Prevention of Gestational Diabetes Mellitus (GDM)
Sanjay Kalra,1 Yashdeep Gupta,2 Arun Kumar3

Abstract
Prevention of Gestational diabetes mellitus holds the key to prevention of the diabetes and metabolic syndrome epidemic sweeping the world. This review discusses prevention of gestational diabetes and provides a scientific framework for the study of this topic. It classifies prevention in various ways, and suggests strategies which fit the different levels of prevention of gestational diabetes. The review also cites recent evidence and best practices to support the feasibility of prevention of gestational diabetes.

Keywords: Primary prevention, Primordial prevention, Secondary prevention, Tertiary prevention, Quaternary prevention, Lifestyle modification.

Introduction
The Dhaka Declaration (2015) highlights gestational diabetes mellitus (GDM) management as a challenge, as well as opportunity, for both public health and clinical medicine.1 GDM is a form of pre-diabetes, which punches far beyond its weight, causing acute, chronic, and trans-generational impact. Similar to rate limiting step in chemistry, which may be hastened with enzymes, or delayed by inhibitors, GDM can be worsened by mismanagement, or prevented by appropriate measures. Action at this level will have downstream consequences, not only for the woman in question, but for her unborn offspring, and for the community she lives in. Hence, prevention of GDM is of paramount importance.

Levels of Prevention
Prevention can be classified according to levels (primordial, primary, secondary, tertiary and quaternary);2,3 targets (all girls and women, women in preconception, antenatal, postnatal, and inter-conception phases); and intervention (non-pharmacological, pharmacological) (Tables-1, 2).

Scope of Prevention
Primordial prevention refers to the avoidance of risk factors of a particular condition. Primordial GDM prevention includes maintenance of weight, appropriate nutrition, physical activity and lifestyle for all girls and all women in the reproductive age group or even during childhood. This attenuates the effect of modifiable risk factors on insulin sensitivity, and on the pathogenesis of GDM. Primary prevention implies the correction of risk factors that are already in play, but which have not yet led to the actual disease. From a GDM perspective, primary prevention focuses on healthy lifestyle, including medical nutrition therapy and exercise, in high risk antenatal women, to prevent GDM onset. Breast feeding can be classified as primordial prevention, when applied to all post-partum women, and as a primary prevention strategy if encouraged in women with history of GDM.

Secondary prevention of any medical condition, including GDM, encompasses screening, early diagnosis and treatment, whether non- pharmacological or drug-based. The aim is to arrest the natural history of the disease at an early stage, and prevent medical, obstetric, and paediatric complications. Targeting antenatal women with poor antenatal care-seeking behaviour, to achieve behaviour change and seek timely antenatal care, will also be included in secondary prevention.

Tertiary prevention refers to management of complications encountered in GDM, so as to minimize their impact on feto-maternal and neonatal health. All medical and obstetric management in the antenatal, postnatal and interconception period, as well as neonatal

Table-1: Classification of prevention of GDM: levels, targets.

<table>
<thead>
<tr>
<th>Level</th>
<th>Life phase</th>
<th>Target</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primordial</td>
<td>Pre puberty / puberty</td>
<td>All young girls</td>
<td>Prevention of risk factors</td>
</tr>
<tr>
<td>Primary</td>
<td>Preconception</td>
<td>All adult women</td>
<td>Correction of risk factors</td>
</tr>
<tr>
<td>Secondary</td>
<td>Early antenatal</td>
<td>All women with GDM</td>
<td>Early screening, diagnosis; lifestyle modification; management</td>
</tr>
<tr>
<td>Tertiary</td>
<td>Antenatal/ Inter conception</td>
<td>All women with complicated GDM; their offspring</td>
<td>Medical, obstetric, neonatal management</td>
</tr>
<tr>
<td>Quaternary</td>
<td>All</td>
<td>All women at risk of/with history of GDM</td>
<td>Avoid over diagnosis, over treatment</td>
</tr>
</tbody>
</table>

1Department of Endocrinology, Bharti Hospital, Karnal; 2Department of Endocrinology, AIIMS, New Delhi; 3Department of Community Medicine, Shaheed Hassan Khan Mewati Government Medical College, Nalhar, Mewat, India.

Correspondence: Sanjay Kalra. Email: brideknl@gmail.com
and paediatric management of the offspring, is part of tertiary prevention.

One should be aware of quaternary prevention, which describes the need to avoid over-diagnosis, over-labelling, and over-treatment of any medical condition. The psychosocial impact caused by a label of ‘diabetes’ in a young women, especially in Asia, underscores the need to practice quaternary prevention in GDM. This is done by following validated means of screening and diagnosis. Quaternary prevention also encompasses the need to follow simple yet sensitive means of screening and diagnosis, as well as avoid over-treatment. For example, unnecessarily treating an antenatal woman with mild uncomplicated dysglycaemia, when she is diagnosed with GDM a few days or weeks prior to delivery, may be projected as a case fit for quaternary prevention.

**Lifestyle Modification**

Data is emerging regarding the role of physical activity, medical nutrition therapy, and weight management, during inter-conception, pre-conception, antenatal, and postpartum phases.

**Non-Pharmacological Prevention**

The Finnish Gestational Diabetes Prevention trial (REDIEL) enrolled 293 women with a history of GDM and/or a pre-pregnancy BMI of ≥30kg/m², at <20 weeks gestation. These women were randomized to a control group, which received standard antenatal care, or an intervention group, which also received individualized counseling on diet, physical activity and weight control.

The incidence of GDM, as diagnosed by a 75g, 2 hour oral glucose tolerance test conducted at 24-28 weeks gestation, was 21.6% in the control and 13.9% in the intervention group (p= 0.044) (39% difference) Gestational weight gain was lower in the intervention group (-0.58kg; P=0.037), whose subjects also reported improved quality of diet and increased physical activity during leisure time.

Similar findings were reported from a Chinese study, which sampled 74 women with a BMI. 24kg/m² at convenience. While both interventional and control groups received standard antenatal care and exercise, dietary and weight counseling at weeks 8-12, the intervention group also received counseling session every month during the 2nd trimester, and weekly follow up on telephone or via e-mail. These subjects had a much lower incidence of GDM and weight gain at the end of the 2nd trimester (28.1% vs 55.9%, p=0.023 and 6.86 ± 3.84kg, p=0.000) than the control group.

**Pharmacological Prevention**

Pharmacological preventive strategies, including the Chinese traditional medication Zuogui Wan, and myo-inositol, have been used in GDM. However, data in support of their use is limited.

Drugs are best utilized in tertiary prevention. While the drug of choice is insulin, metformin and glibenclamide have also been accepted for use in certain situations. The bio-psycho social model of health has been used to create pragmatic indications for the use of metformin. These include GDM detected during the late third trimester, poor adherence to insulin, poor self-management skills for injectable therapy, GDM refractory to high dose insulin, unwanted weight gain with insulin, and psychological or social resistance to insulin.
Postpartum Prevention

Postpartum follow up is a key element of GDM management step for prevention of further episode of GDM, as well as future diabetes.\textsuperscript{15} The components of GDM postpartum follow up are encapsulated in the mnemonic ABCDE (Assessment Breastfeeding Contraception, Diet and Exercise).\textsuperscript{16} Breastfeeding, as a preventive strategy for GDM and diabetes, has been reviewed earlier in the JPMA.\textsuperscript{17}

Barriers and Solutions

Universal or high-risk screening strategies, followed by appropriate treatment, are being used as secondary preventive interventions, to achieve safe glycaemic control and prevent complications in GDM. Women with GDM are being followed up post-delivery, to ensure accurate risk stratification, and appropriate lifestyle/pharmacological interventions. The efficacy of such follow up programmes can be improved if they are made concordant with existing child health schemes.

Best Practices from South Asia

Major strides have taken place in the prevention and management of GDM and its associated complications. In Bangladesh, qazis deliver health education related to GDM prevention while solemnizing marriages. In India, gynaecologists offer preconception education material printed on 'shagun' envelopes in which gifts are given to newlywed couples.

Such best practices need to be replicated across the world, to help arrest GDM, and the diabetes pandemic. The current supplement of JPMA, too, is a means of achieving this goal.

References