

Screening for gestational diabetes in the Anuradhapura district

T R N Fernando¹, B G S Jayaratna², E C K Lankeshwara²

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Abstract

Introduction: Gestational diabetes mellitus (GDM) is one of the most common medical complications of pregnancy. GDM is associated with 2-4 times increase in perinatal complications. Asian women are at higher risk of GDM compared to white Caucasians. Only few studies have been done to understand GDM among rural Sri Lankan women.

Objectives: To determine if risk assessment for GDM is conducted at the field antenatal booking and to determine the types of screening methods for GDM applied in the Anuradhapura district (AD).

Method: Cross sectional retrospective analysis of a hospital based sample of pregnant women attending for their delivery.

Study population: Pregnant mothers with period of amenorrhoea (POA) >28 weeks, in the AD.

Results: N = 422. Six out of seven risk factors mentioned in the antenatal record (ANR) were well documented, in >90%. Eight risk factors, not mentioned in the ANR were poorly documented (<22%). Random urine sugar testing was done in 93%, while blood sugar tests were done in <41%.

Conclusion: Screening for GDM in the primary health care of Anuradhapura district is grossly inadequate.

Introduction

Gestational diabetes is defined as glucose intolerance first recognized during pregnancy. This definition includes women with previously undiagnosed diabetes at one end of the spectrum and those with mild disturbances of glucose intolerance resulting from the metabolic changes in late pregnancy at the other end (1). Perinatal mortality remains five times higher in GDM when untreated compared to non diabetic women.

GDM represents 90% of diabetes mellitus diagnosed during pregnancy. Its prevalence doubled in the last 8 years; a 12% increase occurring per year in high risk populations (3). The number of diabetics, is projected to double (during 2000 - 2030), in developing countries, including South Asia, thus posing a huge challenge to health care systems (8, 10).

The first case report of GDM was in 1824, with a description of a mother with thirst, polyuria and glycosuria and the death of a macrosomic infant from shoulder impaction (1). In 1917, Joslin upon observing 1300 pregnant women, published the first report of GDM, recognising adverse outcomes can be prevented by active metabolic control (2).

The pathogenesis of GDM involves insulin resistance (IR) and defective insulin secretion; anti-insulin hormones secreted by the placenta give rise to IR, making pregnancy a diabetogenic state. The onset of IR is usually after 24 weeks of gestation. A normal pancreatic reserve will respond by increasing insulin secretion, although a reduction in the pancreatic β -cell mass results in maternal hyperglycaemia (3). Glucose is transported across the placenta by facilitated diffusion. Therefore maternal hyperglycaemia will cause fetal hyperglycaemia. The fetal pancreas will increase production of insulin in response to hyperglycaemia. Insulin being an anabolic hormone predisposes the fetus to macrosomia. In addition glucose will stimulate insulin like growth factor (IGF) receptors and increase fetal growth rate.

Perinatal complications of untreated GDM include increased perinatal deaths, large for gestational age fetus, shoulder dystocia and neonatal hypoglycaemia. GDM also increases the risk of pre-eclampsia and intra-partum complications in the mother. The long term risk of type 2 diabetes for women with GDM is doubled compared to non GDM women (17). A 10 year multicentre randomised clinical trial found a significant reduction, in serious adverse perinatal outcome in the treatment group with insulin (5).

¹Lecturer, ²Temporary Lecturer, Department of Obstetrics and Gynaecology, Faculty of Medicine and Allied Sciences, University of Rajarata, Sri Lanka.

In early 1990s studies demonstrated that Asians had the highest risk of developing GDM compared to other ethnicities (4). Cheung and Wasmer examined the records of 2139 Asian women and concluded the prevalence of GDM among women in Sri Lanka is 10.5%, in China 9.2% and Philippines 6.2% (6). In 2004 Seshiah et al reported the prevalence of GDM in South India is as high as 18% (7), while Ginige et al reported this as 10.3% in Homagama in 2003 (19). The International Diabetes Federation states the prevalence of GDM in Sri Lanka stands at 11.5% in its report in 2010 (10). However, in white Caucasians these values are low, about 2-5% (6). The prevalence of GDM depends on: the ethnicity, prevalence of type 2 DM in the population and the type of diagnostic test used.

Assessing high risk women at ante natal booking and testing at 24-28 weeks of pregnancy is the widely accepted screening method for GDM. United Kingdom, NICE Guideline (2008) recommends screening all South Asian women by OGTT, i.e. with or without risk factors. The Sri Lankan Guidelines on Management of Diabetes Mellitus issued in 2007, by the Ceylon College of Physicians, addresses GDM screening (15). This includes 15 risk factors to be assessed at antenatal booking visit and recommends when risk factors are identified, to perform a 2 hour post prandial blood sugar (PPBS) test. If this value is >130 mg/dl, to proceed immediately to a 75g oral glucose tolerance test (OGTT). If 2 hour PPBS is normal, even with one risk factor for GDM, to proceed with 75g OGTT between 24-28 weeks of gestation (15).

National Laboratory Guideline by the Ministry of Health 2007 recommends selective screening for women with risk factors for GDM (18). This identifies 11 risk factors

including, glycosuria in the first trimester or glycosuria on two occasions in either 2nd or 3rd trimester (18).

Objectives

To determine if risk assessment for GDM is routinely carried out at the field antenatal booking (ANB) and the types of test performed to detect GDM, in primary health care in the Anuradhapura district.

Methodology

Study design: cross sectional retrospective analysis of a hospital based sample of pregnant women attending for their delivery.

Study population: 422 pregnant women with a POA >28weeks from AD, using convenient method of sample selection.

Study procedure: ethical clearance was obtained from the Ethics Review Committee of Faculty of Medicine and Allied Sciences, Rajarata University. Data collection was done by using a data extraction sheet. Pilot study was done in April 2011 to pre-test and validate the questionnaire. Verbal consent was taken. Data was collected from the field antenatal records (ANR) of the pregnant women who were >28 weeks, admitted to Teaching Hospital, Anuradhapura (THA). Almost 98% of deliveries of AD take place at the THA.

Data collection was started and completed in June 2011 over 20 days, by a group of medical students of the batch 2005/06 of Rajarata University.

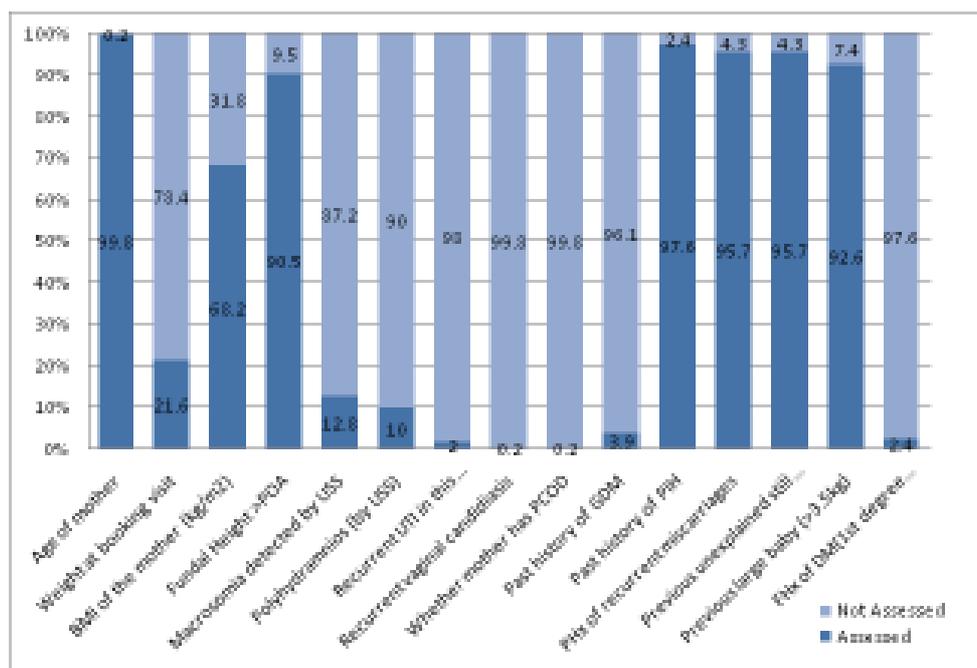


Figure 1. Risk assessment and documentation at field ante natal booking.

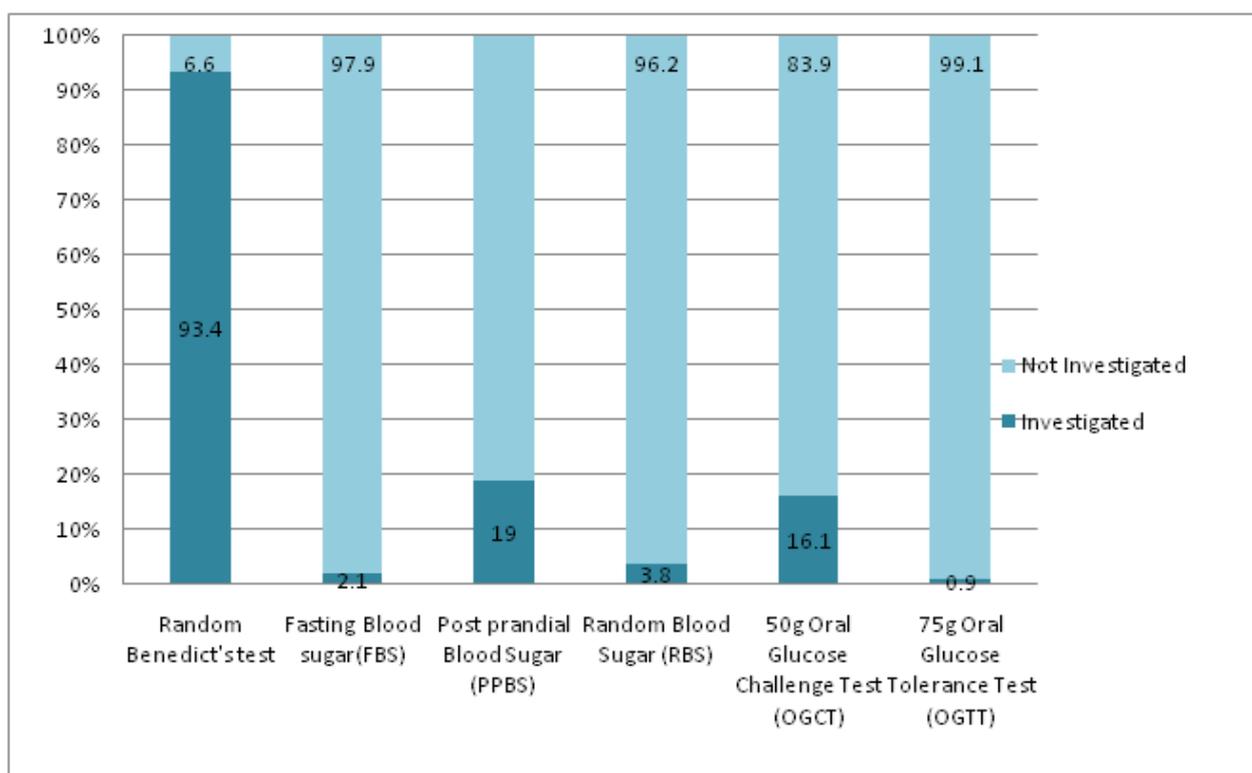


Figure 2. Investigations performed to screen for GDM at field clinics.

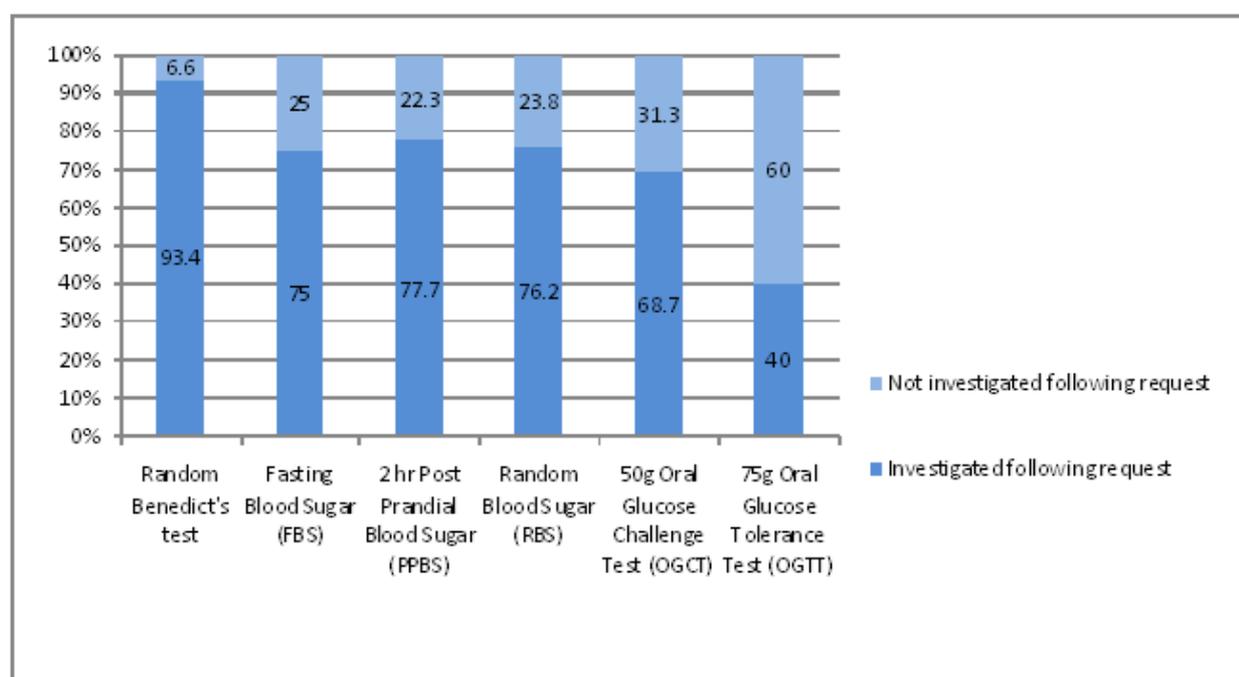


Figure 3. Investigations carried out following request at field ANC.

Results

The median age of the sample is 27 years with an age range from 17 years to 42 years.

The percentage of primigravida is 44.8%.

Out of 15 risk factors for GDM given in Ceylon College of Physicians Clinical Practice Guidelines, 6 were documented in more than 90% of the field antenatal records at the ANB. Body mass index (BMI) was documented in only 68.2%. Seven risk factors were documented in less than 22% at the ANB (Figure 1). The most frequently done test to detect diabetes in the field ante natal clinics (ANC) was the random Benedict's test in urine, accounting for 93.4% (Figure 2). Blood glucose testing was done only in 41.9% of women in this study population. The most frequently requested blood sugar test was 2 hour PPBS and 77.7% of the requested PPBS were done (Figure 3). Out of 422 women, 103 (24.5%) ANR had PPBS requested at primary health care in Anuradhapura district. Only 80 (19%) women out of these 103 had the PPBS results documented in the ANR (Figure 2).

The 50 g oral glucose challenge test (GCT) was the 2nd most frequently done test in 68 (16.1%) women (Figure 2). GCT was requested at the field ANCs. 75 g OGTT was done only in 4 (0.9%) women out of 9 requests in the ANRs (Figure 2 and Figure 3).

Discussion

For the past five decades Sri Lanka has focused on maternal mortality and has achieved millennium development goals with distinction. However, the focus on perinatal mortality had not been as good as maternal mortality. Therefore GDM has not been a priority in the preventive arm of primary health care in Sri Lanka.

Only few studies have been done in Sri Lanka on GDM in rural women. Ginige et al studied 1020 pregnant women from Homagama DDHS area in 2003, on community based screening for GDM (16). This study recommends that in primary care, screening for GDM, testing for postprandial glycosuria by enzyme based test strips is a better alternative to the current practice of Benedict's test of random urine, until our MCH system is able to implement universal screening using capillary blood glucose 2 hours following 75 g glucose loading at 24-28 weeks of pregnancy in the field, following an in depth survey of its cost effectiveness (16).

Nanayakkara K, studied pregnancy outcomes and complications of 200 antenatal mothers diagnosed with GDM at the Teaching Hospital, Kandy, Sri Lanka, and compared these with western data. They showed one in five mothers remained having type 2 diabetes mellitus, in the immediate post-partum: indicating a perilous rise of diabetes in women of reproductive age in this country (9).

Previous research on "screening of GDM" in Sri Lanka, arrived at the following conclusions. One study indicated that traditional risk factors didn't predict GDM, hence screening for GDM should be performed in all women at 24-28 weeks of pregnancy by using 50 g oral glucose challenge test (11). Another study indicates that, screening methods for GDM practiced in Anuradhapura district are highly unsatisfactory (12).

The significant finding in our study is that the risk factors for GDM that were listed in the field ante natal record (ANR) were assessed and documented in over 90%. However, the risk factors that were not mentioned in the ANR were poorly documented (<20%).

Out of 15 risk factors given in Sri Lankan guidelines for GDM, 7 had been listed in the ANR used by the primary health care in Sri Lanka.

They are: age, BMI, Symphysio fundal height, past history of pregnancy induced hypertension, past history of recurrent miscarriages, previous unexplained still births and previous birth weights.

Six out of the seven risk factors given above were assessed and documented in more than 90% in the ANRs except BMI which was only 68% (Figure 1). Weight of the mother was recorded only in 21.6% of ANRs (Figure 1).

Sri Lankan guidelines for GDM recommends to detect high risk women and then to perform 2 hour PPBS or 75 g OGTT (15,18). Risk factor screening, even in high prevalence populations for GDM, has a sensitivity and specificity of only up to 50% (13).

The test that was commonly used to detect hyperglycaemia in this study population was glycosuria testing by random Benedict's test at the ANCs. Majority (93%) of women had a glycosuria test done, which is a common practice in our ANCs (Figure 2). Glycosuria has a very poor sensitivity and specificity in pregnancy and is not recommended as a screening test for GDM. However, the blood glucose testing was performed in less than 41% of women in this study.

Post prandial blood sugar (PPBS) was the test commonly done to check the blood glucose level, this too in only 19% of women (Figure 2). 2 hour PPBS has a specificity of 80% and a sensitivity of 40%, therefore giving high false negative rates. 2 hour PPBS is not a good screening test for GDM.

50 g oral glucose challenge test (GCT) was done in 16% of women in this study. GCT is recommended as a screening test for GDM by American College of Obstetricians and Gynaecologists. GCT has a specificity of 85% and a sensitivity of 80%. This test has an advantage over 75 g oral glucose tolerance (OGTT) as the patient does not have to be fasting and only one blood sample is tested. Disadvantages of this test are, if screening is positive with GCT then a diagnostic test has

to be performed with OGTT and it will not detect fasting hyperglycaemia.

Fasting blood sugar (FBS) was done in 2% of women in this study. FBS has a sensitivity of 70 - 90% and a specificity of 50 - 75%. The sensitivity and specificity increases with the lower cut off value for the FBS level. FBS is recommended by International Association of Diabetes and Pregnancy Study Groups (IADPSG) as a screening test to detect overt diabetes in the first ante natal clinic visit at 126 mg/dl (14). However, attending the clinic for the first time in a fasting state is impractical in many rural settings of South Asia. Furthermore in most women with GDM the fasting value often does not reflect the post prandial value and ethnicity of Asian Indians who have high insulin resistance (IR) and as a consequence, their PPG is higher compared to Caucasians.

The 75 g OGTT, the gold standard test, was performed only in 0.9% of women in this study. OGTT has a sensitivity of 80% and specificity of 87%. This test is considered the best available screening and diagnostic test for GDM, the disadvantage being the need for 3 blood glucose samples to be taken and the increased burden on local laboratories.

International Association of Diabetes and Pregnancy Study Groups (IADPSG) consensus statement based on HAPO data on the diagnosis of GDM recommends:

- Screening at the first antenatal visit to diagnose overt diabetes (to all women or selected high risk women), to detect overt diabetes at the 1st antenatal visit FBS or HbA1c are recommended. They recommended cut off value for FBS >5.1 mmol/l with no suggested cut off value for HbA1c.
- Screening by GCT is not recommended, as GCT will not detect women with fasting hyperglycaemia.
- OGTT threshold for GDM, fasting plasma glucose 5.1 mmol/L (92 mg/dl), 1 hour plasma glucose 10 mmol/L (180 mg/dl) and 2 hour plasma glucose 8.5 mmol/L (153 mg/dl). This new criteria may diagnose up to 18% of women with GDM, increase or even doubling the number diagnosed by previous criteria (14). However, the applicability of these criteria is yet not ratified by WHO and has not been tested on the Sri Lankan population at field level.

Conclusions and recommendations

The screening for GDM is unsatisfactory in the Anuradhapura district. This study confirms the previous study done in AD in 2010 on screening for GDM by Dahanayake et al, that screening methods done are highly unsatisfactory (12).

Screening for GDM should be a priority in our primary healthcare. The global studies indicate that Sri Lankan women, being South Asians are at a high risk of developing

GDM. A consensus should be arrived at by the experts, to decide on the best cost effective screening strategy for Sri Lanka.

There is a need to change the ante natal record, with changes, to include the risk assessment at booking visits for GDM. In addition, the training of primary health care staff and improve awareness among women regarding GDM too is important.

More research should be encouraged to understand GDM in Sri Lankan women and the cost effectiveness for a universal screening strategy.

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