

# Histopathological changes of placenta in pregnant women complicated with pregestational diabetes

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## Abstract

The study presented the results of a study on 68 cases of pregnant women with normal and diabetes who delivered in Department of Obstetrics and Gynaecology, in three Hospital at Baghdad city during the period from 1 December 2016 to 1 may 2017. After delivery, placentae were collected for the histology and histopathological studies. Numerous changes have been recorded significantly in placentae of pregestational diabetes (DM) women included: crowding of villi, increased villous number of immature intermediate villi, decreased terminal villi density, increased terminal villi size, numerous syncytial knots, basement membrane thickening in terminal villi, cytotrophoblast in terminal villi, decreased vascular-syncytial membrane thickness, extravillous fibrinoid between terminal villi, fibrosis in terminal and stem villi, fibrinoid necrosis of stem and terminal villi, stem villi with indented margin, continued trophoblastic layer and stroma with respectable cell population, basement membrane thickening in immature intermediate villous, immature intermediate villi with loose reticular stroma, increased of Hofbauer cells population in immature intermediate villi, calcification intracellular as well as extracellular, chorangioma, thickening of villi vessels, fetal vessel thrombosis, nucleated fetal RBCs, mature intermediate villi with continuous trophoblastic layer and villous edema, edema in terminal and stem villi. Although the damages presented, when analyzed individually, may incidence in other diseases, when summarized they are highly suggestive for pregnancy related with diabetes we can diagnose.

**Keywords:** Placenta, Pregestational diabetes, Histopathology, Pregnancy.

## INTRODUCTION

Diabetes mellitus is a chronic, lifelong condition that effects on body's ability to use the energy found in food. Diabetes in pregnancy is important because of increasing rates of the disease and its effect on maternal, fetal and neonatal health, such as preeclampsia, primary caesarean delivery, macrosomia and birth injury and clinical neonatal hypoglycaemia. Many studies of placentae in diabetes mellitus have created confusing and contradictory results due to the failure to account for confounding variables such as the type and severity of disease, degree of control of hyperglycaemia, premature delivery, and other associated abnormalities such as preeclampsia, fetal birth weight and diagnostic conditions [1].

The placenta is the organ accounting for the transfer of almost all nutrients and gases between mother and fetus. Thus, the placenta achieves fundamental role sustaining adequate fetal growth, and it has been implicated in abnormal fetal growth such as it is well recognized as a problem in pregnancy complicated by type 1 diabetes [2]. Type 2 diabetes insults at the onset of gestation have long-term effects on placental development. These adaptive responses of the placenta to the diabetic milieu, such as buffering excess maternal glucose or improved vascular resistance, may aid limit fetal growth within a normal range. If the period or extent of the diabetic insult, containing maternal hyperglycemia, hyperinsulinemia or dyslipidemia, exceeds the placental capacity to mount adequate responses, then excessive fetal growth may result [3]. Human pregnancy and in specific the first trimester, is a period highly susceptible towards confrontational insults such as oxidative stress, which may lead to insufficient embryonic and fetoplacental development. Maternal type 1 and 2 diabetes increase cellular stress in the placenta between 7-9 weeks of pregnancy and because of underlying stressors may affect early and late placental development [4].

Thus, the present study aims to increase our knowledge about histopathological changes in placenta of pregestational diabetes due to very few studies have been done on histopathological changes in placenta of pregestational diabetic mother and prospect study in this field will go a long way in discovery a solution in assessing the distractive changes in diabetic placenta in different stages of pregnancy.

## MATERIALS AND METHODS

The mothers' informed consents were gained according to Local Research Ethics Committee approval in Iraqi Ministry of

Health. Fresh placentae were obtained from Department of Obstetrics and Gynaecology in three Hospital at Baghdad city during the period from 1 December 2016 to 1 may 2017. A total of 68 placentae were collected directly after delivery for the study and divided into two groups. First group, normal women and second group included women with pregnancies complicated by pregestational diabetes mellitus (DM) (cases n=34), (17 diabetes type 1, 17 diabetes type 2). Placentae were cut and sampled for histological examination. Two standard samples were taken from intact maternal surface and fetal surface and one from the central area and other from the peripheral area. Fresh placental tissue pieces were fixed with formalin (10%) [5]. Then tissue samples from placentae after delivery were prepared for histopathological studies according to routine paraffin methods [6]. Haematoxylin and Eosin staining was accomplished according to [7].

The sections were examined by compound light microscope (Meijitechno, Japan) with digital camera (Canon, Japan, 18 megapixels). Images were analysed independently with the help of expert pathologist by Multihead teaching microscope (Genex, USA). The images were captured with a Live View Pro digital camera directly into the computer in advanced embryology laboratory, Department of Biology, College of Education for Pure Science (Ibn-Al-Haitham), University of Baghdad then adding scale bars to all images by using ImageJ software.

The data analysis was performed using SPSS program version 15 and 18 (SPSS Inc., Chicago, IL, USA). Analysis of variance using independent t-test were used as appropriate test for morphological and histological parametric data. The level of significance was at the limits of agreement (95% confidence interval of the difference between the two groups, and values of  $P \leq 0.05$  and  $P \leq 0.001$  were considered statistically significant and highly significant, respectively between the studied groups.

## RESULTS

Histopathological examination of the sections from the placentae of DM mothers showed numerous changes (Figure 1) including: crowding of villi (Fig.2-A), increased villous number of immature intermediate villi and decreased terminal villi density as well as increased terminal villi size (Fig.2-B), numerous syncytial knots (Fig. 2-C), basement membrane thickening, cytotrophoblast and decreased vascular-syncytial membrane thickness in terminal villi (Fig. 2-D), extravillous fibrinoid between terminal villi and fibrosis in terminal and stem villi (Fig. 2-E), fibrinoid necrosis of stem and terminal villi (Fig. 2-F), stem