

Evaluation of diabetes effected on placenta (from 20weeks - 38 weeks) using ultrasonography .

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Abstract :

This Descriptive study was obtained to study the diabetic effect on placenta in second and third trimester using ultrasonography. This study was done in Omdurman maternal hospital – Khartoum Sudan ,during the period extended from march 2020 to December 2020 .100 pregnant diabetic women were included ,another 100 normal pregnant were closed as control group .All were extended using ultrasound protocol .the scan was done using mindray ultrasound machine .The placenta has been evaluated as thickener ,site , and grade .The study showed significant differences between placenta grading in diabetic group and control group at p-value 0,000 , as well as placenta site at p-value 0,037,and placenta thickness at p-value 0,000.

Key word: diabetes , ultrasound , placenta

Date of Submission: 15-09-2021

Date of Acceptance: 30-09-2021

I. Introduction :

Placenta is temporary fetal organs that begins development from blastocyte shortly after implantation .It plays critical roles in facilitating nutrient ,gas ,wastes exchange between physically separated maternal and fetal circulation ,and important endocrine organs producing hormone that regulate both maternal and fetal physiology during pregnancy .Placenta connects the fetus via umbilical cord ,in the opposite aspect to the maternal uterus species dependent manner . In human a thin layer maternal decidual (endometrial) comes away from placenta when expelled from uterus following birth (pough, et al 2002).The placenta average 22cm in length and 2-2,5 in thickness the center beings thickest and the edge beings thinner .its typically weight 500 gram its connect to the fetus via umbilical cord approximately 55-60 cm in length .its contain two umbilical arteries and one umbilical vein [wayback, et al 2011].The umbilical cord inserts into chorionic palate .vessels branch out surface of placenta and further more divided to form a network covered by thin layer of cells ,this result formation of villous tree structures on maternal side ,this villous tree structures grouped in to lobules called cotyledons . The placenta have disc shape ,but size vastly between different mammalian species (wayback et al 2016).The placenta occasionally take a form in which comprises several distinct parts connected by blood vessels .[wayback et al 2011]. The part called lobes ,may number two, three , four or more such placenta are described as bilobed, bilobuar ,bipartite ,trilobed ,trilobular ,tripartite and so on .if there is clearly discernible main lobe and auxiliary lobe the latter is called asuccenturiate placenta .Sometime the blood vessels connecting the lobes get in the way of fetal presentation during labor , which called vasa previa. About 20,000 protein coding genes are expressed in human cell and 70% of these genes are expressed in the normal mature placenta (fujikura et al 1970). The placenta has grades from 0 to 3 with different features in each grade. Grade 0:The chorionic plate appears as a smooth straight and well-defined unbroken echogenic line. The placental substance has a homogeneous texture without any foci of increased echogenicity. No focal areas of increased echogenicity are seen in the basal layer. These changes are seen in the first and second trimester. Grade1:chorionic plate appears as a well-define un broken echogenic line with some subtle indentation .a few scattered foci of increase echogenicity parallel to the basal layer may in placental substance .no density is seen in the basal layer .a grade 1 placenta may first be seen from 30-32 weeks and may persist until term. Grade 2: the chorionic plate develops more marked indentation .the placenta substance in incompletely linear or comma-shaped echogenic densities contiguous with the chorionic plate .there is an interval increase in size and number of echogenic foci in the placental substance compared to grade 1,the basal layer also contains linear larger and more echogenic than the placental substance .the axis of this echoes is also parallel to basal layer. grade 3: the

chorionic palate appears interrupted by echogenic indentation extending up to the basal layer .the placenta substance is divided by these septa and may contain anechoic of hypo echoic region .additional dense irregular echogenic areas with acoustic shadowing may appear near the chorionic plate .echogenic foci in the basal layer may be larger more dense ,and grade 3 placenta is usually seen in the third trimester near term . Electron microscopy confirm the presence of large cytotrophoblastic cell in the villi of the insulin –dependent woman placenta (Jones and fox 1976).This are mainly of the intermediate type showing a cytoplasm complexity intermediate between that of organelle-rich syncytiotrophoblasts and that of the organelle-depleted resting cytotrophoblastic cell. Mitotic figures are occasionally seen in the cells whilst new cytotrophoblastic cells with large pale ovoid nuclei are sometime noted .The villous syncytiotrophoblasts appear fully viable in most areas but occasion – al small scattered foci of syncytial necrosis are encountered ,these showing nuclear pyknosis increase cytoplasm density and loss of organelles .The syncytial rough endoplasmic reticulum tend to be moderately dilated and the citternea contain electron-dense flocculent material .A normal ,or sometimes increased ,number of syncytial pinocytotic vesicles are present whilst there is commonly an increase in both the number and size of syncytial osmiophilic secretary droplets . The microvillus on the free surface of the villous syncytiotrophoblasts are of normal size and shape and appear to be present in normal density .The trophoblastic basement membrane is irregularly thickened ,the membrane having both amorphous and fibrillary components and containing .occasional dense granular inclusion and fine filament .No evidence is seen of immune complex deposition or formation in thickened areas of the membrane .AT the ultra structural level placentas of gestational diabetes tend to show the same spectrum of changes as do those from insulin-dependent diabetics (Jone and Fox 1976;Fox 1979) : thus focal syncytial necrosis .dilatation of syncytial endoplasmic reticulum ,a normal or increased number of syncytial pinocytotic vesicles ,an increased number of syncytial secretary droplets ,focal basement membrane thickening and evidence of cytotrophoblastic proliferation are all encountered sometime to the same extent and degree as in placentas of insulin –dependent women .

II. Material And Method :

This was an descriptive study carried out in Khartoum city, the capital of Sudan at Maternal Hospital. The study conducted from March 2020 to December 2020 in which a group of (100) diabetic pregnant women and (100) normal pregnancy . under went U/S examination for antennal care. Gray scale procedure was done for them in order to establish some preliminary data of the population.

2D Mindary ultrasound machine with Doppler facilities was used to scan the patients. The examination began with subject supine. First fast scan was done to survey all uterus and its content. Then a scan with details is done to evaluate the placenta site (upper –low line –marginal –previa), grade (0-1-2-3), and thickness .Data analyzed using SPSS to find the significant difference between the variables and the results presented in tables , significant correlation between the variables was represented in

III. Results:

Table 1: Chi-square test for association between placenta grade and DM:

		Group			Total
			DM	Normal	
Placenta grade	1	Count	15(15.0%)	74(74.0%)	89(44.5%)
	2	Count	58(58.0%)	24(24.0%)	82(41.0%)
	3	Count	27(27.0%)	2(2.0%)	29(14.5%)
Total		Count	100(100.0%)	100(100.0%)	200(100.0%)
Chi-Square Tests					
			Value	df	Sig.
Likelihood Ratio			82.825	2	0.000

Table 2: Chi-square test for association between placenta site and DM:

		Group			Total
			DM	Normal	
Placenta site	Not low	Count	88(88.0%)	96(96.0%)	184(92.0%)
	Marginal	Count	12(12.0%)	4(4.0%)	16(8.0%)
Total		Count	100(100.0%)	100(100.0%)	200(100.0%)
Chi-Square Tests					
			Value	df	Sig.
Pearson Chi-Square			4.348	1	0.037

Table 3: Mean placenta thickness for DM affected and normal people:

Group	Mean	Std. Deviation	Std. Error Mean
DM	5.0614	1.53638	0.15364
Normal	3.8572	1.01083	0.10159

Table 4: t-test for difference between DM affected and normal people in mean placenta thickness:

t-test for Equality of Means				
T	df	Sig.	Mean Difference	Std. Error Difference
6.538	171.398	0.000	1.20423	0.18419

IV. Discussion :

The current study showing that diabetes can affected placenta grading, 85% of people who are affected by DM have grade 2 or grade 3 placenta, while the majority 98% of normal people who have grade 1 or grade 2 placenta. Table [1] the result agreed with study done by (Taricco et al 2003),who showed that Secondly villous edema was clearly observed in gestational diabetic placenta and slightly in well controlled diabetic placenta. (Beauharnais et al 2012), reported that villous edema is common in diabetic placenta. The villous edema observed may be due to the accumulation of acidic mucosubstances, (Nelson et al 2002) reported the presence of acidic components at higher density on the surface of membrane microvillus than on inter microvillus surface membrane in normal pregnancies. Similarly it was reported that the thickening of the basement membrane in gestational diabetic and diabetic placenta is the result of mucopolysaccharide deposition seen by intense Aldan blue staining at pH 2.5. Moreover, mucopolysaccharide deposition was also observed in all the cases of villous edema (Ashfag ,et al 2005) reported that . The edema observed may be correlated to the swelling hyaluronic acid molecules, and an in- crease in mucopolysaccharide content, mainly hyaluronic acid, was found in overtly diabetic placenta was finding of (Fowler et al 2008).This justify our finding that placenta vary in grading .

The study also showed significant differences between placentas sites in DM cases and control group , indicating that although the placenta site for the majority of both people who affected by DM (88%) and normal people (96%) was not low, but it is more common for normal people than for those who affected by DM , our result disagreed with (Yael Baumfeld et al 2017)..showed GDM was complication lead to placenta previa

Our result showed that there is a significant in placenta thickness between DM and normal group , where the mean placenta thickness was (5.0614±1.536) for DM is greater than that (3.857±1.0111) for normal group. Table [5]. previous studies reported that thickening of the basement membrane of syncytiotrophoblasts occurs in diabetic placentae (Bjork et al 1984 and contine berceanu et al 2002).showed placenta ultrasound scan revealed increase placenta thickness even from the second trimester when studies morphological and ultrasound finding in placenta of diabetic pregnancy , (Ashfah et al 2005) revealed placenta of women of GDM had significant increases in weight ,central thickness and diameter of the placenta .

V. Conclusion:

This research deal with study of diabetes effect in placenta in second and third trimester and collaret finding with normal .The study found that there was a significant correlation between placenta grading , site and thickness in diabetic pregnancy and normal pregnancy .

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Safa Alhaj Abdelhaleem, et. al. “Evaluation of diabetes effected on placenta (from 20weeks -38 weeks) using ultrasonography.” *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)*, 20(9), 2021, pp. 34-37.