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Gestational Diabetes Mellitus – A Clinical Study

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ABSTRACT: Gestational diabetes mellitus is a common complication in pregnancy associated with a array of maternal and fetal complication. Understanding the various outcomes of GDM would e the key to initiate the cascade of preparatory step to tackle them. Keeping this in mind our study aims to study the various clinical aspects of GDM in a tertiary care hospital.
Materials and Methods: Done with 100 pregnant women diagnosed with GDM via 2 step test and observed for various outcomes.
Results:Increased age and increased gravida and parity were associated with increased observance of development of GDM in our study. Though no increase in operative delivery was noted a significant number of patients developed gestational hypertension. Most patient were controlled with diet exercise and metformin alone.
Conclusion:Studying varying aspect of GDM in large population in a well designed study may help enhancing our knowledge about GDM and hence help in better handling of the problems associated with it.
KEYWORDS: GDM**,**maternal complication, fetal complication.

I. INTRODUCTION:

Gestational diabetes mellitus is a common complication during pregnancy, defined as glucose intolerance with onset and first recognition during pregnancy in women without prior history of diabetes prior to pregnancy[1,2] during last 20 years the prevalence of GDM has increased worldwide and is expected to rise by 2030.[3] The diagnosis of GDM means increased short and long term risk for both mother and the fetus[4]. There has been a dilemma among clinician as how to diagnose Gestational Diabetes Mellitus. Various criteria are used in different parts of the world. To bring uniformity WHOdevised a criteria which was revised in 2013 for diagnosing GDM[5].The factors that have been postulated to increase the risk of GDM among mothers include obesity, history of diabetes in the family members, treatment of infertility, polyhydramnios, recurrent UTI, history of still birth, advancing maternal age. The risk for developing type 2 DM is higher in those with GDM[6]. Though most women with GD give birth to healthy neonate if their blood sugar levels are well regulated with diet or drug, but in some cases it may negatively affect the pregnancy[7]. The neonatal complication include abnormal foetal growth, miscarriages, stillbirth, Shoulder dystocia, respiratory ditress, clavicular fracture, hypocalcemia hypoglycaemia and hypomagnesemia, maternal complications include hypertensive disorders, caesarean delivery, premature labour, polyhydramnios, birth trauma[8].these complication vary in different race and ethnic groups.

Understanding the various outcomes of GDM would be the key to initiate the cascade of preparatory step to tackle them. Keeping this in mind our study aims to study the various clinical aspects of GDM in a tertiary care hospital.

II. AIMS AND OBJECTIVES:

To know the distribution (age, parity, body mass index and family histotry wise), management and complications of GDM during pregnancy.To know the management of GDM with the trial of Diet therapy exercise and addition of oral antidiabetic drug i.e Metformin and / or Insulin and To study the maternal and neonatal complications in pregnant GDM women enrolled in this study**.**

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III. METHODOLOGY:

This study was conducted in Command Hospital(EC), Kolkata over a period of one and half years i.e from March 2011 to August 2012.

Study design: Prospective observational study in tertiary care hospital.
Study subjects: Women were eligible for inclusion who had received a diagnosis of gestational diabetes mellitus with any of the following measures:-
1-hour 50 gm OGCT (glucose concentrations 130mg/dl and above taken as cut off value) performed between 24-28 weeks, depending upon risk factors and if abnormal, 75gm oral glucose tolerance test was done after overnight fasting. (Two or more of the 75g oral glucose-tolerance test values were taken as abnormal using WHO criteria)
The **exclusion criteria** were:-

Prepregnancy diagnosis of diabetes, mothers with Multifetal gestation, mothers withPreexisting hypertension. Also mothers with Chronic health conditions like Chronic renal failure, congestive heart failure and active tuberculosis in mothers, Systemic lupus erythematosus were excluded from our study.

100 pregnant women diagnosed as having gestational diabetes mellitus and fulfilling the Inclusion Criteria were enrolled in the study.

All women attending the antenatal clinic underwent checking of their fasting and post prandial blood sugar levels at their first antenatal visit. Screening test for GDM was performed between 24-26 weks except for those who were found to be at high-risk for GDM at their risk assessment on the first visit. Criteria for screening patients earlier than 24 weeks included obesity, history of diabetes in the immediate family, a previous pregnancy complicated by GDM, history of recurrent abortions and previous history of unexplained intrauterine fetal death. These women were screened shortly after they presented for their first antenatal visit, with the earliest presentation at 8 weeks. If the women had no risk factors for GDM, they were screened at the standard gestational age of 24 to 28 weeks with a 1 hour 50 gm oral glucose challenge test.

Women with plasma glucose concentrations 130mg/dl and above, on the 1-hour 50 g oral glucose challenge underwent a 75 g oral glucose-tolerance test. GDM was diagnosed if the plasma glucose concentration from the 1-hour, 50 g oral glucose challenge was greater than 200 mg/dl or if two or more of the 75 g oral glucose-tolerance test values were abnormal using WHO criteria.

Conflict of interest – none
Informed consent in written form taken in all cases.

IV. RESULT ANALYSIS:

In our study total 100 women with GDM were taken.
AGE: In our study out of 100 patients with GDM 25(25%) patients were in age group 19-23, 42(42%)patients were in age group 24-28,33(33%) patients were in age group 29 and above. (Table 1, Fig 1)

Table 1

Age group years	No of patients
19-23	25
24-28	42
29 and above	33

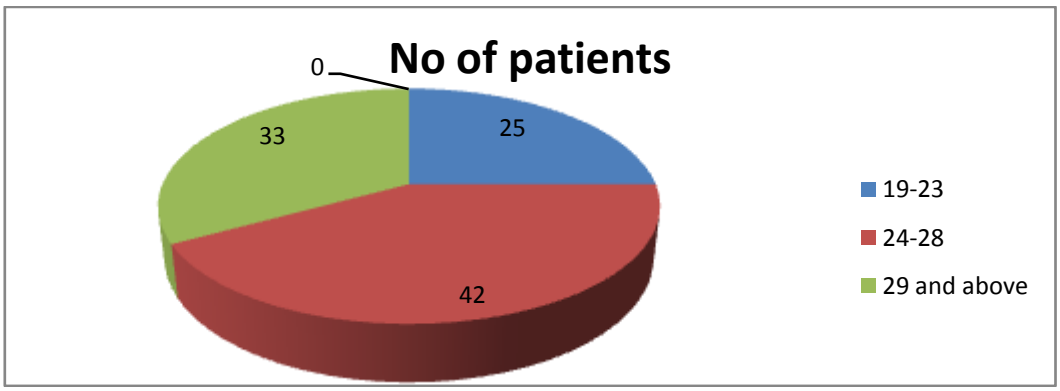

Fig 1 – AGE DISTRIBUTION

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Gravida and Parity: In our study 38 patients were primi gravida, 56 patients were multi gravida and 6 patients had three or higher order pregnancy.
BMI:In our study 32 patients had a pre pregnancy BMI of 19-21,18 had BMI of 22-24,37 patients had prepregnancy BMI of 25 to 27, 9 patients had BMI of 28-30 and 4 had BMI of 31 and above.(Table 2, Fig 2)

Table 2

BODY MASS INDEX	NO. OF PATIENTS
19-21	32
22-24	18
25-27	37
28-30	9
31 AND ABOVE	4

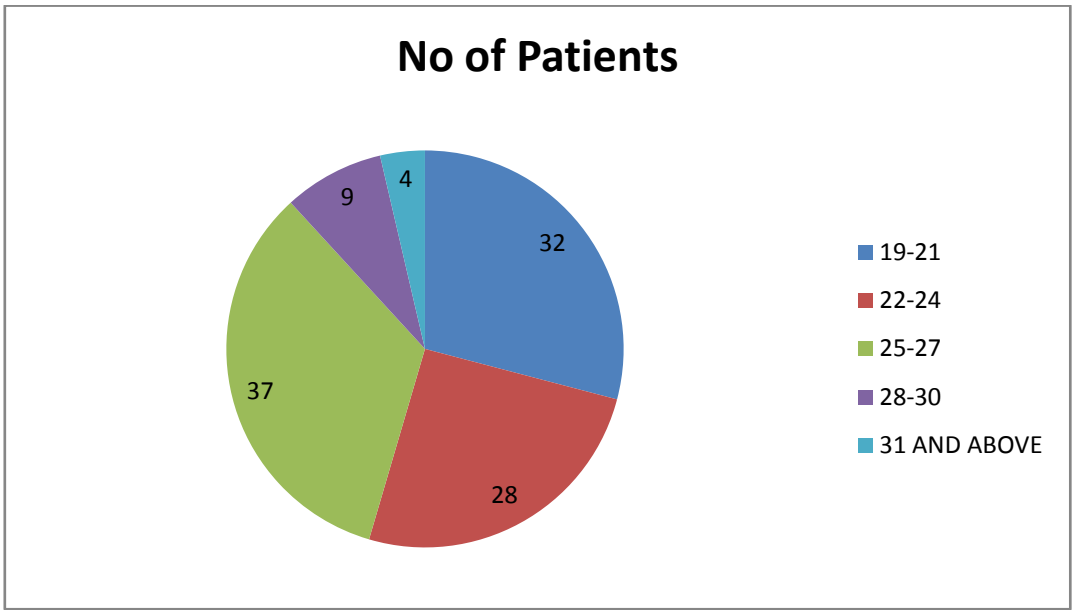

Fig 2 - DISTRIBUTION OF PRE-PREGNANCY BMI

FAMILY HISTORY: In our study 42 patients had family history of type 2 DM, 21 patient had history of hypertension an 31 patients both type 2DM and Hypertension. (Table 3)

Table 3

Family history	No of patients
T2DM	48
Hypertension	21
T2DM and Hypertension	31

Gestational age of diagnosing diabetes: 8 patients were diagnosed with GDM before 20 week of POG, 46 patient were diagnosed in between 20 -30 weeks of POG, 36 patients between 31-35 weeks of POG and 10 patient above 36weeks.(Table 4)

Table 4

Detection week	No of patients
20weeks or earlier	8
20-25	21
26-30	25
31-35	36
>36 weeks	10

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LAB VALUES

BLOOD SUGAR LEVELS:

In our study we found that during the first visit 15 patients had blood sugar level(BSL) between 76-80, 16 patients had BSL between 81-85 ,23 patient BSL between 86-90 ,19 patient had BSL between 91-95, 10 patients had BSL between 96-199 and 7patients BSL of 101 and above in first visit. (Table 5)

Table 5

BLOOD SUGAR LEVEL at 1st visit	No. Of patients
76-80	15
81-85	16
86-90	23
91-95	19
96-100	10
100 and above	17

In our study OGCT cut off value of 130 mg% has been abled to pick up 25% of of GDM patients who would have been otherwise missed for diagnosis if the cut off value would have been taken 140.

Table 6

OGCT values	**No of patients**
130-139	25
140-200	69
200 and above	6

In our study diet and Metformin alone could control GDM in 95% of cases, only 5% cases required Insulin Glargine as an additional therapy.

Table 7

Medication used	**No of patients**
Diet and Exercise	9
Metformin 1gm OD	38
Metformin 1gm BD	35
Metformin1gm TDS	8
Metformin 1gm OD swithed to BD	5
Inj Glargine	5

PREGNANCY OUTCOMES:

MATERNAL COMPLICATIONS: In our study 14 patients with gdm developed Gestational hypertension and 9 patient developed preeclampsia**.**

MODE OF DELIVERY: In our study 48 patient required vaginal delivery, 23 patients underwent emergency LUCS, 24 patient underwent Elective LUCS and 5patients underwent vacuum (instrumental) delivery**.** (Table 8, Fig 3)

Table 8

Modes of Delivery	**No of Patient**
Vaginal delivery	48
Emergency LUCS	23
Elective LUCS	24
Vacuum Delivery	5

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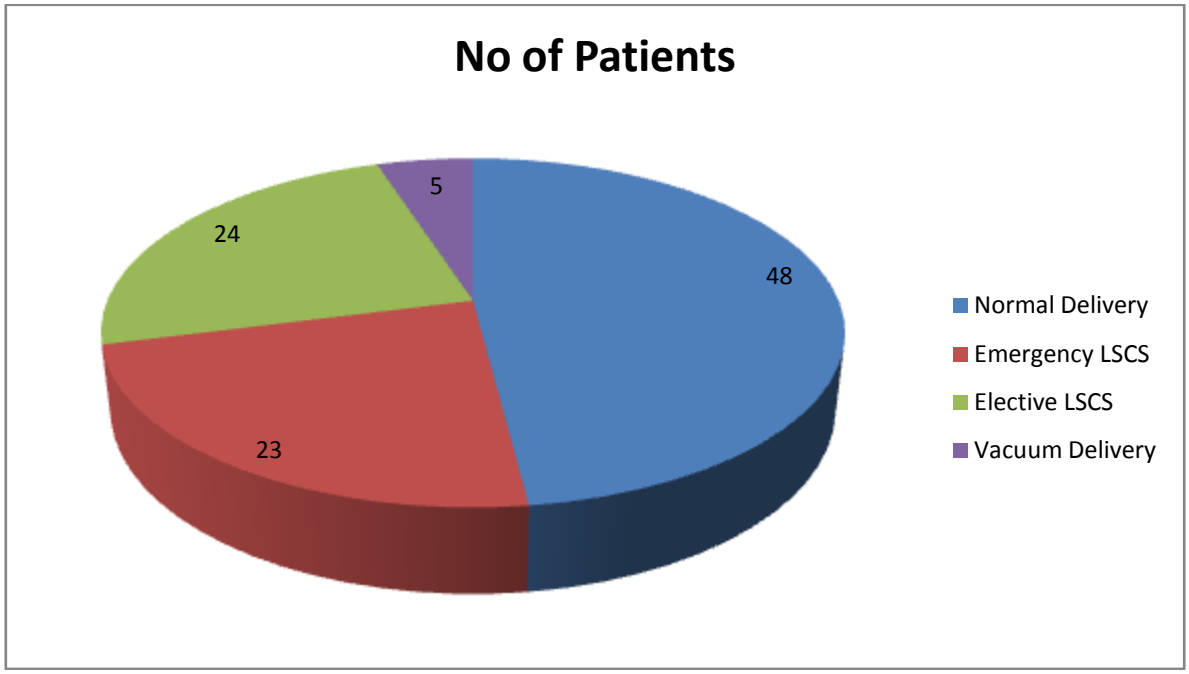

Fig 3 - MODES OF DELIVERY IN GDM PATIENTS

TIMING OF DELIVERY: In our study 18patients had delivery before <37weeks, 79 between 37-40 weeks and 3 deliveries were post dated**.**

BIRTH WEIGHT OF BABIES: In our study 57 babies were in birth weight 2.5-3kg, 19 babies between 3.0 – 3.5kg, 4 patients between 3.6 kg and only 1 baby above 4kg. 12 patients were in between 2-2.5kg and 7 patients were IUGR. (Table 9, Fig 4)

Birth weight in kgs	No of newborn
<2 kg	6
2-2.5kg	12
2.5-3kg	54
3-3.5kg	19
3.6-4	5
4kg and above	4

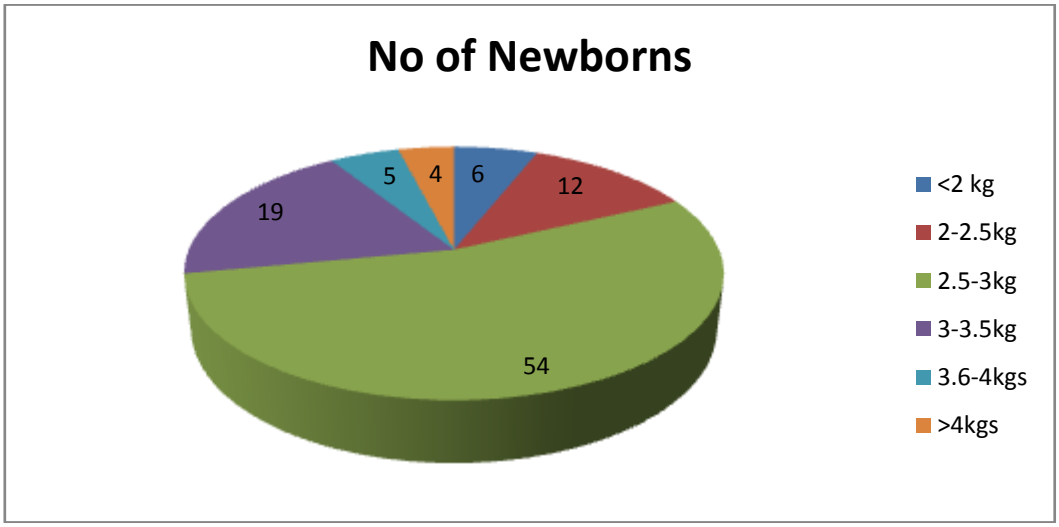

Fig 4 - BIRTH WEIGHT OF NEWBORNS

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CONGENITAL ANOMALIES: Incidence of congenital anomalies in GDM patients controlled with Metformin and Diet are seen in 2cases(2%). 1 baby died 4days after birth.

NEONATAL COMPLICATIONS:Incidence of neonatal complications e.g Hypoglycaemia in 17cases, Birth Asphyxia in 5 cases and Neonatal Sepsis in 1casein newborn babies. There was IUGR in 7 newborns.

V. DISCUSSION:

After analysing the data from 100 GDM patients following facts have been revealed.

DEMOGRAPHIC ANALYSIS:

Age:

In our study out of 100 patients with GDM 25(25%) patients were in age group 19-23, 42(42%)patients were in age group 24-28,33(33%) patients were in age group 29 and above. Thus 75% patients were above 25 years in our study. Thus increased age is a risk factor for GDM in our study. Study done by Zainab Groof et al in Kuwait showed prevalence of GDM increases linearly with maternal age (18.2%) in those over 35 years[9]. Thus our study is at par with other international studies.

Gravida and Parity:

In our study 38 patient were primi gravida, 56 patient were multi gravida and 6 patient had three or higher order pregnancy, thus in our study increased gravida and parity is also found as a risk factor for GDM.

Body Mass Index:

In our study 32 patient had a pre pregnancy BMI of 19-21,18 had BMI of 22-24,37 patient had prepregnancy BMI of of 25 to 27, 9 patient had BMI of 28-30 and 4 had BMI of 31 and above. Thus 70% of affected patients had BMI of 22 and above and hence higher prepregnancy weights may be related to development of GDM. Study done by Zainab Groof et al in Kuwait also showed increasing pattern in prevalence of GDM was seenwith Prepregnancy BMI.

Family History:

In our study 42 patient had family history of type 2 DM, 21 patient had history of hypertension an 31 patient both type 2DM and Hypertension.Family history of Diabetes Mellitus(DM) and/or Hypertension(HTN) is definitely a risk factor as it is revealed in the study that >60% GDM patients have definite family history of DM &/or HTN.

Gestational age of diagnosing diabetes:

8 patient were diagnosed with GDM before 20 week of POG, 46 patient were diagnosed in between 20 -30 weeks of POG, 36 patients between 31-35 weeks of POG and 10 patient above 36weeks. Thus we were able to detect 10% of our cases of GDM by chasing them as late as 37 weeks.

LABORATORY VALUES

Blood sugar levels:

In our study we found that during the first visit 15 patients had blood sugar level(BSL) between 76-80, 16 patients had BSL between 81-85 ,23 patient BSL between 86-90 ,19 patient had BSL between 91-95, 10 patients had BSL between 96-199 and 7patients BSL of 101 and above in first visit.Blood sugar level(BSL) during the first visit can be considered a risk factor as we can see in the above study that increased fasting and/or postprandial BSL, as > 70% of fasting BSL values are 85 mg or above.

In our study OGCT cut off value of 130 mg% has been enabled to pick up 25% of GDM patients who would have been otherwise missed for diagnosis if the cut off value would have been taken 140 mg%**.**

Following the three steps of diagnosis of GDM i.e BSL during first visit, OGCT at 24 to 28 weeks and OGTT >55% of GDM patients have been diagnosed at 30 weeks or far below**.**

OGTT values

2 values out of 3 in 56 patients (treated with Metformin SR BD achieved good control**)**

1 values raised out of 3 in 26 patient (treated with Metformin 1gm HS with good control)

3 out of 3values in 21 patients (Treated with Metformin Sr 1gm TDS with good glycemic control)

3 out of 3values raised in remaining 5patients (treated with Insulin Glargine)

Drugs used:

In our study diet and metformin alone could control GDM in 95% of cases, only 5% cases required Insulin Glargine as an additional therapy. However in studies done by G.Thiruvikrama et al showed that only 17% women were controlled with diet 18% with Metformin whereas 58% required Insulin and & 7% both insulin and Metformin[10].However studies done by Moore et al showed favourable results of Metformin in GDM and find no difference in maternal and fetal outcome[11].

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PREGNANCY OUTCOMES:

Maternal Complications:

In our study 14 patients with GDM developed Gestational hypertension and 9 patients developed preeclampsia.Studies done by Varangati Neelima in Hyderabad showed the prevalence of preeclampsia in patient of GDM was 30%[12]. In studies done in German Perinatal Quality Registry showed increased odds ratio of preeclampsia in GDM[13].

Mode of Delivery:

In our study 48 patient required normal delivery, 23 patients underwent emergency LUCS 24 patient underwent Elective LUCS and 5patientsunderwent vacuum delivery**.**Incidence of Caesarean delivery have been seen as 47% in the above 100 GDM patients controlled with Metformin HCl & diet control. This rate of operative delivery is almost at par as in general obstetric patients. Studies done G.Thiruvikrama et al found similar results, in their study 44% required Caesarean section, 56% underwent normal vaginal delivery. However studies done by ZainabGroof et al showed increased need for Caesarean Delivery.

Timing of Delivery:

In our study 18patients had delivery before <37weeks, 79 between 37-40 weeks and 3 deliveries were post dated**.**

Birth Weight of Babies:

In our study 54 babies were in birth weight 2.5-3kg, 19 babies between 3.0 – 3.5kg, 5 patient between 3.6 – 3.9 kg and only 4 baby above 4kg. 12 patient were in between 2-2.5kg, 6 were of less than 2kg. No significant increase in incidence of Macrosomia was found in our study. However studies done by Zainab Groof et al showed an increase in Macrosomic baby with odd ratio of 2.36.

Congenital anomalies:

Incidence of congenital anomalies in GDM patients comtrolled with Metformin and Diet are seen to be negligible(2%). 1newborn developed meningocele and other newborn developed CTEV and bilateral undescended testis and birth asphyxia. In Studies by A Garcia Patterson et al showed that the rate of CM was 6% for minor malformations and >8 % for major malformation like heart renal urinary skeletal etc.

Neonatal Complications:

Incidence of neonatal complications e.g Hypoglycaemia in 17(17%)cases, Birth Asphyxia in 5 cases and Neonatal Sepsis in 1case in newborn babies. There was IUGR in 7 newborns.In studies done by Daphne N Vormelon found that the incidence of hypoglycemia for all infants of mothers on insulin or noninsulin was 17.2%[14]. Thus our study is at par with other studies.

LIMITATIONS OF THE STUDY:

1. No age matched control group taken in our study
2. Sample size small
3. Cases were not followed up after delivery for long period of time.

VI. CONCLUSION:

GDM is and will continue to pose a problem for obstetricians in the coming decade with variety of diagnostic challenges and maternal fetal complication.

Studying its varying aspect in large population in a well designed study setting may help enhancing our knowledge about GDM and hence help in better handling of the problems associated with it.

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Command Hospital (EC)
Alipore, kolkata-27

DATE: 11 Jan 2011

APPROVAL OF ETHICS COMMITTE

1. Your study proposal titled "Gestational Diabetes Mellitus-A Clinical Study" was discussed by institutional ethics committee of Command Hospital (EC) kolkata, in its meeting held on 27th Dec 2010.
2. The committee agreed to give approval to carry out the proposed work in this institution for fulfillment of the requirement of post graduate degree course.

SECRETARY
INSTITUTIONAL ETHICS COMMITTEE

CH (EC) Kolkata

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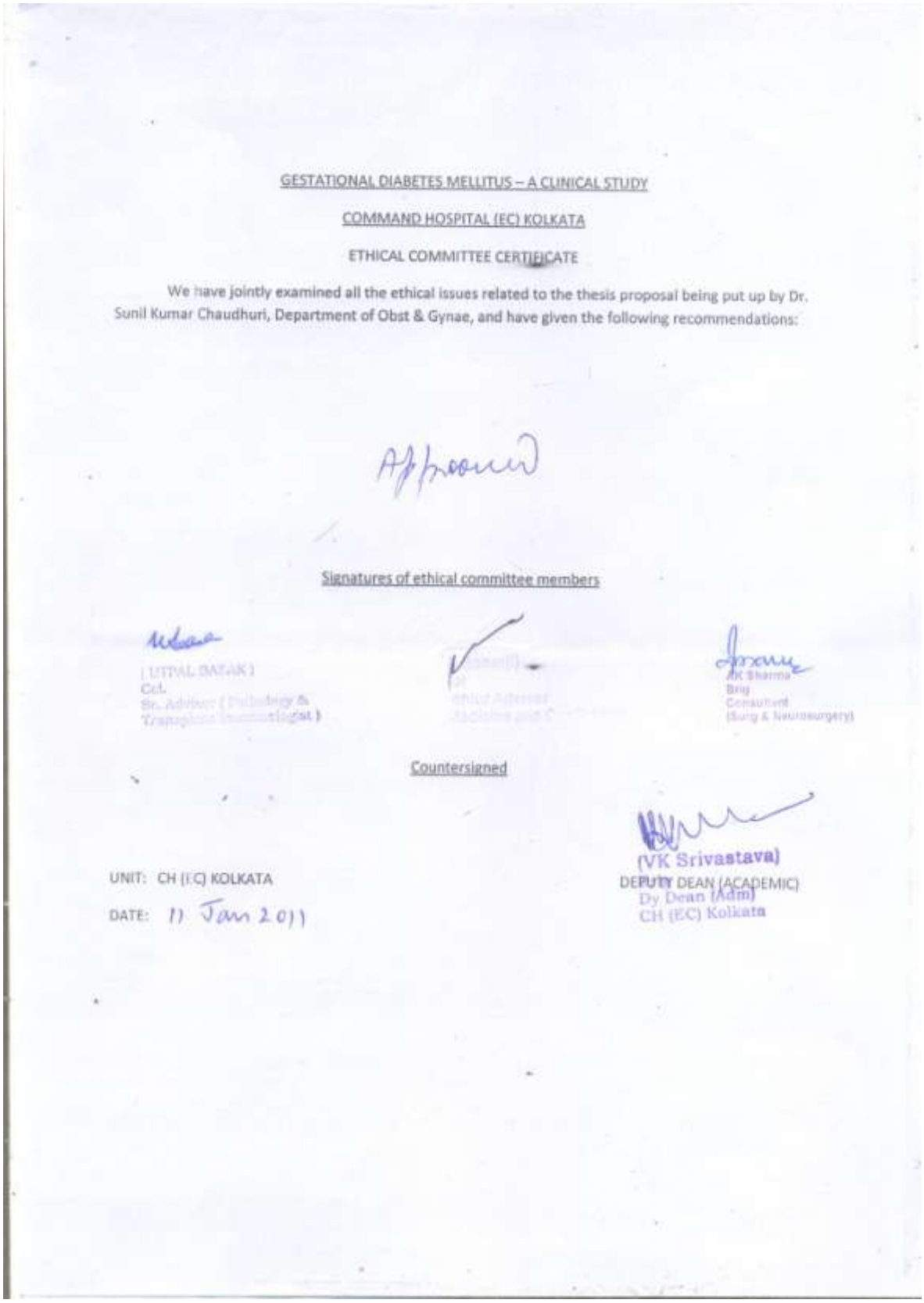

GESTATIONAL DIABETES MELLITUS – A CLINICAL STUDY

COMMAND HOSPITAL (EC) KOLKATA

ETHICAL COMMITTEE CERTIFICATE

We have jointly examined all the ethical issues related to the thesis proposal being put up by Dr. Sunil Kumar Chaudhuri, Department of Obst & Gynae, and have given the following recommendations:

Approved

Signatures of ethical committee members

(UTPAL DATTA)
Col.
Sr. Advisor (Pathology &
Transfusion Haematologist)

(AK Sharma)
Brig
Consultant
(Surg & Neurosurgery)

Countersigned

(VK Srivastava)
DEPUTY DEAN (ACADEMIC)
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DATE: 11 Jan 2011