Will the epidemic of diabetes in India subside?

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The epidemiologists have been prolific in disseminating the data on the cross-sectional and follow-up studies on the high prevalence of diabetes in India and predicting its alarming trends [1–4]. This journal has carried several articles [5–10] further bringing out the data on the differences between urban and rural prevalence of diabetes. This issue of the journal contains an article showing the difference in the cardiovascular risk factors in the rural versus urban population [11]. This has served a useful purpose of bringing in focus the double-burden of transiting communicable diseases and newly entering non-communicable diseases. This has helped the government and Indian council of Medical Research to further strategize regarding the prevention of diabetes.

The rising trends of type 2 diabetes, both in the developed and developing world have been predicted mostly by using 2–3 points of observation 5–10 years apart in many countries [12] including in India [13, 14]. These observations are valid for the current period and probably for the near future. However, it will not be scientific to accept them as accurate predictions beyond the coming decade.

There are several important reasons why these predictions will be proven to be inaccurate. First of all, we are considering a biological phenomenon, with its inherent variability, which will influence the course of the predictive straight line. It is obviously a dynamic situation and we really do not know where the next point will come to lie. As a matter of fact if you continue to extrapolate the present

straight line, you will reach a figure of 100% of Indians being diabetic in the distant future. This argument, although facetious, brings out the absurdities of such long term projections. As a matter of fact, CURES [14] has already shown some degree of leveling of the line, evidenced by the fact that the prevalence of diabetes in Chennai showed a rise of 39.8% between 1989–1995, 16.3% between 1995–2000 and 6% between the year 2000–2004. Numerous dynamic factors that we know and understand and which we do not know can influence the prevalence of diabetes, although hard evidence and quantitation of their impact has not been assessed. (Table 1). So far, not many epidemiologists have seriously looked at these possibilities, except for a brief reference to these factors and showing short term effect of modifying these factors individually and thus producing a favourable environment or behavioural changes. However, whether this will translate into reduced incidence of diabetes has not been studied. Many of the factors in Table 1 likely to influence the prevalence of type 2 diabetes are interdependent, like obesity is dependent on income, education and urbanization. Additionally, there may be many other factors like the quality of air, water, food, and exposure to chemicals influencing the prevalence of diabetes. The demographic structure of the Indian population as reported in the year 2001 [15] showed that 0–19 year age accounted for 45.6% while 50–80 year or above accounted for 13.4% of the population. The current grim scenario exists inspite of the fact that the Indian population predominantly consists of young people. After 3–4 decades, when again older people account for a large proportion of population, a second wave of diabetes is possible. High prevalence of obesity in adolescents as reported from India [16] will aggravate the situation. These data will be further modified by the changing birth and death rates.

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Table 1 Factors likely to influence prevalence of type 2 diabetes

Factors	Factor likely to increase prevalence	Factor likely to decrease prevalence
1 Demography of the population	Increasing life span	Increase in younger age groups
2 Obesity	Increasing obesity	Decreasing obesity
3 Education	Continuing lower educational status	Rapidly increasing general and health education
4 Income	Increasing income (specially when accompanied by poor educational inputs)	Increasing income (specially when accompanied by enhanced educational inputs)
5 Genetic factors	Increased prevalence till adverse environment has acted on most genetically susceptible population	Stabilizing influence of genetically non-susceptible group
6 Physical activity	Decreased activity due to urbanization and poor built environment	Increased physical activity by introducing healthy lifestyle through education and better town planning
7 Diet	Increased calories, saturated fat, sugar and refined food intake	Decreased calories, saturated fat, sugar and refined food intake
8 Mental stress	High stress with poor quality of life	Peaceful and good quality of life

Influence of enhanced income on the prevalence of obesity and diabetes can be in either direction; when coupled with education the prevalence decreases but increasing income alone increases obesity and presumably diabetes. Women of higher socio-economic status tend to be overweight [17]. However, education has a dampening effect on the cardiovascular risk factors like hypercholesterolemia, hypertension, obesity and smoking [18].

Urbanisation has a profound effect on the prevalence of diabetes. However, how urbanization leads to the escalation of obesity, is uncertain. It may be due to decreased physical activity and increased intake of saturated fat and calories [19].

Indian epidemiologists, diabetologists and healthcare personnel have not yet articulated the influence of poor built environment on the prevalence of diabetes, except for an occasional article [20]. Elaborating on this aspect may appear to be social activism, but without doing so, it will be difficult for the politicians to realize the importance of the same. Although screening for diabetes, diabetes education and promotion of healthy lifestyle has found a place in the public utterances of the Indian health planners, healthy town planning has not yet been appreciated as an important factor in the prevention of non-communicable diseases.

The genetic factors also require a close scrutiny. Although the diabetogenic genes of T2 DM are not clearly identified, it is accepted that the Asian Indians have a higher genetic susceptibility. Even so, it is possible that a section of the population has either non-susceptible genetic composition or a protective genetic composition against the development of T2 DM. An inkling of this fact is seen in the two important prevention studies [21, 22], where life style intervention led to almost same degree (58%) of prevention of type 2 DM. It can be conceptualized that with the assault of adverse environment factors, a certain percent of genetic population will succumb to diabetes until you

reach a residual population which can resist the disease. This fact will tend to blunt the slope of the diabetes curve. With increasing education, it is fervent hope of this author that the prevalence will get blunted. It is also hoped that if India adopts sound method of education, behavioural changes, and town planning, the second epidemic after 2–3 decades will also not visit its population.

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