

# Prediction of Preterm Labour

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## I. INTRODUCTION

Preterm delivery (PB) is a significant topic because it is among the main causes of mortality in neonates and its long-term neurologic and developmental challenges [11]. It is linked to cerebral palsy and bronchopulmonary dysplasia, prematurity retinopathy, and many other diseases associated with prematurity [1].

In 2010, it was reported that there had been 15 million premature births (<37 weeks gestation) all over the world, with the prevalence between 5 and 18% of live births [2], [3], [33].

The condition of PB is complex that is caused by multiple etiologic routes. It is a complex condition that has multiple etiologic causes

Iatrogenic factors could cause PB due to medical interventions that address pregnant and fetal reasons, and 80% of PB is spontaneous; and while one million children die due to prematurity, many more suffer the effects of PB [3], [43].

The ability to anticipate preterm labor allows the early intervention for preterm birth, including in the utero transfer into tertiary care centers, appropriate administration of corticosteroids while avoiding excessive use of magnesium sulfate for neuroprotection, as well as antibiotic therapy in the event of infections. Because the cause of preterm labor is not fully understood, identifying risk factors and determining the individual risk of pregnant women is crucial in managing obstetrics for women who could benefit from the current treatment methods. [6] (List 1).

List 1

- Risk factors for preterm birth (adopted from Koulali and Frey) [5, 6].
- Maternal characteristics
- Family history of preterm birth
- Low socioeconomic status
- Low educational attainment
- Maternal age (low and high)
- Ethnicity
- Stress
- Depression
- Tobacco use

- Low body mass index
- Infections (genitourinary or extra genital)
- Periodontal disease
- Uterine anomalies
- History of cervical excisional procedures/surgery (LEEP/conization)
- Reproductive history
- Prior preterm birth
- Prior stillbirth/ Pregnancy loss >16 weeks GA
- Induced abortion
- Cervical insufficiency
- Current pregnancy characteristics
- Vaginal bleeding
- Use of assisted reproductive technologies
- Multiple gestations
- Polyhydramnios
- Short cervical length

## II. METHODOLOGY

### Ultrasound Markers Cervical Length

Screening cervical length using transvaginal ultrasound can be a reliable indicator of PB risk for singleton pregnancies. The threshold of cervical length at 24 weeks gestation to determine the risk of PB was determined to be 25 millimeters (10 Th percentile) (percentile), with 37.3 percent sensitivity and 92.2 percent of specificity [7]

In a 3-week time frame, an increase in cervical length of >10 percent was associated with an increased likelihood of PB [8]. A cervical length of fewer than 15 millimeters was identified as the ideal cut-off, with 81% accuracy and 83 percent of positive predictive value when predicting the actual preterm labor [9].

There is a lack of evidence regarding cervical screening length during the initial third trimester (11-13 weeks) [10] [11]

### Cervical Consistence

The length of the cervical spine is an analysis of morphology, and the cervix exhibits consistency and structural modifications during labor. Two approaches have been suggested to assess cervical elastography: strain elastography and shear wave elastography [12]. The methods are promising, but there are some limitations to their technical implementation. So cervical elastography, which is not yet a well-defined topic, is suggested as a possible option shortly, which could be coupled with the length of the cervical spine [13].

#### Newer Tools

In the population with low risk at 20-24 weeks of gestation, an association of cervical length, angle anterior to the cervical canal as well as maternal traits was found to have a possibility to predict around 40% of severe preterm births [14]. Uterocervical angle (between the lower uterine segment and cervical canal) greater than 95deg or >105deg during the second trimester showed an increased risk of PB at 37 weeks and 34 weeks, respectively [15].

Pulsatility of the uterine artery in the peak of uterine contractions in women at risk of having preterm labor was significantly higher for women who had their baby after seven days of gestation [16], [17].

The strain ratio of the placenta, determined using real-time sonoelastography, was found to be negatively associated with gestational age at birth, and it was suggested that it could be a reliable predictor for PB [17].

The measurement of the central zone of the fetal adrenal gland was proved to be reliable in forecasting PB after seven days, with similar precision to the measurement of cervical length [18]. The central zone of the fetal adrenal gland was found to be accurate in predicting.

The lower middle cerebral arterial pulsatility (MCA-PI) value was a predictor of an earlier start of labor that could be due to hypoxemia in the fetus unrelated to placental disease. However, the cerebroplacental ratio did not correlate with the PB [19]. However, MCA-PI was described as an ineffective indicator of PB and was not likely to be helpful in clinical practice. [19].

#### Biomarkers Cervical Fluid

Fetal fibrin is a glycoprotein made by amniocytes and the cytotrophoblasts, which bind the chorionic membranes to the decidua of the mother. It is typically found in cervicovaginal blood before the 22nd week of pregnancy, but its presence in the cervicovaginal liquid between the ages of 24-34 weeks gestation is a sign of high risk for PB. A systematic review found that, although its accuracy in predicting fetal fibronectin in predicting spontaneous PB differs, it is the most reliable in predicting preterm births in women who have a high risk of having preterm labor that does not have advanced cervical dilatation, which occurs within 7-10 days of testing [20]. However, a meta-analysis of the past few years revealed that the fetal fibronectin test in singleton pregnancy did not result in any reduction in PB or better birth outcomes. The study found that PB rates between 28 and 32, 33, and 37 weeks were not affected despite the increased cost [21].

When testing for fetal fibronectin, blood-stained swabs still worked in predicating PB, but they also had greater false positive rates [21].

In the study, IL-6 and levels of IL-8 in the cervicovaginal fluid were linked to PB after seven days. They were also efficient

in conjunction with the length of the cervical cervix. However, it is not yet available for usage in clinical trials.

### III. CONCLUSION

It is possible to predict and avoid preterm labor precisely, and birth is one of the most important issues modern obstetrics faces. Finding out which women are most likely to experience preterm birth could allow the individualized treatment of medical issues and targeted treatments for therapeutic purposes that aim to improve the outcomes of both fetuses and mothers. Proteomic, genetic and metabolomic methods can eventually lead to the discovery of new biomarkers on the molecular level that is involved with the labor physiology as well as the pathophysiology behind preterm birth; however, it is becoming clear that different types of biomarkers (perhaps comprised of risks factors, length of the cervical as well as molecular indicators) could be needed to differentiate between pregnancies that experience spontaneous preterm labor, preterm PROM and symptoms of (threatened) preterm labor regardless of whether they are present or not of a genital tract infections.

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