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Clinical Presentation and Immediate Outcome of Infant of Diabetic Mother: A study in A Tertiary Care Military Hospital

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ABSTRACT

Background : *Infant of Diabetic Mother (IDM) often have complications associated with fetal hyperinsulinemia induced by maternal hyperglycemia. Infants born to Diabetic Mother (IDM) possess definite idiosyncratic characteristics, which includes Large for Gestational Age (LGA) and high morbidity hazards. Compared to infants of non-diabetic mothers, the neonatal mortality rate in IDM is over five times more and is complex at all Gestational Ages (GA) and birth weight for gestational age groups. This study was conducted to evaluate the clinical presentation and immediate outcome of IDM in a tertiary care Military hospital.*

Materials and methods: *This prospective study was conducted in Department of Paediatrics in Neonatal unit of Combined Military Hospital Chattogram. During this period, all IDM (Pregestational & gestational) delivered in this hospital was enrolled for this study. In this study, a total of 62 IDM were included delivered during the study period.*

Results: *Results suggest that more than half of the infants developed Respiratory distress (51.6%) which is the highest among all the complications. Followed by Neonatal Jaundice (32.3%), Neonatal Sepsis (19.4%), Polycythemia (11.3%), Birth Asphyxia (9.7%), Congenital heart disease/Anomalies (8.1%), Hypoglycemia and Birth injuries both (6.5%), Hypocalcaemia (4.8%), Seizure (3.2%), Others (1.6%) and death (1.6%). Our study also suggest that 51.6% was large for gestational age.*

Conclusion: *The study was conducted from the perspective of Bangladesh and the social conditions and metrological parameters were involved in this study. Considering the limitations, Authors would like to recommend that more study should be conducted taking multiple centers in consideration.*

Key words: Congenital anomalies; Diabetes Mellitus; Infant of diabetic mother; Uncontrolled blood sugar.

Introduction

Infant of Diabetic Mother (IDM) often have complications associated with fetal hyperinsulinemia induced by maternal hyperglycemia[1]. In the first trimester, maternal hyperglycemia can cause diabetic embryopathy, which results in major birth defect and spontaneous abortions. In the second and third trimesters, maternal hyperglycemia can cause fetal hyperglycemia, hyperinsulinaemia, hypocalcaemia, polycythaemia, hyperbilirubinaemia, hypertrophic cardiomyopathy, delayed lung maturation and Large for Gestational Age (LGA)[2,3]. Though many IDMs have an uneventful perinatal progression, there is still an augmented peril of difficulties. Many of these can be diminished but not eradicated, with appropriate obstetric and pediatric interference. However, a recent analysis specified that there is still much scope for development because of the multiplicity of aspects. This study was conducted to evaluate the clinical presentation and immediate outcome of Infant of Diabetic Mother in a Tertiary Care Military Hospital.

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Materials and methods

This prospective study was conducted at Department of Paediatrics in Neonatal Unit of Combined Military Hospital Chattogram for 1 year period from 1.12.2019 to 30.11.2020. This study was permitted by the Combined Military Hospital Chattogram, Bangladesh, where all the collected data were analyzed and stored. Ethical clearance taken from concern authority and written informed agreement was attained from the parents or guardians.

During this period all IDM (Pregestational & gestational) delivered in this hospital were enrolled for this study. The survey was conducted on 62 IDM. Among them 30 were male and 32 were female. First, for ethical issues written consent was taken from all the parents and then the relevant information from the history, physical examination and investigation findings were recorded in a purposely prepared questionnaire. Investigations routinely underwent were capillary blood glucose at 1, 2, 3, 6,12, 24, 36 and 48 hours of age by using glucostix. The glucostix (Capillary blood glucose) was used for screening purpose and for prompt diagnosis and management of hypoglycaemia.

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Estimation of peripheral venous blood glucose level was done for further confirmation of diagnosis of hypoglycaemia. Serum calcium level were measured routinely at 6, 24, 48 hours of age and later if the baby remains hypocalcaemic or symptomatic. Septic screening at 1 hour & 24 hour of age was done routinely. Blood samples were collected each time in all cases by trained nurses. Tests were done by autoanalyzer and interpreted by expert persons. Among other investigations: S. Fractionated Bilirubin, CXR-AP view, plain X-ray of lumbosacral spine, Hb%, TC, DC, blood culture, ECG, echocardiography etc. were done as indicated by clinical parameters. Results were analyzed by analyzing software SPSS version 27.

Mother's obstetrics history involved data concerning their socio-economic status, urban/rural background, family history of diabetes mellitus (In parents). Ultrasonographic findings and HbA1c (In 1st trimester in presentational DM and at diagnosis in GDM) were assessed. Other allied obstetrical and medical complications were noted.

Results

In this study, total 62 IDM were included. 30 were male (48.4%) and 32 (51.6%) were female. Almost 81% (50) of the infants were born at the gestational age of 37-41 weeks, 17.7% (11) born <37 weeks and 1.6% (01) ≥ 41 weeks of gestation. Further, 67.7% (42) of the infant's birth weights were on an average 2.5-3.99 kg, 17.7% (11) ≤ 2.5 kg and 14.6% (09) ≥ 4kg. Almost 88% (54) of the infants were delivered through LSCS, 9.7% (06) spontaneous vaginal delivery and 3.2% (02) assisted vaginal delivery (Table I). 51.6% (32) infant was Large for Gestational Age (LGA), 45.2% (28) Appropriate for Gestational Age (AGA) and 3.2% (02) Small for Gestational Age (SGA) (Table II). Among various complications, Respiratory distress was found in 51.6% (32) of infants, Neonatal Jaundice 32.3% (20), Neonatal Sepsis 19.4% (12), Polycythemia 11.3% (07), Birth Asphyxia 9.7% (06), Congenital heart disease / Anomalies 8.1% (05), Hypoglycemia and Birth injuries both 6.5% (04), Hypocalcaemia 4.8% (03), Seizure 3.2% (02), Others 1.6% (01) and death 1.6% (01) (Table III). Approximately 52% (32) of the infants needed 4-7 days to recover from their complications and approximately 34% (21) infants took ≤ 3 days to recover (Table: IV). Time for establishment of full feeding required <24 hours 25.8% (16), 24-72 hours 48.4% (30) patient and more than 72 hours 25.8% (16) patient respectively (Table V). 51.6% (32) infants were given Dextrose infusion and Oxygen therapy, 32.3% (20) were treated with proper antibiotics. Further, 32.3% (20) infants were treated with phototherapy. Followed by 11.3% (07) with CPAP, 4.8% (03) with Calcium supplements, 3.2% (02) with Inj. Phenobarbitone, 3.1% (01) with Ventilation and 1.6% (01) with exchange transfusion, respectively (Table VI).

Table I : Characteristics of infants of diabetic mother (n= 62)

Characteristics	Number	Percentage (%)
Sex		
Male	30	48.4
Female	32	51.6
Gestational Age (Weeks)		
< 37	11	17.7
37-41	50	80.7
≥ 41	01	1.6
Birth weight (Kg)		
≤ 2.5	11	17.7
2.5-3.99	42	67.7
≥ 4	09	14.6
Delivery Mode		
LSCS	54	87.1
Spontaneous Vaginal	06	9.7
Assisted vaginal	02	3.2

Table II : Birth weight and relation of gestational age (n= 62)

Birth wt. in antenatal chart	No. of patient	Percentage (%)
< 50 centile (SGA)	2	3.2
50-90 centile (AGA)	28	45.2
>90 centile(LGA)	32	51.6

Table III : Clinical presentation of infants of diabetic mother (n=62)

Complications	Number	Percentage (%)
Hypoglycemia	04	6.5
Neonatal Jaundice	20	32.3
Respiratory distress	32	51.6
Neonatal Sepsis	12	19.4
Birth Asphyxia	06	9.7
Polycythemia	07	11.3
Birth Injuries	04	6.5
Seizure	02	3.2
Hypocalcaemia	03	4.8
Congenital heart		
disease/Anomalies	05	8.1
Others	01	1.6
Death	01	1.6

Table IV : Duration of hospital admission (Days) of infants of diabetic mother

Days	Number	Percentage (%)
≤ 3	21	33.9
4-7	32	51.6
≥ 7	09	14.5

Table V : Time of feeding commence of infants of diabetic mother (n=62)

Hours	Number	Percentage (%)
<24	16	25.8
24-72	30	48.4
> 72	16	25.8

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Table VI : Treatment given (n=62)

Treatment	Number	Percentage (%)
Dextrose infusion	32	51.6
Antibiotics	20	32.3
Oxygen therapy	32	51.6
CPAP	07	11.3
Ventilation	01	3.1
Calcium supplements	03	4.8
Phototherapy	20	32.3
Exchange transfusion	01	1.6
Inj. Phenobarbitone	02	3.2

Discussion

According to who report 2016, 8% (12.88 million) of total population of Bangladesh was affected by diabetes mellitus. Among them, a note worthy figure is female. GDM progresses among 6.7% of all pregnancies in our people. Whereas, in western world, only 2 to 3% of all pregnancies are currently being diagnosed as GDM[4,5]. The infant of diabetic mother is at an increased risk of complications compared to infants of non-diabetic mothers[1].

In the last few years several search and survey work have been conducted on IDM and the morbidity of the infants. Sugawara et al between May 2010 and July 2013 conducted a research on 42 Japanese IDM and their mothers at their facility. Infant of diabetic mother had more complications than nondiabetic mother. The authors found higher rate of hypoglycemia which was around between 70% and 81.2%[6]. Opara et al conducted a study for over two years on IDM. Authors found that the commonest morbidities were Hypoglycemia (Suggestively greater in IDMs than non-IDMs) and hyperbilirubinaemia in 30 (63.8%) and 26 (57.4%) infants correspondingly[7]. Mahmoodand Kayes conducted a survey on IDM and found that the occurrence of hypoglycaemia was greater in infants of pregestational diabetic mothers as paralleled to that of gestational diabetic mothers (38.09% and 12.9%) individually[4]. Makwana et al conducted a survey on 34 infants born on diabetic mother. Authors found that respiratory distress was the commonest problem, found in 20 (58.82%) IDMs followed by congenital anomalies in 16 (47.05%) cases and Hypoglycemia in 15 (44.11%)[8]. Further, Mohammad H. Al-Qahtani reported that about 70% of the IDM were born with the issue of Gestational Diabetes Mellitus (GDM) whereas, almost 26% were born with type 2 Diabetes Mellitus (DM) and solitary 4.5% infants with type 1 DM. The maximum common IDM morbidities were found to be Hypomagnesaemia[8].

Studies suggest that infants born from diabetic mother tend to have higher birth weights (Except the disease is severe)[10-13]. In our study we also found that major portion of neonate were LGA, which is 51.6%.

However, it is interesting to mention here that Ranade et al found hypoglycemia among 50% of the infants of diabetic mother[14]. Studies suggest that hyperglycaemia of mother in pregnancy disclosures the infant to the jeopardy of RDS, since insulin constrains gene expressions of surfactant proteins A and B in lung epithelial cells[15-17]. However, mature infants born to mothers with diabetes has exposed to bear a six-fold increase in peril of RDS, consistent with this study (51.6%)[18].

The infant of diabetic mother is at an augmented risk of difficulties compared to infants of non-diabetic mothers. The reasons of the fetal and neonatal sequelae of maternal diabetes are multifactorial. Nevertheless, some of the perinatal difficulties can be outlined to the effect of maternal glycemic regulation on the fetus. Further, significant amount of the perinatal difficulties in IDMs can be prevented by suitable peri-conceptional and prenatal attention[19-22].

Limitation

This study is exceptional as it is the first regional study that emphases on maternal and neonatal results. Our data is analogous to global figures. This study had limited margins mostly because of its slightly limited access to some data. In this study, the maternal nutritional status, obtainability of laboratory data, data imitating treatment objective attainment for instance, fasting glucose level post initiation of therapy were inaccessible. The experience of single center data is another limitation of this study.

Conclusion

This study discussed the clinical presentation and immediate outcome of infant of diabetic mother. 62 infants were taken into consideration in this study. The study was conducted from the perspective of Bangladesh and the social conditions and metrological parameters were involved in this study. More than half of the infants took birth with Respiratory distress (51.6%) followed by Neonatal Jaundice (32.3%), Neonatal Sepsis (19.4%), Polycythemia (11.3%). Treatment were provided and more than half of the infants recovered within 4-7 days' period. Number of death was very less (1.6%).

Recommendations

Considering the above limitations, author would like to recommend that more study should be conducted with taking multiple centers in consideration.

Disclosure

All the authors declared no competing interests.

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