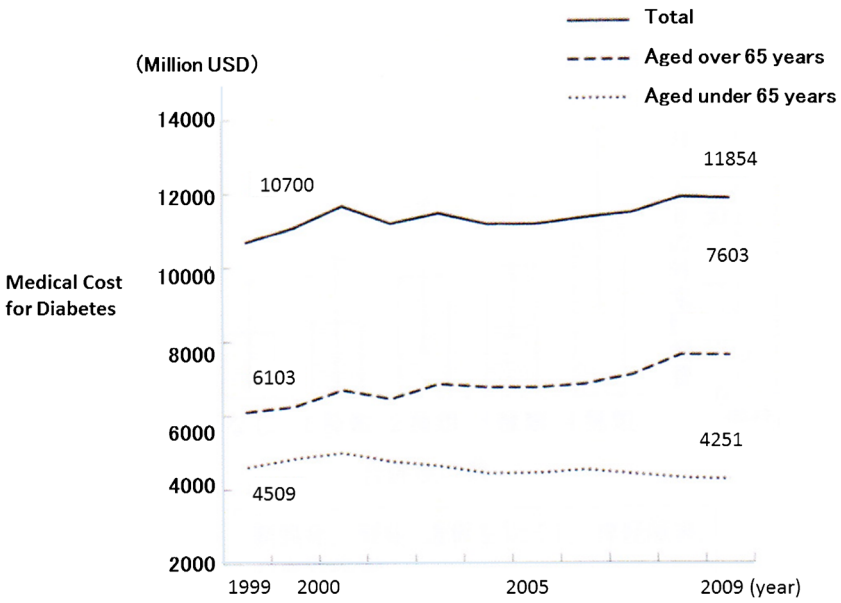

Fig. 1 Changes in medical costs for diabetes in Japan during the period from 1999 to 2009. (With permission from: Shimoda M and Kaku K. Nippon Rinsho 2012; 70(Suppl. 5): 663-666 [in Japanese]) [17]

complications, because of higher direct costs for treatment of multiple complications and higher indirect costs due to loss of productivity and income or earnings for a longer period.

Various new antidiabetic drugs, such as dipeptidyl peptidase-4 (DPP-4) inhibitors, glucagon-like peptide-1 (GLP-1), receptor agonists, sodium-glucose cotransporter-2 (SGLT2) inhibitors, are widely used for treatment of type 2 diabetes in Japan. Over 80% of Japanese patients with type 2 diabetes use one of the new drugs (Japan Agency for Medical Research and Development, Tokyo, Japan, 2018). The effectiveness in reducing blood glucose levels with these new drugs seems to be superior to previously used conventional drugs such as metformin, sulfonylureas, and α-glucosidase inhibitors [18]. Some patients with type 2 diabetes tend to be placed on insulin for glycemic control even at the early stage of the disease. It is clear that these new therapeutic approaches can be more effective for glycemic control, but also more expensive compared with conventional pharmacological therapies for type 2 diabetes [18].

Medical costs are likely higher for patients with type 1 diabetes. In Japan, most patients with type 1 diabetes are treated with intensive insulin therapy, involving multiple daily injections using insulin analogues or CSII. These therapeutic options are more effective for glycemic control, reducing hypoglycemia, and preventing diabetic complications [19, 20]. However, these treatments are more expensive than conventional drugs, with costs of at least US $120 per month with multiple daily insulin injections, and over US $200 per month using CSII, even when covered by Japanese medical insurance. In addition, patients with type 1 diabetes require examinations at least three to four times per year and regular checkups for complications. In sum, they impose an annual direct medical cost of over US $1600 [21]. Kikuchi et al. reported that in 2018, approximately 87% of youth with type 1 diabetes felt burdened by the current cost of diabetes treatment and management [22•], much higher than the 67.5% reported in a nationwide survey conducted in 1998 [23].

Future Approaches to Reducing the Medical Costs of Diabetes in Japan

From these findings, it is clear that coordinated action is needed. Kuriyama et al. reported that the Japanese are more likely to develop health issues such as diabetes due to excess weight than their western counterparts [15]. The economic impact of overweight and obesity seem to be the same in Japan as in western countries, even though Japanese people have lower mean BMI. Intervention trials for people who are overweight could help prevent the occurrence of diabetes. Controlling the occurrence (primary prevention) and progression of diabetes (secondary prevention) seem to be necessary to reduce the medical costs of diabetes. The Diabetes Prevention Program [24] demonstrated that lifestyle intervention rather than early use of metformin in prediabetic subjects was useful in preventing the onset of type 2 diabetes (decrease in the onset of diabetes: 58% in lifestyle intervention vs. 31% in use of metformin). The Da Qing IGT and Diabetes Study [25], conducted in China, also demonstrated that lifestyle intervention was effective in reducing the onset of type 2 diabetes (decrease in the onset of diabetes: 31% with dietary management, 46% with physical exercise, 42% for both interventions). Hisashige [26] reported that primary intervention in subjects with impaired glucose tolerance detected through screening tests can reduce the medical costs of diabetes in Japan. Identifying prediabetic subjects and early intervention may be the most advisable options for lowering the incidence and medical costs of diabetes in Japan.

Conclusion

The current economic impact of diabetes in Japan is significant. Intervention trials for prediabetic people to prevent the occurrence of diabetes are likely to be the most cost-effective method for lowering the medical costs of diabetes in Japan, rather than using new antidiabetic drugs on established patients with diabetes.

Compliance with Ethical Standards

Conflict of Interest Tatsuhiko Urakami, Remi Kuwabara, and Kei Yoshida declare that they have no conflict of interest.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

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