



Risk Factors for Preterm Birth

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ABSTRACT

Preterm delivery defined as the birth of a fetus before 37 completed weeks of gestation. Single live births are most important cause of neonatal morbidity and mortality. Gestational age is defined as the duration of pregnancy from the day of a mother's last normal menstrual period and is reported on total birth. Prematurity is one of the major etiological factors of neonatal death. Most common risk factor like cigarette smoking, black race, intrauterine devices uses, nutrition, marital status, urea plasma species, lower insulin sensitivity, consanguineous marriage, infection such as sexual transmitted disease and urinary tract infection, hypertension, diabetes mellitus, metabolic and cardiovascular disease particularly increased adiposity, abnormal vaginal flora, inflammatory bowel disease, stress, depression, pesticide exposure, preterm premature rupture of membrane, multiple pregnancy, placental abnormalities, trauma or physical injury and infection during pregnancy, respiratory disorder, respiratory insufficient, polyhydramnias, gynaecological and familial history are the effects of preterm birth. During last trimester of pregnancy the lung and other organ get matured, if this process is disturbed it leads to decrease survival of the newborns. Corpus luteum produce progesterone, which is essential in early pregnancy but in the last gestation period the production is taken by the placenta. In last stages of gestation the pituitary gland has a supportive role in parturition and also ineffective adrenal gland leads to preterm birth. This review had discussed about the risk factors for preterm birth such as stress, sexually transmitted disease, preeclampsia, anemia, premature rupture of membrane, inflammatory bowel disease and polyhydramnios. This is due to lack of knowledge and awareness among the pregnant women and their families.

Keywords: Preterm birth, Risk factors, gestation, Anemia, stress, preeclampsia, infection.

INTRODUCTION

Preterm delivery defined as the birth of a fetus before 37 completed weeks of gestation.¹⁻³ Single live births are most important cause of neonatal morbidity and mortality.^{4,5} Gestational age is defined as the duration of pregnancy from the day of a mother's last normal menstrual period and is reported on total birth. Prematurity is one of the major etiological factors of neonatal death.⁵ Most common risk factor like cigarette smoking, black race,³⁻⁶ intrauterine devices uses, nutrition, marital status, urea plasma species, lower insulin sensitivity, consanguineous marriage, infection such as sexual transmitted disease and urinary tract infection, hypertension, diabetes mellitus, metabolic and cardiovascular disease particularly increased adiposity, abnormal vaginal flora, inflammatory bowel disease, stress, depression, pesticide exposure, preterm premature rupture of membrane, multiple pregnancy,³ placental abnormalities, trauma or physical injury and infection during pregnancy, respiratory disorder, respiratory insufficient, polyhydramnias,⁷ gynaecological and familial history are the effects of preterm birth. Preterm birth is a syndrome.⁸ Nurses are more to PTB, because of exposed of chemical-ray radiation, prolonged standing, heavy lifting, night shift, long hours work.⁹⁻¹³ The main aim of the review was to find out the mechanism involved in the preterm birth.

RISK FACTORS

During last trimester of pregnancy the lung and other organ get matured, if this process is disturbed it leads to decrease survival of the newborns. Corpus luteum produce progesterone, which is essential in early pregnancy but in the last gestation period the production is taken by the placenta. In last stages of gestation the pituitary gland has a supportive role in parturition and also ineffective adrenal gland leads to preterm birth.⁸ Phosphorylated myosine is maintained by calcium (Ca²⁺), cyclic guanosine monophosphate, cyclic adenosine monophosphate. The elevated level of intracellular calcium concentration and the decrease in cyclic nucleotide concentration will lead to myometrial contraction which result in preterm birth.¹⁴

Stress

Stress is one of the risk factors for preterm birth. This was due to increased corticotropine releasing hormone (CRH), a neuropeptide synthesized primarily in the paraventricular nucleus of the hypothalamus.¹⁵ During pregnancy, CRH is also synthesized by the placenta and amniotic membrane and increases exponentially in the final weeks before a full term delivery. In advanced pregnancy, there is a fall in concentration of CRH binding protein, leading to an increase in levels of CRH. Thus the increased CRH release leads to increased adrenocorticoids hormone and increased glucocorticoids, which in turn up-regulate CRH in the



placenta and stimulate prostaglandin production and leads to preterm birth.¹⁶

Sexually transmitted disease

Sexually transmitted disease (STD) is one of the risk factors for preterm birth. Cytokine production will get increases in case of infection and can lead to increased prostaglandin production and preterm birth. Elevated cytokines levels have been found in the amniotic fluid of pregnant women which results in intrauterine infection. This may lead to preterm premature delivery. Higher amniotic fluid levels of IL- 6 were observed in women with infection than in women without infection who gave preterm birth. Amniotic fluid IL-6 levels were elevated during the early second trimester in women with a greater risk of preterm delivery.¹⁷ Serum IL-6 concentration higher than 8 pg/ml at 22-34 weeks gestation were predictive of preterm birth.¹⁸

Polyhydramnios

An increase in the fetal urine production or decrease in the fetal swallowing which leads to increase of amniotic fluid volume. The normal amniotic fluid volume will shows the balance between fluid production and movement of fluid out of the amniotic sac. The mechanism of the polyhydramnios is not clearly understood but in the later gestation the primary cause of amniotic fluid production is fetal urination and secretion of lung fluid which result in preterm birth.¹⁹

Anemia

The risk factors such as preterm birth and the intrauterine growth retardation are quite similar even though there is little influence in the maternal nutritional status in the risk of preterm delivery which is the potential biological mechanism were identified through which anemia affect the pregnancy. Anemia and iron deficiency will induce maternal and fetal stress which leads to corticotrophin releasing hormone. An increase in the corticotrophin releasing hormone concentration may be the risk factor of preterm birth. The another mechanism may be that iron deficiency increase the oxidative damage to the erythrocytes and feto-placental unit which increase the risk of maternal infection which stimulate the secretion of corticotrophin releasing hormone which is risk factor of preterm birth.²⁰

Pre-mature rupture of membrane

The premature rupture of membrane may be due to infection or abruption

1. Infection

The rupture of membrane is related to the biochemical process which includes disruption of collagen within the extracellular matrix of the amnion and the chorion and the programmed death of cells in the fetal membranes. The premature rupture of membrane is caused by reproductive genital infection, inflammatory reactions of

cytokines and chemokine pathway which involves the extracellular matrix.²¹

2. Abruption

A proper mechanism of abruption involved in PROM is properly unknown. Homeostasis mechanism is carried out by decidual cells which act as a primary tissue factor. In case of abrupted related hemorrhage, this tissue factor (DC) binds to plasma derived factor VIIa to activate the factor X. After that factor Xa bind with its cofactor Va, which involved in the conversion of prothrombin to thrombin and fibrin from fibrinogen and latter it activates the platelet. The severity of abruption is totally depending upon the consumption of fibrinogen. However, the elevated levels of thrombin and antithrombin complex in the plasma increase the risk of preterm labour.²²

Preeclampsia

Preeclampsia is defined as the high blood pressure condition that usually occurs during the pregnancy. The blood pressure of >140/90mmHG during the pregnancy are considered as preeclampsia. The mechanism behind the preeclampsia is based on placental, immunologic and cardiovascular, dysfunctional trophoblast development, defective placental angiogenesis, and an exaggerated maternal systemic inflammatory response.

1. Placenta

During high blood pressure condition, the resistance in maternal blood vessel will gets increased. This may lead to decreased blood flow across the placenta results in hypoxic condition to the fetus causing placental injury.^{23,24}

2. Angiogenic factor

Angiogenic factor is the potential biomarkers in patient with preeclampsia. Regulation of placental angiogenesis is essential for a healthy placenta and a successful pregnancy. A balance between proangiogenic factors, VEGF and PIGF, and anti-angiogenic factors, sVEGFR-1 and sEng, is important for normal placental development. If the level of PIGF is reduced or imbalanced in patients they may develop preeclampsia, whereas sVEGFR-1 and sEng are increased, particularly in early-onset preeclampsia.^{25,26}

CONCLUSION

This review had discussed about the risk factors for preterm birth such as stress, sexually transmitted disease, preeclampsia, anemia, premature rupture of membrane, inflammatory bowel disease, polyhydramnios. This is due to lack of knowledge and awareness among the pregnant women and their families. This may prevent by educating the pregnant women regarding the risk factors for preterm birth by explaining the changes that occur during the pregnancy, antenatal and prenatal care, regular monitoring of uterine activity and also by improving their sanitation to avoid the consanguineous marriage and appropriate delivery setting.



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