

Effect of Diabetes & Malnutrition During Pregnancy and its Effect on Placenta & Fetus

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Abstract

Diabetes and malnutrition is very common in population. Further its chances increases during pregnancy. When pregnant women suffer by these condition, their fetus also affected. Diabetes and malnutrition affects women's body so placenta which is formed during pregnancy affect and consequently morphological structure and function of placenta (transfer of nutrition and gaseous exchange) affect. Maternal blood circulation also affected, hyperglycemia occurs in diabetes and hypoproteinemia in malnutrition. So fetus suffer and consequently newborn baby born with some minor (macrosomia in diabetes and low birth weight in malnutrition) or major (diabetes and protein-energy malnutrition syndrome respectively) pathology.

Keywords: Fetus; Diabetes malnutrition; Placenta.

INTRODUCTION

Placenta is a bridge between mother and fetus. The placenta is formed from elements of the membranes (amnion and chorion) which surround the developing foetus as well as uterine endometrium and provides means for physiological exchange between the fetal and maternal circulation. At various stages during development, the placenta performs a remarkable range of functions, until the foetal organs become functional. These include gaseous exchange (oxygen & carbon dioxide), excretion and maintenance of

homeostasis, hormone secretion, haemopoiesis and help in metabolic functions.

Human placenta is haemochorial, chorioallantoic and deciduate. Placenta is a flattened discoidal mass with an approximately circular or oval outline. It has an average volume of 500 ml, an average weight of 470 gram, average diameter of 185 mm. Placenta is thickest at its centre, it rapidly thins towards its periphery. It has two surface – foetal & maternal.

Fetal surface is smooth, shiny and transparent. So that mottled appearance of subjacent chorion to which it is closely applied can be seen.

Umbilical cord which is about 50 cm long and 1-2 cm in diameter is attached to fetal surface near its centre. Umbilical cord contain two umbilical arteries and one umbilical vein (only left umbilical vein because right umbilical vein regress). Branches of umbilical vessels radiate out toward periphery. Veins being deeper and larger than arteries.

The **maternal surface** is finely granular and mapped into 15-30 lobes by a series of fissures or grooves. Placental lobes correspond to major branches of distribution of umbilical vessels.

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MATERIAL AND METHODS

After delivery the full term placentas of normal (non-pathological), diabetic and malnourished pregnancies were collected along with detailed case history and relevant investigations. Total 50 placenta were taken for study. All placentas were collected after delivery. The placenta was washed with normal saline and then **gross examination of placenta was done under following heads:**

1. Weight
2. Diameter
3. Umbilical cord
4. Fetal surface was examined for colour, opacity, subchorionic fibrin cyst, thrombosis of foetal surface vessels.
5. Maternal surface was examined for completeness, normal fissures, laceration, depressed area, retro-placental haemorrhage.

Criteria for selection of cases:

1. All case belongs to 20-35 year of age.
2. Gestational age (recorded by per abdominal examination irrespective of LMP) 38-42 weeks.
3. They had no racial and environmental differences.

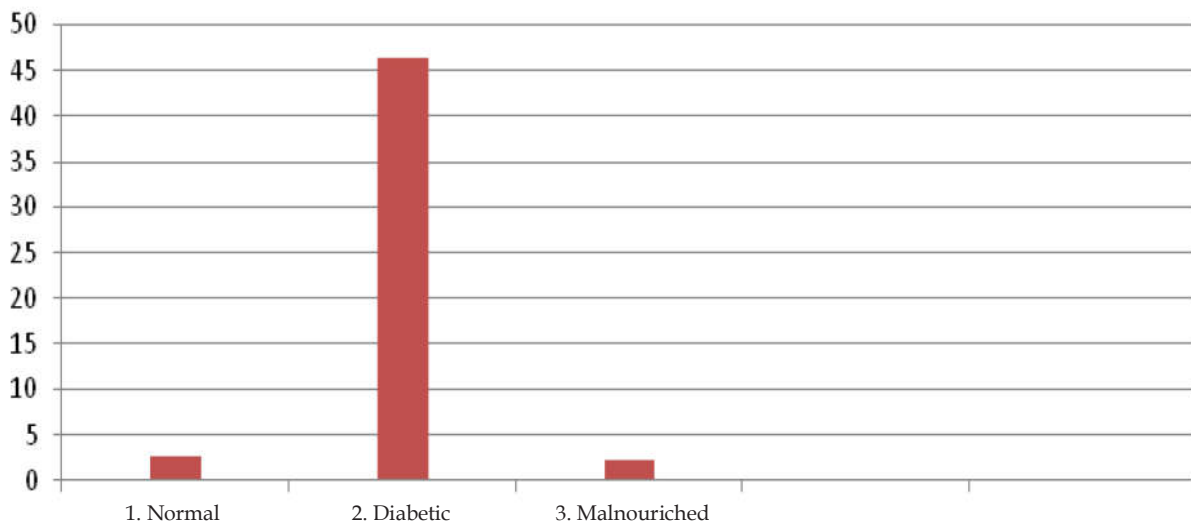


Fig. 1: Total numbers of normal placenta studies were 15. Total number of diabetic placenta studies were 15. Total numbers of malnourished placenta studies were 15.

Observation

The present study includes 50 placentas which were grouped under normal (control), diabetic and malnourished.

The placenta was considered normal (control group) of the patient whose haemoglobin was 12 gm% and above. On examination pallor and oedema were absent.

The placenta was considered diabetic of the patient whose fasting blood sugar was in the range 101 to 150 mg% and post-prandial blood was in range 120 to 307 mg%.

The placenta was considered malnourished of the patient whose haemoglobin was in range 6-11 gm%, pallor was in range (+ to +3) and oedema (+ to +3).

Table 1: Distribution of placenta under study

Category	Total no. of placentas	(%)
1. Normal (control group)	15	30%
2. Diabetic	15	30%
3. Malnourished	20	40%
Total	50	

Total numbers of normal placenta studied were 15. Total numbers of diabetic placenta studied were 15. Total numbers of malnourished placenta studied were 15.

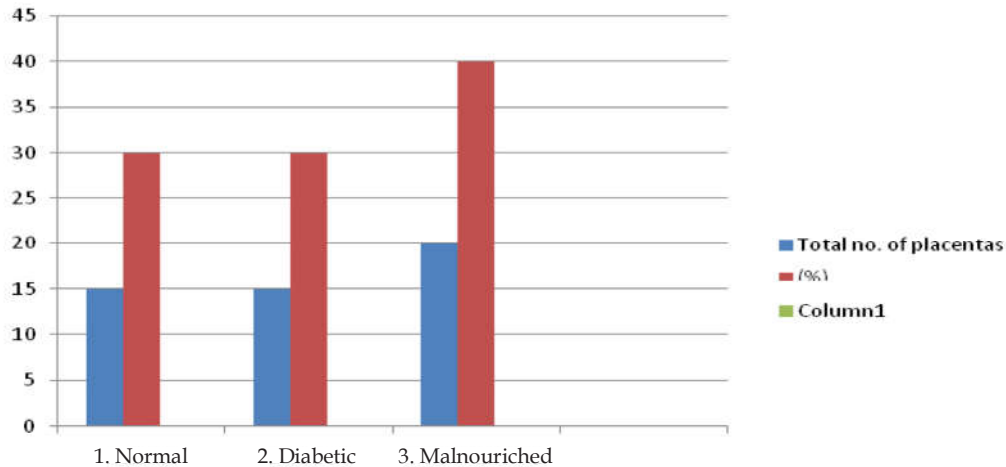


Fig. 2: Table 1 in graph form

Table 2: Weight of placenta in different categories

Category	Range (gm)	Mean
1. Normal	460-500	480
2. Diabetic	500-550	525
3. Malnourished	400-490	445

Mean weight was highest in the diabetic placentas and least in malnourished placentas.

Table 3: Diameter of placenta in different categories

Category	Range (cm)	Mean
1. Normal	14-20	17
2. Diabetic	15-20	17.5
3. Malnourished	11-19	15

Mean diameter was maximum in the diabetic placentas and least in malnourished placentas.

Table 4: Umbilical cord length in different categories

Category	Range (cm)	Mean
1. Normal	20-55	37.5
2. Diabetic	40-52	46
3. Malnourished	26-44	35

Mean cord length was maximum in the diabetic placentas and least in malnourished placentas.

Table 5:

Category	Umbilical cord surfaces			
	No. of vessels	Insertion	Fetal surface	Maternal surface
1. Normal	3	Central	Normal	Normal
2. Diabetic	3	Central	Normal	Normal
3. Malnourished	3	Central	Normal	Normal

No significant changes were observed in all three categories in insertion and number of vessels with in umbilical cord. No significant change was seen in fetal and maternal surfaces of placenta also.

Table 6: Weight of newborn in different categories

Category	Range (kg)	Mean
1. Normal	2.5-3	2.75
2. Diabetic	2.2-3.5	2.88
3. Malnourished	2-2.7	2.35

Mean Weight of newborn was maximum in the diabetic placentas and least in malnourished placentas.

DISCUSSION

Present study deals with morphological changes in placenta of diabetic and malnourished mother from placenta of normal (non-pathological) mother.

The mean weight of placenta from normal (non-pathological, Full term gestation period) mother in present study found as 480 gram. The study revealed that mean weight of placenta was found higher in diabetic mother and least in malnourished mother. Wong (1966)¹ studied 60 placentas, 30 from normal and 30 from malnourished mother and observed that average weight of normal placenta was found 463 gram and average weight of malnourished placenta was 339 gram clearly shows downward trend as regards weight of placenta from normal to malnourished cases.

Krishna M, Agarwal KN (1979)² stated placental weight is significantly reduced in malnourished mother and this reduction is due to decrease in cell number.

*Teasdale F (1985)*³ after his study stated that placenta weight in diabetes mellitus cases was somewhat higher than the placenta of normal mother (control group). They stated it was due to parallel increase in parenchymal and non-parenchymal tissues. It was also correlate with our study.

*Patten (1953)*⁴ and *Brews (1963)*⁵ observed that range of placental diameter was from 15-20 cm. The findings of our study in control group was nearer to previous work performed.

*Walkar and Pye (1960)*⁶ mentioned that average length of umbilical cord is about 54 cm. The findings of our study in control group were nearer to previous work performed.

In our study mean weight of newborn showed significant variation in various categories. The diabetic group showed maximum mean weight and malnourished group showed least mean weight. *Auinger W(1977)*⁷ has also studied influence of malnutrition on weight of newborn and reported it was less in this group. They stated that the decrease in newborn weight was dependent solely on lesser weight of mother.

CONCLUSION

Pregnancy induced diabetes and malnutrition is very common in population. It affect placenta and consequently foetus. So it is very important that nutritional status in women during pregnancy and also during reproductive age should be better. Because health of an individual decided since birth. It affects Heath of the Nation.

*Chan KK, HoLF, Lao TT (2009)*⁸ stated that both maternal nutritional intake and presence of gestational diabetes have been found to affect relative placental growth. They concluded that dietary modulations improve gestational diabetes pregnancy outcome, not only by improving glycaemic controls but also by affecting placental growth by altering the proportion of protein intake.

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