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Studies on Diabetes In Pregnancy – A Review

Dr. Nema Usman*, Anshika Varshney**
**Assistant Professor, Anatomy, JNMC-AMU, India*
*** Bachelors' in Biotechnology, MMDU-Ambala, India*
Corresponding Author: Dr. Nema Usman

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I. Introduction

As diabetes is a risk factor in pregnancy in this particular study we have reviewed the previous studies associated with diabetes in pregnancy. We will also ascertain the risk associated with gestational diabetes. This compilation of research works on this particular topic will be helpful in further studies in this area as diabetes is a very much prevalent clinical condition and its screening and researches in this particular field are extremely needful, moreover the health of pregnant ladies with diabetes is a subject of great concern.

II. Review and Literature

Peck RW, Price DE, Lang GD, MacVicar J, Hearnshaw JR(1). Performed retrospective study of 133 pregnancies in women with Type 1 diabetes, and the 116 which progressed beyond 28 weeks were further analyzed. Despite good maternal blood glucose control, 38% of babies had birth weights above the 90th centile and operative intervention occurred in 77 deliveries (66%). Their results confirm that in Type 1 diabetes large babies are common despite good blood glucose control, and suggest that maternal blood glucose control in the first trimester may be an important determinant of birth weight.

Emma pomeroy, Jay T. Stock, Tim J. Cole, Michael O'Callaghan, Jonathan C. K. Wells (2)studied Relationships between Neonatal Weight, Limb Lengths, Skin fold Thicknesses, Body Breadths and Circumferences in an Australian CohortResults Diabetic embryopathy can affect any developing organ system, but cardiovascular and neural tube defects are among the most frequent anomalies. Other complications include preeclampsia, preterm delivery, fetal growth abnormalities, and prenatalmortality

Vrachnis N, Antonakopoulos N, Iliodromiti Z, Dafopoulos K, Siristatidis C, Pappa KI, Deligeoroglou E, Vitoratos N.(3) studied Impact of maternal diabetes on Epigenetic Modifications Leading to Diseases in the Offspring Compelling evidence for the role of epigenetic transmission in these complications has come from comparison of siblings born before and after the development of maternal diabetes, exposure to this intrauterine diabetic environment being shown to cause alterations in fetal growth patterns which predispose these infants to developing overweight and obesity . Research data also suggest that exposure to a diabetic intrauterine environment during pregnancy is associated with an increase in dyslipidemia, subclinical vascular inflammation, and endothelial dysfunction processes in the offspring, all of which are linked with development of cardiovascular disease later in life.

Russell NE,Higgins MF,Kinsley BF,Foley ME&McAuliffe FM (4)studied Heart rate variability in neonates of type 1 diabetic pregnancy Cardiomyopathy is a common finding in offspring of pre-gestational type 1 diabetic pregnancy. Echocardiographic and biochemical evidence of fetal cardiac dysfunction have also been reported. Studies suggest that offspring of diabetic mothers (ODM) undergo a fetal programming effect due to the hyperglycaemic intrauterine milieu which increases their risk of cardiovascular morbidity in adult life.

Casson IF, Clarke CA, Howard CV, McKendrick O, Pennycook S, Pharoah PO, Platt MJ, Stanisstreet M, van Velszen D, Walkinshaw S.(5) studied Outcomes of pregnancy in insulin dependent diabetic women: results of a five year population cohort study.

Among 462 pregnancies, 351 (76%) resulted in a liveborn infant, 78 (17%) aborted spontaneously, nine (2%) resulted in stillbirth, and 24 (5%) were terminated. Of the terminations, nine were for congenital malformation. The stillbirth rate was 25.0/1000 total births (95% confidence interval 8.9 to 41.1) compared with a population rate of 5.0/1000, and infant mortality was 19.9/1000 live births (5.3 to 34.6) compared with 6.8/1000. The prevalence of congenital malformations was 94.0/1000 live births (63.5 to 124.5) compared with 9.7/1000 in the general population.

Dr Denice S Feig, Valerie A Palda(6)studiedIn a prospective study of 811 pregnancies in the Pima Indians of Arizona, 6·3% were known to have diabetes before pregnancy.5 A retrospective analysis of type 2 diabetes in pregnancy in the Ojibwa-Cree of northwestern Ontario, Canada, yielded a prevalence of 3·2%. The Canadian study probably underestimated the prevalence, since it included only women who were diagnosed before pregnancy and not women diagnosed early in pregnancy.

Law CM (7) studied Fetal and infant influences on non-insulin-dependent diabetes mellitus (NIDDM).These studies show that babies who are small at birth or during infancy have increased rates of IGT and NIDDM. These relations are independent of social class and are seen at all levels of current body mass. More detailed anthropometric measurements at birth show that the baby at risk of glucose intolerance is characterized by disproportionate fetal growth, particularly relative thinness. Direct measurements have shown that this is a function of insulin resistance rather than deficiency. Reduced fetal growth is also associated with higher levels of plasma glucose in children. The aetiology of IGT and NIDDM may lie in undernutrition in utero or during infancy.

Cundy T, Gamble G, Townend K, Henley PG, MacPherson P, Roberts AB.(8) Studied Perinatal mortality in Type 2 diabetes mellitus.The perinatal mortality in Type 2DM was 46.1/1,000, significantly higher than the rates for the general population (12.5), Type 1 DM (12.5) and GDM (8.9) ($P < 0.0001$). Congenital malformations accounted for only 10% of the perinatal mortality. There was a seven-fold increase in the rate of late fetal death and 2.5-fold increase in the rates of intermediate fetal and late neonatal death

Zhu L, Nakabayashi M, Takeda Y (9)studied Statistical analysis of perinatal outcomes in pregnancy complicated with diabetes mellitus.The prevalence of pregnancies complicated with DM was 5.1%. Preeclampsia developed in 124 cases at a rate of 25.8%. Incidence of preterm delivery was 16.6%. Caesarean sections were performed in 36.7% patients. There were significant differences of caesarean section rates between diabetic complication group (retinopathy and nephropathy) and non-complication group (69.5% vs 30.5%, $p < 0.0001$), and between preterm and term deliveries (60.0% vs 32.1%, $p < 0.0001$

Towner D, Kjos SL, Leung B, Montoro MM, Xiang A, Mestman JH, Buchanan TA (10)studiedCongenital malformations in pregnancies complicated by NIDDM.Overall, 56 (16.9%) of the 332 infants were born with congenital anomalies (11.7% major anomalies and 5.1% minor anomalies). Moreover, the risk in individual patients appears to be related to maternal glycemic control rather than to the mode of antidiabetic therapy during early pregnancy.

Brydon P, Smith T, Proffitt M, Gee H, Holder R, Dunne F. (11) studied that pregnancy complicated by type 2 diabetes mellitus is a high-risk state, with miscarriage and congenital malformations almost twice that seen in type 1 disease. These adverse outcomes are contributed to by poor attendance for pre-pregnancy care, later booking for antenatal clinic and poor glycaemic control at booking. Offspring of pregnancies complicated by type 2 diabetes are more likely to be delivered before 37 weeks gestation and be large in size for gestational age. The rates of hypertension, pre-eclampsia and postpartum haemorrhage are greater than the general maternity population, as is the rate of operative delivery.

Brand JS, West J, Tuffnell D, Bird PK, Wright J, Tilling K, Lawlor DA. (12) Studied Gestational diabetes and ultrasound-assessed fetal growth in South Asian and White European women: findings from a prospective pregnancy cohort, Eight hundred thirty-two pregnancies (7.8%) were affected by GDM: 10.4% of South Asians and 4.4% of White Europeans. GDM was associated with a smaller fetal size in early pregnancy [differences (95% CI) in mean HC at 12 weeks and mean AC and EFW at 16 weeks comparing fetuses exposed to GDM to fetuses unexposed (reference) = - 1.8 mm (- 2.6; - 1.0), - 1.7 mm (- 2.5; - 0.9), and - 6 g (- 10; - 2)] and a greater fetal size from 24 weeks' gestation through to term [differences (95% CI) in mean HC, AC, and EFW comparing fetuses exposed to GDM to those unexposed = 0.9 mm (0.3; 1.4), 0.9 mm (0.2; 1.7), and 7 g (0; 13) at 24 weeks]

Lene R. Nielsen,Pia Ekbom, Peter Damm, Charlotte Glümer, Merete M. Frandsen, Dorte M. Jensen, Elisabeth R. Mathiesen(13) studied HbA_{1c} Levels Are Significantly Lower in Early and Late Pregnancy The normal range of HbA_{1c} was 4.7–6.3% in non-pregnant women, 4.5–5.7% in early pregnancy, and 4.4–5.6% in late pregnancy. To exclude that the differences in HbA_{1c} were due to differences in BMI between the groups, women with BMI >25 kg/m^2 were excluded from all the groups, leaving 106 non-pregnant subjects, 87 early pregnancy subjects, and 85 late pregnancy subjects. Average HbA_{1c} did not change significantly (control 5.5 ± 0.4, early pregnancy 5.1 ± 0.3, and late pregnancy 5.0 ± 0.3%; *P* for trend <0.001), whereas BMI was comparable (21.7 ± 2.0, 21.6 ± 1.7, and 21.5 ± 1.9 kg/m^2; *P* = NS).

III. Conclusion

After reviewing above articles it is reconfirmed that diabetes is one of the risk factor in pregnancy. But it is mainly the suppression of hormone insulin caused by increased level of placental hormones that results in high blood glucose level which can be anti-vital to foetal health. So it is important to check blood glucose level in every pregnant female and those with pre-hyperglycemia at early age must be kept under observation. such studies awoke awareness in societies and can led to new measures of prevention and cure.

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