



Full term Placenta: As an Indicator of Foetal wellbeing

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Abstract

This is a well-known fact that placenta is one of the most important anatomical structure in term of nutrition to foetus is concerned. The placenta is an essential organ for normal development of the foetus, inadequate blood perfusion may lead to abnormal foetal development. The placenta is responsible for the exchange of oxygen and nutrients from the mother to the foetus. During intrauterine life, the foetus depends upon the placenta as its lungs, liver and kidney. Despite its major role in human development, the study of placenta has lagged behind that of foetus and placenta became less important organ, which is not justified for its actual importance. Placental dysfunction is a major cause of pregnancy complications, such as intrauterine growth restriction (IUGR), which occurs when the foetus fails to achieve its full growth potential. For this review article, related relevant data were collected from various journals and different databases, which directly indicate a positive correlation of normal placental & foetal growth.

Keywords: Pregnancy, Placenta, Foetus, Placental Growth, Foetal Growth, Placental dysfunction, intrauterine growth restriction

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1. Introduction

Placenta is an anatomical structure, which starts to develop during early pregnancy. Foetal growth & well-being directly depends on the functional & structural composition of the placenta [1,2]. Placenta has a crucial role in foetal development & health by performing all the important vital activities & functions such as respiration, nutrition, excretion, hormone production as well as protection etc [2,3,4]. The morphology of human placenta varies accordingly, like the shape of human placenta varies from regular to irregular & circular to oval with an average diameter from 15 to 25 cm and thickness from 2.5 to 3.5 cm & weight ranges from 500 to 650 gm [5]. Placenta is a foeto-maternal organ having a foetal part & a maternal part [6,7]. The surface of placenta which facing towards the embryo / foetus is smooth and called as foetal surface while the surface of placenta which attached to the uterine wall / endometrium is called as maternal / endometrial / uterine surface [8,9]. On the foetal surface of placenta, a smooth thin shiny delicate membrane is present which is called as amnion [10,11]. In between two layers of amnion the branches of umbilical blood vessels run and called as chorionic blood vessels (arteries & veins) [12].

Placenta via umbilical cord (having two umbilical arteries and one umbilical vein) form a transport (exchange) system for nutrients, waste materials, oxygen & carbon-di-oxide as well as hormones, which passing between mother and embryo / foetus [13,14]. By means of this transport system, mature human placenta and placental membrane perform various necessary functions including safety of foetus, nourishment, gaseous exchange (respiration), elimination of metabolic wastes (excretion) as well as endocrine (hormonal) functions etc. [15]. By maintaining the efficient transport interface between maternal & foetal circulation, the placenta fulfill all biologic, metabolic as well as energetic needs of foetus. Thus provide undisturbed exchange / transport mechanism to the developing foetus during growing in the protected environment of the uterus [16,17,18]. The placenta is a organ of complexity and composed of different cell types which involve in different functions, ranging from invasion & attachment to endometrium / uterine and vascular remodeling of chorionic villi for better nutrient transport & growth as well as hormone production [19,20]. Thus changes in cellular composition of placenta resulting, alterations in fate of cell

which play important roles in the reallocation of cellular function (placental metabolism) and foetal growth [21,22]. Thus morphologically as well as physiologically placenta is a complex as well as complete organ for better survival of developing embryo / foetus [23,24,25]. The placenta is primarily a vascular interface between the maternal and foetal circulatory systems [26,27]. But the placenta is not simply an inert transport interface but its metabolic needs utilize 45–60% of the nourishment (oxygen and glucose) delivered to the uterus at full term, even though full term placenta have only 10–20% (approximately) of total uterine mass at the full term [28,29]. In the adverse / stressful conditions such as hypoxia (of any cause) or under perfusion of placenta, the placenta alters its metabolism in specific ways [30]. During isolated hypoxia the human placenta decreases its consumption of oxygen and increases glycolysis to maintain its biological energetic needs and placental growth as well as foetal growth are not compromised [31,32]. Because of this compensatory mechanism the foetal oxygen delivery is continue at the expense of glucose breakdown [33]. But that fetal hypoglycemia is strongly associated with foetal growth restriction, this results in impaired fetal growth called as intrauterine growth restriction (IUGR) [34,35]. As a vascular interface the placenta has a primary role for foetal growth and wellbeing. Impaired placental development will result in reduced placental vascularity, blood flow or oxygen and nutrient delivery to the foetus results to diminished foetal growth lead to complications in pregnancy [36]. Size and weight of placenta also correlates with the size & weight of foetus [37,38]. A relatively large sized placenta for any birth weight may indicates the compensatory mechanism of placenta for some transport deficiency, whereas a relatively small sized placenta may indicate the compromising conditions of foeto-placental transport / exchange system which lead to diminished supply of nutrients to the foetus [39]. Thus placenta is highly adaptable, increasing in size in response to either nutrient restriction or oxygen deprivation [40]. The placenta is critical for intrauterine existence, from the foeto-placental circulation that is important for normal foetal development & growth. A lack of foeto-placental interface lead to disturb foetal growth and resulting in the long-term complications of pregnancy.

2. Conclusions

The placenta is a remarkable organ, which acts as indicator of foetal growth & wellbeing, it evolved to performing the various developmental needs of foetus so we can say that the placenta is the interface between mother and foetus. Placenta has different cell types that are completely different the adult one and involve in variety of functional adaptations during prenatal life. For better understand the relationship between normal placental & foetal development we need to do research on that to improve our ability about prediction and treatment of pregnancy complications such as IUGR etc. Therefore, review article attempting to highlights relationship between placenta and foetal growth.

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Conflict of interest

The authors have no conflicts of interest to declare.

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