Original Article

GESTATIONAL DIABETES AND CONGENITAL ANOMALIES

Pushpa Goswami, Koshila,
Geeta Bai, Chetan Das

ABSTRACT:
Objective: To determine the association of congenital anomalies with gestational diabetes mellitus (GDM). **Study setting**: Department of Pediatrics of Civil Hospital Mirpurkhaas, Sindh.
Methods: infants (babies below 12 months of age) born with congenital anomalies were included in the study subsequent to informed consent from their parents. Sampling technique was non probability purposive sampling. Complete history was taken with reference to age, weight of baby, the past intake of drug during pregnancy, family history of congenital abnormalities and about presence/ absence of gestational diabetes mellitus (GDM) during pregnancy. Data analyzed on IBM, SPSS version 21.0. P-value of <0.05 was reflected as significant.
Results: Mean age of baby was 0.15 years±0.48 born to GDM mothers(n=82) while mean age of babies born to non GDM mothers(n=63) was 0.17±0.33 years. Congenital anomalies compared between mothers with gestational diabetes mellitus (GDM) and the mothers without having GDM (n=63). Congenital anomalies revealed significantly related to presence of GDM in mothers, X^2=24.74, d=13 and p value=0.025.
Conclusion: Congenital anomalies found significantly related to GDM.

KEY WORDS: congenital anomalies, gestational diabetes mellitus.

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Correspondence:
Dr. Pushpa Goswami,
MBBS, MPhil Anatomy
Associate Professor of Anatomy
Liaquat University of Medical and Health sciences, Jamshoro
Email: pushparamesh1998@gmail.com

INTRODUCTION

Gestational diabetes mellitus (GDM) is the most important wellbeing concern in Asia. Additional attention should be given to those Asian ladies who are more prone to develop GDM i.e., with the past of GDM in previous pregnancy, macrosomia or congenital anomalies.[1]
GDM can be defined as any disturbance in glucose levels that occur for the first instance or is primarily noticed during pregnancy.[2]Diabetic embryopathy might alter the course of organogenesisbut the neural tube and cardiovascular birth anomaliesare amid the frequently noticed anomalies. Additional complications might comprise preeclampsia, fetal growth abnormalities, preterm delivery and still birth. Research on neurodevelopmentrevealed that the progeny of mothers having diabetes are more prone to developgross as well as fine motor dysfunctions, autism spectrum disorder, attention deficit hyperactivity and learning difficulties. [3]Congenital anomalies are those conditions that are significantly determined earlier than or during birth and which are identifiable in early life. A few of these birth defects are classified as major that might lead to death of infant or might acquire surgical intrusion.Some of the birth defects are classified as minor that are drasticallydamaging to the health and eminence of life.[4] Hyperglycemia leads to generation of free radicals that might play part in developingcongenital anomalies, specifically in the period of organogenesis, by disturbing cell homeostasis and unfavorablyupsetting mitosis.[5]GDM is also the risk factor for developing ventricular diastolic dysfunctions without causing fetal myocardial hypertrophy.[6] Babies of diabetic mothers are prone to functional or structural congenital heart anomalies which raise the morbidity as well as also mortality.[7]The rate of inborndefects among the newborn in maternal diabetics than that of the normal healthy pregnancy has amplified by five times; i.e., cardiac deformities occur in 8.5 percent of the cases.Most frequently observed are ventricular septal defect (VSD), transformation of major arteries, pulmonary atresia, aortic stenosis, conotruncal defect and dextrocardia. [8] This study has been designed to evaluate the association of the presence of congenital anomalies with maternal gestational diabetes mellitus.

METHODOLOGY

This cross sectional study was conducted in Department of Pediatrics of Civil Hospital Mirpurkhaas, Sindh, from January 2019 to December 2019. After approval from hospital ethical board, infants (babies below 12 months of age) born with congenital anomalies were included in the study subsequent to informed consent from their parents. Sampling technique was non probability purposive

Sampling. Complete history was taken with reference to age, weight of baby, the past intake of drug during pregnancy, family history of congenital abnormalities .Pre-term newborns, babies > 1 year ageand having no congenital anomaly were excluded from the study. Data was analyzed by means ofIBM: SPSS 21.0. Frequencies (%) were determined for categorical variables like congenital malformations and presence or absence of GDM. Mean ± SD determined for the continuous variables like age of mother and baby. Chi square test was applied for comparison of categorical variables. P-value of <0.05 was reflected as significant.

RESULTS

and about presence/ absence of gestational diabetes mellitus (GDM) during pregnancy. Thorough physical examination was performed Mean age of baby was 0.15 years±0.48 born to GDM mothers(n=82) while mean age of babies born to non GDM mothers(n=63) was 0.17±0.33 years. **Table No. 1**

Congenital anomalies compared between mothers with gestational diabetes mellitus (GDM) and the mothers without having GDM (n=63). Congenital anomalies revealed significantly related to presence of GDM in mothers, X^2=24.74, d=13 and p value=0.025. **Table No.2 and figure No.1**

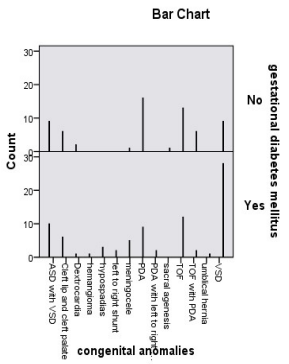
Table No. 1: Mean of neonate's age and maternal age (n=145)

	gestational diabetes mellitus (GDM)	N	Mean	Std. Deviation
neonatal age (years)	Yes	82	.15	.048
	No	63	.17	.033
maternal age (years)	Yes	82	34.25	6.55
	No	63	30.65	8.04

Table No.2: Association of congenital anomalies with GDM (n=145)

			GDM		Total
			Yes	No	
congenital anomalies	VSD	N(%)	28(19.3)	9(6.2)	37(25.5)
	Dextrocardia	N(%)	1(.7)	2(1.4)	3(2.10
	TOF	N(%)	12(8.3)	13(9.0)	25(17.2)
	PDA	N(%)	9(6.2)	16(11.0)	25(17.2)
	left to right shunt	N(%)	2(1.4)	09(.0)	2(1.4)
	PDA with left to right shunt	N(%)	2(1.4)	0(.0)	2(1.4)
	TOF with PDA	N(%)	2(1.4)	6(4.1)	8(5.5)
	ASD with VSD	N(%)	10(6.9)	9(6.2)	19(13.1)
	Cleft lip and cleft palate	N(%)	6(4.1)	6(4.1)	12(8.3)
	meningocele	N(%)	5(3.4)	1(.7)	6(4.1)
	umblical hernia	N(%)	1(.7)	0(.0)	1(.7)
	hemangioma	N(%)	1(.7)	0(.0)	1(.7)
	hypospadias	N(%)	3(2.1)	0(.0)	3(2.1)
	sacral agenesis	N(%)	0(.0)	1(.7)	1(.7)
Total		N(%)	82(56.6)	63(43.4)	145(100.0)

Figure No: 1: GDM and rate of congenital anomalies



DISCUSSION

GDM is associated with adverse maternal and fetal outcomes. It is a strict intimidation to motherly and baby health in a supply restraint state like Pakistan.[9] In present study, out of 145 congenital anomalies, 56.6% congenital anomalies were present in babies born to GDM mothers. Prevalence of GDM, according to a study, carried in secondary and tertiary care hospitals of Karachi and Hyderabad in Pakistan, revealed as 11.8%. [9]

Wu Y, Liu B et al.[10] revealed significant linear association of GDM with numerous subtypes of congenital anomalies in babies. They further more focused on the advantages of counseling prior to conception in ladies with pre-existing diabetes or at the risk for GDM for the prevention of congenital anomalies.Adjusted relative risks(RRs) of of cyanotic congenital cardiac disease were 1.50 (95% CI 1.43–1.58) for maternal GDM; the adjusted RRs of hypospadias in babies were 1.29 (95% CI 1.21–1.36) for maternal GDM.

Lee KW et al. [11] discovered the prevalence of low birth weight in neonates born to mothers with GDM was 14.6 percent, followed by congenital anomalies (2.4 percent). [11]

Both the pre-gestational diabetes mellitus and GDM groups had notablyhigher odds of cyanotic cardiac disease, macrosomiaand any birth defect than controls. The pregestational diabetic group had higher odds of cleft lip and palate, cleft palate alone, hypospadias and limb reduction defect.[12] Fetus of diabetic mothers found with increased interventricular septum thickness but point to be focused that there were no significant differences in the pregestational diabetic and GDM groups ($p > .05$). So, it is worthy for diabetic pregnant women to be screened for diastolic function of their fetus.[13]Hyperglycemic status of mother threats the fetus to augmented oxidative stress, apoptosis, hypoxia, and epigenetic alterations. All offspring are not affected and also not to the identicaldegree, pregnancy result is affected by mother's diet; and maternal glucose levelsmodify transcriptional profiles of fetus and so amplify the variation in transcriptomic profiles as a consequence of distorted gene regulation. Aforementioned points support the epigenetic alterations. Maternal hyperglycemia has been considered as tertogenic modifiable factor, explored by animal research models.[3]

Mohsin M, et al. [14] revealed that 18 babies with myocardial hypertrophy and 32 with normal septal thickness, out of total fifty birthsof gestational diabetic mothers.

Abu-Sulaiman RM and SubaihB[15] in their study revealed various echocardiographic finding in infants; i.e., patent ductusarteriosus (70 percent), Hypertrophic cardiomyopathy (38 percent), patent foramen ovale (68 percent), pulmonary stenosis (01%), TOF(1%), VSD(04 percent), mitral valve prolapse (02 percent), and atrial septal defect (05 percent). Programs should be adopted in our population to screen such anomalies prior to birth of baby. Gestational diabetes mellitus (GDM) is a teratogenic condition for the fetus. Congenital malformations among the newborns of diabetic mothers are 5-times greater than general population. Tetralogy of fallot is a common form of congenital heart defect. We would like to report a diagnosed case of fetal tetralogy of fallot based on findings including a ventricular septal defect (VSD), aortic valve overriding, bidirectional shunt via VSD in aortic long axis view, in addition to anomalies on the three-vessel view with small pulmonic annulus in a high risk mother with GDM with a gestational age of 19 weeks. It appears that although the risk of fetal cardiac malformations may be highest in women with GDM, all pregnancies of pre-gestational diabetes and GDM are at increased risk, given this, regular fetal echocardiographies should be consider in women with GDM.[16] Mothers having GDM are more prone to have babies with congenital anomalies. Further broad spectrum studies are required to explore the underlying mechanisms.

CONCLUSION

Congenital anomalies are significantly related to GDM mothers.

Conflict of interest: None.
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Authors

1. Dr. Pushpa Goswami
   MBBS, MPhil Anatomy
   Assistant Professor of Physiology
   Liaquat University of Medical and Health sciences, Jamshoro
2. Dr. Geeta Bai Senior lecturer Of Physiology
   MBBS, MS OBGy
   Consultant Obstetrician and Gynaecologist
   Liaquat University of Medical and Health sciences, Jamshoro
3. Dr. Chetan Das
   MBBS, FCPS Pediatrics
   Professor and consultant Pediatrics
   Liaquat University of Medical and Health sciences, Jamshoro
   Diabetologist, Diabetic clinic,
   LUH, Jamshoro/Hyderabad

Authors Contribution	
Dr. Pushpa Goswami	Conception of study design, acquisition, analysis, and interpretation of data.
Dr. Koshila	Drafting and methodology, data interpretation
Dr. Geeta Bai,	Analysis and interpretation of data for work
Dr. Chetan Das	Data Collection

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