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Original article

Assessment of risk factors and predictors for spontaneous pre-term birth in a South Indian antenatal cohort

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ABSTRACT

Objective: To assess incidence of spontaneous preterm births and determine biochemical and obstetric risk factors for spontaneous pre-term births in a cohort of antenatal women visiting a secondary care hospital.

Methods: A prospective cohort study was designed to include 1420 pregnant women coming for antenatal care at a secondary care hospital. The cohort was followed throughout pregnancy and relevant history, obstetric and ultrasonographic examination and biochemical investigations was carried out in 2nd (20-24 weeks period of gestation) and 3rd trimester (28-32 weeks period of gestation). Outcome of delivery was noted for all the subjects.

Results: A total of 1133 women were recruited. Among the 1071 respondents, 11 had abortions, 93.1% delivered at term while 5.9% had preterm deliveries. Preterm deliveries were noted among 6.5% women with short stature, 13.3% with cervical length <2.5 cms and 5.2% among women with anaemia. Statistically significant association was noted between Oligohydramnios, IUGR and preterm births. Salivary estriol was lower in women who had preterm births as compared to term births.

Conclusions: The incidence of preterm births (5.9%) was low in the present cohort. Oligohydramnios and Intrauterine Growth Retardation (IUGR) were identified as significant risk factors for preterm births. Conventional risk factors like short cervix, short stature and biochemical inflammatory markers were not identified as predictors of prematurity. Lower levels of salivary estriol identified among women at risk of preterm births demonstrates the utility of the test as a non-invasive investigation for early identification of preterm births.

1. Introduction

For much of the 20th century, preterm birth, defined as birth at less than 37 completed weeks of gestation, was viewed as an unpredictable and inevitable fact of life. Medical efforts thus focused on ameliorating the consequences of prematurity rather than preventing its occurrence.[1] Pre-term birth (PTB) is a major determinant of neonatal mortality, morbidity and childhood disability and remains one of the most serious problems in obstetrics. Despite major preventive efforts, the incidence of PTB has remained constant at about 5–10% of live births in most countries over the past two decades. In 75% of PTB cases no obvious causes have been established, but several etiological risk factors have been speculated. Non-obstetric risk factors include: poor socioeconomic status, maternal malnutrition, maternal age of <20 and >35 years, heavy manual work and cigarette smoking.[1–4] Obstetric risk factors associated with PTB include: cervical incompetence, short cervical length, multiple gestations, short birth intervals, abortion, pre-labor premature rupture of membrane (PPROM) and previous PTB. [5–7] Current knowledge indicates that iron deficiency anemia in pregnancy is a risk factor for preterm delivery and subsequent low birth weight. [8–10] In addition, risks for preterm birth have been documented to increase with elevated levels of biomarkers, [11] high levels of hCG, maternal age <20 years, two or more previous miscarriages, [12] and reduced salivary estriol levels. [13]

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Overall incidence of preterm labor is reported to be 6–15% and 4–50% of these occur spontaneously, whereas 25% occur following preterm pre-labor rupture of membranes (PPROM).[14] India, despite having highest number of births and neonatal deaths in the world, still has paucity of data on preterm births and the risk factors thereof, coupled with diversity in geography, availability and utilization of health services. Hence the current study was designed to estimate the incidence of spontaneous preterm births and identify the biochemical risk factors like inflammatory markers namely C – reactive protein (CRP), Inter Leukin –4 (IL-4), Tumor Necrosis Factor alpha (TNF-α) which might be suggestive of chorioamnionitis predisposing to preterm labour; assess levels of triple markers namely Estriol, α1- Feto protein (AFP) and Human Chorionic Gonadotrophin β sub unit (βhcG); estimate progesterone levels which ensure the sustenance of pregnancy and ascertain the role of obstetric risk factors like short cervix in the causation of spontaneous preterm births in a secondary care hospital of coastal Karnataka. In addition, the study proposed to evaluate role of salivary estriol (E3) in detecting increased risk of spontaneous preterm labour. The study focused on spontaneous preterm births, hence documented risk factors for indicated pre term births were primarily excluded at recruitment.

2. Methods

2.1. Study setting and population

A prospective cohort study was carried out in the Department of Obstetrics and Gynaecology (OBG) at a secondary care hospital, in collaboration with Departments of Paediatrics, Biochemistry and Community Medicine of a Medical College, over a period of three years. The study population included pregnant women of gestation period between 8–16 weeks, in the age group of 18–35 years coming for routine ante-natal check-up to the obstetrics outpatient department (OPD) of the secondary care hospital and willing to participate in the study. Those with past history of epilepsy and HIV and those with past obstetric complications like placenta praevia, abruption, cervical encirclage, uterine fibroid, uterine anomaly and multiple pregnancies (twin and triplet pregnancies) were excluded, as these conditions could lead to iatrogenic preterm deliveries.

Sample size calculation was based on short cervix as a parameter representing risk for preterm births in the cohort. The sample size was calculated anticipating a sensitivity of 56% for cervical length as a predictor of pre term labour, [15] with a relative precision of 3% at 5% level of significance, 1207 women needed to be enrolled for the study. Accounting for a drop out of 10% and exclusion of 5% of the pregnant women due to pregnancy related complications in the follow up period, the sample to be recruited in the cohort was 1420.

2.2. Data collection methodology

Permission was obtained from the institutional ethical committee review board **(IEC: 32/2011)** before initiation of the study. All the pregnant women found to be eligible and willing to participate in the study were enrolled during their first visit to the OBG OPD after obtaining written informed consent. The design has been outlined in Fig. 1. The cohort was followed throughout pregnancy and relevant history, obstetric and ultrasonographic examination and biochemical investigations was carried out for which five ml of blood was drawn in 2nd (20–24 weeks period of gestation) and 3rd trimester (28–32 weeks period of gestation), for all the subjects. The outcome of delivery was recorded. Routine hospital tests, done in the first trimester was obtained from the records of the subjects. Post natal assessment of gestational age

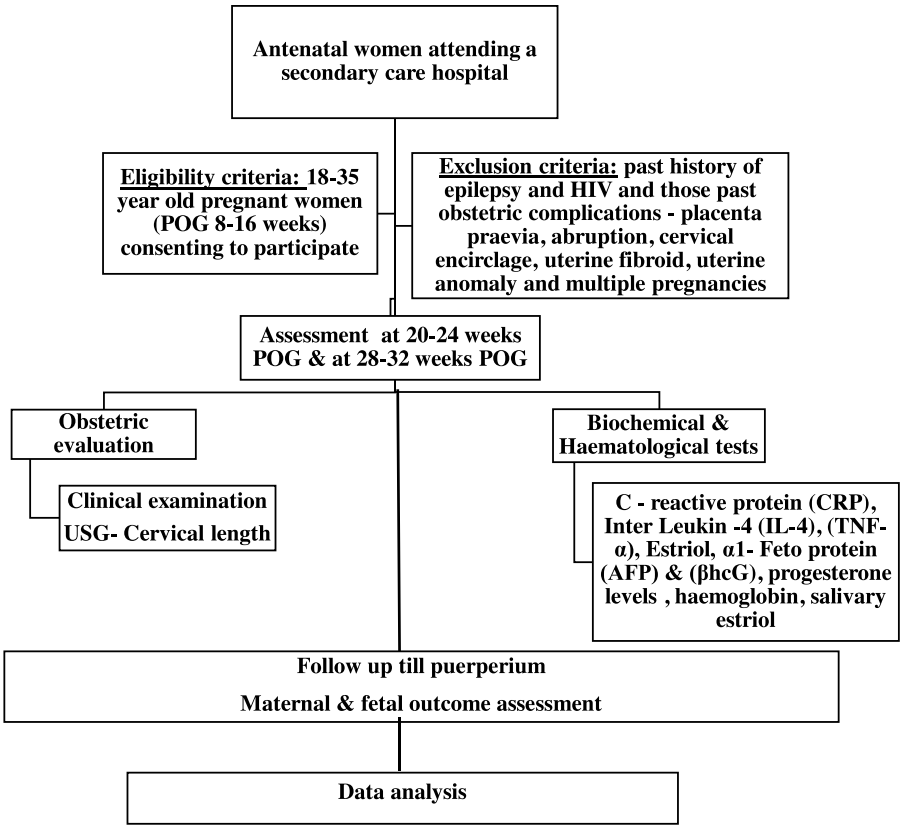

Fig. 1. Flow diagram depicting the Study design.

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