

## Short Note

# Do Women with Gestational Diabetes Require Cardiovascular Risk Assessment?

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Non-communicable diseases like diabetes and cardiovascular disease (CVD) are growing at an alarming rate and are emerging public health problems, both in the developed and low middle-income countries (LMIC). Their major economic, social and healthcare impacts are likely to be seen more in LMIC, as these countries harbor 80% of people with diabetes [1]. Similarly, 80% of the global burden of CVD deaths occurs in developing country [2]. Approximately 5% of the pregnancies develop gestational diabetes mellitus (GDM) (ranging from 1 to 14%). However, its incidence is likely to rise in developing countries due to increased prevalence of obesity [3]. According to the guidelines from the American Heart Association, GDM is a risk factor for future CVD [4]. Hence, there is an urgent need to screen GDM pregnancies for early detection of cardiovascular events later in life.

Unlike normal pregnancies where cardiovascular adaptation encompasses increased cardiac output, higher intravascular volume and decreased systemic vascular resistance [5], GDM pregnancies demonstrate altered cardio-metabolic process due to increased systemic maternal arterial stiffness. This may develop because of arterial remodeling secondary to hyperglycemia, hyperinsulinemia, oxidative stress, low grade inflammation, endothelial dysfunction and glycosylated-end products [6]. Significant arterial stiffness combined with increased peripheral resistance could predispose to changes in cardiac structure and function and may lead to future increased CVD risk.

One way to assess arterial stiffness is through carotid artery intima media thickness (cIMT) measurement on ultrasound. It is considered an independent predictor of future cardiovascular happenings such as stroke and coronary artery disease [7]. Recently, stiffness in the carotid vessel of women with previous history of GDM was assessed upto 6 years after delivery. A significantly increased thickness was observed as compared to control subjects indicating that women with a GDM history appear to have an early sign of subclinical vessel involvement and subsequently at increased risk for CVD later in life [8,9]. Others measured cIMT in pregnant women with gestational diabetes and revealed a positive association between the presence of GDM and increased cIMT as compared to that with normoglycemic

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pregnancies [10,11]. These results open an avenue for investigating cIMT as a possible subclinical atherosclerotic marker in GDM pregnancies. As a part of physiological process, cIMT increases from the first to the third trimester of pregnancy. It however, regresses in the postpartum period [12]. It is postulated that postpartum regression in cIMT is unlikely to happen in a proportion of GDM mothers. This could be influenced by the degree of glycemic control obtained during pregnancy as poor glucose control could result in stiffening of the vessel wall with resultant arterial remodeling.

Another marker of atherosclerotic process, which has lately been examined during GDM pregnancies, is the echocardiographic assessment of epicardial fat thickness (EFT). It serves as a reliable cardiac risk marker. In relation to the metabolic effects of insulin resistance on epicardial adipose tissue and arterial stiffness [13], a positive correlation was observed between EFT and women with history of gestational diabetes as compared to that with controls [8]. Further, an increased cIMT was found to correlate significantly with EFT [8]. Recently, EFT in pregnant women with gestational diabetes was found to be significantly higher as compared to that in normoglycemic pregnancies [14].

Beside cIMT and EFT, assessing subclinical cardiac dysfunction through functional echocardiography in GDM pregnancy could be of relevance. It is now well known that poor glycemic control, insulin resistance and obesity predisposes to the development of mal-perfusion of the sub-endocardium and myocardium. Given the earlier involvement of sub-endocardial fibers, it is suggested that systolic dysfunction is initially apparent in the longitudinal systolic contraction due to fiber orientation and has been demonstrated in asymptomatic diabetic patients [15]. Functional echocardiography may reveal systolic dysfunction in pregnant women with gestational diabetes similar to that observed in non-pregnant diabetic population.

Based on American Heart Association recommendations to prevent heart disease in women with GDM [4], such women should be evaluated for the presence of cardiovascular biomarkers to detect subclinical atherosclerosis and early signs of cardiac dysfunction. Through such an assessment and along with other

maternal characteristics such as age, basal metabolic index (BMI), blood pressure (BP), smoking history, family history of CVD and lipid profile an informative and practical cardiovascular risk score can be formulated. Preventive strategy adopted through careful screening of GDM women would provide an opportunity to clinicians to implement targeted risk reduction activities such as monitoring of blood pressure and weight and health education to improve life style. Modifiable cardiovascular risk factors such as increase in physical activity, avoidance of active smoking and excessive alcohol consumption and nutritional modification (in the form of low consumption of saturated fat, red meat proteins and common salt and high intake of unsaturated fats and fibre) could provide long-term benefit in reducing CVD risk in such women.

In conclusion, recognition of the association between GDM and future cardiovascular risk provides a new insight into adapting a screening tool during pregnancy in such women for prediction of long-term cardiovascular morbidity. We believe that the public health implications of this would be considerable, particularly in LMIC where the existing health system and infrastructure do not have the capacity to cater for rising burden of CVD.

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