Selection bias, a caveat in gestational weight gain research

To the Editor,

In epidemiological studies on gestational weight gain (GWG), the selection bias burden due to a mismatch between the selected and eligible target population remains unclear and underexplored. It is, therefore, critical to explore the plausible sources of selection bias to ensure rigor in epidemiological estimates determining associations between GWG and other parameters of interest. GWG is the difference between pre-delivery weight and first trimester or pre-pregnancy weight, which has emerged as a burning research topic due to its independent association with adverse perinatal outcomes, such as large for gestational age and macrosomia (1). Selection bias can happen due to the pathophysiological and clinical complexities associated with GWG. This letter highlights some of these scenarios that require a calibrated study population selection approach to minimize the selection bias risk in future GWG studies.

I begin with the Institute of Medicine 2009 guideline, (2) a popular prepregnancy body mass index-based recommendation of GWG ranges and patterns, widely used in population-based epidemiological studies. It's critical to identify and exclude pregnant females with the following characteristics from the eligible study population, as this guideline may not apply to them due to inadequate evidence: Aborigines; preeclampsia; gestational diabetes mellitus; different obesity subclasses; and triplet and higher-order pregnancies (2-4). Besides, some physicians believe that the recommendations for overweight and obese women are too high (4).

Then, what are the conditions or situations in which GWG measurements are at risk of reverse causation bias? for example in gestational diabetes mellitus (GDM), a late metabolic complication of pregnancy characterized by hyperglycemia, GDM treatment with a calorie-restricted diet, for instance, can alter the GWG course. Besides, variation in the treatment can cause differences in GWG patterns among patients suffering from the same ailment. For example, while weight loss may occur in GDM patients compliant with non-pharmacological interventions, the opposite can happen in insulin-treated GDM patients. Pre-existing health conditions can also determine the GWG pattern because of the disease course itself or its treatment, as may be seen in thyroid dysfunction and Stein-Leventhal syndrome.

Next, it's essential to distinguish pregnancies prone to GWG fluctuations. For instance, women with preeclampsia, a pregnancy-induced hypertensive condition associated with proteinuria, may present with decreased weight gain in early pregnancy due to inadequate intravascular plasma volume expansion and increased weight gain in late pregnancy because of excessive vascular permeability and edema (due to oncotic pressure drop) (2).

Other factors which can influence GWG measurements during a prospective longitudinal follow-up of a pregnant cohort include abnormal amniotic fluid volumes (e.g., oligohydramnios), shorter or longer duration of pregnancy (e.g., preterm delivery), social factors (e.g., smoking), and genetic makeup of the mother (5).

Taken together, all these factors highlight the importance of selection bias evaluation in GWG studies. Therefore, cautious, well-rationalized, and knowledge-based research protocols are required for GWG research to produce unbiased, robust, and generalizable research findings.

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