The current state of diabetes mellitus in India

Seema Abhijeet Kaveeshwar[1], Jon Cornwall[2]

1. Bangalore, India 2. University of Otago

EDITORIAL

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Corresponding Author:
Seema Abhijeet Kaveeshwar
M.Pharmacy (Clinical Pharmacy)
Email: seems26@gmail.com

Diabetes is fast gaining the status of a potential epidemic in India with more than 62 million diabetic individuals currently diagnosed with the disease.[1,2] In 2000, India (31.7 million) topped the world with the highest number of people with diabetes mellitus followed by China (20.8 million) with the United States (17.7 million) in second and third place respectively. According to Wild et al.[3] the prevalence of diabetes is predicted to double globally from 171 million in 2000 to 366 million in 2030 with a maximum increase in India. It is predicted that by 2030 diabetes mellitus may afflict up to 79.4 million individuals in India, while China (42.3 million) and the United States (30.3 million) will also see significant increases in those affected by the disease.[3,4] India currently faces an uncertain future in relation to the potential burden that diabetes may impose upon the country. Many influences affect the prevalence of disease throughout a country, and identification of those factors is necessary to facilitate change when facing health challenges. So what are the factors currently affecting diabetes in India that are making this problem so extreme?

The aetiology of diabetes in India is multifactorial and includes genetic factors coupled with environmental influences such as obesity associated with rising living standards, steady urban migration, and lifestyle changes. Yet despite the incidence of diabetes within India, there are no nationwide and few multi-centric studies conducted on the prevalence of diabetes and its complications. The studies that have been undertaken are also prone to potential error as the heterogeneity of the Indian population with respect to culture, ethnicity, socio-economic conditions, mean that the extrapolation of regional results may give inaccurate estimates for the whole country.

There are, however, patterns of diabetes incidence that are related to the geographical distribution of diabetes in India. Rough estimates show that the prevalence of diabetes in rural populations is one-quarter that of urban population for India and other Indian sub-continent countries such as Bangladesh, Nepal, Bhutan, and Sri Lanka.[3,5] Preliminary results from a large community study conducted by the Indian Council of Medical research (ICMR) revealed that a lower proportion of the population is affected in states of Northern India (Chandigarh 0.12 million, Jharkhand 0.96 million) as compared to Maharashtra (9.2 million) and Tamil Nadu (4.8 million).[5] The National Urban Survey conducted across the metropolitan cities of India reported similar trend: 11.7 per cent in Kolkata (Eastern India), 6.1 per cent in Kashmir Valley (Northern India),[6] 11.6 per cent in New Delhi (Northern India), and 9.3 per cent in West India (Mumbai) compared with (13.5 per cent in Chennai (South India), 16.6 per cent in Hyderabad (south India), and 12.4 per cent Bangalore (South India).[7] A suggested explanation for this difference is that the north Indians are migrant Asian populations and south Indians are the host populations,[8] however this possible cause-and-effect has not been corroborated through further research. Similar ethnographic disparities have been observed in indigenous and non-indigenous populations in countries colonised by the Great Britain: indigenous people from New Zealand and Australia have been shown to suffer from diabetes and cardio-metabolic disorders more than the non-indigenous people.[9,10] Further studies are required in India to highlight cultural and ethnic trends and provide a more complete understanding of the differences in diabetes aetiology between Indian and other ethnic groups within India.

Although the Indian urban population has access to reliable screening methods and anti-diabetic-medications, such health benefits are not often available to the rural patients. There is a disproportionate allocation of health resources between urban and rural areas, and in addition poverty in rural areas may be multi-faceted. Food insecurity, illiteracy,

poor sanitation, and dominance of communicable diseases may all contribute, which suggests that both policy makers and local governments may be undermining and under-prioritising the looming threat of diabetes.[5] Such inadequacies contribute to an infrastructure that may result in poor diabetes screening and preventive services, non-adherence to diabetic management guidelines, lack of available counselling, and long distance travel to health services. Aged care facilities in rural areas report disparity in the diabetes management compared with their urban counterparts,[11] with these populations more likely to suffer from diabetic complications compared to their urban counterparts. More needs to be done to address the rural-urban inequality in diabetes intervention.

Obesity is one of the major risk factors for diabetes, yet there has been little research focusing on this risk factor across India.[12] Despite having lower overweight and obesity rates, India has a higher prevalence of diabetes compared to western countries suggesting that diabetes may occur at a much lower body mass index (BMI) in Indians compared with Europeans.[12,13] Therefore, relatively lean Indian adults with a lower BMI may be at equal risk as those who are obese.[6] Furthermore, Indians are genetically predisposed to the development of coronary artery disease due to dyslipidaemia and low levels of high density lipoproteins;[14] these determinants make Indians more prone to development of the complications of diabetes at an early age (20-40 years) compared with Caucasians (>50 years) and indicate that diabetes must be carefully screened and monitored regardless of patient age within India.[14]

An upsurge in number of early-onset diabetes cases is also responsible for the development of various diabetic complications due to longer disease duration, however data on the prevalence on diabetic complications across the whole of India is scarce.[15,16] A recent international study reported that diabetes control in individuals worsened with longer duration of the disease (9.9±5.5 years),[15] with neuropathy the most common complication (24.6 per cent) followed by cardiovascular complications (23.6 per cent), renal issues (21.1 per cent), retinopathy (16.6 per cent) and foot ulcers (5.5 per cent).[7] These results were closely in line with other results from the South Indian population,[17-21] however further data from different sections of India is required to be able to assess whether patterns of complications rates vary across the country. Poor glycaemic control, a factor that has been observed in the Indian diabetic population,[18] is responsible for micro- and macrovascular changes that present with diabetes, and can predispose diabetic patients to other complications such as diabetic myonecrosis[22] and muscle infarction.[23] Developing countries like sub-Saharan African countries have noted rise in *Plasmodium falciparum* cases in patients with diabetes mellitus,[24] and the convergence of two such diseases provides for complications that not only limit the available treatment options but also increase the morbidity, mortality and financial burden on a resource limited country like India.

There are a number of challenges that plague diabetes care in India. While HbA1c is the gold standard test around the world for insulin initiation and intensification, it is not easily available to a large section of Indian population.[24] Furthermore, there is a lack of "clinical inertia" for the commencement of insulin therapy in both the clinical and patient communities. The most common apprehensions are related to the complexities of the insulin regimen and concerns about weight gain, hypoglycaemic events, and fear of insulin prick. An inadequacy in Indian guidelines is also responsible for wide variation in treatment preferences across the country;[25] the creation of simple and practical insulin guidelines that can be incorporated into routine clinical practice by primary health care physicians are desperately required to facilitate treatment and the initiation of insulin therapy throughout the country.

To reduce the disease burden that diabetes creates in India, appropriate government interventions and combined efforts from all the stakeholders of the society are required.[2] Clinicians may be targeted to facilitate the implementation of screening and early detection programmes, diabetes prevention, self-management counselling, and therapeutic management of diabetes in accordance with the appropriate local guidelines form the backbone of controlling the predicted diabetes epidemic. Early screening and detection of pre-diabetes (especially in pregnant women,[26] children and adults with BMI ≥25) may yield positive health outcomes in society.[27] Continuing education programmes for general practitioners may provide the "clinical inertia" required to initiate programme adherence, and may be a major step in achieving target glycaemic levels and the prevention of disease complications. Aggressive clinical measures in terms of early insulin initiation combined with optimal doses of oral hypoglycaemic agents and appropriate lifestyle modification could also have long-term positive effects in disease management.

Government policies may help in creating guidelines on diabetes management, funding community programmes for public awareness about the diabetes risk reduction, availability of medicines and diagnostic services to all sections of community.[28] Efforts by various governments

and agencies around the world to intervene in diabetes management have resulted in positive health outcomes for their communities. In the United States there are number of public and private funded programmes to prevent and manage diabetes that have been successful.[29,30] Similarly, the Australian government runs programmes such as the "National Health Priority Areas initiative" that is dedicated to provide focussed and continuum of care and attention on chronic disease like diabetes.[31,32] The United Kingdom government places special emphasis on diabetes care in patients, with the National Health Service conducting various patient education programs and trials to improve quality of life of patients such as the "Dose Adjustment for Normal Eating" (DAFNE) study and "Diabetes Education & Self-Management for Ongoing & Newly Diagnosed" (DESMOND) study to provide patient education.[33] Similarly, a government initiative in the United Arab Emirates has set up an expert panel to form guidelines for diabetes management and public awareness programmes.[34] This has resulted in positive health effects which may arrest rising trend in diabetes cases in that country.[34] In India, similar efforts and services are required at 'grass roots' level to contain the new-age diabetes pandemic.

Conclusion

Diabetes mellitus is reaching potentially epidemic proportions in India. The level of morbidity and mortality due to diabetes and its potential complications are enormous, and pose significant healthcare burdens on both families and society. Worryingly, diabetes is now being shown to be associated with a spectrum of complications and to be occurring at a relatively younger age within the country. In India, the steady migration of people from rural to urban areas, the economic boom, and corresponding change in life-style are all affecting the level of diabetes. Yet despite the increase in diabetes there remains a paucity of studies investigating the precise status of the disease because of the geographical, socio-economic, and ethnic nature of such a large and diverse country. Given the disease is now highly visible across all sections of society within India, there is now the demand for urgent research and intervention - at regional and national levels - to try to mitigate the potentially catastrophic increase in diabetes that is predicted for the upcoming years.

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