Original Research Article

Gestational or overt diabetes complications on Mothers and Newborn babies

ABSTRACT:-

Background:-

Diabetes in pragnancy is associated with increase risks of Fetal, neonatal, and lifelong complication in the offspring.

In infants of diabetic Mother (IDMs) hypoglycemia is a common complication.

Aim of study:-To study complication of gestation or overt Diabetes in Mothers and neonatal complication in Benghazi, Libya, at Benghazi Children hospital in last 4 years.

Setting and Design:-

This is descriptive, case series retrospective study was conducted at Benghazi children hospital, Libya. This study include 40 patients was referred From the Nursery department of the Gynaecologiet and osteteric Eljamaharia hospital during peroid from 01.01.2016 to 01.06.2020.

Subjective and Methods:-

ALL patients aged Less than 4 weeks, both males and Females are included and babies from different socio-economic classes were included. Most of the babies were from benghazi city, some patient From surrounding small Villages away from benghazi and some Cases referred from some cities From east and west to beaghazi .All patient born to over diabetic mothers or had gestational diabetes.

Method

At The time of the study, the available a data From the Files was recorded in special Case sheets as follow:-

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—Complication of overt diabetes or gestational diabetes on The Mother:

Available data From the File was include:-

●incidence of abortion.

●mode of Delivery.

—Complication in infant of Diabetic Mothers These include:-

●Birth weight.

●BloodGlucose Level.

●Bilirubin level and its treatment.

● Birth injurie.

●congenital anormalis overt or these detected by Eccho and ABDomen ultra sound.

●prognosis (Discharge or expired babies).

All these data were analyzed by SPSS version 18.0 software, and they will be presented as absolute number, percentage and means.

Results:

This study was conducted retrospectively during last 4 ½ years, it was included 40 patients, 24 patients were male (60%) and 16 patients were female (40%), male to female ratio 1.5:1

Maternal complication:

-Incidence of abortion:

Eighteen out of 40 cases had history of Abortion **(45%).**

- Mode of delivery:

Twenty-eight out of 40 cases were delivered by C.S **(70%)**.

- Infant complication:

-Birth weight:

Out of 40 cases, 29 babies **(72.5%)** were macrocosmic and only one case collected as SGA and premature baby **(2.5%).**

- Risk of hypoglycemia:

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In this study we found 20 cases had Blood glucose level less than 30 mg **(50 %),** and rest of cases had Blood glucose level more than 30 mg.

- Hypocalcemia:

In 21 cases, serum calcium were studied, and we found 9 **(42.8 %)** cases their serum calcium below 7 mg.

- Hyperbilirubinemia:

In this study,19**(47.5%)** cases were found to had S.Bil more than 15 mg % (Regardless of other contributed factor like Bl. Incompatability, prematurity or birth injuries), and for these babies, DVET (Double volume exchange transfusion) done for 6 babies **(31.5%)** and rest were treated by phototherapy.

- Birth injuries:

Out of 40 cases, birth injuries were detected in 7 cases **(17.5%).**

-Congenital anomalies: Include overt and those detected by Eccho and ultrsound screen.

i- by Echo:

In this study we found 20 cases **(50 %)**, had cardiac lesion detected by Eccho screen.

ii– by Abdominal and brain ultrasound :

In only one case was detected by abdominal U.S to had renal vein thrombosis of left kidney. And another case had mild dilation of left lateral ventricle of the brain.

Prognosis:

Out of 40 patients were studied, 4 patients expired **(10%),** 2 cases male **(50 %)** and 2 cases female, the rest of patients were discharged.

Conclusion:

From our study of complication occurred in gestational or overt diabeticmothers and their infants, we conclude that:

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Women with overt or gestational diabetes had asignificant risk of spontaneous abortion.

Majority of pregnant women with overt or gestational diabetic were delivered by caesarian section.

Our babies of gestational or diabetic mothers were at aconsiderable risk of macrosomia and its complicatio, riskof hypoglycemia, hypocalcemia, hyperbilirubinemia and congenital malformation.

1- INTRODUCTION

Before the availability of insulin, the diabetic woman rarely became pregnant, diabetis reduce her Life expectancy and Fertility.if she did became pregnant the prognosis for the Mother and infant was poor.

Before 1930, maternal mortality rate for diabetic ranged From 6 to 60 % and perinatal morfility rate From 25 to 73 % (1)

The neonatal mortality rate is > 5 time that OF inFants OF non diabetic mothers and is higher at all gestational age and in every birth weigh to gestational age Category (2). it is estimated That 3-10% OF all pregnancy are complicated by diabetes, and 90% of these are women with gestational diabetes (3).The probable pathogenic sequence is That maternal hyperGlycemia cause Fetal hyperGlycemia and The Fetal pancreatic response lead to Fetal hyperinsulinemia, Fetal hyperinsulinemia and hyper Glycemia Then cause increase hepatic Glucose uptake and Glycogen synthesis, accreted Lipogenesis and augmented protein synthesis. Hyperinsulinemia produce fetal acidosis, which may result in an increase rate of stillbirth. The separation of placenta at birth suddenly interrupts glucose infusion into The neonate without aproportional effect on The hyperinsulinemia resulting in hypoGlycemia and attenuated lipolysis during The First hours after birth.For all These , pregnancy is commonly complicated by one or more variety OF problems in The Fetus and Newborn These include (1):-

–Sudden Fetal death in The Third trimester.

–Premature birth.

– Macrosomia and birth trauma.

–Intrapartum asphyxia.

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– Cesarean section delivery.

–Intrauterine growth retardation.

—Neonatal respiratory distress**.**

–HypoGlycemia.

–Hypocalcemia.

–Hyperbilirubinemia.

–polycy themin and hyperviscosity.

–persistent pulmonary hypertension syndrome.

–cardiomyopathy.

– Congenital anomalies.

Maternal diabetic controll is a key Factor in determring Fetal out come and Neoborn complication.

2- Material and method:-

This is descriptive, case series retrospective study was conducted at Benghazi Children hospital, Libya. This study include 40 patients referred from the nursery department of The gynaecologiet and obsteteric Eljamaharia hospital during the peroid from 01.01.2016 to 01.06.2020. The small number of the studied babies in relation to the prevalence of gestational or overt diabetes which increases nowaday is related to limited number of referring of these cases to Benghazi, Libya children hospital. Patients aged Less than 4 Wks, both male and female were included.

–method:-

At the time of the study, the available data From the Files was recorded in Special case sheet as Follow:-

2.1 The complication OF over diabetes or gestational diabetes on the mother:

The available data include:-

–incidence of abortion.

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–mode of deliveries.

2.2 complication in infant of diabetic mother these include:-

–Birth weight.

–Blood glucose Level.

–Bilirubin level and its treatment.

– Birth injuries.

–congenital anomalis overt of those detected by Eccho and ABDomenal ultrasound screen.

–prognosis (Discharging or death).

All these data were analyzed by SPSS version 18.0 software, and they will be presented as absolute number, percentage and means.

3-Result:

3.1 Maternal complication:

3.1.1 Incidence of abortion:

Table 1:

Show incidence of abortion in the overt or gestational diabetic mothers of the 40 collected cases.

Years	No. Of cases collected per year	No. Of. Abortion	%
2016	16	10	62.5%
2017	3	2	66.6%
2018	6	2	33.3%
2019	9	2	22.2%
2020	6	2	33.3%
Total	40	18	45%

.1.2 Mode of delivery:

Table 2:

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Show numbers and percentage of vaginal and caesarian deliveries in the 40 collected cases.

No. Of cases collected per years	No.of Cases delivered vaginally and its percentage	No.of Cases delivered by C.S and its percentage
2016 (16) Cases	5 Cases delivered vaginally —>31.2%	11 Cases delivered by C.S–> 68.7%
2017(3)Cases	/	3 Cases delivered by C.S–> 100%
2018 (6) Cases	1 Cases delivered vaginally —>16.6%	5 Cases delivered by C.S–> 83.3%
2019 (9)Cases	2 Cases delivered vaginally —>22.2%	7 Cases delivered by C.S–> 77.7%
2021(6)Cases	4 Cases delivered vaginally —>66.6%	2 cases delivered by C.S–> 33.3%
Total (40)Cases	12 Cases delivered vaginally—>30%	28 Cases delivered by C.S–> 70%

3.2 Infant complication:

3.2.1 Birth weight:

Table 3:

Show Birth weight distribution in the 40 collected cases.

Range of wt	No. Of cases	%
Less then 2000 gram	1	2.5%
2000—3000 gram	3	7.5%
3000—4000 gram	7	17.5
4000—5000 gram	23	57.5%
>5000 gram	6	15%

As shown is this table, out of 40 cases, 29 babies (72.5%) were macrocosmic (Birth weight over 4000 gram). And only one case collected as SGA and premature baby 2.5%.

3.2.2 Risk of hypoglycemia:

In this study we found 20 cases had Blood glucose level less than 30 mg % (50 %), and rest of cases had Blood glucose level more than 30 mg%.

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As we mention before, there is an association between macrosomia and hypoglycemia, these babies with hypoglycemia are further studied in relation to their birth weight and we found, macrosomia (Birth weight more than 4000 grams), present in 15 (75%) cases with hypoglycemia, while in the rest 5 cases (25%) had birth weight less than 4000 grams.

3.2.3 Hypocalcemia:

In 21 cases, serum calcium were studied, and we found 9 (42.8 %) cases their serum calcium below 7 mg.

3.2.4 Hyperbilirubinemia:

In this study,19(47.5%) cases were found to had S.Bil more than 15 mg (Regardless of other contributed factor like Bl. Incompatability, prematurity or birth injuries), and for these babies, DVET (Double volume exchange transfusion) done for 6 babies (31.5%) and rest were treated by phototherapy.

3.2.4 Birth injuries:

Out of 40 cases, birth injuries were detected in 7 cases (17.5%). As there is an association between macrosomia, mode of delivery and risk of birth injuries, these cases were further studied in relation to their birth weight and mode of deliveries.

Table 4:

Show association between macrosomia, mode of delivery and risk of birth injuries.

Cases and their birth injuries	**Birth weight**	**Mode of Delivery**
Case 1: -Rt.Erb`s palsy -Shoulder stuck	4.370 Kg	Full term vaginal delivery
Case 2: -Lt.Erb`s palsy - Fracture Rt.Humors -Shoulder stuck	5.670 Kg	Full term vaginal delivery

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Case 3 : - Fracture Lt.Clavicle	4.400 Kg	Full term vaginal delivery
Case 4 : - Rt.Erb`s palsy -Shoulder stuck	4.600 Kg	Full term vaginal delivery
Case 5: Rt.Erb`s palsy	4.500 Kg	Full term vaginal delivery
Case 6: - Fracture Lt.Humors - Fracture Rt.Erb`s palsy -Shoulder stuck	4.170 Kg	Full term vaginal delivery
Case 7: - Fracture Rt.Clavicle	4.100 Kg	Full term vaginal delivery

As shown in this table, birth injuries present in 7 babies (17.5 %), all of these babies were macrosomia and delivered vaginally.

3.2.5 Congenital anomalies:

Include overt and those detected by Eccho and ultrsound screen.

i-by Echo:

In this study we found 20 cases (50 %), had cardiac lesion detected by Echo screen. Most of these patients had multiple cardiac lesion ... These lesion according to their frequency include :

– Asymmetric septal hypertrophy : detected in 15 (75 %) cases, ranging in severity and include mild 8 (53.3 %) cases, mod. 6 cases (40 %) and sever 1 (6.6%) cases lesion.

–ASD detected in 9 cases (45%) ... all were small size defect.

–VSD detected in 6 cases (30 %) ... all were small size defect.

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–Other cardiac lesion include PDA, Tricuspid regurgitaion and multiple heart tumors was detected in only one case.

ii– by Abdominal and brain ultrasound :

In only one case was detected by abdominal U.S to had renal vein thrombosis of left kidney. And another case had mild dilation of left lateral ventricle of the brain.

iii– In two cases there were evidence of intestinal obstruction in 15 days with abdominal distention and delayed passing of meconium. These cases were diagnosed as meconiumplug.

Prognosis:

Out of 40 patients were studied, 4 patients expired (10%), 2 cases male (50 %) and 2 cases female, the rest of patients were discharged.

4– Discussion:

This retrospective study included 40 patients referred from the Nursery department of the Gynecologist and obstetric El-Jamheria Hospital.

The small number of the studied babies in relation to the prevalence of gestational or overt diabetes which increase nowaday is related to limited number of referring of these cases to Nenonatology care unit of Benghazi Children Hospital.

4.1 Maternal complications:

4.1.1 In this study we found 45% of cases had history of abortion and in some individual case, there was H/O recurrent abortion. This indicate women with poor diabetic control in pregnancy had a significantly increase incidence of spontaneous abortion.

4.1.2 In this study we found 30% of cases were delivered vaginally and 70% of cases were delivered by cesareans section and in the majority of these cases there were H/O frequent C.S deliveries, and sometimes the indication for C.S was the previous 2 or 3 C/S deliveries. This will further prone mother, fetus and infant to the anesthesia related complication, increase risk of the mother for hospitalization, wound infection, risk of

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Blood transfusion and its complication and to surgical complication. These results similar to that reported in many studies (5, 8).

4.2 Infant complication:

In this study we found:

- 72.5% of cases had birth weight over 4000 grams (macrosomia).

These macrosomic babies were at risk of birth injuries which reported in 17.5% of cases, in all of these cases, babies were macrosomic and delivered vaginally. This result similar to that reported in many studies (8).

- 50% of cases had hypoglycemia and in these cases, 75 % of babies were macrosomic. Same result reported in other studies (7).

- 42.8% of studied cases had hypocalcemia.

- 47.5% of cases had hyperbilirubinemia, in which 31.5 % of these cases DVET was needed.

All these result are accord with that written by previous other studies:

In 1983 Mikael knip et al (9), studied newborn infant of diabetic and non diabetic mother, they found the IDMs had ahigher birth weight than the control infant and more were delivered by C.S … Blood glucose concentration in cord blood were higher in the IDMs than in normal infant with threefold increase in the C.peptide concentration in the IDMs in comparison with the control infant. They also found that IDMs with macrosomia at birth had lower blood glucose concentration postnatally and higher concentration of free immunreactive insulin and C.peptide in the cord Blood than in those without macrosomia. Their report were fetal hyperinsulinemia is aresponse to maternal hyperglycemia, and hyperinsulinemia play acentral role in the development of fetal over growth and neonatal hypoglycemia.

In 1993 Jeannel.Ballard et al (10), studied newborn infant of diabetic and nondiabetic mother and concentrated more with macrosomic IDMs, they found rate of macrosomia in IDMs has been associated with the rate of poor maternal glycemic control as measured by maternal glycohemoglobin value. Elevated serum bilirubin and low blood glucose concentration in the nenonate had reported in association with elevated

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maternal glycosylated hemoglobin value and finally they report that disproportionate macrosomia (Which was highly specific to the studied population of IDMs), was associated with higher rate of neonatal complication compared with those in infant with proportionate macrosomia or nonmacrosomia.

In 1994 Biasini-A; Casadei-G; Cerasoli-G in italy (11), reported that insulin requiring diabetes during organogenesis double or triples awoman's risk of producing amalformed infant, increase risk of hypoglycemia and macrosomia (Complication of fetal hyerinsulinemia), hypocalcemia and cardiomyopathy.

In 2000 Schwartz -R; Teramo - KA (12) in united state studied effect of diabetic pregnancy on the fetus and newborn,they report that maternal hyperglycemia and fetal hyperinsulinemia will lead to congenital malformation, fetal macrosomia, RDS, neonatal hypoglycemia, N.N hypocalcemia and N.N hypomagnesemia and control of maternal metabolism can have significant impact on each of the above.

Finally, from our study, we found 50 % of cases had cardiac lesion and in these cases 75% had Asymetric septal hypertrophy, this same to result reported in other studies.

In 1996 Akoral - A et al in India (13), reported that the hypertrophic cardiomyopathy which arare primary myocardial disease occur in IDMS.

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5-Recommendation:

1- The infant of diabetic mother is still at increase risk of perinatal death, neonatal problems and major congenital malformation: Many of these problem are preventable. All pregnant women should have ascreening test for gestational diabetis, and all young women with diabetis should receive preconceptional advice and information about pregnancy. The object of prepregnancy care are to assess suit-ability for pregnancy, to optimise control in early pregnancy, and to improve pregnancy outcome through the provision of individualized education and information. Prepregnancy care can reduce the malformation rate to approximately that of the nondiabetic.

2- In each area there should be one designated diabetologist and one designated obstetrician who, together with their team, should see all pregnant women in acombined clinic in ahospital with an intensive care baby unit. All pregnant women with diabetis should have 24-hour access to the specialist team. Tight glycemic control during pregnancy can reduce complication of pregnancy greatly, improving infant mortality and morbidity. During pregnancy education about hypoglycemia and avoidance of ketoacidosis is essential, and these women should have regular examination of fundi & renal ffunctio.

3- All diabetic pregnant women should have ultrasound scanning to assess gestation, to look for abnormalities and to assess fetal growth. Fetal monitering should be used, particularly for those at high risk.

4- Women with diabetic control and No complication of diabetes or pregnancy may be delivered at 39 to 40 weeks, but those at high risk earlier. During labour or caesarean section blood glucose should be normalized using intravenous glucose and insulin supervised by aspecialist team.

5- Delivery should take place in ahospital where an experienced pediatrician for careful monitering are available. Blood glucose value checked during the first 3 hours, after birth, sporadically before feeding, and anytimes symptoms are suspected. Feeding can be started as soon as the infant is stable, usually within 2 to 4 hours after birth and continued at 3 to 4 hours intervals.

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