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Study the Relationship between Fetal Growth Rate and Presence of Maternal Liver Steatosis In Diabetic Patients

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ABSTRACT: study of relationship between fetal growth rate and presence of maternal liver steatosis in diabetic patients, were the study performed on female pregnant mothers, Sudanese nationality between 18-45 years old, with high body mass index and at least stage one of liver steatosis. In main three hospitals in period from 2016 to 2018. Using mindray machine SD6, made in china, with 5MHz curvilinear transducer.
The frequency of trimester for diabetic patients was equal for the both second and third with 33 patients for each, and the family history was positive to negative with ratio 2:1. Were the correlation between steatosis grade and trimester were the steatosis grade was three levels mild, moderate and severe, correlate between mild and the trimester was 12 patients in 2nd and 16 patients in 3rd , with moderate grade 13 patients in 2nd and 14 in 3rd and the severe grade 8 in 2nd and 3 patients 3rd diabetic patients.

KEYWORDS: fetal growth, pregnant patients, maternal liver steatosis, diabetic patients

I. INTRODUCTION

The liver has been called "the metabolic brain" of the fetus [1], controlling the distribution and utilization of nutrients from the placenta. Nutrient access and fetal liver blood flow act both independently and together to influence fetal growth and body composition [2,3]. The fetal liver has two sources of venous supply; well-oxygenated blood from the placenta through the umbilical vein being the main source, and low-oxygenated blood from visceral organs through the portal vein. The distribution of the nutrient rich umbilical venous blood to the liver has been suggested to be a mechanism for regulation of fetal growth [4]. This is based on experimental studies showing that increasing liver flow from the umbilical vein leads to higher cell proliferation in the liver, heart, skeletal muscle and kidneys in fetal lamb [4]. In addition, studies of human low-risk pregnancies have shown that larger fetal size is associated with higher umbilical venous liver flow as a response to maternal glucose intake [5]. Also, higher umbilical venous flow to the liver is associated with newborn adiposity [6].

Normal pregnancy is a condition characterized by a series of complex hormonal adaptations that occur to ensure that sufficient glucose is available to meet the nutritional requirements of the growing fetus without causing maternal hypoglycemia [7]. As normal pregnancy progresses, there is an increase in insulin resistance that may result in gestational diabetes [8].

Pregnancy can also occur in women with preexisting diabetes. A significant increase in preexisting diabetes in pregnant women has been observed in the USA between 1999 and 2005, rising from 10% to 21% [9]. Pregestational diabetes, both type 1 and type 2, can cause alterations in fertilization, throughout pregnancy, and even after delivery. It can predispose the fetus to many alterations in organogenesis, restrict its growth, and predispose the mother to some diabetes-related complications, such as retinopathy and nephropathy, or accelerate the course of these complications, if they are already present. Gestational diabetes generally leads to fetal growth alterations [8].

Pregnant women with diabetes present increased risk of complications, and their offspring, of neonatal morbidity and mortality. Many population-based studies have explored the impact of diabetes on pregnancy outcomes in women with presentational (types 1 and 2) and gestational diabetes [10]. Poor pregnancy outcomes, such as increased risks of congenital malformations, Preterm delivery, fetal and neonatal loss, pre-eclampsia, Cesarean section and maternal morbidity and mortality, occur in one in every four women with presentational diabetes [11,12].

Two studies from Europe have evaluated other markers of fatty liver among women with gestational diabetes mellitus (GDM). One cross-sectional study of 31 European women showed an association between non-diabetic women with a history of GDM and increased hepatocellular lipids on MR spectroscopy, however did not evaluate for secondary causes of hepatic steatosis to make the diagnosis of non-alcoholic fatty liver disease (NAFLD) [13].

Another study of 97 European women (68 GDM) assessed within 3–6 months after pregnancy found that previous GDM was associated with a higher score on the fatty liver index (FLI), which is a weighted score based on BMI, waist circumference, triglycerides, and GGT that has been shown to correlate with the presence of NAFLD in a middle-aged European cohort [14,15].

II. MATERIAL AND METHOD

The study is case control study, will be performed on female pregnant mothers, Sudanese nationality between 18-45years old, with high body mass index and at least stage one of liver steatosis. In police hospital, General Omar Sawi medical complex between 2016 -2018. Multiple gestations, or pregnancy complicated by gestational anomalies will be excluded. Patient's age, number of previous births, weight and length will be taken from the patient's records. BMI will be calculated using the standard formula described by WHO: the maternal weight in kilograms divided by the squired maternal height. An abdominal scan will be performed to detect and determine the stage of liver steatosis as described previously. Fetal measurements will be taken are BPD, FL, GA and fetal weight during routine pregnancy follow up ultrasound, using Mindray machine SD6, made in china, with 5MHz curvilinear transducer.

Scanningtechnique: Longitudinal scan from outer margin of the left to the outer margin of the right lobe. Transverse scan with the probe angled cephalic to include the superior margin to the inferior margin of the left and right lobe of the liver. Subcostal scan to examine the whole of the right lobe. Intercostal scan which is a supplementary view for examining the right lobe of the liver especially when the right lobe is well within the rib cage. Stage of liver steatosis was determined as previously mentioned in chapter tow for mild stage 1 to severe in stage 3.

III. RESULTS

Table 1. Show statistical parameters for diabetic patients

	Mean	STD	Minimum	Maximum
Age	30.50	7.322	18	43
Weight	104.02	13.269	79	130
Height CM	161.91	6.520	146	174
BMI	39.55	4.148	27	49
FL	48.69	15.181	18	99
BPD	64.48	15.916	33	99
GA_LMP	29.323	6.5830	11.0	41.1

Table 2. Show the frequency and percent of pregnant trimester and family history for diabetic patients:

Trimester	Frequency	Percent	**Family history**	Frequency	Percent
2nd	33	50.0	Negative	16	24.2
3rd	33	50.0	Positive	50	75.8
Total	66	100.0	Total	66	100.0

Table 3. Show correlate between steatosis grade andTrimester and

Steatosis grade	Trimester		Total
	2nd	3rd	
Mild	12	16	28
Moderate	13	14	27
Severe	8	3	11
Total	33	33	66

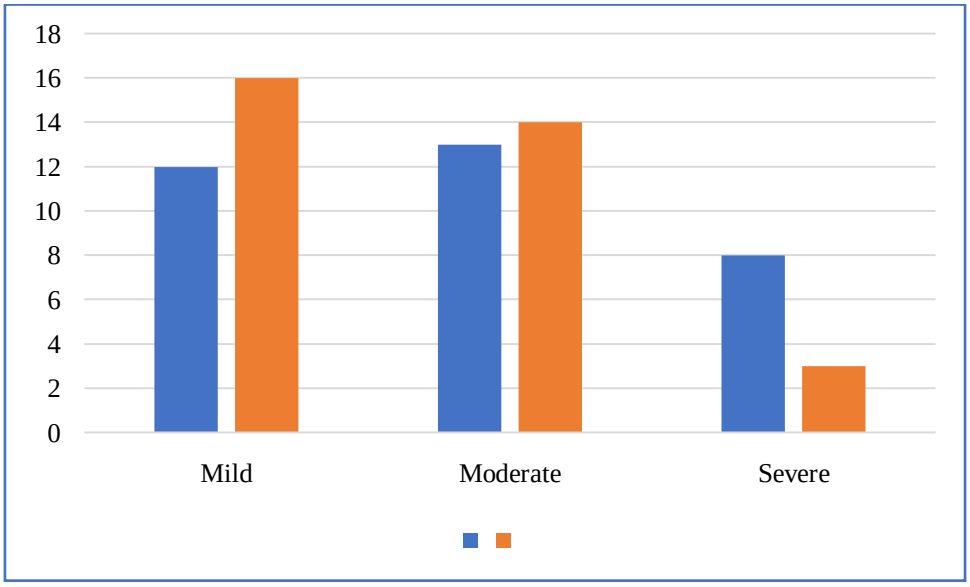

Figure 1. Show correlate between steatosis grade and Trimester

IV. DISCUSSION

Steatosis is an acquired, reversible disorder of metabolism, resulting in an accumulation of triglycerides within the hepatocytes. Most commonly associated with obesity, maternal obesity can result in negative outcomes for both women and fetuses.

Table 1. show statistical parameters for diabetic patients and the variables was age, weight, height and body mass index. And the measurement was FL, BPD and GA. All this presented as mean, standard deviation, minimum and maximum, the mean and STD for age 30.50 ± 7.322 years, for weight height and BMI was 104.02 ± 13.269 kg, 161.91 ± 6.520 cm and 39.55 ±4.148 kg/cm^2.

Table 2. show the frequency and percent of pregnant trimesterandfamily history for diabetic patients were the frequency and percent for trimester was 2nd 33 patients and 3rd was 33 patients with percentage 50.0% and 50.0% respectively. and the family history with negative history 16 patients 24.2 % and positive 50 patients with 75.8% among all diabetic patients.

Table 3. show correlate between steatosis grade and Trimester were the steatosis grade was three levels mild, moderate and severe, correlate between mild and the trimester was 12 patients in 2nd and 16 patients in 3rd, with moderate grade 13 patients in 2nd and 14 in 3rd and the severe grade 8 in 2nd and 3 patients 3rd diabetic patients as shown in figure 1.

V. CONCLUSION

Study the relationship between fetal growth rate and presence of maternal liver steatosis in diabetic patients, were the study performed on female pregnant mothers, Sudanese nationality between 18-45years old, with high body mass index and at least stage one of liver steatosis. In main three hospitals in period from 2016 to 2018. Using mindray machine SD6, made in china, with 5MHz curvilinear transducer.

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