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Original article

Outcome of Infants of Diabetic Mother: Tripoli University Hospital's Experience

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Abstract

Diabetes is the most common medical complication during pregnancy, yet guidelines regarding the care of for IDMs are not well established. This study was conducted to find out the spectrum of IDMs complications, and their prognostic outcomes. This study was conducted at NICU/TUH over 12 months period. Diabetic mothers were grouped into 2 categories: PGDM 50%, (T1D 36% & T2D 14%), and GDM 50%. 143 live born of IDMs were seen in this period, male to female ratio (1.1:1), 70.6% had complications; 83.9% were delivered at term, 16.1% were delivered pretermurly, 85.3% were delivered by C/S, 44.1% were delivered macrosomic, LBW was seen in 12.6%, 53.8% developed hypoglycemia, 17.5% had RDS, 5.6% had hypocalcemia, 4.9% had high bilirubinemia, 3.5% had congenital anomalies. The main leading cause of deaths in this study was premaurity and its associated problems. IDM is a common problem in our society, hypoglycemia was the commonest complication followed by macrosomia and RDS. There was significant statistically relationship between some IDM complications and the outcome. Mortality rate was 8.0%, RDS due to prematurity and sepsis were the leading cause of death

Keywords: *Maternal Diabetes; Infants of Diabetic Mother.*

Introduction

Diabetes is the most common medical complication during pregnancy. It affects 0.5 to 5% of all pregnancies [1]. It may antedate pregnancy (pre gestational diabetes) or may be detected for the 1st time during pregnancy (gestational diabetes). Of those 80% are caused by gestational diabetes as opposed to pre gestational diabetes [2]. IDMs are at increased risk of peri- conceptional, fetal, neonatal and long-term complications [3]. A fourfold higher rate of congenital anomalies of CNS, heart, kidneys, intestine and skeletal system has been documented in IDMs, suggesting a strong association between congenital anomalies and glycaemic control [4]. Perinatal mortality among offspring of diabetic mothers still remains high. The cause of increased perinatal morbidity and mortality is not known but has been attributed to increased insulin levels in babies leading to hyper- anabolism. Studies have shown that strict control of maternal glucose during pregnancy has a favorable influence on the perinatal outcome [5]. Women with diabetes must be closely monitored throughout pregnancy. If optimal care is provided, the perinatal mortality rate, excluding congenital malformations, is nearly equivalent to that observed in normal pregnancies. Communication between members of the perinatal team is of crucial importance to identify infants who are at the highest risk for complications from maternal diabetes. In developing countries like Libya, there are more stressing due to unavailability of good neonatal care which IDMs badly need. Studies showing that the outcome of infant born to mother with diabetes in developing countries are deficient for planning of care and referral needs. In this study effort have been made to throw light and describe the clinical outcome of infants born to diabetic mothers at TUH.

Methods

Study design

The study was conducted at NICU/ TUH over 12 months period, January – December, 2013. Diabetic mothers were grouped into 2 categories: pre-gestational (T1D & T2D) and gestational DM. Diagnosis of GDM was based on ADA criteria.

Inclusion criteria

All consecutive infants born to mothers with GDM and PGDM in TUH during the study period.

Exclusion criteria

Stillborn babies of diabetic mothers.

Study tool

A preformed case sheet was designed to collect data about IDMs and to obtain the necessary information about their complications during admission and observational period.

Statistical analysis

All data were analyzed by SPSS software 12, descriptive and differential statistics used accordingly.

Results

Data were collected for 145 diabetic women, 2 were still born and 143 live born. The results will be presented for those 143 live born under the following headlines:

I-Antenatal care, type of diabetes and its duration and its managements.
II- Mode of delivery.
III- Gender distributions.
IV- Morbidity pattern.
V- Duration of stay in hospital.
VI- Mortality rate for IDM.

Antenatal care, type of diabetes, its duration and its managements

During the time of work up of this study, we have found the antenatal care of few of diabetic mothers were regular for few months of gestation and was distributed between TUH, Aljala maternity hospital and polyclinics, and in the majority, the antenatal care was completely irregular, perhaps didn't exist.

Types of diabetes during pregnancy as the following: 50% of the cases were PGDM (36% T1D & 14% T2D), while the rest of cases were GDM (Figure 1).

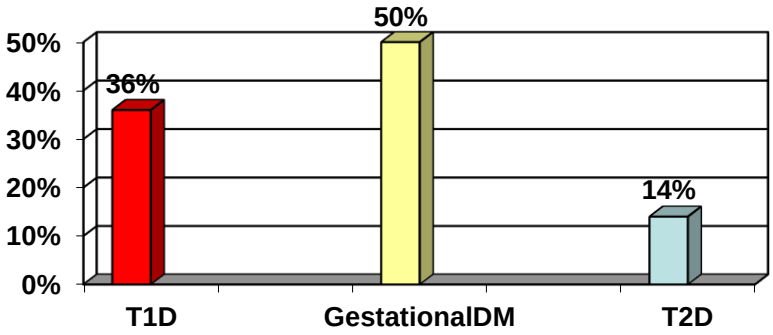

Figure 1. Types of diabetes during pregnancy

Duration of diabetes: The duration of diabetes in PGDM was >1 year in 95% of cases, while most of GDM was discovered during the 1st trimester of pregnancy 84%, 10% discovered during the 2nd trimester, and in 6% was discovered during 3rd trimester.

Insulin therapy was confined to almost all cases, 3% of GDM was only on diet regime,1% of PGDM cases continue to use oral hypoglycemic agents and were shifted to insulin therapy in the last trimester due to uncontrolled hyperglycemia.

Mode of delivery

Majority of babies 122 (85%) were delivered by C/S, and 21(15%) were delivered by normal vaginal delivery, there was no significant relationship between the mode of delivery and the

outcome of IDMs in terms of mortality (P= 0.8); out of 122 who were delivered by C\S, 10 babies (8.1%) died, while 2 cases (9.5%) out of 21 delivered by NVD died respectively.

Gender Distribution

Out of143 babies; there were 74 (51.7%) males & 69 (48.3%) females [1.1 :1], statistically there was no difference in mortality between the 2 genders.

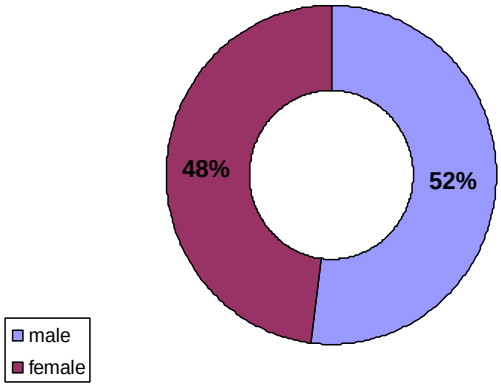

Figure 2. Gender Distribution

Morbidity pattern in IDMs under study

IDMs who had complications during observation or admission made 70.6%. Hypoglycemia was the commonest problem faced in this study, it affected 54% of cases, macrosomic observed in 44.1%, RDS complicated 17.5% of IDMs in this study, prematurity seen in16.1%, LBW found in 12.6%, hypocalcaemia in 5.6%, hyperbilirubinemia in 4.9%, and congenital anomalies were detected in 3.5% of cases.

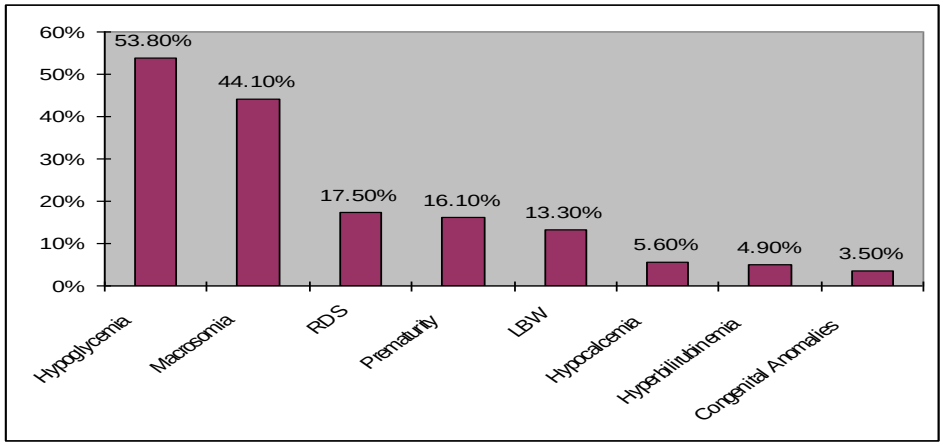

Figure 3. Medical problems complicated IDMs during the study

1- Gestational age: Most of the studied babies were delivered at term 120 (84%), 23 babies (16%) were delivered prematurely, and no post term babies. There was no significant relationship between gestational age and the presence of complications of IDMs (p= 0.6) in this study; (87%) of preterms and (68%) of the term babies had one or more complications; these complications in the form of hypoglycaemia, hypocalcaemia, hyperbilirubinemia, RDS, sepsis, and congenital anomalies (Table 1 & 2).

Table 1. Relationship between gestational age and presence of the complications

Complications	With	Without	Total
Term	81 (68.0%)	39 (32.0%)	120
Preterm	20 (87.0%)	3 (13%)	23
Total	101 (70.6%)	42 (29.4%)	143 (100%)

Table 2. Relationship between gestational age and the outcome:

Outcome	Discharge	Died	Total
Term	115(95.8%)	5(4.2%)	120
Preterm	16(69.6%)	7(30.4%)	23
Total	131(91.6%)	12(8.4%)	143(100%)

2- Hypoglycemia: It was recorded in 77 babies (54%) of IDMs: It was corrected by early oral feeding in 69 babies, and it needed to have intravenous dextrose 10% concentration or more in 8 babies. Hypoglycaemia at birth was strongly associated with macrosomia and low birth weight.

Table 3. Relationship between hypoglycemia and the outcome

Outcome	Discharge	Died	Total
Hypoglycemia	70(90.9%)	7(9.1%)	77
No hypoglycemia	61(69.6%)	5(7.6%)	66
Total	131(91.6%)	12(8.4%)	143(100%)

3- Macrosomia: The birth weight of the babies under this study ranged [1.75 - 6.25 kg] with mean weight= 3.38 ± 0.7kg, and there were no babies with extremely low birth weight. 19 cases (12.6%) had LBW, 64 cases (45%) were macrosomic (birth weight > 4000 gm), and 60 cases (41%) had normal birth weight. In this study the birth weight and the outcome were statistically significant (p=0.001) as 6 (33.3%) babies with LBW were died.
4- respiratory distress syndrome (RDS): Out of 143 cases, RDS complicated 25 cases (17.5%), 6 babies (24%) died, and the relationship between the occurrence of RDS and outcome was statistically significant (p=0.002).

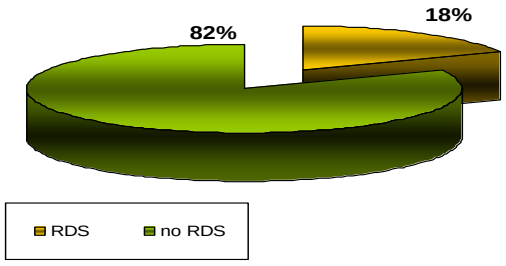

Figure (4) RDS distribution between IDMs in study

5- Hypocalcemia: 8 babies (5.6%) developed hypocalcaemia, presented with jitteriness, apnea, tonic convulsions, those babies were treated by regular intravenous calcium gluconate, and it was corrected within 3 - 5 days. Significant relationship between hypocalcemia and the outcome (p=0.002); 3 (37.5%) cases out of 8 babies who had hypocalcaemia were died.

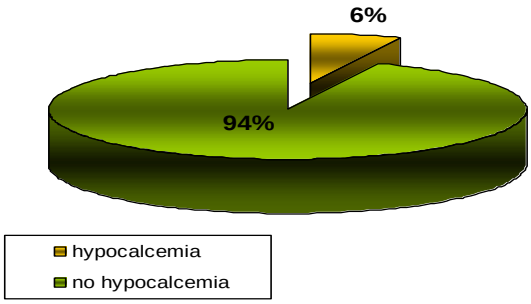

Figure 5. Distribution of hypocalcemia in IDMs

Table 4. Relationship between hypocalcemia and the outcome

Outcome	Discharge	Died	Total
Hypocalcemia	5(62.5%)	3(37.5%)	77
No hypocalcemia	126(93.3%)	9(6.7%)	66
Total	131(91.6%)	12(8.4%)	143(100%)

6-Hyperbilirubinemia (jaundice): 7 babies (4.9%) had hyperbilirubinimia, the relationship between hyperbilirubinemia and outcome was statistically significant (p=0.04), it is important to check serum bilirubin and manage it since it significantly affects the outcome of IDMs in term of mortality.

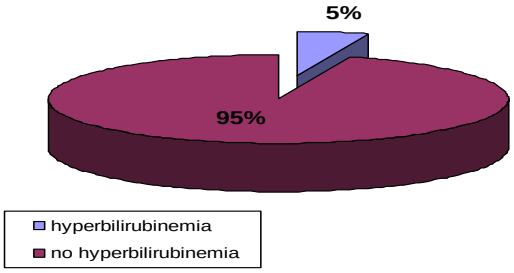

Figure 6. Distribution of hyperbilirubinemia between IDMs

7- Congenital Anomalies: 5 babies (3.4%) had congenital anomalies, one with cyanotic congenital heart disease, two with hydrocephalus, one with meningocele, and one with oesophageal atresia. No significant relationship between congenital anomalies and the outcome (p=0.3), 2 (20%) of IDMs died with congenital anomalies. It is too important to search for obvious and unobvious congenital anomalies in IDMs.

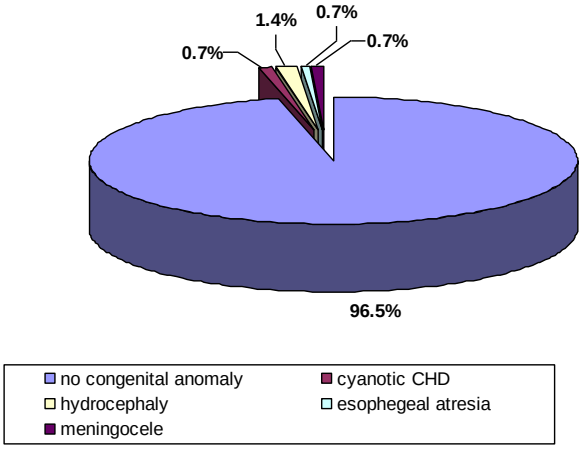

Figure 7. Different congenital anomalies among IDMs in the study

Table 5. Relationship between congenital anomalies and the outcome

Outcome	Discharge	Died	Total
Congenital anomalies	3(60.0%)	2(40.0%)	5
No congenital anomalies	128(92.8%)	10(7.2%)	138
Total	131(91.6%)	12(8.4%)	143(100%)

8- Polycythemia: No cases were detected.

V- Hospital stay: The duration of hospitalization of IDMs under the study ranged [1- 34] days with mean duration 4 ± 5.6 days. The duration of stay differed between the cases with

complications (mean= 5 days), and for those with no complication (mean= 2 days), the difference between these 2 means was statistically significant (p= 0.000).

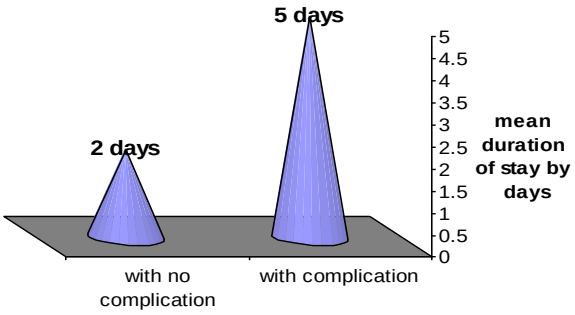

Figure 8. Duration of hospitalization of IDMs

VI- Mortality rate of IDMs: 12 babies (8%) died during this study, RDS due to prematurity and sepsis were the main reason of death in 5 cases (43%), 3 (25%) cases died due to congenital anomlies, 2 cases (16%) died because of congenital anomalies and sepsis, while RDS alone was the cause of death in 2 cases (16%).

Table 6. Causes of death among the IDMs in the study

Causes of death	Frequency	Percent (%)
RDS	3	2.1%
No congenital anomalies	2	1.4%
Sepsis	2	1.4%
Prematurity + sepsis	2	1.4%
Prematurity + RDS	3	2.1%
Total	12	8.0%

Discussion

Diabetes is the most common metabolic disease affecting women during pregnancy and is associated with adverse outcomes during fetal and neonatal period. Many of the perinatal complications can be traced to the effect of maternal glycemic control on the fetus, however many of these complications can be prevented by appropriate peri-conceptional and prenatal care [16]. Our study included 73 ladies with GDM, and 72 ladies with preexisting diabetes, (36% wereT1D, while 14% were T2D). The incidence of C/S was 85.0%, this is a high frequency when compared with similar studies conducted in Libya such as Alkhadra hospital study where it was 61%, and it was 65.4% in Aljala maternity hospital study, this may explain the absence of birth injury in our study, in comparison with Aljala maternity hospital study, where it was 6.4% [17]. Preterm delivery in IDMs (gestational age < 37 weeks gestation) was (16.1%) which was higher than Alkhadra and Aljala maternity hospitals studies respectively 13.7%, 14.76% [18,19].

Hypoglycaemia in this study, it was 54%, this is a much higher than many other studies, it was 38.6% in Qatif Central hospital, Saudia Arabia (21) and 35% in both Karachi study and Aljala maternity hospital study (19, 20) and it was only 4.6% in Alkhadra hospital study. (18) Although most fetuses of diabetic mother's exhibit growth acceleration, growth restriction mostly related to underlying maternal vascular disease occurring in 12.6% of cases of this study, which is 3 times higher than that of Aljala maternity hospital, and Karachi studies 4.08 %, 5% respectively [19,20], and it was 14.8% in Saudi Arabia study [21]. Macrosomia was recorded in 44.1 %, this value is nearly similar to Karachi study which was 45% (20), 85% of our IDMs were delivered by C/S & 15% were delivered by NVD, and in reviewing a similar study of Alkadra hospital where 29% were macrosomic, and 72 % of them were delivered by C/S and 28.0% were delivered by NVD, macrosomia detected in 78% (19), 39.0% (17) of IDMs studies in ALjala maternity hospital, it was higher in Saudi Arabia study which was 58% [21]. Congenital anomalies in our study made 3.5%, this is

much less than congenital anomalies associated with IDMs recorded among studies performed in Aljala maternity hospital and Alkhadra studies which were 19.3%, 20% respectively. (17, 18) Our study revealed 0.7% of IDMs had congenital heart disease, while it was 0.9% and 11.4% in Alkhadra (18), and in Aljala maternity hospital studies respectively [17]. Gastrointestinal malformations were 0.7% in our study, and it was 0.4% in Aljala hospital study. Our study showed 2.1% babies had CNS malformations compared with 2.8% in Aljala maternity hospital study [17].

Hypocalcemia affected 5.6 % of the babies in our study, which is much lower than that reported in Aljala hospital studies where it affected 7.6 % 25.8 % respectively [17,19]. Regarding hyperbilirubinemia, our study reported 4.8% of our IDMs have jaundice, and in Aljala hospital studies 33.8%, 8.9 [17,19], while it was 17.4% in Alkhadra hospital study [18]. Until recently neonatal RDS is common in IDMs even when they are term and it is a cause for serious morbidity in IDMs, it complicated 17.5% of the babies in our study, which is higher than that in ALkadra hospital study and Aljala hospital studies 3.7%, 14.3% respectively [18,19]. Polycythemia which may complicate IDM and is related to glycemic control; it wasn't detected in this study, but it was reported to be 3.7% in Aljala hospital study. Our mortality rate was 8.0%, RDS due to prematurity and sepsis were the commonest causes of death in our study, which is higher than that in Aljala hospital study (1998- 2000); where the mortality rate was 3.4% (17), and this is may be explained that most of the IDM babies transferred to SCBU at Tripoli Children Hospital. Hospital stays: the average hospital stay was 4 days which is longer than that in Aljala hospital study by one day (17), and this is may be explained by the fact that babies got transferred to the children hospital next door, while in our study all baby's management was under taken at NICU, Tripoli University Hospital.

Conclusion

IDM is a common problem; hypoglycemia was the commonest complication followed by macrosomia & RDS. There is a statistically significant relationship between IDM complications (gestational age, birth weight, RDS, hypocalcaemia, congenital anomalies) and the outcome in term of mortality.

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