Prevalence, Impacts and Efforts to Combat GDM in Malaysia

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In Malaysia, prevalence of GDM:

- Shamsudin K et al (2001) - 24.9% (2-step method)
- P C Tan et al (2007) - 11.4% (2-step method)
- N Idris et al (2009) - 18.3% (2-step method)
- National Obstetric Registry (2010) - 8.7%
- Logakodie et al (2017) - 27.9%

(DM prevalence NHMS 2006 was 14.9%, in 2011 was 20.8%)
Increasing prevalence as obesity increases
Screening for gestational diabetes at antenatal booking in a Malaysian university hospital: The role of risk factors and threshold value for the 50-g glucose challenge test

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A prospective observational study in a Malaysian university hospital (Tan, Ling, Zawiah, 2007) which enrolled 1600 women at the antenatal booking visit, identified an 11.4% incidence of GDM. Universal screening by OGCT, with a positive test threshold of 7.2 mmol/L was applied during the study. The sensitivity of the OGCT at this threshold is 90%. Women with a history of GDM were excluded from the study and thus the incidence of GDM is probably an underestimate. In the women diagnosed with GDM, 58 of 183 (31%) reported no risk factors and therefore would have been overlooked had selective risk based screening been used.

1st January 2010 until 31st December 2010
14 government hospitals in Malaysia.

Incidence of diabetes in pregnancy was 9.90% (2010), 8.66% (2011) and 8.83% (2012)

GDM 11,848 (8.66%) and 1,009 (0.74%) had pre-existing diabetes.
## Screening for Diabetes during pregnancy

<table>
<thead>
<tr>
<th>Year</th>
<th>Total new antenatal</th>
<th>Total antenatal screened MGTT</th>
<th>Antenatal confirmed GDM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>2016 (starting April)</td>
<td>21,373</td>
<td>13,914</td>
<td>2,554</td>
</tr>
<tr>
<td>2017</td>
<td>27,447</td>
<td>19,696</td>
<td>3,587</td>
</tr>
<tr>
<td>2018 (Jan-Jun)</td>
<td>227,422</td>
<td>150,184</td>
<td>34,228</td>
</tr>
</tbody>
</table>

Note: Data for 2016 and 2017 – from 1-2 health clinics per state, in 2018 from all health clinics

Data Family Health Division, Ministry of Health

## Screening for Diabetes postnatal

<table>
<thead>
<tr>
<th>Year</th>
<th>% postnatal mothers screened MGTT</th>
<th>% postnatal mothers abnormal MGTT</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016 (starting April)</td>
<td>33.2</td>
<td>1.5</td>
</tr>
<tr>
<td>2017</td>
<td>47.2</td>
<td>3.12</td>
</tr>
<tr>
<td>2018 (Jan-Jun)</td>
<td>47.4</td>
<td>2.4</td>
</tr>
</tbody>
</table>

Note: Data for 2016 and 2017 – from 1-2 health clinics per state, in 2018 from all health clinics

Data Family Health Division, Ministry of Health

Logakodie et al showed 53.8% screened postnatal and higher prevalence of postnatal DM among GDM mother was 12.1%.

## Women at risk to develop GDM include:

- Body mass index (BMI) >27 kg/m²
- Previous history of GDM
- First-degree relative with DM
- History of macrosomia (birth weight >4 kg)
- Bad obstetric history [unexplained intrauterine death, congenital anomalies (i.e. neural tube defects, cardiac defects), shoulder dystocia]
- Glycosuria ≥2+ on two occasions
- Current obstetric problems (essential hypertension, pregnancy-induced hypertension, polyhydramnios and current use of corticosteroids)

## Screening

- To identify asymptomatic patients who may have overt diabetes or GDM
- 2 types of screening;
  - Universal - screen all women
  - Selective - high risk women


Diagnosis

- OGT has been recommended by international guidelines.5,6,7,8
- It should be done at booking for high risk women, and repeated at 24-28 weeks of gestation if the initial result was negative.4,6
- HbA1c alone is not useful as diagnostic test for GDM.9
- Random blood sugar measurement is inadequate test to screen for GDM.10

Overt diabetes in pregnancy

- No universally accepted definition
- Diagnosis is made when blood glucose level is high during the first trimester
- A second test must be performed on another day to confirm the diagnosis either by using FPG, RGP, HbA1C, or OGGT.11
- If results indicate overt diabetes, treatment and follow-up should be carried out as for pre-existing diabetes.8,12

Diagnosis of GDM and Overt Diabetes Mellitus

- GDM is diagnosed in the presence of any one of these results:4
  - FPG ≥5.1 mmol/L
  - 2-hour postprandial (2-HPP) ≥7.8 mmol/L
- Overt diabetes is suspected in the presence of at least one of the following:13
  - FPG ≥7.0 mmol/L
  - RGP ≥11.1 mmol/L with symptoms
- However, the diagnosis of overt DM is confirmed with a second test (FPG/RPG/OGTT).13
- OGGT is required if the FPG or RGP results do not meet the criteria of overt diabetes
Recommendation 1

- Screening for GDM based on risk factors using 75 gram OGTT should be done at booking.
  - If the test is negative, it should be repeated at 24-28 weeks of gestation.
- For women at the age of 25 or more with no other risk factors, OGTT should be done at 24-28 weeks of gestation.
- Overt diabetes in pregnancy should be managed as pre-existing diabetes.

Significance of GDM

Adverse outcomes
pre eclampsia, polyhydramnios, fetal macrosomia, birth trauma, operative delivery, perinatal mortality & neonatal complications

Potential long term consequences to infant
Development of obesity & diabetes during childhood, impaired fine & gross motor functions

Women with h/o GDM
10% per year risk of maternal development of diabetes after the index pregnancy with GDM

Impact on Maternal and Birth Outcomes

GDM women had a higher risk of having a non-spontaneous vaginal delivery compared to non-GDM women


Impact on Maternal and Birth Outcomes

LCM in relation to DM and GDM per 1000 live births

This three year review showed the still birth rate due to LCM was higher among pre-existing DM than GDM.
However, true incidence of LCM as there may have been cases of spontaneous loss that had not been captured.
Preconception Care\textsuperscript{1}

- Preconception care, provided by a multidisciplinary team, consists of:\textsuperscript{6}
  - Discussion on timeline for pregnancy planning
  - Lifestyle advice (diet, physical activities, smoking cessation and optimal body weight)
  - Folic acid supplementation
  - Appropriate contraception
  - Full medication review (discontinue potentially teratogenic medications)
  - Retinal and renal screening
  - Relevant blood investigations

\textsuperscript{6} National Collaborating Centre for Women's and Children’s Health (UK), Diabetes in pregnancy: management of diabetes and its complications from preconception to the postnatal period. London: NICE, 2015.

Referral for Medical Nutrition Therapy (MNT)

- MNT should be given to pregnant women with these conditions:
  - at risk of GDM
  - pre-existing diabetes
  - at diagnosis of GDM
  - at initiation of insulin therapy
  - postpartum care

Preconception Care\textsuperscript{2}

- Women with pre-existing diabetes should be:
  - informed of the glycaemic control targets and empowered to achieve control before conception
  - counselled on the risks and expected management strategies during pregnancy.

Recommendation 2

- Pregnant women at risk of gestational diabetes mellitus should be offered medical nutrition therapy which includes monitoring of gestational weight gain
- MNT should be individualised according to nutritional needs and cultural preference
Table 1: Total and rate of weight gain recommendations during pregnancy

<table>
<thead>
<tr>
<th>Pre-pregnancy body weight status (BMI in kg/m²)</th>
<th>Total weight gain (ranges in kg)</th>
<th>Rates of weight gain in second and third trimester [mean (range) in kg/wk]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Underweight (&lt;18.5 kg/m²)</td>
<td>12.5-18.0</td>
<td>0.51 (0.44-0.58)</td>
</tr>
<tr>
<td>Normal weight (18.5-24.9 kg/m²)</td>
<td>11.5-16.0</td>
<td>0.42 (0.35-0.50)</td>
</tr>
<tr>
<td>Overweight (25.0-29.9 kg/m²)</td>
<td>7.0-11.5</td>
<td>0.28 (0.23-0.33)</td>
</tr>
<tr>
<td>Obese (≥30 kg/m²)</td>
<td>5.0-9.0</td>
<td>0.22 (0.17-0.27)</td>
</tr>
</tbody>
</table>


In the local setting, the BMI criteria for overweight is 23.0-27.4 kg/m² and obesity is ≥27.5 kg/m². There is no recommendations on total and rates of weight gain for local population. However, targeting GWG to the lower range in Table 1 may be recommended to improve pregnancy outcomes.

Antenatal Management

- Oral antidiabetic agents
- Insulin treatment
- Types of insulin
- How to initiate
- Role of insulin analogue

Recommendation 7

- In GDM, metformin should be offered when blood glucose targets are not met using changes in diet and exercise within 1-2 weeks.
  - It should be prescribed after consultation with specialists.
- Metformin should be continued in women who are already on the treatment before pregnancy.

Indications for insulin initiation

- Blood glucose targets are not met after MNT and metformin therapy
- Metformin is contraindicated or unacceptable
- FPG ≥7.0 mmol/L at diagnosis (with or without metformin)
- FPG of 6.0-6.9 mmol/L with complications such as macrosomia or polyhydramnios (start insulin immediately, with or without metformin).
Insulin initiation - after MNT and metformin failed

<table>
<thead>
<tr>
<th>Glycaemic abnormality</th>
<th>Suggested Insulin Type and Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>FPG &gt;5.3 mmol/L</td>
<td>Start 0.2 units/kg of intermediate-acting insulin at bedtime, increase by 2 units every 3 days until targets are reached.</td>
</tr>
<tr>
<td>1-hour postprandial &gt;7.8 mmol/L</td>
<td>Start 6 units of short-acting insulin, increase by 2 units every 3 days until targets are reached. If preprandial short-acting insulin dose exceeds 16 units TDS, consider adding 6-10 units intermediate-acting insulin in the morning and titrate accordingly until targets are achieved.</td>
</tr>
<tr>
<td>2-hours postprandial &gt;6.7 mmol/L</td>
<td></td>
</tr>
</tbody>
</table>

Blood glucose target

<table>
<thead>
<tr>
<th>Timing of Blood Glucose</th>
<th>Target Value (mmol/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fasting or preprandial</td>
<td>5.3</td>
</tr>
<tr>
<td>1-hour after the start of a meal</td>
<td>7.8</td>
</tr>
<tr>
<td>2-hours after the start of a meal</td>
<td>6.7</td>
</tr>
</tbody>
</table>

Recommendation 8

- Insulin therapy can be initiated at outpatient setting in pregnant women with diabetes.
- The preferred choice of insulin regime in diabetes in pregnancy is multiple daily injections.
- Insulin analogues should be continued during pregnancy in women with pre-existing diabetes who are already on the treatment and have established good blood glucose control before pregnancy.
- Rapid-acting insulin analogue may be considered as an option, particularly in patients with frequent hypoglycaemia or postprandial hyperglycaemia using human insulin during pregnancy.

Recommendation 9

- Low dose aspirin (75 - 150 mg daily) should be given to prevent pre-eclampsia in women with pre-existing diabetes from 12 weeks of gestation until term.
- Vitamin C and E supplementation should not be given to prevent pre-eclampsia in women with diabetes.
**Recommendation 10**

- In women with pre-existing diabetes,
  - retinal assessment should be performed at booking and repeated at least once throughout the pregnancy
  - renal assessment should be performed at booking; those with pre-existing renal disease should be managed in a combined clinic

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**Fetal Surveillance**

<table>
<thead>
<tr>
<th>Timing</th>
<th>Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>11-14 weeks of gestation</td>
<td>• Early scan is performed to:</td>
</tr>
<tr>
<td></td>
<td>- confirm gestational age using crown-rump length measurement</td>
</tr>
<tr>
<td></td>
<td>- assess for major structural malformation including acrania and anencephaly</td>
</tr>
<tr>
<td>18-26 weeks of gestation</td>
<td>• Detailed structural anatomy scan which includes the spine and heart (four-chamber, outflow tract and three-vessel views)</td>
</tr>
<tr>
<td>28-36 weeks of gestation</td>
<td>• Serial growth scan is performed every four weeks to assess fetal growth and amniotic fluid volume</td>
</tr>
<tr>
<td></td>
<td>• The rate of fetal growth should be used to facilitate decisions with treatment, and timing and mode of delivery</td>
</tr>
</tbody>
</table>

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**Referral to secondary/tertiary care**

- **Why refer?**
  - For continuous specialist care to detect complications, review medications and optimise glycaemic control

- **Who should be referred?**
  - All women with pre-existing diabetes
  - Women with GDM who have poor glycaemic control and fetal complications

- Referral to a dietitian to ensure balanced diet and achievement of good glycaemic control.

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**Timing and Mode of Delivery**

- In 2 systematic reviews on GDM and pre-existing T2DM requiring insulin, active IOL at 38 weeks gestation vs expectant management until 42 weeks:
  - Reduced the risk of macrosomia
  - No significant increase in rates of caesarean section, shoulder dystocia, neonatal hypoglycaemia or perinatal deaths.
### Recommendation 12

#### Condition | Timing
--- | ---
Pre-existing diabetes  
without complications | between 37+0 and 38+6 weeks
with maternal or fetal complications | before 37+0 weeks
GDM  
on diet alone with no complications | before 40+0 weeks
on oral anti-diabetic agents or insulin | between 37+0 and 38+6 weeks
with maternal or fetal complications | before 37+0 weeks

- Mode of delivery should be individualised, taking into consideration the estimated fetal weight and obstetric factors.
- Women with diabetes who receive antenatal corticosteroids for fetal lung maturation should have close monitoring.

### Postpartum Management

1. Glucose monitoring
2. Pharmacotherapy
3. Contraception
4. Breastfeeding
5. Lifestyle modification

### Postpartum - 1

- Pre-existing diabetes on insulin treatment:
  - reduce their dose immediately after birth
  - monitor blood glucose to establish the appropriate dose
  - are at increased risk of hypoglycaemia in the postnatal period, especially when breastfeeding
  - advise to have a meal or snack available before or during feeds
- Most women diagnosed with GDM should be able to discontinue their insulin immediately after delivery.

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**Recommendation 14**

- In women with history of GDM,
  - OGTT should be performed at 6 weeks after delivery to detect diabetes and pre-diabetes. If the result is negative, annual screening should be performed
  - with abnormal postpartum modified glucose tolerance test, metformin and intensive lifestyle intervention should be considered to prevent diabetes
  - breastfeeding of at least 3 months or longer should be encouraged to reduce the risk of diabetes

**Challenges Faced during the implementation of these guidelines and programs**

- System factor
  - Health care providers
  - Patient factor

- Pre-pregnancy care
- Screening & Diagnostic criteria
- Treatment
- Monitoring
- Intrapartum
- Postpartum

**Issues: Pre-pregnancy care**

- Pre-pregnancy care (PPC) services limited
- When to refer patient with Diabetes for PPC?
- High risks patients with pre-existing DM not screened and stabilized pre-pregnancy
- Difficult to achieve target pre-pregnancy: Good glycaemic control i.e HbA1c < 6.5%
- Patient not keen for conversion to insulin
- Lack of pre-pregnancy counselling on complications
- Lack of referral for dietician to consider pregnancy load

**Issues: Screening for GDM**

- What is the best screening method/strategies? Universal/Risk factor based?
- Differences in population risks, cost-effectiveness considerations, and lack of an evidence based to support large national screening programs
- Criteria & method for screening and it’s algorithm –may not be followed
- Too many criteria to remember
**Issue: Treatment**

- Impact of treatment on GDM (HAPO)
- Use of insulin analogue
- Use of oral anti-diabetic agent i.e Metformin
- Insufficient data available to determine the effect of treatment of IGT in pregnancy on perinatal outcome (WHO: IGT is now classed as GDM)
- Criteria for referral? All patient for shared care

**Issues: Monitoring**

- Lack of maternal and fetal monitoring during pregnancy (including for complications)
  1. Maternal weight gain
  2. Periodic fetal growth & development testing (abdominal girth)
  3. Assessment of glycaemic control: SMBG, Differs target in monitoring
  4. Appropriate no. of clinic visit – 2/52 till 32/52 then 1/52 till delivery
  5. More frequent visit – uncontrolled diabetes
  6. Timing and route of delivery
    Early delivery: risk of failed induction & poor neonatal respiratory status
    Monitoring of Cx: retinopathy, nephropathy

**Issues: Postnatal**

- Convert back to pre-pregnancy dosage / medication
- Baby’s outcome
- Default 6 week post partum OGTT and annually there after
- Counseling regarding pre conception care
- Optimising the control of diabetes reduces the risk of fetal anomaly in preexisting Diabetes
- Pre conception Folic Acid
- Lifestyle modification: Maintaining body weight & Physical activity
- Family planning

**Issues: System**

- Long waiting time
- Frequent staff turnover
- Heavy workload
- Increased GDM patients with normal BSP but still need to be reviewed by doctors
- Lack education: individual/group session
Issues: System

- Lab result delayed/not traced early – cause delay in action taken
- Patient have to travel 3-4 times/day for BSP at clinic (transport/permission to leave work place)
- Poor data collection and monitoring
- Established policies that do not promote treatment to goal
- Limited staff for patient teaching
- Occasionally lack of glucose supply for MGTT
- Measurement of perinatal outcome: How and what to monitor?

Issues: Health care providers

- High workload
- Lack of system support: consultation room not conducive, no IT support
- Lack of Dietitian: long waiting time for appt
- Lack of diabetes educator

Issues: Health care providers

- Lack of multidisciplinary team approach
- Lack of training/counselling skill
- Non-adherence to CPG recommendation
- Failure to explain prescribed regimen
- Assumption (incorrect) of patient adherence
- Lack of training in management of GDM
- Lack of training in handling cultural and literacy issues

Issues: Patient

- Late antenatal booking
- Lack of trust in health care providers
- Lack of understanding of treatment regimen
- Too many and frequent appt (hospital & clinic)
- Unable to get release from work
- Defaulted clinic appt & repeat MGTT & BSP
- BSP result not complete/Lack SMBG
- Patient default appt
Issues: Patient

- Patient refuse admission for induction of labour
- Poor compliance: diet control, insulin
- Lack of suitable exercise program for pregnant lady
- Inappropriate dosing and timing of insulin regime
- Poor family support
- Lack of transportation
- Depression or other emotional issues
- Believe in traditional treatment: herbal etc

Summary

- Prevalence of GDM in M’sia is increasing: associated with maternal and foetal outcomes.
- Need to strengthen the screening strategy and GDM management
- There are many issues in managing GDM which need to be addressed
- More research on GDM is required