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Early diagnosis and treatment of gestational diabetes mellitus with maternal and fetal outcomes assessment

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Abstract
The study was performed in the Department of Obstetrics and Gynecology in Krishna Medical College from June 2011 to June 2013. The objective was to screen and diagnose all the GDM cases early during the pregnancy by Single step OGT test and to treat them early so as to reduce the maternal as well as fetal complications during pregnancy. Study detected 22 % incidence of GDM by single step 75 g OGT test. This study have detected GDM cases early and did their regular follow up till delivery. All GDM patients received treatment early and they maintained BSL within normal limit till they delivered.

Keywords: gestational, fetal, gravida, pregnancy, diabetes mellitus, GDM, urinary tract, glucose homeostasis

Introduction
Diabetes mellitus (DM) is a persistent metabolic condition marked by an total or conditional insulin deficiency culminating in hyperglycemia. Physiologically, during the nine months of birth, the woman was like a different human. Virtually every system undergoes changes. The biochemical and hormonal basis for regulation of carbohydrate metabolism, particularly blood glucose homeostasis is extremely complex. Pregnancy is a condition where the system is in need of the various utilizable materials, in which carbohydrate is an important constituent not only for the upkeep of normal functions of the pregnancy but also for the growing fetus in uterus. Pregnancy possibly represents functional challenge whether normal carbohydrate metabolism will be maintained or not, depends upon the individual's compensatory mechanism.

GDM is a term that generates significant controversy. It is defined as 'Carbohydrate intolerance of varying degrees with onset of the first recognition during pregnancy after 20 weeks [1]. Frank diabetes is known to affect the growing fetus in different forms. Seshiah and co-workers from Madras (1991) suggested that even minor degree of derangement in Carbohydrate metabolism during pregnancy is also associated with high fetal loss. Thus diagnosis of GDM during pregnancy offers an important opportunity for implementation of strategies to prevent DM in future.

Thus there is a need for collaborative effort to screen diagnose and treat GDM as a measure towards primary prevention of diabetes.

Aim and Observation
Early diagnosis and treatment of gestational diabetes mellitus with maternal and fetal result evaluation. To determine the occurrence of Gestational Diabetes Mellitus. To screen all antenatal women for Gestational diabetes mellitus. To evaluate the maternal and fetal outcomes in Gestational diabetes mellitus.

Review of Literature
Diabetes has been described more than 2000 years ago. As per to Hindu writings, black ants were drawn to the urine of patients with this disease, which induced extreme hunger, tremendous urine intake, and body waste.

The term 'Diabetes' was originally invented by Apollonius of Memphus. His original definition was 'to move around' or 'siphon,' which represents the early perception of the disease as 'a melting of flesh and limbs into the fluid.' Gradually, the Latin word for honey 'mellitus' was added to diabetes because of its link to sweet urine. 1869 A.D century provides witness to the remarkable progress for diabetic women who become pregnant. At the beginning of century diabetic women commonly suffered from infertility and women achieving pregnancy had dismal prognosis and the perinatal mortality was nearly 40%. Diabetes is one of the most common endocrine disorders. Problems like infertility were commonly encountered in the past. Over the years this problem is largely replaced by repeated abortions to sudden intra uterine deaths as the chances of conception have immensely improved. The concepts of gestational diabetes mellitus, gestational glucose intolerance and impaired glucose intolerance have gained our attention in this century.

Gestational Diabetes Mellitus is characterized as any degree of carbohydrate aversion that results in a variable intensity hyperglycemia initiation or first identification during pregnancy, irrespective of whether diabetes continues after pregnancy. Incidence 3-5% in general population [2]. Its prevalence ranges from 3.8 to 21 %in Indian population [3]. Zargar (2004) published universal screening at 2nd or 3rd trimester done in 1999-2002 in Kashmir based on Carpenter & Coustan criteria gives prevalence of 3- 8% [4]. By WHO criteria prevalence is 4.4% [5]. f day or last meal. Plasma blood glucose level is measured at the end of 1 hour. A value > 140 mg% has to be followed up with a 3 hr OGTT specificity of

OGCT, 87% sensitivity of OGCT " 79% (ACOG Bulletin Nov2007) [6]. The gold standard for diagnosis of GDM is an OGTT. This test is performed according to guidelines laid down by ADA. Subjects should consume 150 gm carbohydrate on each day of 3 day preceding the test. No alcohol should be digested after previous evening meal. The test is conducted after 8 hrs and no more than 16 hrs of fasting. Initially a fasting venous blood sample is taken from anterior cubital vein. A 100 gm glucose load is given as orally usually prepared as 50% glucose solution. The exact time when the subject drinks should be recorded not more than 5 min. can be taken to finish the solution. During the test the subject should be seated comfortably. Smoking and consumption of beverages other than water should not be permitted. Subsequent venous blood samples are drawn exactly at 1, 2, 3 hrs. after the subject started to drink glucose.
Sesshiah and others have recently published criteria for diagnosis of GDM in which they have recommended 75 gm 2 hour OGTT. 13 In an antenatal clinic a pregnant woman is given an oral load of 75 gm glucose without regard of time of last meal. In the measurement of plasma glucose a venous sample is obtained every two hours. GDM is detected if it is greater than or equivalent to 140 mg level of plasma glucose.
GDM is characterized as an allergy to carbohydrates first recognized during pregnancy. Pregnancy is a disorder of a diabetes. Variant Human placental lactogen and placental growth hormone (GH) make significant contributions to pregnancy insulin resistance. There is significant rise in levels of Cortisol in maternal circulation which again contributes to insulin resistance. Elevated levels of estrogen, progesterone and prolactin all worsen insulin sensitivity during pregnancy. As a result of diminished maternal sensitivity to insulin action, the pregnant state is characterized by increased insulin concentrations as a compensatory mechanism. (Kuhl etal 1991) [7]. Friedman & Colleagues identified that people who have GDM have a distinct capacity to experience tyrosine phosphorylation by insulin beta receptors relative to those with non-diabetic pregnancy. Compared with non-diabetic gravidas this mutation was correlated with lower glucose transfer behavior [8]. Beta cell dysfunction may be secondary to auto-immunity directed against pancreatic beta cell monogenic origins such as the establishment of young maturity onset diabetes or chronic insulin resistance [9]. Interleukin-6, another inflammatory cytokine, also inhibits glucose transporter-4 synthesis, as well as induces insulin resistance by an up-regulating suppressor of cytokine-3 that inhibits tyrosine phosphorylation of insulin receptor substrate 1 and 2 [10]. For population and sex-specific growth curves, fetal macrosomia is classified as birth wt > 4 kg or birth wt > 90th percentile (Boyd M E *et al* 1983) [11]. It complicates as many as 50% of pregnancy in women with GDM [11]. According to Pederson's hypothesis maternal hyperglycemia results in fetal hyperglycemia and fetal pancreatic islet cells are stimulated to produce increased amounts of insulin [12].

Material and Methods

The prospective cohort study is performed on pregnant women in chronological order attending the antenatal clinics in Department of Gynecology and Obstetrics, KIMS Hospital, karad for a period of 24 months from May2011 to May 2013. During this period the study subjects at 16th to 18th weeks of gestation were evaluated for presence of GDM according DIPSI (Diabetes In Pregnancy Study Group India) recommended method and followed up to the delivery to determine the outcome of pregnancy as per pre designed. To obtain an unbiased data universal screening of all pregnant women attending antenatal checkup is done from all socioeconomic strata. The inclusion criteria includes all pregnant woman at 16-18th weeks of gestation with singleton pregnancy while case pertaining to type1diabetes mellitus, urinary tract infection (UTI), major chronic diseases such as carcinoma, tuberculosis and disease leading to fluid accumulation such as congestive heart failure, renal failure and advanced liver failure excluded from this study.

Observations and Analysis

A total of 1000 patients were included under this randomized control trial and were evaluated for GDM using the D.I.P.S.I criteria. Out of 1000 patients 220 (22%) were diagnosed as G.D.M and remaining the non GDM group. In this 354 (35.4%) belonged to the high risk group and 646 (64.6%) belonged to the low risk group. Among the GDM patients (220) 183 belonged to the high risk group (83.3%) and 87 (16.7%) belonged with the low risk group. This set of population which were missed during selectively screening and is statistically significant. So universal screening is mandatory.

Table 1: Age Wise Distribution of GDM Patients

Age Group	Gdm Patients	%
<20	30	13.6%
21-25	33	15%
26-30	62	28%
31-35	93	42%
>35	2	0.9%
TOTAL	220	

As seen in Table 1 the prevalence ratio increased from 14.5 years in the 15-19 year age group to 28 percent in the > 30yrs age group.

Table 2: Gravidity of Patients with Gdm

Gravidity	GDM	%
Primi-Gravida	31	14%
Second- Gravida	53	24%
Third-Gravida	58	26%
Multi-Gravida	78	35%
Total	220	

As seen in Table 2, the GDM incidence rises by gravity from 16.3% in primigravidas to 25.8 per cent in gravidas > 4.

Discussion

This study of Early diagnosis and treatment of gestational diabetes mellitus with maternal and fetal outcome assessment was conducted in Krishna Institute Medical college and Hospital in Department of OBGY during period from June 2011 to June 2013. All antenatal women visiting Out Patient Department were screened for Gestational Diabetes Mellitus

and those diagnosed to have Gestational Diabetes Mellitus were followed up till delivery. It was noted that out of 1000 patients who followed up and delivered in our hospital between June 2011-June 2013,220 patients were diagnosed as a case of GDM making the incidence as 22%

This denoted that in this study population the incidence of GDM was 22 %. Thus the Positive Predictive value of single step OGT 2 Hours after 75 grams glucose is 22%. In our study we found incidence which was significantly less than other studies. Incidence was Maximum with the V. Seshiah study which was 16.5%.

In our study, a significant proportion of subjects with GDM were obese (13%). Study of prevalence of GDM in Southern Iran (Bander Aban City) showed that BMI of 25 kg/m2 or more were significantly more prevalent in GDM subjects[5] which is in accordance with the present study. GDM was seen to be least prevalent (3.23%) in underweight subjects (BMI < 18.5 kg/m2). We observed family history of diabetes mellitus in significant proportion of cases i.e. 91(41.3%). A study from Tamil Nadu also concluded that family history of diabetes was significant risk factor for GDM. This observation is compatible with research in Europe that showed strong family history of type 2 diabetes in most subjects with GDM [13].

Conclusion

This study have detected 22 % incidence of GDM by single step 75 g OGT test. Study have detected GDM cases early and did their regular follow up till delivery. All GDM patients received treatment early and they maintained BSL within normal limit till they delivered. GDM patients were examined for fetal anomalies by ultrasound scan and HbA1C. Fetal outcome was good in all GDM cases (22), who delivered normally or even by LSCS. With ome still birth in 16% NICU admissions. No perinatal mortality noted. Only 18%of the patients required insulin therapy. Out of 220 patients 31% patients delivered vaginally and 53% patients delivered by LSCS. 28% of the baby had macrosomia .no significant increase in congenital anomalies in GDM was noted. Single step OGT test is a simple and easy test to screen as well as diagnose the cases of GDM. Positive Predictive value of single step OGT 2 Hours after 75 grams glucose is 22 %. Mean age of patients having GDM is 29.72 ± 3.41 years. Incidence of fetal morbidity is just 16.6 %. In this study, it was observed that people with GDM had a higher proportion of obstetric risks, like pre-eclampsia, pre-term labour and CS, as well as mean birth weight, LGA and macrosomic infants from controls.

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