

Review Article

Gestational diabetes mellitus management among obese women in primary health care settings in Qatar: a comprehensive review

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ABSTRACT

Gestational diabetes mellitus is a major public health concern because of its association with adverse maternal, fetal, and neonatal outcomes. The clinical burden is particularly high among women with obesity, who commonly enter pregnancy with pre-existing insulin resistance and an elevated risk of excessive gestational weight gain, hypertensive disorders, operative delivery, and future type 2 diabetes. Qatar has a high prevalence of obesity and diabetes, and recent national data indicate that gestational diabetes affects a substantial proportion of pregnancies. Primary health care services are therefore central to early risk assessment, screening, nutrition therapy, glucose monitoring, pharmacological treatment, referral, and postpartum prevention. This narrative review examines the epidemiology, pathophysiology, risk factors, screening, diagnosis, and evidence-based management of gestational diabetes among women with obesity in Qatar. It emphasizes individualized medical nutrition therapy, safe physical activity, appropriate gestational weight-gain targets, self-monitoring of blood glucose, timely initiation of pharmacological therapy, multidisciplinary care, and structured postpartum follow-up. The review also addresses culturally relevant dietary practices, language and health-literacy barriers, digital-health opportunities, and the need for stronger continuity between antenatal and long-term primary care.

Keywords: Gestational diabetes mellitus, Obesity, Pregnancy, Primary health care, Medical nutrition therapy, Qatar, Maternal health, Postpartum diabetes prevention

INTRODUCTION

Gestational diabetes mellitus is generally defined as hyperglycaemia first detected during pregnancy that does not meet the diagnostic criteria for overt diabetes in pregnancy.¹ It is one of the most common metabolic complications of pregnancy and is associated with a continuous increase in adverse outcomes as maternal glucose concentrations rise, even below the thresholds used to diagnose diabetes.²

Women with obesity are particularly vulnerable because obesity is commonly accompanied by pre-existing insulin resistance, chronic low-grade inflammation, altered adipokine secretion, dyslipidaemia, and reduced metabolic flexibility. These abnormalities become more clinically

apparent as pregnancy progresses and placental hormones further increase insulin resistance.³ Consequently, women with obesity have a greater probability of developing gestational diabetes, hypertensive disorders, fetal overgrowth, caesarean delivery, and postpartum metabolic disease.

Gestational diabetes is highly relevant to Qatar. A recent nationwide cohort covering deliveries between 2019 and 2022 reported a gestational diabetes prevalence of approximately 31.6%, substantially higher than estimates reported in earlier local studies.⁴ The difference between historical and contemporary estimates reflects changes in population risk, universal screening, diagnostic criteria, and case ascertainment. Qatar has also established national clinical guidance for the diagnosis and management of

diabetes in pregnancy, supporting standardized screening and coordinated care across primary and specialist healthcare services.⁵

This review examines the management of gestational diabetes among women with obesity in Qatar, with particular attention to the role of primary health care in screening, lifestyle management, pharmacological treatment, referral, postpartum surveillance, and long-term diabetes prevention.

EPIDEMIOLOGY OF GESTATIONAL DIABETES IN QATAR

Estimates of gestational diabetes prevalence in Qatar vary according to the period studied, population characteristics, screening strategy, and diagnostic criteria. An earlier Qatar-based study reported a prevalence of 16.3% and identified obesity, advanced maternal age, and family history of diabetes as important associated factors.⁶ A subsequent universal-screening study reported gestational diabetes in 21.5% of the overall study population and in approximately 23.5% of Qatari participants.⁷

A population-based study of Qatari women who delivered in 2017 reported a gestational diabetes prevalence of approximately 24.3% and demonstrated associations with higher maternal age, pre-pregnancy obesity, caesarean delivery, and large-for-gestational-age infants.⁸ At the regional level, a systematic review and meta-analysis found that gestational diabetes prevalence is particularly high across the Middle East and North Africa, with Qatar among the countries reporting the highest national estimates.⁹

Obesity is a major contributor to this burden. A systematic review demonstrated that the risk of gestational diabetes increases progressively across overweight and obesity categories, with the highest risk observed among women with severe obesity.¹⁰ Qatar-specific evidence similarly shows that pre-pregnancy obesity is associated with gestational diabetes, pre-eclampsia, caesarean delivery, and adverse neonatal outcomes in its multiethnic maternity population.¹¹ These findings support the need for preconception weight management and early pregnancy risk assessment rather than waiting until routine screening at 24–28 weeks.

PATHOPHYSIOLOGY AND RISK FACTORS

Normal pregnancy is characterized by progressive insulin resistance, particularly during the second and third trimesters. Placental hormones, including human placental lactogen, placental growth hormone, progesterone, oestrogen, prolactin, and cortisol, alter maternal glucose and lipid metabolism to ensure an adequate nutrient supply to the fetus. Gestational diabetes develops when pancreatic beta cells cannot increase insulin secretion sufficiently to compensate for this physiological insulin resistance.¹²

Women with obesity frequently begin pregnancy with greater insulin resistance and beta-cell stress. Adipose-tissue dysfunction increases the release of free fatty acids and inflammatory mediators and alters the secretion of leptin, adiponectin, and other adipokines. These disturbances impair insulin signalling and may increase hepatic glucose production, skeletal-muscle insulin resistance, and placental nutrient transfer.¹³

Established risk factors include pre-pregnancy overweight or obesity, previous gestational diabetes, previous delivery of a macrosomic infant, advanced maternal age, family history of type 2 diabetes, polycystic ovary syndrome, high parity, physical inactivity, excessive gestational weight gain, and membership of an ethnic population with a high prevalence of type 2 diabetes.¹⁴ Women with multiple risk factors require early assessment because some may have previously undiagnosed type 2 diabetes rather than gestational diabetes arising later in pregnancy.

ROLE OF PRIMARY HEALTH CARE IN QATAR

Primary Health Care Corporation is central to the provision of antenatal care in Qatar. Health centres facilitate early pregnancy registration, baseline assessment, laboratory testing, nutritional counselling, health education, glucose monitoring, and referral to specialist services when clinically indicated. PHCC antenatal services also support coordination between family physicians, midwives, dietitians, health educators, obstetricians, endocrinologists, and hospital-based maternity teams.¹⁵

For women with obesity, the first antenatal visit should include documentation of pre-pregnancy weight or the earliest available pregnancy weight, height, body mass index, previous obstetric history, family history of diabetes, current medications, dietary practices, physical activity, blood pressure, and other metabolic risk factors. Primary care clinicians should distinguish between uncomplicated obesity, early hyperglycaemia, overt diabetes, and established gestational diabetes because these conditions require different levels of monitoring and referral.

Electronic medical records can improve continuity by allowing glucose results, medications, nutrition plans, weight trends, referrals, and postpartum screening requirements to be communicated across care settings. However, electronic documentation is useful only when responsibilities and referral thresholds are explicitly defined. A record that merely identifies gestational diabetes without assigning follow-up responsibility does not provide effective continuity of care.

SCREENING AND DIAGNOSIS

The International Association of Diabetes and Pregnancy Study Groups recommends a one-step approach using a 75-g oral glucose tolerance test. Under this approach, gestational diabetes is diagnosed when one or more

glucose values meet or exceed the specified threshold.¹⁶ Qatar's approach is broadly aligned with international recommendations and incorporates early assessment followed by routine testing later in pregnancy.

Women with obesity and other high-risk characteristics should be tested at the first antenatal encounter to identify previously undiagnosed diabetes or clinically significant early hyperglycaemia. Fasting plasma glucose, random plasma glucose, and glycated haemoglobin may be used to detect overt diabetes, although glycated haemoglobin should not be treated as a substitute for the oral glucose tolerance test used to diagnose gestational diabetes later in pregnancy. Women whose early results do not indicate diabetes should undergo routine gestational diabetes screening at 24–28 weeks.¹⁷

Using the one-step 75-g oral glucose tolerance test, the commonly applied gestational diabetes thresholds are a fasting plasma glucose of 5.1–6.9 mmol/l, or 92–125 mg/dl; a one-hour glucose value of at least 10.0 mmol/l, or 180 mg/dl; or a two-hour glucose value of 8.5–11.0 mmol/l, or 153–199 mg/dl. One abnormal value is sufficient for diagnosis. Results meeting the diagnostic criteria for overt diabetes should be classified and managed separately.

Alternative two-step screening strategies are used in some healthcare systems. Therefore, clinicians should follow the current Qatar national guideline and the approved institutional pathway rather than combining thresholds from different diagnostic systems. The American College of Obstetricians and Gynecologists also emphasizes that screening and treatment protocols should be consistently applied within the relevant healthcare system.¹⁸

MANAGEMENT IN PRIMARY HEALTH CARE SETTINGS

Lifestyle management is the foundation of gestational diabetes treatment. It should begin promptly after diagnosis and should not be reduced to generic advice to “eat less” or “avoid sugar.” Effective management requires individualized medical nutrition therapy, physical activity guidance, gestational weight monitoring, diabetes education, and self-monitoring of blood glucose. Lifestyle interventions combining these components can improve glucose control and may reduce excessive fetal growth and other adverse outcomes.¹⁹

Medical nutrition therapy

Medical nutrition therapy should provide sufficient energy and nutrients to support maternal health and fetal growth while preventing excessive gestational weight gain, marked postprandial hyperglycaemia, and maternal ketosis. Severe calorie restriction is inappropriate during pregnancy, including among women with obesity.

Dietary assessment should consider meal timing, carbohydrate quantity and quality, habitual portion sizes, sweetened beverages, refined grains, takeaway foods, snacks, cultural foods, eating outside the home, and food-related beliefs. Carbohydrate intake should be distributed across regular meals and snacks rather than concentrated in one or two large meals. High-fibre and minimally processed carbohydrate sources, including vegetables, legumes, whole grains, and appropriate portions of fruit, should generally replace refined grains, sweets, and sugar-sweetened beverages.

Combining carbohydrate foods with lean protein, vegetables, and unsaturated fats may reduce postprandial glucose excursions and improve satiety. Advice should remain individualized because a food that is acceptable for one patient may produce excessive postprandial glucose in another. Food records and paired premeal and post-meal glucose readings can help identify problematic meals more effectively than broad lists of prohibited foods.

Culturally appropriate counselling is essential in Qatar's diverse population. Dietary plans should reflect the patient's language, household food practices, financial circumstances, cooking methods, work schedule, and access to healthy foods. Dietitians should modify familiar meals rather than prescribing an unfamiliar eating pattern that the patient is unlikely to sustain.

Physical activity

In the absence of obstetric or medical contraindications, regular moderate-intensity physical activity should be encouraged. Most pregnant women should aim for approximately 150 minutes of moderate-intensity aerobic activity per week, distributed across several days.²⁰ Walking, swimming, stationary cycling, and pregnancy-appropriate strengthening exercises are commonly suitable options.

Short periods of walking after meals may be particularly useful for reducing postprandial glucose. Exercise advice must nevertheless be individualized according to the woman's previous activity, physical limitations, pregnancy complications, heat exposure, and obstetric guidance. Women should be educated about warning symptoms that require cessation of exercise and clinical review.

Gestational weight gain

Gestational weight gain should be monitored throughout pregnancy. For a singleton pregnancy in a woman with a prepregnancy body mass index of at least 30 kg/m², the Institute of Medicine recommends a total gestational weight gain of approximately 5–9 kg.²¹ This range should guide care rather than operate as an inflexible target.

Excessive gestational weight gain can worsen insulin resistance and contribute to fetal overgrowth, while

inadequate weight gain may raise concerns about nutritional sufficiency and fetal growth. Weight trends should therefore be interpreted together with dietary intake, glucose control, fetal growth, oedema, and the woman's overall clinical condition.

Blood glucose monitoring and treatment targets

Self-monitoring of blood glucose is required to evaluate the effectiveness of lifestyle treatment and determine whether pharmacological therapy is needed. Monitoring commonly includes fasting glucose and glucose one or two hours after the beginning of each main meal. Additional monitoring may be required when medication is initiated, doses are changed, glucose control is unstable, or the patient is unwell.

Common treatment targets are fasting glucose below 5.3 mmol/l, or 95 mg/dl; one-hour postprandial glucose below 7.8 mmol/l, or 140 mg/dl; and two-hour postprandial glucose below 6.7 mmol/l, or 120 mg/dl.¹⁷ Targets should be applied according to the current national or institutional guideline and individualized when clinically necessary.

Treatment should not be judged from an isolated abnormal glucose value. Clinicians should evaluate the pattern, frequency, timing, dietary context, adherence, and direction of glucose results. Persistently elevated values despite appropriate lifestyle treatment require prompt reassessment rather than repeated advice without escalation.

PHARMACOLOGICAL MANAGEMENT

Randomized clinical trials have established that active treatment of gestational diabetes reduces clinically important adverse outcomes compared with routine antenatal care alone.²² Treatment of even mild gestational diabetes can reduce fetal overgrowth, shoulder dystocia, caesarean delivery, and hypertensive complications.²³

Insulin is the preferred pharmacological treatment in major diabetes guidance because it is effective, can be adjusted precisely, and does not cross the placenta.¹⁷ The insulin regimen should be selected according to the glucose pattern. Predominantly fasting hyperglycaemia may require basal insulin, whereas postprandial hyperglycaemia may require rapid-acting mealtime insulin. Some women require a combination of basal and prandial insulin.

Metformin has been used as an alternative or adjunct to insulin and has demonstrated short-term efficacy in randomized studies.²⁴ However, metformin crosses the placenta, a proportion of women treated with metformin still require supplemental insulin, and uncertainty remains regarding some long-term offspring outcomes. It should therefore not be described as universally equivalent to insulin or automatically presented as first-line therapy.

Some national guidance, including that of the National Institute for Health and Care Excellence, permits metformin when lifestyle treatment is insufficient and when its benefits and limitations have been discussed with the patient.²⁵ Its use in Qatar should follow the current national guideline, institutional formulary, clinical circumstances, contraindications, and shared decision-making. Other oral glucose-lowering medications are generally not recommended routinely because pregnancy safety evidence is more limited.

MULTIDISCIPLINARY CARE AND REFERRAL

Primary care management should be integrated with obstetric, endocrinology, diabetes education, nutrition, and fetal surveillance services. Referral is particularly important when there is suspected overt diabetes, severe or persistent hyperglycaemia, difficulty initiating insulin, recurrent hypoglycaemia, significant comorbidity, fetal growth abnormality, hypertensive disease, or uncertainty regarding the diagnosis.

Women with obesity may also require assessment for obstructive sleep apnoea, hypertension, mobility limitations, mental-health concerns, and other complications that influence pregnancy management. A multidisciplinary approach is therefore not an administrative preference; it is necessary to address the interaction between metabolic, obstetric, nutritional, and behavioural risks.

MATERNAL AND NEONATAL OUTCOMES

Poorly controlled gestational diabetes increases the likelihood of gestational hypertension, pre-eclampsia, induction of labour, operative delivery, birth trauma, and caesarean delivery. Maternal obesity can independently increase many of the same risks. When both conditions are present, risk assessment should not assume that correcting glucose alone eliminates the obesity-related component of risk.

Fetal and neonatal complications include excessive fetal growth, large-for-gestational-age birth, macrosomia, shoulder dystocia, neonatal hypoglycaemia, respiratory morbidity, hyperbilirubinaemia, and admission to neonatal intensive care. Exposure to maternal hyperglycaemia and obesity may also contribute to long-term obesity and metabolic dysfunction in the offspring. Effective glucose management reduces several of these adverse outcomes, but it does not eliminate the need for obstetric and fetal monitoring.

POSTPARTUM FOLLOW-UP AND PREVENTION

Gestational diabetes should not be treated as a temporary condition that becomes irrelevant after delivery. Women with previous gestational diabetes have a substantially higher risk of developing type 2 diabetes than women who remain normoglycaemic during pregnancy.²⁶ Obesity,

postpartum weight retention, recurrent gestational diabetes, insulin requirement during pregnancy, and abnormal postpartum glucose results further increase this risk.

A 75-g oral glucose tolerance test should be completed approximately 4–12 weeks after delivery. The oral glucose tolerance test is preferred because fasting glucose or glycated haemoglobin alone may miss clinically important glucose intolerance during the early postpartum period. Women whose postpartum results are normal should continue lifelong screening for prediabetes or diabetes at least every one to three years.¹⁷

Postpartum management should address nutrition, gradual weight reduction when appropriate, physical activity, sleep, contraception, future pregnancy planning, and cardiovascular risk. Breastfeeding should be encouraged and supported when possible. Longer and more intensive lactation has been associated with a lower incidence of progression to type 2 diabetes among women with previous gestational diabetes.²⁷

A major weakness in many healthcare systems is the loss of follow-up after delivery. The maternity team may consider the pregnancy episode complete, while primary care may not receive a clear handover. Qatar's electronic health infrastructure provides an opportunity to create automatic postpartum reminders, overdue-test alerts, and long-term diabetes-risk registries.

CHALLENGES IN PRIMARY HEALTH CARE SETTINGS IN QATAR

Adherence to lifestyle recommendations is affected by more than patient motivation. Dietary customs, family influence, social gatherings, large portion sizes, frequent restaurant meals, sedentary routines, work commitments, pregnancy-related symptoms, and limited opportunities for outdoor activity during hot weather can all affect implementation.

Qatar's population is linguistically and culturally diverse. Communication barriers may impair understanding of glucose monitoring, carbohydrate portions, medication administration, hypoglycaemia management, and postpartum testing. Education should therefore be delivered in the patient's preferred language using practical demonstrations, visual resources, teach-back methods, and written instructions that match the patient's health-literacy level.

Women with obesity may also experience stigma during clinical encounters. Blaming language is counter-productive and may reduce engagement. Clinicians should use person-first terminology, acknowledge biological and environmental contributors to obesity, and maintain clear clinical accountability without reducing the condition to a failure of personal discipline.

Digital-health interventions can support glucose transmission, dietary education, appointment reminders, and communication with healthcare professionals. Systematic evidence suggests that appropriately designed digital interventions may improve aspects of glycaemic management and service efficiency in gestational diabetes.²⁸ Digital care should supplement rather than replace clinical assessment, particularly when medication adjustment or obstetric review is required.

Local maternal nutrition research has demonstrated a high burden of pre-pregnancy overweight and obesity among women recruited in Qatar and has emphasized the need for context-specific interventions targeting maternal weight and gestational weight gain.²⁹ Research in Qatar also shows that pregnant women frequently use online information for diet and physical activity, creating both an opportunity for credible digital education and a risk of exposure to inaccurate or conflicting advice.³⁰

DISCUSSION

The evidence shows that Qatar is dealing with a high and possibly increasing burden of gestational diabetes. Earlier prevalence estimates of approximately 16–24% should not be presented as the definitive current national range. More recent nationwide data indicate a prevalence exceeding 30%, although direct comparison between studies is limited by differences in screening, diagnostic criteria, ethnicity, study period, and population coverage.

Women with obesity require more than the standard gestational diabetes pathway. They enter pregnancy with higher baseline metabolic and obstetric risk, and the coexistence of obesity and hyperglycaemia may intensify adverse outcomes. Management should consequently begin with preconception prevention where possible, continue through early antenatal risk assessment and active glucose management, and extend into structured postpartum diabetes prevention.

Primary health care is the most appropriate setting for much of this continuum because it can integrate antenatal care with nutrition, chronic-disease prevention, family medicine, vaccination, mental health, and long-term screening. However, primary care cannot manage complex gestational diabetes in isolation. Clear referral criteria, rapid access to specialist advice, interoperable records, and explicitly assigned responsibility are required.

Lifestyle treatment is necessary but is often implemented poorly. Generic dietary instructions, delayed dietitian referral, and repeated counselling despite persistently abnormal glucose values are not adequate care.

Primary care teams should use glucose patterns to guide treatment, provide culturally relevant nutrition therapy, escalate pharmacological treatment without unnecessary delay, and document a postpartum plan before delivery.

CONCLUSION

Gestational diabetes among women with obesity is a major maternal and public-health challenge in Qatar. The high national prevalence requires coordinated action across preconception, antenatal, obstetric, and postpartum services. Primary health care has a central role in early risk identification, universal screening, medical nutrition therapy, physical activity guidance, glucose monitoring, timely pharmacological treatment, referral, and long-term diabetes prevention. Care must be individualized, culturally appropriate, multidisciplinary, and supported by reliable digital systems. The greatest weakness is not the absence of effective interventions but the inconsistent delivery of those interventions across the full maternal-health continuum.

Recommendations

Qatar should continue strengthening standardized national pathways for early pregnancy testing, routine screening at 24–28 weeks, glucose targets, medication escalation, specialist referral, fetal surveillance, and postpartum testing. Clinical pathways should clearly distinguish screening for overt diabetes in early pregnancy from routine gestational diabetes testing later in pregnancy. Women with obesity should receive structured preconception and interpregnancy support addressing weight, nutrition, physical activity, diabetes risk, and pregnancy planning. During pregnancy, timely dietitian access should be prioritized for women with gestational diabetes rather than restricted to those who have already failed several weeks of general advice. Multilingual and culturally adapted educational materials should be developed centrally and used consistently across primary and hospital services. Digital systems should allow secure transmission of glucose readings, flag repeated values above target, and generate automatic reminders for postpartum oral glucose tolerance testing and long-term diabetes screening.

Future Qatar-based research should examine the effectiveness of culturally adapted nutrition interventions, optimal weight-gain strategies for different obesity classes, patient experiences, postpartum screening completion, long-term progression to type 2 diabetes, and maternal and childhood metabolic outcomes. Local implementation research is particularly important because evidence generated in other healthcare systems may not fully address Qatar's population structure, dietary environment, climate, and model of care.

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