

Mortality in diabetes mellitus: revisiting the data from a developing region of the world

Viswanathan Mohan, Rajendra Pradeepa

There are an estimated 246 million people with diabetes in the world, of whom about 80% reside in developing countries.¹ India is the country that currently has the largest number of people with diabetes (40.9 million), and this number is expected to increase to 69.9 million by the year 2025.¹ The most disturbing trend is a shift in age of onset of diabetes to a younger age in recent years. This presents a serious challenge to the healthcare system because, at the peak of their working career, people with diabetes have an excess risk of mortality and morbidity compared with those without diabetes.²⁻⁴ Indeed, over two-thirds of deaths attributable to diabetes occur in developing countries.⁵ Asian Indians with diabetes also have higher mortality than people with diabetes from other ethnic groups.⁶

Although diabetes is often not recorded as the cause of death, globally, it is believed to be the fifth leading cause of death in 2000 after communicable diseases, cardiovascular disease, cancer and injuries.⁷ Moreover, it is associated with other disease conditions such as coronary artery disease, which are subsequently recorded as the cause of death. According to a WHO study, there are about five times as many deaths indirectly attributable to diabetes.⁸ A report published by the Indian Council of Medical Research (ICMR) in 2004 shows that, in India, diabetes accounts for 109 000 deaths/year.⁹ WHO estimated that, in 2005, mortality from diabetes, heart disease and stroke cost about 210 billion US dollars in India and that a large proportion of the heart disease and stroke costs in these estimates were related to diabetes.⁵

Madras Diabetes Research Foundation & Dr Mohan's Diabetes Specialities Centre, WHO Collaborating Centre for Noncommunicable Diseases, Prevention and Control, Chennai, India

Correspondence to: Professor V Mohan, Madras Diabetes Research Foundation & Dr Mohan's Diabetes Specialities Centre, WHO Collaborating Centre for Noncommunicable Diseases, Prevention & Control, 4, Conran Smith Road, Gopalapuram, Chennai - 600 086, India; drmohans@vsnl.net

Among people with diabetes, the majority of deaths worldwide are due to cardiovascular and cerebrovascular diseases and end stage renal diseases.¹⁰ Information on mortality and cause of death due to diabetes in India is mainly from retrospective hospital-based clinical or autopsy studies.¹¹⁻¹⁵ In 1999, Zargar *et al*¹² reported that the common causes contributing to death in diabetic patients in a tertiary hospital at Srinagar were infections (33.8%), chronic renal failure (30.8%), coronary artery disease (16.3%), cerebrovascular disease (13.7%), hypoglycaemia (7.8%), diabetic ketoacidosis (6.6%) and hyperosmolar coma (2.2%). Bhansali *et al*¹³ also reported that infections were the leading cause of mortality in patients with diabetes in a tertiary hospital in Chandigarh in North India, similar to the findings of Zargar *et al*.¹² However, coronary artery disease has been reported to be leading cause of death in other studies conducted in north India.^{14 15}

There are very few population-based studies on mortality in India. The Chennai Urban population Study (CUPS) conducted in Chennai in South India provided evidence on the effect of type 2 diabetes on mortality in a population.² The overall death rates were nearly threefold higher in people with diabetes than in those without (18.9 vs 5.3 per 1000 person-years). The hazards ratio for all-cause mortality for diabetes was found to be 3.6 compared with non-diabetic people. The study also showed that the leading cause of mortality in diabetes was cardiovascular (52.9%) and renal (23.5%) diseases.

There are very few studies that have revisited the data on mortality and causes of death from a developing region.^{16 17} A population-based study of causes of death, carried out in Osaka Prefecture over 29 years, reported a remarkable increase in the age at death and significant changes in the causes of death of patients with diabetes.¹⁷ Owing to advances in clinical medicine, such as diagnostic procedures, and in health education, some of

the characteristics of the population with diabetes have changed over the past few decades. In this issue of the journal, Zargar *et al*¹⁸ have revisited their data on people with diabetes, using both underlying and contributory causes of death to find the changing pattern of the causes of death over time in a tertiary care hospital at Srinagar. The present study is an extension of their previous work; data for a subsequent 9 years (1997-2005) have been analysed. Of the 234 776 people admitted to the centre during the review period, 16 690 (7.1%) died, of whom 741 had diabetes mellitus, as mentioned on the death certificate. The mean (SD) age at death for people with diabetes was 60.07 (13.62) years in men and 57.36 (13.40) years in women, which is rather disturbing considering that life expectancy in India currently stands at 69 years. However, one should exercise caution when making assumptions about average life expectancy in the whole population extrapolated from people who die in hospital, as people who die at home, either from diabetes or other diseases, tend to be older than those who die in hospital, and, furthermore, a large proportion of people die at home. It is therefore difficult to establish what contribution diabetes makes to earlier age of death from the data presented.

The causes contributing to death were infections (40.9%), chronic renal failure (33.6%), coronary artery disease (16.9%), cerebrovascular disease (13.2%), chronic obstructive pulmonary disease (6.9%), acute renal failure (6.2%), malignancy (4.2%), hypoglycaemia (3.5%) and diabetic ketoacidosis (3.4%). Thus, as reported in their 1999 paper,¹² the authors state that infections and renal failure continue to be the leading causes of mortality in people with diabetes. This is very different from studies conducted in developed countries, where coronary artery disease and cerebrovascular disease are the principal causes of mortality in people with diabetes,^{19 20} or indeed from the population-based study from Chennai quoted above.²

The current data produced by Zargar *et al*¹⁸ suggest that death was attributable to a single cause in 52.9%, two causes in 36.3% and three or more causes in 7.0% of the patients with diabetes. They report that about one-sixth of all deaths occurred in people with diabetes aged <50 years, over half of all deceased people with diabetes were ≥60 years, and one-quarter of people with diabetes died at the age of ≥70 years. Studies from the West

have reported that most deaths occur in people with diabetes aged ≥ 75 years.²¹ The present finding, that one-sixth of all deaths occurred in people with diabetes aged < 50 years is therefore of great concern, as they represent the earning age group. Thus it is clear that diabetes appears to be a significant public health problem in India.

Although more than two-thirds of deaths worldwide are in developing countries, little is known about the causes of death in these countries. In India, only one-third of deaths are registered, and, of these, only one-third have data provided on the cause of death.²² India's diabetes epidemic is escalating. Thus, there is an urgent need for quality data on death rates and for the causes of death in people with diabetes to be reported if further steps to improve public health are to be taken. Various methods have been adopted to study mortality and its causes in people with diabetes, which include: follow-up of patients in a hospital or in a community and analysis of pathological autopsy records and death certificates. Under-reporting of diabetes as an underlying cause of death on death certificates is very common. Thus, although it is a great challenge, there is an obvious need to study mortality, its causes and trends among people with diabetes, as diabetes is rarely perceived as a major contributor to mortality in the developing world and availability of relevant data is hampered by lack of complete registration systems.

These are unmet medical issues that need to be urgently addressed.

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