

# Gestational Diabetes in the Gulf Region: Streamlining care to optimise outcome

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## ABSTRACT

The burden of gestational diabetes mellitus (GDM) has notably been on the increase in many countries. This observed trend feeds into the growing problem of obesity and type 2 diabetes, especially in regions with higher background prevalence of diabetes such as the Gulf Cooperation Countries (GCC). Despite the emerging body of evidence indicating adverse maternal and perinatal risks related to GDM, significant variations exist globally regarding the key components of GDM care, particularly, screening, diagnosis and long term follow up. This article appraises these key aspects of GDM across the GCC region against the backdrop of new global insights into the diagnosis and management of GDM. The options for minimising variations in screening and diagnosis and new opportunities for streamlining care across the Gulf region are explored. This proposition has the potential for driving an enabling environment for sharing best practices as well as engaging in collaborative research across the GCC.

*Keywords:* gestational diabetes, Gulf region, pregnancy, obesity, type 2 diabetes

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## INTRODUCTION

Gestational diabetes mellitus (GDM) is a clinical entity which represents glycaemic impairment of first onset or recognition during pregnancy with a reported prevalence of 3–14% in different populations.<sup>1,2</sup> It has been associated with increased maternal and perinatal risks and there is recognition of the growing burden of GDM in different populations.<sup>3–5</sup> This upward trend has been fuelled in part by the obesity pandemic in many societies, including the Gulf Cooperation Countries (GCC), which is made up of Saudi Arabia, Kuwait, Oman, United Arab Emirates, Qatar and Bahrain.<sup>6,7</sup> An increasing burden of obesity in women of reproductive age group translates into increased risk of GDM during pregnancy and consequently, a past history of GDM then triggers an increased lifetime risk of developing type 2 diabetes.<sup>6</sup> Given the link between GDM and the long term burden of type 2 diabetes in the female population, it seems imperative for a distinctive geographical zone such as the Gulf region to explore common themes in the approach and policies that are aimed at reducing the burden of type 2 diabetes in the society.

The published literature reveals significant variations in the approach to screening, diagnosis and long term follow up of GDM patients both globally and within the GCC.<sup>2</sup> Arguably some aspects of the variations resulted from the historical controversies that surrounded the acceptance of GDM as a distinct clinical entity. This article appraises these variations within the context of Gulf region and proposes new approaches for streamlining care and establishing important benchmarks.

This article proposes that by devising concrete, regionally relevant and reproducible pathways for GDM across the Gulf region, a common template for high impact strategies can be developed to reduce the prevalence of type 2 diabetes in the region.

## PREVALENCE OF GDM IN THE GULF COOPERATION COUNTRIES

Variations exist in the reported prevalence rates of GDM within and between countries of the GCC with rates as low as 4.2% in Oman to as high as 24.9% in United Arab Emirates (UAE).<sup>8,9</sup> Reported rates in other GCC countries are 16.3% in Qatar, 10.1% in Bahrain and 2.7%–12.5% in Saudi Arabia.<sup>10–13</sup>

Despite the similarity in the native ethnic populations across the GCC, there may be multifactorial reasons why variations exist in the reported prevalence rates of GDM. The increasingly multiracial and multi-ethnic population in some GCC due to the steady economic migration could be contributory.<sup>5</sup> More importantly, the variations in the screening and diagnostic criteria used in different institutions across the GCC countries could impact on the reported rates.<sup>12</sup> Arguably the rising rates of obesity in the reproductive age group would suggest that the reported prevalence rates represent static points on an upward moving disease burden scale. The reliability of some of the published data is limited by the fact that they are mostly retrospective institutionally based studies.<sup>11,13</sup> By establishing a 'diabetes in pregnancy registry' within and across the GCC, the true prevalence of GDM would be captured and this would enable countries to develop coordinated policies based on dynamic and reliable data set.

## STREAMLINING SCREENING AND DIAGNOSTIC CRITERIA

One of the main challenges in advancing reproducible research in GDM has been the multiplicity of screening and diagnostic thresholds supported by different globally respected authorities and study groups (Table 1), including the World Health Organisation (WHO), American Diabetes Association (ADA), and more recently the International Association of Diabetes in pregnancy study group (IADPSG).

**Table 1. Current Diagnostic approaches and thresholds for GDM.**

	WHO (75g 2hr OGTT, No *GCT)		ACOG/ADA <sup>+</sup> 3hr 100g OGTT (preceded by GCT)		IADPSG 2 hr 75g OGTT (Universal, no GCT)		NDDG** 3 hr 100g OGTT (Preceded by GCT)	
	mg/dl	mmol/l	mg/dl	mmol/l	mg/dl	mmol/l	mg/ml	mmol/l
Fasting	92–125	5.1–6.9	95	5.3	92	5.2	105	5.8
1 hour	180	10.0	180	10	180	10	190	10.6
2 hour	153–199	8.5–11	165	8.6	155	8.5	165	9.2
3 hour			140	7.8			145	8.0

WHO World Health Organisation, \*GCT- 1hr universal 50g Glucose challenge test, ACOG-American College of Obstetricians and Gynaecologists, IADPSG-International Association of Diabetes in Pregnancy Study Groups.

\*\*NDDG-National Diabetes Data Group (Values above two or more thresholds constitute a positive result for both NDDG/ADA/ACOG two step).

+ ADA American Diabetes Association (ADA revised GDM detection and diagnosis option in 2011 to include the one step IADPSG approach).

These variations play out in the approaches to screening and diagnosis in the GCC.<sup>12,14,15</sup> There remains strong consensus that establishing a uniform approach to diagnosing GDM will have extensive benefits for patients, caregivers, and policymakers.<sup>15</sup>

The merits of universal versus risk-factor based screening remains an ongoing debate, however the relatively higher prevalence of diabetes in the GCC countries have led to the adoption of a universal screening programme in some of the GCC.<sup>9,14</sup> Diagnostic approaches for GDM vary in the GCC with the ADA criteria used in some published studies from UAE, the WHO revised criteria of 1999 in studies from Kuwait, two stage protocol in Bahrain consisting of a 1-hour glucose challenge test followed by a 3-hour 75g Oral Glucose Tolerance Test (OGTT) in screen positive women.<sup>9,11,16</sup> The 2-hour fasting 75g OGTT was used in a recently published study in Qatar.<sup>10</sup>

In an attempt to create a common diagnostic platform, the international association of diabetes and pregnancy study groups (IADPSG) proposed a new strategy for screening and diagnosis of diabetes in pregnancy.<sup>17</sup> The consensus recommendation addressed two issues which are particularly relevant in the GCC. These include the detection of previously undiagnosed pre-gestational diabetes in early pregnancy and an improved detection of gestational diabetes. There has been some reluctance towards the full adoption of the IADPSG criteria primarily related to projected cost effectiveness especially in countries with a lower background prevalence of diabetes.<sup>2,18</sup>

The IADPSG recommends universal screening for diabetes/hyperglycaemia at the first prenatal visit in early pregnancy using cut offs for non-pregnant populations for either the fasting blood glucose (FPG), random blood glucose (RPG) or glycosylated haemoglobin (HbA1c). For those patients with normal results, a universal 2-hour OGTT is then performed between 24 and 28 weeks according to the IADPSG criteria.<sup>13</sup>

This initial screening is particularly relevant in patients with obesity, family history of type 2 diabetes or ethnicity with a high prevalence of diabetes. These risk profile is not uncommon in the antenatal populations in most GCC countries. The detection of overt diabetes in early pregnancy provides the opportunity to institute practical risk reduction plans for both the fetus and mother.<sup>13</sup>

For the initial early pregnancy screening for pre-gestational diabetes, there is currently no evidence to recommend one test (FPG, HbA1c, RPG) over the other. However, the FPG is a pragmatic option in that it is relatively low cost and not subject to the limitations of HbA1c in conditions of altered red cell turnover.<sup>11</sup> Attempts have been made to extrapolate aspects of the new IADPSG criteria on previous hospital data for GDM screening with the conclusion that it would result in higher pick up rate for GDM with potential resource implications.<sup>11,14</sup> The improved identification of a subset of women who have an increased lifetime risk of developing type 2 diabetes, provides an opportunity for targeted preventive measures after the pregnancy.

However, despite the endorsement of IADPSG recommendations by international organisations including the WHO and ADA, adoption and implementation of the new criteria has been slow.<sup>2</sup> Streamlining care for women with GDM in GCC ideally should start by agreeing and adopting a unified screening and diagnostic thresholds, hence a strong case is therefore made for the adoption of the IADPSG screening strategy consisting of universal FPG/HbA1c/RPG in early pregnancy (to detect pre-existing diabetes) and a 2 hour 75g OGTT between 24–28 weeks of pregnancy (Table 2). If adopted, the GCC (or an individual country within the GCC) would be the first region to generate prospective data from full implementation of the IADPSG criteria.

### **GDM MANAGEMENT IN GCC**

Following a diagnosis of GDM, management strategies are typically aimed at preventing fetal macrosomia and reducing perinatal complications.<sup>6,12</sup> From published reports, clinical management of GDM in the GCC countries are along established glucocentric approach with emphasis on dietary modification, lifestyle changes and medications.<sup>12</sup> Specialist antenatal/diabetes services exist in some institutions in the GCC.<sup>12</sup> For patients who required medications, insulin appears to be the medication of choice with little reports on the extent of use of oral hypoglycaemic agents.<sup>16</sup> The use of metformin in the management of GDM has become an established practice in many parts of the world, with reassuring safety and efficacy data.<sup>12,19</sup> The additional benefit of convenient dosing and ease of administration, compared to subcutaneous insulin injections makes it an ideal agent worthy of wider integration in the GCC with the potential for better treatment compliance.

The evidence of increased maternal and fetal risks in women with GDM calls for a streamlined and focused service structure.<sup>6</sup> The model of a dedicated, multiprofessional antenatal specialist clinics for

**Table 2. Suggested Pathway for Streamlining Screening, Diagnosis and Follow up of GDM in GCC.**

FIRST PRENATAL/ANTENATAL VISIT
<p>Aim: To diagnose Pre-existing Diabetes</p> <ul style="list-style-type: none"> <li>• Perform Fasting Plasma Glucose (FPG)/HbA<sub>1c</sub>/Random</li> </ul> <p>Diagnose Overt Diabetes if</p> <ul style="list-style-type: none"> <li>• FPG <math>\geq 7.0</math> mmol/l(126 mg/dl)</li> <li>• HbA<sub>1c</sub> <math>\geq 6.5\%</math></li> <li>• Random <math>\geq 11</math> mmol/l(200 mg/dl)</li> </ul> <p>If Fasting <math>\geq 5.2</math> diagnose GDM</p>
24–28 WEEKS GESTATION
<p>Aim: To diagnose GDM</p> <ul style="list-style-type: none"> <li>• Perform universal fasting 2 hour 75g OGTT</li> </ul> <p>Diagnose GDM if</p> <ul style="list-style-type: none"> <li>• FPG <math>\geq 5.2</math> mmol/l(92 mg/dl)</li> <li>• 2 hour <math>\geq 8.5</math> mmol/l(153 mg/dl)</li> </ul> <p>Diagnose Overt Diabetes if FPG <math>\geq 7.0</math>mmol/l</p>
POST PARTUM FOLLOW UP OF GDM PATIENTS
<p>6–8 Weeks Post Natal Visit</p> <ul style="list-style-type: none"> <li>• 2 hour 75g OGTT</li> </ul> <p>Diagnose Diabetes if</p> <ul style="list-style-type: none"> <li>• FPG <math>\geq 7.0</math> mmol/l(126 mg/dl)</li> <li>• 2 Hour <math>\geq 11</math> mmol/l(200 mmol/l)</li> </ul> <p>Diagnose Pre diabetes if</p> <ul style="list-style-type: none"> <li>• FPG <math>&lt; 7.0</math> mmol/l and 2 hour 7.8–11 mmol/l(Impaired Glucose Tolerance IGT)</li> <li>• FPG between 6.1–6.9 mmol/l(Impaired Fasting Glucose IFG)</li> </ul> <p>Annual Visit</p> <ul style="list-style-type: none"> <li>• FPG, diagnose Diabetes if <math>&gt; 7.0</math>mmol/l</li> </ul>

women with Diabetes as currently adopted in some of the centres in GCC should be promoted as the default service structure. This approach will facilitate the sharing of best practices across the region and also align the service structure with models used in the rest of the developed world.

### POST PREGNANCY FOLLOW UP

The potential long term dividend of screening for and diagnosing GDM is the attractive possibility of delaying or preventing the onset of type 2 diabetes in these susceptible patients.<sup>20</sup> The current approach to post pregnancy follow up is varied and largely unstructured in many parts of the world.<sup>21</sup> Evidence would suggest that the first few years following the index pregnancy when GDM was diagnosed present the golden window, given that early conversion to type 2 diabetes occur in the first five years following the diagnosis of type 2 diabetes.<sup>6,20</sup>

The estimated lifetime risk of developing type 2 diabetes is 2.6–70% depending on the length of the follow up period.<sup>20,21</sup> The variations in the recommendation by global organisations including the WHO and the ADA have led to different follow up strategies in different countries.<sup>22</sup> There is a consensus on the timing of the initial follow up, pegged at between 6–12 weeks postpartum by the leading global diabetes organisations (WHO, ADA, American College of Obstetrics and Gynaecology (ACOG), Australasian Diabetes in Pregnancy Society). The WHO advocates the 75g OGTT whilst the ADA recommends fasting plasma glucose (FPG).<sup>23,24</sup> A hybrid between the WHO and ADA is supported by the American College of Obstetrics and Gynaecology (ACOG).<sup>25</sup> In a study by Agarwal et al., in UAE, a combined approach using the Fasting Plasma Glucose (ADA) and 2hour 75g OGTT (WHO, 1999 criteria) had the highest diagnostic yield of women with glycaemic impairment.<sup>22</sup>

For patients with normal postnatal result at 6–8 weeks visit, there is currently no solid evidence to guide the timing and frequency of long term follow ups. Currently these range from yearly to 2–3 yearly and more frequent follow up in high risk groups.<sup>22</sup> With a higher background prevalence, a structured pan- regional approach to post-partum follow up of women with GDM in the Gulf region is strategic in the battle against the rising prevalence of type 2 diabetes. A pragmatic approach would consist of an initial follow up at 6–8 weeks (fasting plasma glucose and a 2 hour 75g OGTT) followed by annual fasting plasma glucose for those with normal results at the initial visit (Table 2). The annual fasting plasma glucose ideally should take place in primary care and could be integrated into other

interventions targeted at risk reduction for type 2 diabetes. If adopted uniformly, this approach would provide the long term data on the time line and patient related factors for transition to type 2 diabetes in the GCC.

### **CONSIDERATIONS DURING THE MONTH OF RAMADAN**

The dominant religion in the GCC is Islam, and fasting during the holy month of Ramadan is a religious observance. Although pregnancy and diabetes are legitimate reasons to be excused from the fast, many women prefer observance. A recent study of pregnant women in Bradford (UK) found that 43% of 300 women reported fasting and one third fasted for the full period of Ramadan.<sup>26</sup> The figures for adherence to Ramadan for GCC are not known but water restriction could be an additional challenge in a hot climate.<sup>27</sup>

Ramadan has not been associated with adverse health outcomes outside of pregnancy.<sup>28</sup> The situation for pregnant women is less well studied, but when studied in a general way, the cohort will include fasting, non-fasting and partially fasting women. Maternal and fetal outcomes during Ramadan have been associated with conflicting evidence with reports of lower birth weights<sup>29</sup> and no change in birth weights.<sup>30</sup> This lack of consistency in observed results may be related to variable observance of Ramadan. Ramadan adherence in pregnant women may not be uniform in different countries thus there is a need for data reflecting strict adherence to Ramadan, particularly in hot climates. For the GCC, there is a need to produce locally relevant data to inform patient education programs.

### **PROPOSED MODEL OF STREAMLINED CARE**

Given the strategic public health importance of tackling the diabetes epidemic in the Gulf region, we opine that a comprehensive approach to screening, management and follow up of women with gestational diabetes is feasible and worthy of implementation, hence our proposed model as outlined in Table 2. This model is based on a synergy of the current best evidence and locally relevant logistics to allow for ease of implementation. The proposed pathway is focused on key concepts which include; identification of undiagnosed pre-gestational diabetes early in pregnancy, universal screening for GDM and a structured long term follow up which encourages strategic partnership between the patient and the primary health care system. For ease of adoption, we recommend the use of HbA<sub>1c</sub> and random plasma glucose for the booking visit screening (for detection of overt undiagnosed diabetes) in view of the practical logistics associated with performing a fasting plasma glucose at the first prenatal visit, particularly the need for a second visit. Our recommendation for universal screening for GDM using a consistent diagnostic criteria across the GCC will ensure that the true prevalence of GDM can be determined to inform planning and resourcing of antenatal diabetes services across the region.

We believe that a multidisciplinary team approach is pivotal in delivering optimum care to women with diabetes during pregnancy and beyond. The model of a joint diabetes antenatal service is being used in some centres and we recommend a wider adoption of this approach across all antenatal diabetes services across the GCC with representation from all the key specialties involved in diabetes care including; obstetricians with expertise in diabetes, endocrinologists, dieticians, diabetes specialist nurses, diabetes midwives/obstetric nurses, diabetes educators and a named link-neonatologist. By adopting the follow- up structure as proposed, long term data on the many variables that influence conversion to type 2 diabetes could be gathered to inform future research direction into interventions that could delay transition to type 2 diabetes.

### **CONCLUSION**

Global variations in the screening, diagnosis and follow up of GDM patients are clearly mirrored in the GCC countries. This calls for a rethink of the current approach if we are to make significant progress in stemming the epidemic of diabetes in women of reproductive age group in the Gulf region. As a minimum, an approach that streamlines screening and diagnostic process coupled with a structured follow up is urgently required. The availability of local data to inform patient education and guidance during the month of Ramadan is highly desirable. The creation of a regional network with a focus on all aspects of diabetes in pregnancy is recommended. Such a network will serve as the hub that unifies and maximizes the efforts of individual countries in addition to providing the avenue for sharing best practices and encouraging networked research.

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