Source : www.thehindu.com Date : 2022-04-14

THE KEY PHRASE IS ‘FOCUS ON THE FOETUS, FOR THE FUTURE’

Relevant for: Developmental Issues | Topic: Rights & Welfare of Children - Schemes & their Performance, Mechanisms, Laws Institutions and Bodies

The focus should be on targeting pregnancy-related diabetes and breaking the vicious cycle of transgenerational transmission | Photo Credit: Getty Images/iStockphoto

The novel coronavirus pandemic has been an eye-opener to all about what a widespread, global public health issue looks like. Drawing an analogy from this communicable disease pandemic, one would be better placed to fathom the range and the depth of another pandemic — a silent ‘pandemic of non-communicable diseases’ (NCDs), i.e., diabetes and related conditions such as obesity, hypertension and heart disease, sweeping across the world, rapidly yet steadily over the last few decades.

To illustrate the global burden of NCDs, let us use the example of diabetes mellitus. Diabetes is a disease characterised by a sustained increase in blood sugar (“hyperglycemia”) that eventually affects the blood vessels in the body causing damage of various vital organs that include the heart, eyes, kidneys, nerves and brain. In the year 2021, the prevalence of diabetes was estimated by the International Diabetes Federation (IDF) to be 537 million people. On extrapolating the data to the year 2045, it is safe to say that almost 783 million people will be living with diabetes. In addition to this, for every person who is known to have diabetes, there is another person whose diabetes has yet to be detected. Further, a number of people live with what is called ‘pre-diabetes’, which is the penultimate stage before overt diabetes.

There is a saying in Tamil that one should not search for the origin of a sage and the headwaters of a river. But, in the case of diabetes and other NCDs, we have no other option but to fervently search for the sage and the headwaters before the world faces a deluge.

While several reasons can be ascribed for this rising trend — these include an aging population, urbanisation, genetic predisposition, nutrition and lifestyle transition — there is one factor that has not yet received due attention, namely, diabetes that occurs during pregnancy. Pregnancy-related diabetes encompasses both newly detected diabetes during pregnancy (or ‘gestational diabetes’) as well as women with pre-existing diabetes (or ‘pre-gestational diabetes’). For the sake of simplicity, we will use the broader term ‘Hyperglycemia-in-Pregnancy (HIP)’ that covers both. The global prevalence of HIP is 16.7% of all live-births. In India, one out of four live-births is complicated by HIP.

In the 1980s, the British physician and epidemiologist, Prof. David Barker, put forward his hypothesis of “fetal origins of adult disease”. Prof. Barker stated that a man’s susceptibility to many of the adult-onset diseases had already been programmed while he was still an unborn, developing baby (“foetus”) inside his mother’s womb. In this intra-uterine (inside the womb) programming, any adverse stimulus — say an increased blood sugar level in case of maternal diabetes — permanently affects the structure, the functioning and the metabolism of the developing human body at the cellular and tissue levels, thereby predisposing the individual to disease in adult life.

Furthermore, the pancreas of the foetus (which secretes the hormone insulin), is able to respond to the maternal blood-sugars present in the blood that go to the foetus. In case the blood sugar levels are increased, the fetal pancreas secrete excessive insulin, which in turn deposits fat in

the growing foetus, sometimes even resulting in a ‘big baby’. When this adversely programmed child grows up, he is faced with an unhealthy environment of high caloric foods, lesser physical activity and stress. At this point of time, the trigger of the gun loaded inside the womb is pulled by the environment. Eventually, the child develops diabetes or pre-diabetes. He also becomes prone to other related NCDs such as hypertension and heart disease.

The claws of HIP extend even more to reach future generations. The offspring, when an adult, might transmit unfavourable genetic and epigenetic effects to the next generation. If the offspring were a girl, she is also prone to develop pregnancy-related diabetes, adding additional adversity for her progeny. Thus, a vicious cycle is established. Hyperglycemia begets hyperglycemia; diabetes begets diabetes and the vicious cycle goes on. All of this started at one point — when a woman developed HIP sometime earlier!

A major strategic point for checkmating diabetes and other NCDs lies at the intra-uterine level. To achieve this, action should commence well before conception. In a woman with pre-existing diabetes, blood sugar values need to be maintained closer to normal levels prior to conception. She should also maintain a healthy weight. The first trimester in pregnancy is a critical period when the organ systems of the body begin to form. If any perturbation occurs at this stage, the damage is likely to persist for life. If such a perturbation could be thwarted, say by achieving good blood sugar control in the mother, the risk of future NCDs in the offspring could be minimised. Therefore, the need is that pregnant women should be screened for diabetes at their very first visit to a maternity clinic. The present recommendation by the ‘Diabetes-in-Pregnancy–Study Group of India’ (DIPSI) lays emphasis on testing for diabetes in ‘all pregnant women’ from the ‘early weeks of pregnancy’. Once HIP is detected, further management by medical nutrition therapy — and if needed, insulin therapy — is done.

DIPSI, led by its founder-patron, Prof. V. Seshiah from Chennai, has established a ‘single-test approach’ wherein a pregnant woman is subjected to a single glucose-load by mouth and blood sugar is tested after two hours. Here, the pregnant woman need not be fasting to undergo the test. This test has been approved and adapted by the Government of India in its National Health Mission.

The time around conception offers a great window of opportunity to optimise metabolic status in all women in the reproductive age group. The health of offspring and of further generations depends upon the metabolic health of the pregnant woman. Targeting pregnancy-related diabetes and breaking the vicious cycle of transgenerational transmission is a wholesome action to significantly bring down the expanding burden of diabetes and other NCDs.

In recognition of his numerous contributions to the field of pregnancy-related diabetes in India and around the world, the Government of India has declared the birthday of Prof. Seshiah, which falls on March 10, as “National Gestational Diabetes Mellitus Awareness Day”. Furthermore, Prof. Seshiah was conferred the Padma Shri in the field of medicine (as a part of the Republic Day honours this year). At this juncture, it is wise to reiterate his words on the prevention of NCDs in the community, i.e., “Focus on the Foetus, for the Future”.

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