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Original Research Article

Screening for Gestational Diabetes by DIPSI Guidelines

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Abstract

Aim and Objectives: The present study was undertaken to find out the role and effectiveness of DIPSI guidelines as a replacement for other more time consuming and cost effective methods for detecting gestational diabetes mellitus **(**GDM) in the Indian population and to compare outcome between GDM and non GDM population.

Methods: A total of 345 women were selected of low risk category between the gestational ages of 24 to 28 weeks and were subjected to screening for gestational diabetes by DIPSI guidelines. A 75mg oral glucose load was given irrespective of their last Meal timing followed by blood glucose estimation by glucose oxidase – peroxidase method. A report of ≥140mg/dl were labeled as GDM as per DIPSI guidelines.

Results: Out of 345 subjects screened, 30 (8.7%) were positive for GDM. The false positives encountered with DIPSI were 0.57% (2/345) and another 2 cases (0.57%) were false negative by DIPSI criteria. The rate of LSCS and rate of macrosomia was significantly higher in GDM population (30% and 33.33% respectively) as compared to general population (4.4% and 2.5% respectively). In GDM group 23.3% (7) had Shoulder Dystocia compared with 0.6% (2) in the normal population. 10% were breech compared with only 0.2% in the general population with 1 IUFD requiring hysterotomy. The rates of CPD were also higher (3.3%) than the general population (1.5%). A total of 19 neonates required NICU admission of which 11 were IDM. 36.66% of IDM required NICU admission as compared to only 2.5% of the non diabetic population.

Conclusions: DIPSI guidelines can use as a replacement for other more resource and time consuming and costly methods like ADA criteria for the detection of GDM in the low resource settings in developing countries.

Keywords: Gestational Diabetes Mellitus (GDM), DIPSI guidelines, ADA, MNT, Macrosomia, Perinatal outcome.

1. Introduction

Gestational Diabetes Mellitus (GDM) is defined as 'Carbohydrate intolerance with recognition or onset during pregnancy', irrespective of the treatment with diet or insulin. GDM is associated with maternal as well as fetal complications. The importance of GDM is that two generations are at risk of developing diabetes in the future. Women with a history of GDM are at increased risk of future diabetes, predominately type 2 diabetes, as are their children [1]. The prevalence of GDM in India varied from 3.8 to 21% in different parts of the country, depending on the geographical locations and diagnostic methods used. GDM has been found to be more prevalent in urban areas than in rural areas [2-9]. For a given population and ethnicity, the prevalence of GDM corresponds to the prevalence of Impaired Glucose Tolerance [IGT, in non-pregnant adult] within that given population [10]. Early detection and prompt treatment of GDM has been shown to reduce the risk of these complications and future health care burden on health system of the country.

The controversy concerning optimal strategy still continues for the detection and diagnosis of GDM. American Diabetes Association (ADA) recommends two step procedures for screening and diagnosis of diabetes and that too in selective (high risk) population. Compared with selective screening, universal screening for GDM detects

more cases and improves maternal and neonatal prognosis [11]. In the Indian context, screening is essential in all pregnant women as the Indian women have 11 fold increased risk of developing glucose intolerance during pregnancy compared to Caucasian women [12]. The recent data on the prevalence of GDM in our country was 16.55% by WHO criteria of 2 hr PG 140 mg/dl [13]. As such Universal screening during pregnancy has become important in our country. For this we need a simple procedure that is economical and feasible.

In India more than 70% of population live in rural settings and facilities for diagnosing diabetes itself is limited. In this scenario, performing OGTT recommended by other associations [e.g., American Diabetes Association, National Diabetes Data Group, International Association of Diabetes and Pregnancy Study Groups] to diagnose GDM is not possible as the cost involved is prohibitive to perform three blood tests and thus not favored by both health care providers and seekers. This may be one of the reasons why the program for universal screening for all pregnant women is not implemented. Most importantly detection and care of GDM has become a public health priority as the still birth rate is high in India and one of the causes is gestational diabetes mellitus [14]. Hence, the need is for a simple and economical test to diagnose GDM. In this context, DIPSI procedure of estimating plasma glucose from one blood sample is cost effective and evidence based as revealed by the pregnancy outcome in this study and as well as by Wahi *et al* [15].

2. Material and Methods

The present study was carried out in Department of Obstetrics and Gynecology at K. B. B. H. Bandra, Mumbai from January 2011 to December 2011. Patients between 24 to 28 weeks of gestation coming to the ANC clinic for the first time for registration and those coming for follow up ANC visit were selected for the study. A total of 400 women were selected of which 54 women were lost to follow up. A total of 345 women were assessed. Before starting the study Institutional Ethical Committee approval and written informed consent from all patients were obtained. The patients above 28 weeks and those below 24 weeks of gestation, women with wrong or mistaken dates or those whose dates are not determined by a ultrasonography or by LMP and women already on treatment for or diagnosed with gestational diabetes were excluded from the study.

All the selected patients were subjected to screening for gestational diabetes by DIPSI guidelines. A detailed menstrual, family and obstetric history was taken. A complete routine general examination was done including height, weight; blood pressure followed by a complete per abdomen examination was done. A 75mg oral glucose load was given irrespective of their last Meal timing followed by blood glucose estimation by glucose oxidase – peroxidase method. Women with plasma glucose level of 140mg/dl or more were considered as women with gestational diabetes.Women with positive screen with DIPSI were subjected to undertake ADA criteria for Diagnosis for Gestational Diabetes. 100g glucose load was given after fasting blood glucose estimation and 1, 2 and 3 hour venous glucose levels were estimated. Women who had a family history of GDM or diabetes if diagnosed negative by DIPSI were made to undertake diagnosis by ADA criteria. These women were initially started on MNT after confirming GDM. Women not controlled on MNT were started on insulin.

Management- Once diagnosis was made, medical nutritional therapy (MNT) was advised initially for two weeks. If MNT failed to achieve control i.e., FPG >90mg/dl and/or 1 1⁄2 hr PPG <120mg/dl, insulin was initiated. Once target blood glucose was achieved, woman with GDM till the 28th week of gestation were lab monitored for both fasting and 1 1⁄2 hr post breakfast once a month. After the 28th week of gestation, the laboratory monitoring was more frequent at least once in 2 weeks, if need be more frequently. After 32 weeks of gestation, lab monitoring was done once a week till delivery. The type of delivery, any intrapartum complications and need for NICU admission were noted. All these women were followed up till delivery. Macrosomia was diagnosed as >4kg.

3. Observations and Results

Table 1 show the statistics of various variables among cases. The majority of patients were in the age group of 18 – 30 years with mean age of 24.8±3.48 years. The average gestational age for screening was 25.87±1.28 weeks. The average BMI was 24.45±3.64 ranging from 16.64 to 38.36.

Table 1: Statistics of Variables among Cases

Variables	Mean±SD	Median	IQR	Minimum	Maximum
Age (yrs)	24.80±3.48	25.00	5.00	18.00	37.00
Weeks of gestation-Dates	25.87±1.28	26.00	2.50	24.00	28.10
Weeks of gestation-Dates Scan (earliest)	25.95±1.29	26.10	2.10	24.00	28.40
Height (cm)	149.54±4.85	150.00	7.00	140.00	160.00
Weight (kg)	54.57±8.89	54.00	10.50	39.00	97.00
Body Mass Index	24.45±3.64	24.14	4.48	16.64	38.36
RBS by DIPSI Guidelines (mg/dl)	88.30±29.22	81.00	20.65	50.00	210.00
Birth weight (kg)	2.68±0.39	2.60	0.40	1.90	4.20

Note: IQR= Interquartile Range (i.e. 75th Percentile-25th Percentile)

Total 33 women had associated current or past co-morbidities (9.6%), among these women tuberculosis was the most common at 4.6% followed by jaundice and appendisectomy at 1.4%. Only 0.9% of women was known cases of diabetes mellitus in pregnancy and only 0.3% and 0.9% had a history of PIH and asthama respectively as shown in table 2.

Table 2: Distribution of cases with respect to past history of illness

Past h/o illness	No.	Percentage
Appendisectomy	5	1.4%
Asthma	3	0.9%
Jaundice	5	1.4%
K/C/O DM in pregnancy	3	0.9%
PIH	1	0.3%
Tuberculosis	16	4.6%
None	312	90.4%
Past h/o GDM	**No.**	**Percentage**
Yes	33	9.6%
No	312	90.4%

89.3% of the total study group had no family history of diabetes. Of the 10.7% women who had a history of diabetes mellitus 4.3% was attributed to maternal diabetes, 1.7% to paternal diabetes and the rest 4.6% to the remainder of the family members. Of the cases diagnosed either by DIPSI criteria or those by ADA criteria 7 were identified with a positive family history of diabetes. All of these 7 cases were confirmed by both DIPSI and ADA criteria as having diabetes. Of the seven cases in 3 cases mother was a diabetic. Out of the 3 in one case both the mother and brother were diabetic. The father had a history of diabetes in 1 case only and the rest were in no 1st degree relatives. Figure 1 show the categories of BMI among the cases.

Figure 1: Categories of BMI among the cases

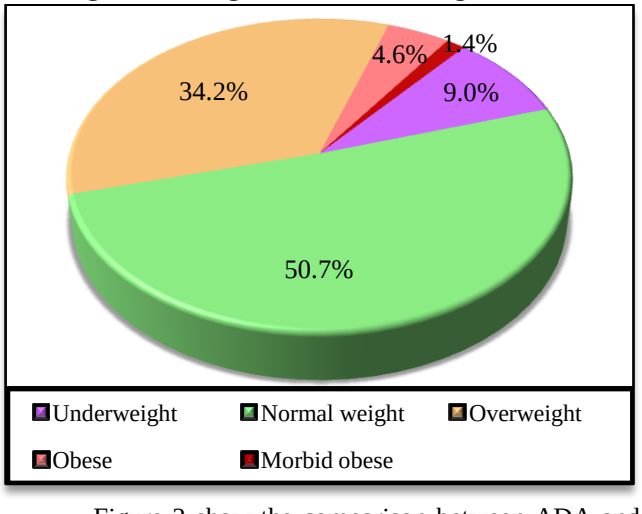
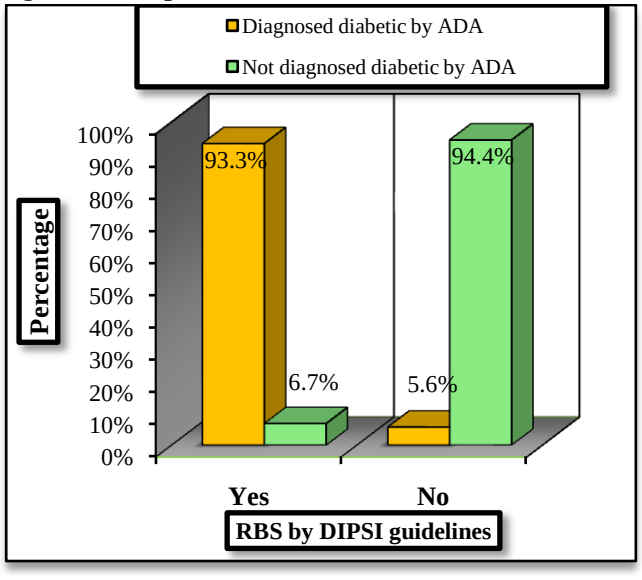


Figure 2 show the comparison between ADA and DIPSI criteria. 30 patients were diagnosed with GDM by DIPSI criteria of which 2 patients were diagnosed as non diabetic according to ADA criteria. Others who had family history of GDM or diabetes were also rechecked by ADA for GDM. Of this group 2 patients were diagnosed by ADA criteria which were missed by the DIPSI Screening criteria. The total patients confirmed as having GDM were 30 (8.7%). So the false positive encountered with DIPSI was 0.57% (2 cases of the total population) and another 2 cases (0.57%) were false negative by DIPSI criteria.

Figure 2: Comparison between ADA and DIPSI Criteria



Out of all the patients diagnosed with GDM only 5 (16%) patients required Insulin for control of hyperglycemia. The remainder of the study group [27 (7.8%)] was controlled by MNT including diet modification. Overall the LSCS rate obtained in the study population was very low (6.7%). Excluding the GDM population the LSCS rate dropped even further (4.4%). Among the patients with confirmed GDM the LSCS rate was 30% (9) with 1 patient requiring hysterotomy due to breech presentation with IUFD, (Table 3).

Table 3: Mode of Delivery among the cases

Delivery	No.	Percentage
FTND	318	92.2%
LSCS	23	6.7%
PTND	3	0.9%
IUFD Delivered by hysterotomy	1	0.3%
Total	345	100.0%

Table 4 show complication observed among the cases. The overall the rate of complications in the entire study group was 8.7%.

Table 4: Show the complication among the cases

Complications	No.	Percentage
Breech	4	1.2%
Cpd	4	1.2%
Cpd With Fetal Distress	5	1.4%
Fetal Distress	7	2.0%
Meconium Stained Liq With Distress	1	0.3%
Shoulder Dystocia	9	2.6%
Nil	315	91.3%
Total	345	100.0%
Complications	No.	Percentage
Yes	30	8.7%
No	315	91.3%
Total	345	100.0%

Macrosomia was detected in 5.2% (18) patients of the total study group. Out of the total patients with GDM 33.33% (10) patients delivered a macrosomic neonate as compared to only 2.5% in the normal population. A total of 19 neonates required NICU admission of which 11 were IDM. 36.66% of IDM required NICU admission as compared to only 2.5% of the non diabetic population.

4. Discussion

In the Indian context, screening is essential in all pregnant women as the Indian women have eleven-fold increased risk of developing glucose intolerance during pregnancy compared to Caucasian women [16]. Diabetes mellitus is an epidemically explosive problem which is increasing at an unstoppable pace. DIPSI guideline having suggested one time plasma sugar level as a measure to detect GDM is an attempt to pre-empt future possibility and predisposition for diabetes mellitus. In my study a total of 345 women were tested for GDM by DIPSI criteria and the patients who were diagnosed as GDM were re tested for confirmation by the ADA Diagnostic criteria for GDM. All patients were followed up until delivery.

In present study mean age of the patients was 24.8±3.48 years and the average age of the women with GDM was 24 years. So there was no significant difference between age groups in GDM and control which corresponds to the study by Wahi *et al* [15] in which the average age was 27±2.3 years in GDM group with 26.2±2.3 years in the control group. The average BMI in the GDM group was 29.702 with 16% morbidly obese, 23% obese and 40% over weight compared with the overall BMI of 24.45 in the entire study group. This was comparable to the study of Wahi *et al* [15] which also had a significant proportion of subjects with GDM overweight (30.65%) and 25.8% obese. Study of prevalence of GDM in Southern Iran (Bander Aban City) showed that BMI of 25kg/m^2 or more were significantly more prevalent in GDM subjects [17] which were in accordance with the present study. GDM was seen to be least prevalent (3.23%) in underweight subjects (BMI < 18.5 kg/m2).

In this study 23% of the patients with confirmed GDM were having a positive family history of diabetes which corresponds to the study of Wahi *et al* [15] (24.19%). A study from Tamil Nadu also concluded that family history of diabetes was a significant risk factor for GDM [18]. This finding was in accordance with a study in Europe that showed positive family history of type-2 diabetes in majority of subjects with GDM [19]. The overall incidence of GDM confirmed by the ADA criteria was 8.7%. All the women in the study belonged to a low socio economic class. GDM prevalence has been reported variably from 1.4% to 14% worldwide and different among racial and ethnic groups. Prevalence is higher in blacks, Latino, Native Americans and Asian women than White women [20]. A similar study in Kashmir gave the prevalence of 3.8% [21]. In the study by Wahi *et al* the prevalence of GDM obtained was 6.94%. So the false positives encountered with DIPSI were 0.57% (2 cases of the total population) and another 2 cases (0.57%) were false negative by DIPSI criteria.

The LSCS rate in the GDM group was much higher 30% as compared to the general population (4.4%). Wahi *et al* [15] also obtained a 22.58% cesarean section rate in non interventional GDM population. Only 1 patient in the GDM population required Hysterotomy for an IUFD with breech presentation. The rate of macrosomia was also significantly higher (33.33%) in the GDM population as compared to the normal population 2.5%. Most studies show foetal macrosomia in 10-20% of the infants born to the mothers with GDM [21]. Asian Indian mothers also show prevalence of large babies as 27.6% in GDM group [22]. In the study by Wahi *et al* [15] the no of women with macrosomia was 14.52% in the GDM non treatment group and 10% in the treated group. In our study higher rates of macrosomia were observed most likely due to poor patient compliance to MNT and insulin with inadequate follow up most likely due to low socio economic class and poor education.

In the GDM population shoulder dystocia was the major complication (23.33%) followed by cephalo pelvic disproportion in 13.33% of cases followed by breech in 10% of cases foetal distress in 6.6% of the cases and IUFD in 3.3% of cases. This complication rate was much higher than the normal population, (4.4%). This was comparable to the study by Wahi *et al* [15] that also showed a still birth rate of 4.84% and a foetal distress rate of 3.23%. A similar study from Thailand showed incidence of respiratory distress syndrome and still birth rate as 4.9% and 1.2%, respectively [23].

5. Conclusion

DIPSI guideline is a simple single prick no tedious cost effective method for detecting GDM. The present study evidently proves advantage of adhering to DIPSI guidelines in the diagnosis and management of GDM for a significantly positive effect on pregnancy in relation to mother and child. DIPSI criteria are equally effective and efficacious to ADA criteria for diagnosing GDM.

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