ORIGINAL RESEARCH PAPER

Gynaecology

UNIVERSAL SCREENING OF GESTATIONAL DIABETES MELLITUS BY DIPSI METHOD AND THEIR FETOMATERNAL OUTCOME

KEY WORDS: universal screening, GDM, GGI, DIPSI

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ABSTRACT

OBJECTIVE : Early detection and timely intervention of gestational glucose intolerance (GGI) and gestational diabetes mellitus (GDM) by universal screening with Diabetes in Pregnancy Study Group India (DIPSI) Criteria and to study their fetomaternal outcome.

METHOD : Randomly selected 200 antenatal women were screened universally for GDM using DIPSI criteria by measuring venous plasma glucose levels 2 hours after ingesting 75 grams of oral glucose in first trimester. Pre-gestational diabetic were excluded. Results were analysed using chi-square test.

RESULTS : Using DIPSI criteria,25 cases (12.5%) of GDM and 17 cases (8.5%) of GGI were identified. Out of these 25 cases of GDM,10 cases(40%), 7 cases(28%) ,8 cases(32%) were detected in first ,second and third trimester respectively.out of 17 GGI cases,3 cases(17.64%),7 cases(41.18%),7 cases(41.18%) were detected in first,second and third trimester respectively.

As present study was conducted on all antenatal patients irrespective of risk factors,it was found that 5 cases(20%) of GDM and 4 cases(23.52%) of GGI were detected without any risk factors which would have been missed if only high risk cases were screened.

When al cases were followed for their fetomaternal outcome,it was found that there were 5 (20%) cases of GDM nad 2 (11.76%) of GGI devoloped gestational hypertension,2(8%) GDM cses had preeclampsia.,3(12%) acses had prematurity.18 cases(72%) of GDM and 6 cases(35.29%) of GGI underwent caesarean section,although commonest indication was fetal distress(32%)

There was only one case of IUD among GDM cases and none among GGI. .

3(12%) cases of GDM had hypoglycaemia and none among GGI.

Conclusion: A one step procedure with a single value is DIPSI criteria serves both as screening and diagnostic tool for diagnosing GDM in every antenatal women. This study validates credibility of DIPSI criteria.

BACKGROUND

Gestational diabetes mellitus (GDM) is defined as any degree of glucose intolerance with onset or first recognition during pregnancy[1]. It remains an area of controversy, in areas including selective versus universal screening, timing of testing, choice of one-step or two-step approach, and the criteria to be used to diagnose GDM. Some of these controversies have been plaguing this field for several decades and they continue to remain unresolved. Until recently, many researchers questioned the very need to screen for GDM, and its cost-effectiveness in particular.

Prevalence of diabetes is increasing globally, particularly in the developing world with China and India contributing a major part of the increasing burden. A serious concern is that India is projected to have the highest population of people with diabetes in the world, by 2030[1].The rise in prevalence is attributed to aging population, urbanization, rising obesity, unhealthy diets and physical inactivity, in addition to the genetic predisposition of South Asians to diabetes[2].While all these factors do contribute to the epidemic of diabetes, early life programming seems to play a facilitator role and prepare the ground for adult life risk factors to come into play. The `Foetal Origin of Disease' hypothesis proposes that susceptibility to adult diseases may be influenced by gestational programming[3],whereby stimuli or stresses encountered by the foetus at critical or sensitive periods of development can permanently induce structural, physiological, and metabolic changes, which predispose the individual to disease in adult life[4].Primary prevention of type 2 diabetes mellitus (T2DM) encompasses maintaining normoglycaemia in genetically or otherwise susceptible individuals[5].Primary prevention strategies like lifestyle modification with or without pharmacological interventions can delay or prevent the development of T2DM in persons diagnosed with impaired glucose tolerance (IGT)[6,7] .An ideal target for such preventive interventions are women with history of gestational diabetes mellitus (GDM) and their children, as they are at a very high risk of developing diabetes, predominantly T2DM. GDM is defined as, `any degree of glucose intolerance with onset or first recognition during pregnancy[8,9].A recent meta-analysis shows that women with GDM have an increased risk of developing T2DM (RR 7 43, 95% CI 4 79–11 51).

A study from India found that women with GDM had a 3-fold increased lifetime risk of developing T2DM compared to pregnant women without GDM 16 years after index pregnancy[10]. In an Indian population it has been shown that by 17 years of age, one-third of children born to GDM mothers have evidence of impaired glucose tolerance (IGT) or T2DM[11].

One third (33%) of women with GDM in India give a history of maternal diabetes[3]. In-utero exposure to hyperglycaemia has been shown to be associated with increased occurrence of IGT and defective insulin secretory response in later stages of life, independent of genetic predisposition to T2DM[13].In addition, children exposed to maternal diabetes in-utero, are known to have higher risk of obesity and diabetes compared to their unexposed siblings, suggesting non-genetic factors for the increased risk amongst exposed offsprings[13,14].This compelling evidence centralizes the role of the intra-uterine environment in inordinately increasing the risk of future T2DM and other metabolic abnormalities, and offers unique opportunities for primary prevention.

As the age of onset of diabetes is declining and the child bearing age increasing, it is not uncommon for women to have previously undiagnosed diabetes when they become pregnant; it is therefore important that all pregnant women be tested both early in the pregnancy to rule out overt diabetes, as well as later on in the 2nd and 3rd trimesters to detect GDM. Since, women with GDM are at a high risk of developing diabetes 5–10 years postpartum, follow-up of women with GDM after the delivery is crucial. This is emphasized by the fact that T2DM can be delayed or prevented in women with GDM by lifestyle modifications or modest-intermittent drug therapy[7].Apart from its relevance in preventing intergenerational transmission of diabetes, GDM - being one of the most common medical conditions associated with pregnancy – is also highly relevant for the prevention of adverse pregnancy outcomes. Thus identifying women with GDM, and implementing interventional strategies aimed at controlling glycaemic status has implications for maternal and neonatal morbidity and mortality through reductions in abortions, stillbirths, obstructed labour,

macrosomia, shoulder dystocia and pregnancy-induced hypertensive disorders, pre-eclampsia, postpartum haemorrhage, neonatal hypoglycaemia, jaundice, infant respiratory distress syndrome etc.

A significant advantage of universal screening that is often unrecognized is that in countries like ours where the prevalence of diabetes is very high, type 2 diabetes occurs at much lower ages and urban areas have a high prevalence

This article describes the study design and research methodology for the identification and follow-up of pregnant women with GDM and GGI and their offspring to notice fetpmaternal outcome.

Present hospital based descriptive randomised clinical study was conducted in department of obstetrics and gynaecology,SMS Medical College,Jaipur.

AIM

The aim is to establish a cohort consisting of pregnant women to understand

1) determinants, e.g. socio-economic status, and risk factors for the development of GDM,
2) early detection of glucose intolerance and gestational diabetes mellitus ,timely intervention and their follow up to prevent maternal and fetaal complications
5) to reduce the maternal and fetal risk associated with gestational glucose intolerance and GDM.

This comprehensive study will help shape the public health response to the rising burden of GDM and diabetes.

METHODS

This hospital based descriptive randomised clinical study was conducted in Department of Obstetrics and Gynaecology, SMS Medical College, Jaipur.

Randomly selected 200 antenatal women were screened universally at first antenatal visit in first trimester for gestational diabetes mellitus by using DIPSI criteria.And all were followed throughout their antennal period in all trimester.

DIPSI RECOMMENDED METHOD-SINGLE STEP TEST (DIABETES IN PREGNANCY STUDY GROUP INDIA

This test measures venous plasma glucose levels 2 hours after ingesting 75 gms of oral glucose in first trimester. They were diagnosed to have gestational diabetes mellitus(GDM) when 2hour post glucose value was > 140 mg/dl, as gestational glucose intolerance(GGI) if 2 hr PG ranges between 120 – 140 mg/dl and as normal glucose tolerance (NGT) with 2hr PG < 120mg/dl. Pregnant women with NGT in first trimester were re-tested at 24 – 28 weeks, at 32nd -34th weeks and also in later weeks when rapid maternal weight gain occurs or fetal macrosomia is suspected. Both GDM and GGI were advised MNT for 2 weeks. GGI cases were followed with a repeat DIPSI test after 2 weeks and GDM cases were followed with FPG levels and blood sugar 1˝ hour postmeal. GDM,GGI and NGT women were followed throughout pregnancy to study fetomaternal outcome 4. Cases of GDM who failed to respond to MNT were switched to insulin therapy.

Exclusion criteria: Pre-gestational diabetics were excluded.

Table – 1 ***Abnormal blood glucose Trimester wise by DIPSI method***

Trimester	GDM		GGI		NGT
	Number (25)	%	Number (17)	%	
First (n=200)	10	40.00	3	17.64	187
Second (n=187)	7	28.00	7	41.17	173
Third (n=173)	8	32.00	7	41.17	158

Table – 2 ***Distribution of Cases According to Venous Plasma Glucose Levels 2 hours After 75 gm of Oral Glucose (DIPSI Criteria)***

DIPSI Test	Number	%
NGT	158	79.00
GGI	17	8.50
GDM	25	12.50
Total	200	100.00

Table – 3 ***Association of Risk Factors for Gestational Diabetes Mellitus****

Risk Factors	NGT (n = 158)		GGI (n = 17)		GDM (n = 25)		Total	
	No.	%	No.	%	No.	%	No.	%
Risk factors	68	43.04	13	76.48	20	80	101	50.50
No risk factors	90	56.96	4	23.52	5	20.00	99	49.50

Table – 4 ***Distribution of Cases According to maternal and fetal Complications****

Obstetric Complications	NGT (n = 158)		GGI (n = 17)		GDM (n = 25)		Total		P-value	Significance
	No.	%	No.	%	No.	%	No.	%		
Gestational Hypertension	16	10.12	2	11.76	5	20.00	23	11.50	0.355	NS
Preeclampsia	5	3.16	0	0.00	2	8.00	7	3.50	0.338	NS
Prematurity	11	6.96	1	5.88	3	12.00	15	7.50	0.651	NS
Polyhydramnios	10	6.32	1	5.88	3	12.00	24	12.00	0.546	NS
Oligohydramnios	14	8.86	0	0.00	3	12.00	17	8.50	0.500	NS
PROM	6	3.79	0	0.00	1	4.00	7	3.50	NA	-
IUGR	4	2.53	0	0.00	2	8.00	6	3.00	NA	-
Chorioamnionitis	0	0.00	0	0.00	0	0.00	0	0.00	NA	-
Caesarean Delivery	42	26.57	6	35.29	18	72.00	66	33.00	-	-

Table – 5 Distribution of Cases According to Fetal and Neonatal Complications*

Fetal Complications	NGT (n = 158)		GGI (n = 17)		GDM (n = 25)		Total		P-value	Significance
	No.	%	No.	%	No.	%	No.	%		
Fetal Complications										
IUFD	1	0.63	0	0.00	0	0.00	1	0.50	NA	-
Still Birth	1	0.63	0	0.00	0	0.00	1	0.50	NA	-
Macrosomia	6	3.79	2	11.76	2	8.00	10	5.00	0.274	NS
Fetal Distress	12	7.59	6	35.29	8	32.00	26	13.00	0.000	Sig

Neonatal Complications										
Admission in neonatal care unit	15	9.40	1	5.88	6	24.00	23	11.50	0.077	NS
Hypoglycemia	0	0.00	0	0.00	3	12.00	3	1.50	NA	-
Respiratory Distress Syndrome	8	5.06	1	5.88	3	12.00	12	6.00	0.398	NS

RESULTS :

Using DIPSI criteria,25 cases (12.5%) of GDM and 17 cases (8.5%) of GGI were identified.

Out of these 25 cases of GDM,10 cases(40%), 7 cases(28%) ,8 cases(32%) were detected in first ,second and third trimester respectively.

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3(12%) cases of GDM had hypoglycaemia and none among GGI.

DISCUSSION

Pregnant women belonging to a high risk ethnic population like Indians, require universal screening. This observation emphasizes the need for an appropriate diagnostic tool to diagnose GDM.A one step procedure with a single glycemic value which serves both as screening as well as diagnostic tool.

Incidence of GDM was found as 13.40% by V Balaji et al (2011)[16] and 6.51% by Preeti Wahi et al (2011)[17] based on DIPSI criteria by universal screening and 4.95% in study done by Walter Plasencia et al (2011)[18] using universal screening. Nilofar AR et al (2012)[19] calculated incidence as 6% using ADA criteria by screening on high risks in Davangere, Karnataka.

Walter Placensia et al (2011)[18] found 27 (31.76%) cases of GDM at 6-14 wks and 47 (55.29%) cases at 20-30 wks and A P Sawant et al (2011)[20] identified 4 (22.22%) cases of GDM in first half of pregnancy and 14 (77.77%) cases in second half of pregnancy.

Turki Gasim et al (2012)[21] identified 91 (41.4%) cases of GDM with family history of diabetes mellitus, 43 (19.5%) cases with history of GDM in previous pregnancy, 16 (7.30%) cases with history of macrosomic baby and 3 (1.40%) cases with previous still birth.

Preeti Wahi et al (2011)[17] found incidence of 7 (10%) cases of IUGR, 1 (1.4%) case of shoulder dystocia and none of them developed gestational hypertension, PROM among treated GDM patients and 20 (14.3%) cases of IUGR among NGT.

Turki Gasim et al (2012)[21] found incidence of gestational hypertension in 40 (18.2%) cases, prematurity in 25 (11.4%) cases, polyhydramnios in 7 (3.2%) cases, oligohydramnios in 6 (2.7%) of GDM.

Mohammad H et al (2012)[22] found global incidence of caesarean rate as 85.9% among GDM and 37.8% among NGT.

Our results were in contrast to study done by Preeti Wahi et al (2011)[17]only 6 (8.5%) cases of GDM underwent caesarean section. Turki Gasim et al (2012)[21] found 53 (24.1%) cases of GDM undergoing caesarean section.

Turki Gasim et al (2012)[21] found 28 (12.7%) cases of macrosomia, 8 (3.6%) cases of IUGR, 3 (1.4%) cases with congenital anomalies, 25 (11.4%) cases with prematurity and 3 (1.36%) cases of still births among GDM.

Preeti Wahi et al (2011)[17] observed 7 (10%) cases with LBW, 3 (4.2%) cases of macrosomia, none of newborn developed RDS, congenital anomalies and still birth among GDM cases.

Turki Gasim et al (2012)[21] found that out of newborn of 220 GDM cases, 36 (16.4%) cases were admitted in NICU >24 hrs, 8 (3.6%) cases were LBW, 28 (12.7%) cases were macrosomic, 6 (2.7%) cases developed hypoglycemia, 18 (8.2%) cases developed hyperbilirubinemia, 3 (1.4%) cases had RDS at birth.

Incidence of GDM patients requiring insulin were 26 (38.09%) cases in study done by Preeti Wahi et al (2011)[17], 19 (22.4%) cases in study by Walter Plasencia et al (2011)[18] and 49 (28.65%) cases in study by Turki Gasim et al (2012)[21].

CONCLUSION

Our approach to prevent the rising burden of diabetes is to focus attention on the early origins of health and address the issue of gestational diabetes mellitus (GDM). Indian ethnicity increases the risk for gestational diabetes. Since all our women are of Indian origin by default all of them are at higher risk of GDM. Hence in our country universal screening for GDM is mandatory.

Even the milder form of hyperglycemia (GGI groups) were associated with significant adverse effect on fetomaternal outcome, hence these cases needs identification and timely management. Screening all pregnant women for glucose intolerance, achieving euglycemia in them and ensuring adequate nutrition may prevent in all probability the vicious cycle of transmitting glucose intolerance from one generation to another.

"Addressing GDM thus constitutes a window of opportunity for early intervention and reduction of the future burden of type2 diabetes mellitus".

ETHICS

Study has been approved by ethical committee.

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