

ECHOCARDIOGRAPHIC FINDINGS IN INFANTS OF DIABETIC MOTHERS AND ITS RELATION TO MATERNAL GLYCEMIC CONTROL

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Introduction

Diabetes mellitus complicates 1–2% of all pregnancies, Maternal diabetes mellitus increases perinatal mortality and morbidity five-fold compared with normal pregnancies. Congenital malformations are seen in 5–8% of babies of diabetic mothers.

Congenital heart diseases are the common anomalies associated with gestational diabetes mellitus. Furthermore, the risk of fetal cardiac malformations in infant of diabetic mother (IDM) is significant. The most common anomalies are atrial septal defect (ASD), ventricular septal defect (VSD), transposition of the great vessels, truncus arteriosus, coarctation of aorta and hypertrophic cardiomyopathy .

Most of the cases are usually asymptomatic however some may present immediately following delivery with decreased cardiac output, respiratory distress and other symptoms of cardiac failure requiring aggressive medical therapy.

The echocardiographic evidence of hypertrophy is noted by late second and early third trimester.

A positive correlation between glycosylated hemoglobin (HbA1c) levels and septal thickness measurements is reported. Impaired maternal glucose tolerance has been associated with several morbidities, including maternal toxemia and fetal macrosomia, congenital heart disease, growth restriction, neonatal hypoglycemia, hypocalcaemia, hypomagnesaemia, polycythemia, hyperbilirubinemia and respiratory distress syndrome.

Aim of the work

This work aimed to evaluate the use of echocardiography in the assessment of hemodynamic stability in newborns. And to determine the prevalence of congenital heart diseases or any cardiac abnormalities in infant of diabetic mother (IDM) in relation to the glycemic control of their mother.

Subject and Methods

The study conducted on 72 neonates admitted to the neonatal intensive care unit in Alexandria University Children's Hospital. After approval of the ethical committee of the Faculty of Medicine, Alexandria University, an informed parental consent will be obtained for all enrolled newborns.

This study included two groups:

Group I: Include 35 neonates born to diabetic mother(21 mothers had gestational diabetes and 14 mothers had pregestational diabetes)

Group II: Include 37 neonates born to non-diabetic mothers as a control group (reference group).

Echocardiography was done within the first week after delivery.

Cases with significant findings were planned for follow up after 1 to 3 months.

Maternal venous blood samples were collected for estimation of glycosylated hemoglobin(HbA1c) as indicator of diabetic control.(done for cases only)

Results:

we compared between gestational and pregestational diabetic mothers according to diabetic control using the glycosylated hemoglobin (HbA1c)level , the cut off point of HbA1c level was 6.5 mg/dl. The pregestational group showed higher levels of HbA1c.in comparison to the gestational group. (P=0.002)

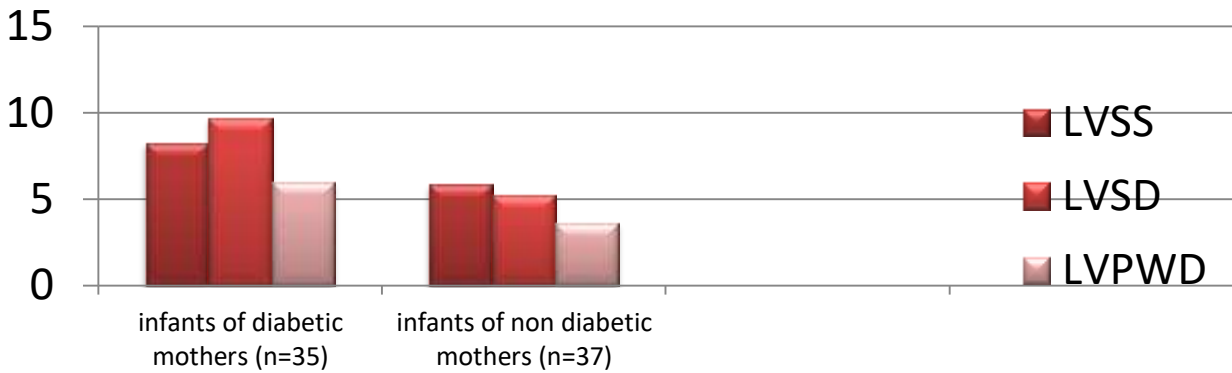
We compared between the infants of diabetic mothers group and the infant of non diabetic mothers group as regard of left ventricular dimensions , there was higher significant difference between the two groups as regard the left ventricular septal diameter in systole(LVSS)and left ventricular septal diameter in diastole(LVSD) (p<0.001).The left ventricular hypertrophy was higher among the infants of diabetic mothers group. As regard the left ventricular posterior wall diameter in systole(LVPWS) and left ventricular posterior wall diameter in systole (LVPWd), we found a higher significant difference between two compared group (p=0.001). The infant of diabetic mothers had thicker left posterior wall than the infant of non diabetic mothers.

Table (1):A comparison between the different studied groups according to diabetic control glycosylated hemoglobin (HbA1c) among gestational and pregestational diabetic mother :

	GDM(n=21)		PreGDM (n=14)		Test of significance
HbA1c of the mother	N	%	N	%	
• Mean ± SD	6.60 ±2.09		9.23 ±2.41		t=4.42 P=0.002*
• Min-Max	4.4-12		4.5-12		
• Medium	5.50		10.25		
Categories of DM by HbA1c					
• Controlled	11	52.4	2	14.3	χ ² =5.22 p=0.02*
• Uncontrolled	10	47.6	12	85.7	

Table(2) A comparison between the 2 studied groups as regard of left ventricular dimensions:

	Infants of non diabetic mothers (n=37)	Infants of diabetic mothers (n=35)	Test of significance
LVSS			
• Mean ±SD	5.84±1.71	8.23±2.14	T=5.24 P<0.001*
• Min- max	2.70-8.40	4-14	
• Medium (IQR)	6(3.20)	8(2)	
LVSD			
• Mean ±SD	5.26±1.87	9.74±2.76	T=8.11 P<0.001*
• Min- max	3-10	4-16	
• Medium (IQR)	5(3)	10(4)	
LVPWd			
• Mean ±SD	3.59±0.79	4.57±1.48	Z=3.51 P<0.001*
• Min- max	2.80-7	2-7	
• Medium (IQR)	3.30(1)	5(2)	



Conclusions

We concluded that infants of diabetic mothers are at higher risk to increased myocardial thickness than infants of non-diabetic mothers. All macrocosmic infants of diabetic mothers are at higher risk for development of cardiovascular complications. Maternal glycemic control has a significant influence on cardiac morphology and function in infants of diabetic mothers .The cardiovascular complications were usually attributed to poor control of hyperglycemia during pregnancy.



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