Early Life Origins of Diabetes in Indians

by

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The dogma of diabetes describes a genetic susceptibility and precipitation by obesogenic factors (diet, inactivity, stress etc). The genetic factors are non-modifiable, therefore, the diabetes prevention trials of today concentrate on treatment of precipitating factors (diet, exercise and stress). The interventions are usually done in post-reproductive adults, and therefore, do not help the next generation.

The dogma was challenged a few decades ago when it was shown that individuals who faced intrauterine 'famine' during Dutch Winter Hunger had altered susceptibility to obesity and other non-communicable diseases in later life. Research in Pima Indians showed that those conceived after mother was diagnosed diabetic had higher risk of diabetes compared to those who were born before mothers were diagnosed diabetic. A study in monozygotic twins showed that smaller of the twins had higher risk of diabetes. This was a clue that there could be a non-genetic susceptibility arising during intrauterine life. This paradigm made inroads in medical thinking when David Barker showed that low birth weight was a strong risk factor for diabetes, hypertension, coronary heart disease and many other non-communicable diseases. Thus, both fetal under- and over-nutrition increase susceptibility of the fetus to future disease, this process is now called 'fetal programming'. A wide range of environmental factors operating in pregnancy have the potential for fetal programming.

India has a unique position, in that it is the world’s capital of early life under nutrition (low birth weight, childhood under nutrition) as well as being one of the world capitals of diabetes. Research in Pune has demonstrated a substantial role for fetal programming by maternal under nutrition as well as diabetes in the etiology of diabetes. A part of this susceptibility operates through influences on body composition and both micro-nutrient deficiencies (vit B12, folate etc) and macronutrient excess (glucose, lipids etc) increase the risk. Postnatal factors that promote a catch-up growth in small babies seem to exaggerate the risk.

Molecular mechanisms underlying fetal programming are not clear but epigenetics seems to play an important role. This suggests that the susceptibility to non-communicable disease could be modified. Trials are in progress to influence fetal programming by improving the health of the adolescents.

Prof. Yajnik is the Director of the Diabetes Unit at the King Edward Memorial Hospital and Research Centre in Pune, India. He trained in Pune and in Oxford, UK, and investigates the high susceptibility of Indians to diabetes and related disorders.

He is known for his description of the ‘thin-fat’ Indian (high body fat percent at low BMI) and its intrauterine programming by maternal nutritional and metabolic factors.

He is the current President of SNEHA India (Society for Natal Effects on Health in Adults) and a Trustee of the International DOHaD society. He is an Honorary Visiting Fellow, MRC Lifecourse Epidemiology Unit, Southampton, UK, visiting Professor at University of Exeter UK, and of the Danish Diabetes Academy, and adjunct Professor II SER, Pune. He received Helmut Mehnert award of International Diabetes Federation (2009), David Barker medal of International DOHaD society (2011), and Outstanding Investigator Award of World India Diabetes Foundation.

Dr Yajnik is advisor to many organizations including Department of Biotechnology (DBT), Indian Council of Medical Research (ICMR), National Institute of Nutrition (NIN), India, WHO (Geneva), FIGO (Federation International of Gynecology and Obstetrics) and the Wellcome Trust, London, UK.