Climate change and an increased prevalence of gestational diabetes

Climate change, with a gradual warming of the environment, has been proposed for several decades, and there are increasing scientific observations to support this. The potential reality has been very marked in Australia over recent years with a severe drought and then catastrophic bushfires. Climate change will have diverse effects on health, and one way may be the change in prevalence and clinical nature of different disorders.

The first observation that the prevalence of gestational diabetes mellitus (GDM) might vary with ambient temperature appeared more than a quarter of a century ago.[1] Subsequent work in Australia, using the previous Australasian Diabetes in Pregnancy Society (ADIPS) criteria, found a non-significant change in the fasting glucose level but a significant increase in the two-hour glucose level in the warmer weather. Overall, there was no change in prevalence.[2] A follow-on climate chamber study found a significant increase in the post-glucose load levels with increasing temperatures from 25 to 30°C.[3] This was related to increased arterialisation of the peripheral blood with increasing temperatures.

In 2016, another Australian study, using the current ADIPS criteria, found a marked increase in the prevalence of GDM in the summer compared with the winter seasons.[4] These observations have subsequently been found, reported, and confirmed in many parts of the world[5–7] although there have been some negative outcomes.[8] Many of these studies relate to the increasing prevalence of GDM in the summer months with climate change, although to our knowledge, this aspect has not been specifically examined.

What has not been systematically examined is whether these changes are acute and related to the temperature of the day, the temperature of the pathology collection centre, or whether it is a seasonal factor, perhaps related to the accumulation of brown fat and changes in insulin sensitivity.[5]

What is known is that the overall prevalence of GDM in most reported studies is higher in summer than in winter – or in hotter rather than colder environs. In Australia, the change in the diagnostic criteria for GDM has resulted in an approximate 50% increase in prevalence[9] and the changed criteria appears to be exacerbating the seasonal variation. Whether the increased and increasing prevalence of GDM occasioned by both these factors is an advantage to the outcome of the pregnancy remains to be determined. In Australia, perhaps standardisation of the temperature in pathology collection areas could be considered. Or perhaps criteria adjustment may be required for different seasons.

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Gestational diabetes mellitus screening in pandemic times: Are there viable alternatives?

The COVID-19 outbreak has changed medical care guidelines across all medical specialties. Various patients are in vulnerable situations where postponing care is not an option, such as the case for pregnant women. Efforts are being made to maintain the quality of care during pregnancy while simultaneously reducing exposure to COVID-19.

Recently, Canadian[1] and UK[2] Societies of Obstetrics and Gynaecologists alongside Queensland Health[3] proposed alternatives to the screening of gestational diabetes mellitus (GDM) during the COVID-19 pandemic. In short, the alternative recommendation for GDM screening during pregnancy involves demographic characteristics combined with haemoglobin A1c (HbA1c) or non-fasting random plasma glucose for all pregnant women without pre-existing diabetes. However, while HbA1c above the 5.7% threshold is related to high specificity, it has low diagnostic sensitivity of approximately 25% as a GDM predictor.[1]

The ultrasound measurement of maternal visceral adipose tissue (m-VAT) has been shown as a useful indicator of GDM among pregnant women, emerging as a marker of metabolic risk with greater accuracy than pre-pregnancy body mass index (BMI) compatible with obesity that reaches maximum sensitivity ranging from 20%[4] to 56%.[5] m-VAT can also be easily implemented during a routine ultrasound with no additional cost and fast learning curve among sonologists and sonographers. The probe is placed in a sagittal position 2 cm above the maternal umbilical scar and the electronic caliper placed from the aortic anterior wall to the *linea alba*. However, despite the aforementioned benefits, there is no established consensus regarding the cut-off for this test. Different m-VAT thresholds were found to be associated with increased GDM risk, ranging from 42.7[4] to 48 mm,[6] when controlling for maternal age, pre-pregnancy BMI and related to GDM diagnostic criteria proposed by the International Association of Diabetes and Pregnancy Study Groups (IADPSG). External validity of the findings is suggested by adjusting for ethnicity, maternal age and educational level confounders in previous regression analyses with similar results.[4,6] The m-VAT sensitivity, a critical assessment of a diagnostic test, when using a 42.7 mm threshold resulted in an impressive performance of 87% (95% CI 60–98%), with a specificity of 62%.[4]

Our group recently demonstrated that a 45 mm m-VAT threshold for early pregnancy screening among a low-risk outpatient pregnant sample showed significant crude and adjusted odds ratios of 13.4 (95% CI 2.9–61.1) and 8.9 (95% CI 1.9–42.2), respectively.[5] A similar result was obtained among pre-gravid non-obese women (BMI < 25.0), with crude and adjusted odds ratios of 16.6 (95% CI 1.9–142.6) and 14.4 (95% CI 1.7–125.7), respectively. In pre-gravid obese women (BMI > 30), the use of a 45 mm m-VAT threshold was not significantly able to predict GDM risk. The final accuracy of the 45 mm m-VAT threshold showed a 66% ability to predict GDM in the whole sample. Not only so, but the predictive ability of the threshold increased to 72% among non-obese pre-gravid women only. [5]

We believe that the inclusion of m-VAT during routine early ultrasound can identify patients who would benefit from additional investigations regarding GDM, as well as identify patients who do not require unnecessary laboratory tests, which can risk exposure to COVID-19. As this procedure can be done in the first 20 weeks of pregnancy, a nuchal translucency evaluation could be used as a form of risk stratification for GDM.

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