

Preterm Birth in Low-resource Setting

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ABSTRACT

Preterm labor (PTL) is a global problem which is a complex disease with a high rate of morbidity and mortality, also has long-term consequences for the baby and the family. The well-known morbidities related to PTL are respiratory distress syndrome, necrotizing enterocolitis, intraventricular hemorrhage, retinopathy of prematurity, and anemia of prematurity. In a developing country, the management of PTL is limited by poor health systems, low education level of the mother, poor financial support, lack of facility and trained health personnel, and demographic barriers. This limitation leads to high morbidity and mortality of preterm birth, especially in developing countries. It is important to reduce the rate of preterm birth by preventing the event. Several risk factors have been identified and are avoidable and preventable, such as smoking, bacterial infection, poor nutritional status, and malnourished mothers. Strategies to prevent PTL have been proposed in primary, secondary, and tertiary interventions to reduce the morbidity and mortality of preterm birth.

Keywords: Management, Morbidity and mortality, Preterm labor, Risk factor.

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INTRODUCTION

Preterm labor (PTL) is birth at or after 20 weeks but before 37 completed week's gestation.^{1,2} The WHO defines preterm birth as any birth before 37 completed weeks of gestation, or fewer than 259 days since the first day of the woman's last menstrual period (LMP) and this can be further subdivided based on gestational age: extremely preterm (<28 weeks), very preterm (28–32 weeks), and moderate or late preterm (32–36 weeks of gestation).³ Preterm labor is included in the term "The Great Obstetrical Syndrome" defined by Roberto Romero. As PTL or birth is caused by multiple etiologies.^{3,4}

Preterm can be classified into three groups by the process preceding the labor: spontaneous preterm birth, preterm premature rupture of membrane, and provider-initiated preterm birth (defined as the induction of labor or elective cesarean section before 37 completed weeks of gestation due to maternal or fetal indications). Morbidity by provider-initiated preterm birth is increasing in many high-income and middle-income countries.³ Preterm birth is a complex disease with a high rate of morbidity and mortality of newborns worldwide. The well-known morbidities of preterm delivery are respiratory distress syndrome, necrotizing enterocolitis, intraventricular hemorrhage, retinopathy of prematurity, anemia of prematurity, and they have their long-term consequences for both the neonates and the parents.^{2,4}

The incidence of preterm birth varies between 5% and 18% of all births and is increasing.^{2,5} In 2010, an estimated 14.9 million babies (12.3–18.1 million) were born preterm, 11.1% of all live births worldwide, ranging from about 5% in several European countries to 18% in some African countries.⁵ More than 60% of preterm babies were born in South Asia and sub-Saharan Africa, where 52% of the global live births occur.³ Indonesia contributed for 675,700 cases with an incidence rate of 15.5 per 100 live births in 2010.⁶ In Cipto Mangunkusumo Hospital Jakarta, data of July 2007 to December 2009 showed that there were 55.4% of preterm birth.

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RISK FACTORS

About two-thirds of preterm births are spontaneous.³ Preterm labor is abnormal signaling and activation of one or more common pathways of labor.¹ Many factors contribute to the spontaneous preterm birth process. Several pathological processes related to PTL have been identified, such as intrauterine infection or inflammation, uterine ischemia, uterine overdistension, abnormal allograft reaction, allergy, cervical insufficiency, and hormonal disorder.^{1,7} In up to half of all cases, the precise etiologies are unidentified. Assisted reproductive techniques and the concomitant increase in multiple pregnancies have contributed to the rise.^{5,8} Nearly 60% of twins and nearly all triplet and higher-order multiple births will be born preterm.^{9,10} Surgical intervention for the management of cervical intraepithelial neoplasia (such as loop excision of the cervical transformation zone) is associated with a two-fold increase in the risk of preterm birth.^{3,11} Individual or family history of preterm birth, young or advanced maternal age, short interpregnancy intervals, low maternal body mass index (BMI), multiple pregnancy, preexisting noncommunicable disease, hypertensive disease of pregnancy, and infections are risk factors for preterm birth.^{3,12,13} The cause of preterm birth is multifactorial, with social, psychological,

and biological factors playing a role.¹⁴ The etiologies differ according to gestational age, ethnicity, and characteristics unique to each population.¹⁵

PROBLEMS OF MANAGEMENT IN DEVELOPING COUNTRIES

Developing countries like Indonesia lack facilities contributing to higher morbidity and mortality of mothers and children. Poor health systems, low education level of the mother, poor financial support, lack of facility and trained health personnel, and demographic barriers are important factors contributing to the higher rate of mortality and morbidity for mothers and children.¹⁶ There are three types of delays in obstetric and neonatal care.¹⁷ Delay of recognition and decision to seek care, delay of transport to care, and delay of receiving the quality of care. Programs that have been established to reduce the number are increasing skilled attendance, developing the quality of maternal and neonatal care, antenatal risk screening, educating the community about pregnancy and birth, and improving the referral and transportation system. Interventions to reduce the morbidity and mortality related to preterm birth can be classified as primary (directed to all women before or during pregnancy to prevent and reduce risk), secondary (aimed at eliminating or reducing risk in women with known risk factors), or tertiary (initiated after the parturition process has begun, to prevent a delivery or improve outcomes for preterm infants).^{2,17}

PREVENTION

Primary prevention is the strategy directed at all women before or during pregnancy to reduce the risk of preterm birth. Primary interventions are beneficial to the overall health of the woman as they include weight optimization, nutritional supplementation, smoking cessation, and avoidance of late-preterm births.¹⁴

The prepregnancy BMI is useful clinically for evaluating the nutritional status and a low BMI is considered a strong predictor of adverse pregnancy outcomes such as PTB.¹³ Women with BMI <19 kg/m² have the greatest risk of PTB compared to women with BMI >30 kg/m². Therefore, nutritional and lifestyle adjustment to ensure that weight is within the normal range is recommended in the preconception period.¹³ Many researchers found that mothers with a low prepregnancy BMI had an increased risk for preterm and very preterm birth. Women with a low prepregnancy BMI who maintained a moderate level of gestational weight gain (0.23–0.68 kg/week) had a reduced risk for preterm and very preterm birth.

There are two important potential mechanisms by which low prepregnancy BMI may contribute to preterm: maternal under-nutrition, infection, and inflammation.¹⁴ Low prepregnancy BMI may be an indication of chronic nutritional deficiency (macronutrients and micronutrients), which may negatively impact normal processes of fetal growth and development, leading to adverse outcomes such as preterm birth obesity.¹⁸ Obese women have higher rates of delivery due to preeclampsia and gestational diabetes, and also have higher rates of congenital anomalies.¹⁹

Low serum levels of micronutrients such as iron, folate, and zinc are highly prevalent among pregnant women in low-income settings and are associated with preterm birth and stillbirth. The role of nutritional supplementation in this setting is controversial, with numerous studies reporting conflicting results.¹⁴

One hypothesis is that maternal hyperhomocysteinemia has a role in the origin of preterm birth and the reduced maternal

folate status associates with elevated homocysteine-related placental vasculopathy. This can be neutralized with a high dose of folic acid supplementation during pregnancy particularly in the third trimester, the high dose of folic acid supplementation during pregnancy particularly in the third trimester reduces the risk of preterm birth.²⁰ Although the effect of preconception zinc supplementation on preterm birth has not been studied, a Cochrane review of zinc supplementation initiated before 27 weeks of gestation has shown a small but significant reduction in preterm birth (relative risk 0.86).¹⁹

Cigarette smoking is a well-known cause of both preterm birth and intrauterine growth restriction. The risk attributable to cigarette smoking is >25% for preterm birth and is about 5% for infant mortality.¹⁴

Control of the prepregnancy metabolic disease is needed to decrease the rate of preterm birth. Suboptimal control of hypertension in early pregnancy in women with diabetic nephropathy is associated with a significant risk of preterm delivery. Improved preconception control of hypertension may reduce adverse perinatal outcomes in women with diabetic nephropathy.²¹

Early detection and therapy of vaginal infection is thought to reduce the incidence of preterm birth. A cohort study in Afro-American women showed that vaginal douching effects on the risk of preterm birth depend on the timing of the exposure. They concluded that douching in the 6 months before pregnancy, but not during pregnancy, appears to protect against preterm birth.²⁰

Increased awareness of PTB as the leading cause of infant mortality might offer an opportunity to inform the public and the medical profession about potentially avoidable risk factors such as abnormal weight, smoking, poor nutrition, and repeated uterine instrumentation. Choices made in the fertility care such as the number of embryos transferred might be affected by broader public knowledge of the significantly increased risk of preterm birth in multiple gestations conceived with assisted reproductive technology.¹⁴

EARLY DETECTION

The methods for early detection of women with high-risk preterm birth include transvaginal ultrasound and fetal fibronectin.^{22–24} In a limited source health facility, fetal fibronectin is not available. Transvaginal ultrasound is a reliable examination for the detection of preterm birth.²⁵ Transvaginal ultrasound which measuring cervical length and funneling is safe, acceptable, and reproducible.^{22,23}

Preconceptional Primary Prevention

Preconception care has a benefit to maternal, fetal, and neonatal outcomes. It also has an impact to decrease the rate of PTL.²⁶ Preconception point emphasize on promoting healthy lifestyle interfering fertility on the period and between pregnancies.²⁶ Tobacco smoking during pregnancy will increase adverse pregnancy outcomes including PTL.²⁷ Prepregnancy weight has an impact on pregnancy outcome. Underweight women and obese women have an increased risk of adverse pregnancy outcome compared to normal body weight women.^{19,23,28}

Public Educational Interventions

Preterm labor information is promoted by giving information about risk factors and the impact of PTL during preconception care in public health service and religious institutions for a young couple and married couple.²⁸ It could increase awareness of PTL as the

leading cause of infant morbidity and mortality by preventing and avoiding risk factors.

Raise Awareness of Scope and Significance of Preterm Labor

Awareness of PTL includes the awareness of the short-term and long-term impact of PTL to baby and the family by education about PTL and its risk factors such as unplanned pregnancy, pregnancy at extremes age, interpregnancy interval (18–24 months), substance abuse, and sexually transmitted disease.²⁸

Public and Professional Policies

A health policy adopted by the government to improve availability and utilization of reliable and acceptable contraception, minimal uterine instrumentation, protection in the working environment (increased salary for pregnant women, exemption from night shift, working time limitation), and limit number of embryos transferred during IVF will decrease the rate of PTL.²⁸

Preconceptional Management

Education about risk factors, signs, symptoms, and outcomes of PTL. Preparation of maternal and baby health insurance.²⁸

Risk Factor Reduction^{28–30}

Several actions that could prevent PTL are:

- Gynecology examination: ultrasound examination, Pap smear, early detection, and management of genital infection.
- Detection of asymptomatic bacteriuria.
- Management of metabolic disease/comorbidity.
- Nutritional supplements.
- Smoking cessation.

Early Detection and Prompt Intervention

Risk factors include prior preterm birth, multiple gestations, uterine anomalies, the prior or current risk of preeclampsia, IUGR, birth defects, medical disease, vaginal discharge, substance abuse, abnormal BMI, and pregnancy in the extreme ages need to be screened early.^{28,31} Screening that could be performed during antenatal care is a vaginal examination in the first antenatal care, urine examination, nutritional supplements during pregnancy, and smoking cessation in pregnancy.^{32,33}

Based on the meta-analysis that the risk of preterm birth doubled when bacterial vaginosis was diagnosed before 20 weeks of pregnancy. Sungkar et al. made a multicenter RCT on pregnant women across Jakarta and Cipto Mangunkusumo National Central Hospital.³¹ Scoring system was made and concluded history of preterm birth, cigarette smoking, history of abortion, yellowish vaginal discharge, and tooth-related complaints during pregnancy as the variables.⁴

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