

Diabetes in India: snapshot of a panorama

Current Science had highlighted two important issues: (a) diabetes mellitus, which is becoming more prevalent in India (Hattersley, A., *Curr. Sci.*, 2002, **82**, 273–278) and (b) well-being as a pivotal component in measuring health outcomes (Sen, Nirupa, *Curr. Sci.*, 2002, **82**, 249–250).

By the year 2025, India is predicted to have the most number of people with diabetes mellitus in the world¹.

Diabetes mellitus is categorized into type 1 and type 2. Type 1 diabetes is due to autoimmune destruction of pancreatic beta cells in genetically susceptible persons. Viruses are strong candidates for environmental triggers; others are diet, bacteria and chemicals. Type 2 diabetes is often diagnosed in adults. It results from defects in both insulin secretion and insulin action (insulinopenia and insulin resistance).

Most Indians with diabetes who come for medical treatment are adults².

In our computerized database³, 16,655 individuals have a principal diagnosis of diabetes mellitus (type 1 and type 2). Twenty-six met the criterion of malnutrition-related diabetes mellitus⁴, which is now called malnutrition-modulated diabetes mellitus, 17 had chronic calcific pancreatitis and three had preceding acute pancreatitis.

In the group of young onset diabetes (i.e. age of onset below 20 years), 123 (54.7%) had documented episodes of ketosis, while 102 (45.3%) did not. In the relatively older group of individuals, 5197 (31.72%) had onset of diabetes between the ages of 20 and 40 years. The onset in the remaining 11,187 (68.28%) was above the age of 40 years.

Among children aged 15 or less at diagnosis of diabetes, the mean age at presentation varied from 9.62 years in boys (SD 3.8 years) to 8.5 years in girls (SD 3.99 years)⁵. The girls tended to present about a year later than boys (mean duration of diabetes in girls 3.38 years and in boys 2.58 years). In this group, nearly a fourth of them presented first time below the age of five years⁶.

We looked at consanguineous marriages in diabetes. Among 333 consecutive subjects, 23% ($n = 74$) were born out of consanguineous marriages. Among these, 56.8% ($n = 42$) had family history of diabetes when compared with 56%

($n = 132$) of those born out of nonconsanguineous marriages.

We then looked at the family history of diabetes in parents of individuals with diabetes mellitus. Among 871 consecutive persons, 47.5% men ($n = 257$) and 47.75% women ($n = 159$) gave a family history of diabetes. Unlike women, in the case of men with family history of diabetes cases where only the father had diabetes (49.4%; $n = 127$) were more than those where only the mother had diabetes (36.96%; $n = 95$; $P < 0.01$). More number of men as well as women with diabetes had only a diabetic mother more often than both parents being diabetic.

In a recent study⁷ we reported that among 15,523 individuals with diabetes, 1.66% ($n = 248$) had putative autoimmune diseases (hypothyroidism, 59.3%, $n = 147$; vitiligo 25.8%, $n = 64$; thyrotoxicosis 9.7%, $n = 24$).

Potentially correctable factors are common in diabetes, which can be tackled in a cost-effective manner⁷: nearly a fourth of men with diabetes were smokers, and between 45% (men) and 90% (women) were sedentary. Even though intervention is difficult, attention must be focused on these.

Among 5864 patients who had estimation of both serum cholesterol and triglycerides⁸, 4.4% ($n = 259$) had elevation of both cholesterol (> 250 mg/dl) and triglycerides (> 200 mg/dl). In a subset of 224 consecutive persons who were newly diagnosed to have diabetes, 86% ($n = 192$) had one or more risk factors (body mass index > 25 , serum cholesterol > 200 mg/dl, serum triglycerides > 150 mg/dl).

Symptomatic peripheral neuropathy was present in 22%. In comparison, 3.1% of patients in the database had a diagnosis of ischaemic heart disease at the time of presentation (356/17,356) and 1.12% had a diagnosis of cerebrovascular disease (186/16,570). When specifically questioned for it, 7.9% of men in 342 consecutive cases reported erectile dysfunction. When not directly questioned, only 2.7% volunteered that they had sexual dysfunction (305/11,407).

Sleep disturbances were common in diabetes. Nearly four times as many persons with diabetes than controls had disordered sleep (33.7% vs 8.2%; $P < 0.01$)⁹. Recently, primary sleep debt was shown to impair carbohydrate metabolism, there-

by contributing to the cause of hyperglycaemia and impaired quality of life.

Diabetes mellitus may be considered a model of non-communicable diseases, which are becoming common in developing countries. As a result of this health transition, physicians must prepare for a paradigm shift in management outcomes.

Newer outcome measures in these conditions must be incorporated: Traditional endpoints such as clinical signs and biochemical values were ascribed to 'doctors' preoccupation with the disease process'. To address these issues, instruments were developed to assess the well-being, quality of life and treatment satisfaction¹⁰.

There is now increasing evidence that stress may predispose to the metabolic syndrome, which includes insulin resistant-diabetes mellitus, hypertension, dyslipidaemia and truncal obesity. Both experimental and clinical studies have shown that stress could be a forerunner of the metabolic syndrome¹⁰.

1. Sridhar, G. R., Rao, P. V. and Ahuja, M. M. S., in *RSSDI Textbook of Diabetes* (eds Ahuja, M. M. S. et al.), RSSDI, Hyderabad, 2002, pp. 95–112.
2. Sridhar, G. R. and Nagamani, in *Ann. NY Acad. Sci.*, 2002, **958**, 390–393.
3. Sridhar, G. R. and Yarabati Venkat, *Indian J. Endocrinol. Metab.*, 2000, **4**, 70–80.
4. Sridhar, G. R., *J. Assoc. Phys. India*, 1994, **42**, 561–564.
5. Sridhar, G. R., *Int. J. Diabetes Dev. Countries*, 1996, **16**, 108–113.
6. Sridhar, G. R., *Indian J. Endocrinol. Metab.*, 1997, **1**, 13–15.
7. Sridhar, G. R., *Curr. Sci.*, 1998, **75**, 414.
8. Sridhar, G. R. and Nirmala, G., *Lipid Disorders, Implications and Management* (eds Tripathy, B. B. and Das, S.), Indian College of Physicians, Mumbai, 2002, pp. 59–80.
9. Sridhar, G. R. and Madhu, K., *Diabetes Res. Clin. Practice*, 1994, **23**, 183–186.
10. Sridhar, G. R. and Madhu, K., *Int. J. Diabetes Dev. Countries*, 2001, **21**, 112–120.

G. R. SRIDHAR

*Endocrine and Diabetes Centre,
15-12-16 Krishnanagar,
Visakhapatnam 530 002, India
e-mail: gsrnidhar@hotmail.com*