# **Original Research Article**

DOI: http://dx.doi.org/10.18203/2394-6040.ijcmph20164294

# Risk factors for preterm birth: a community based longitudinal study in rural Mysuru, Karnataka, India

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Received: 18 October 2016 Revised: 13 November 2016 Accepted: 15 November 2016

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#### **ABSTRACT**

**Background:** Preterm birth is defined as birth of the baby before 37<sup>th</sup> completed week counting from first day of the last menstrual period. Preterm infants constitute two-third of low birth weight babies. Estimated 15 million babies are born too early every year. Almost 1 million children die each year due to complications of preterm birth.

**Methods:** A Community based longitudinal study was conducted for the period of one year (March 2015- February 2016). All the antenatal mothers who completed 24 weeks of gestation, who were available for follow- up till 1week after the delivery were included in the study. Registration of the mothers was done for the period of 6 months, follow up was done till their 1st week of the delivery. During the first visit, a pretested semi structured proforma was administered which includes details regarding socio demographic background, major risk factors etc. Mothers were examined and Information pertaining to basic investigations was collected. Mothers were followed up till the delivery and details regarding delivery and birth weight were collected. Minimum of 3 visits were made before declaring lost follow up. Data collected was entered in MS office excel sheet and analyzed using Statistical Package for Social Sciences(SPSS) software version 22.0.

**Results:** Out of 257 registered mothers, 246 mothers had live birth. 11 mothers lost to follow-up. Total numbers of preterm birth out of 246 deliveries were 5 (2%) 95% CI (0.22-3.78%). Gestational diabetes mellitus, Education of the mother and type of the family was found to be statistically significant (p<0.05) under univariate analysis. Whereas multivariate regression showed that age of the father was the independent predictor of Preterm birth and higher the age of father risk of having preterm baby was 7.57 times higher.

**Conclusions:** Though presence of 'high risk' factors are attributed to the adverse pregnancy outcomes like preterm birth, socio demographic characteristics of the antenatal mother and her family play a vital role.

Keywords: Longitudinal study, Multivariate regression, Pretested semi-structured questionnaire

# INTRODUCTION

In any community mothers and children constitute a priority group. They comprise approximately 71.14% of the population of the developing countries. Mothers and children not only constitute a large group but they are

also a "vulnerable" or special risk group. The central purpose of antenatal care is to identify" high risk cases" and provide skilled care. Preterm birth is defined as birth of the baby before 37<sup>th</sup> completed week counting from first day of the last menstrual period. Preterm infants constitutes two-third of low birth weight babies.<sup>2</sup>

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Causal factors linked to preterm birth include medical conditions of the mother or fetus, genetic influences, environmental exposure, infertility treatments, behavioural and socioeconomic factors and iatrogenic prematurity.<sup>3</sup>

Estimated 15 million babies are born too early every year. That is more than 1 in 10 babies. Almost 1 million children die each year due to complications of preterm birth. Many preterm babies land up in complications like Asphyxia, Hypothermia, Hypoglycemia, Infections, Jaundice, Dehydration, Anaemia, Fetal shock, Heart failure, Sudden infant death syndrome and so on. 3

Many survivors face a lifetime of disability, including learning disabilities and visual and hearing problems.<sup>2</sup> The morbidity associated with preterm birth often extends to later life, resulting in enormous physical, psychological and economic costs.<sup>4</sup> Hence strict vigilance of the high risk pregnancies and intensive care of the preterm babies help to achieve better MCH indicators.

Hence the present study intended

- To estimate the proportion of preterm birth in our field practice area.
- To determine the factors affecting the Preterm birth.
- To evaluate the association between Risk factors and Preterm birth.

#### **METHODS**

A Community based longitudinal study was conducted for the period of 1 year (March 2015- February 2016). All the antenatal mothers who completed 24 weeks of gestation, seeking health care services from Hadinaru and Suttur PHC's of Mysuru, Karnataka, India and who were available for follow- up till 1 week after the delivery were included in the study.

Antenatal mothers were excluded based on their unwillingness to participate in the study. Institutional Ethics Committee clearance was obtained before the start of the study.

List of all the pregnant women who were beneficiaries of both the PHC's of our field practice area were collected and expectant mothers who meets the eligibility criteria were contacted and registered for the study at their residence. Registration of the mothers was done for the period of 6 months, follow up was done till their 1st week of the delivery. Total of 257 mothers were registered during the period of 6 months.

During the first visit, after taking informed consent a pretested semi structured proforma was administered this includes details regarding socio demographic background, major risk factors of the present pregnancy, past obstetric history, delivery details of the present pregnancy. Ultrasonography reports along with their 1st

day of last menstrual period were used to calculate the expected date of delivery. Mothers were examined for pallor, edema, height, weight and blood pressure, fundal height. Respiratory and cardiovascular system examination was done as a routine and to determine any abnormality. Information pertaining to basic investigations was collected.

Mothers were followed up till the delivery with the help of Anganawadi and ASHA workers. During subsequent visits, development of any symptom, risk factor was noted.

Investigation reports were reviewed and BP, weight, fundal height was recorded. Mothers were contacted within the 1 week of their expected date of delivery and details regarding birth weight, date of delivery, place of delivery, mode of delivery were collected.

Minimum of 3 visits were made before declaring lost follow up. Data collected was entered in MS office excel sheet and analyzed using Statistical Package for Social Sciences(SPSS) software version 22.0.

#### **RESULTS**

Out of 257 registered mothers, 246 mothers had live birth. 11 mothers lost to follow-up. Total numbers of preterm birth out of 246 deliveries were 5 (2%) 95% CI (0.22-3.78%). Preterm birth was found in 8.4% of the graduate mothers, 2% of the mothers who studied up to diploma/intermediate, 0.7% of the mothers who studied up to high school and 10% of the mothers who studied up to middle school.

And the difference was found to be statistically significant (p<0.05). As many as 5.2% of the Preterm deliveries seen in Three generation family. And no preterm deliveries seen in nuclear and joint family. This difference was found to be statistically significant (p<0.05).

The association between the preterm birth and factors such as age of the mother, age of the father, education of the father found to be statistically insignificant (Table 1).

Relationship between preterm birth and Gestational diabetes mellitus found to be statistically significant at 95% CI. And the factors like Anemia, Previous still births, Intra uterine deaths, previous caesarean delivery did not attain statistical significance at 95% CI (Table 2).

The variables with p value <0.25 during uni-variate analysis were included for multi-variate logistic regression analysis.

It was observed that in multi-variate analysis of predictors of preterm birth revealed that age of the father was statistically significant with OR: 7.57, 95% CI: 1.47-38.99%, p=0.01. So we can conclude that age of the

father was the independent predictor of preterm birth and higher the age of father, risk of having preterm baby is 7.57 times higher (Table 3).

Table 1: Association between socio demographic characteristics and preterm delivery (N=246).

	Preterm delivery		χ²/p	
	Yes n (%)	No n (%)		
Age of the mother				
<19 years	0	33 (100)		
20-24 years	3 (2)	149 (98)	$\chi^2=3.74 / p=0.71$	
25-29 years	2 (4)	49 (96)		
30-34 years	0	9 (100)		
>35 years	0	1 (100)		
Age of the father				
20-24 years	0	13 (100)		
25-29 years	0	109 (100)		
30-34 years	2 (2.90)	67 (97.10)	$\chi^2 = 5.76 / p = 0.07$	
>35 years	3 (5.5)	52 (94.5)		
<b>Education of the mother graduate</b>	1 (8.4)	11 (91.6)		
Intermediate/diploma	1 (2)	51 (98)		
High school	1 (0.7)	145 (99.3)	$\chi^2 = 9.88 / p = 0.05*$	
Middle school	2 (10)	18 (90)		
Primary school	0	3 (100)		
Not literate	0	13 (100)		
<b>Education of the father</b>				
Graduate	0	19 (100)		
Intermediate/diploma	2 (5.66)	34 (94.44)		
High school	1 (1)	106 (99)	$\chi^2 = 7.10 / p = 0.24$	
Middle school	2 (5.89)	32 (94.11)		
Primary school	0	11 (100)	_	
Not literate	0	39 (100)		
Type of family				
Nuclear	0	57 (100%)	$\chi^2 = 5.95/p = 0.027 *$	
Joint	0	92 (100%)		
Three generation	5 (5.2%)	92 (94.8%)		

<sup>\*=</sup> p value< 0.05, statistically significant.

Table 2: Relationship between high risk factors and preterm delivery (N=246).

High risk factors	Level	Preterm delivery		Total n (%)	OR (95%CI)
		Present n (%)	Absent n (%)		
Elderly primi	< 30yrs	5 (2.1%)	238 (97.9%)	243 (100%)	
	>30yrs	0	3 (100%)	3 (100%)	*
Short statured primi	<140cms	0	5 (100%)	5 (100%)	
	>140cms	5 (2.1%)	236 (97.9%)	241 (100%)	*
Pre-eclampsia & Eclampsia	Yes	0	7 (100%)	7 (100%)	
	No	5 (2.1%)	234 (97.9%)	239 (100%)	*
Anaemia	Yes	2 (1.65%)	131 (98.4%)	133 (100%)	0.56(0.09-
	No	3 (1.8%)	110 (98.2%)	112 (100%)	3.41)
Gestational Diabetes Millitus	Yes	1 (16.7%)	5 (83.3%)	6 (100%)	11.8(1.11-
	No	4 (1.7%)	236 (98.3%)	240 (100%)	125.41)**
Twins and Hydramnios	Yes	0	2 (100%)	2 (100%)	
	No	5 (2.1%)	239 (97.9%)	244 (100%)	*
Previous still births, Intra uterine death, Previous caesarean section	Yes	2 (7.5%)	25 (92.5%)	27 (100%)	5.76 (0.91-
	No	3 (1.6%)	216 (98.6%)	219 (100%)	36.14)
Grand multipara	Yes	0	11 (100%)	11 (100%)	
	No	5 (2.2%)	230 (97.8%)	235 (100%)	*

 $<sup>*</sup> odds \ ratio \ could \ not \ be \ calculated \ as \ the \ frequency \ of \ the \ variables \ were \ found \ to \ be \ less; \ **p \ value \ -<0.05. \ Statistically \ Significant.$ 

Table 3: Uni variate and multiple logistic regression analysis of predictors of preterm				
among study participants $(n=246)$ .				

	Univariate analysis			Multivariate analysis	
Variable	OR (95% CI)	Chi-square value	p value	OR (95% CI)	p value
Education of mother	*	9.88	0.05	0.76 (0.18-3.12)	0.70
Education of father	*	7.10	0.24	0.63 (0.22-1.17)	0.38
Type of family	*	5.95	0.02	*	0.99
Previous still births,Intrauterine death, Previous caesarean section	5.76 (0.91-36.1)	4.40	0.09	0.41 (0.03-5.64)	0.50
Age of the father	*	6.02	0.07	7.57 (1.47-38.99)	0.01**
Gestational diabetes mellitus	11.8 (1.11-125.41)	6.61	0.04	0.11 (0.03-4.57)	0.24

<sup>\*</sup> odds ratio could not be calculated as the frequency of the variables were found to be less; \*\*p<0.01- highly significant

#### **DISCUSSION**

Out of 246 antenatal mothers who had given live births, 5 (2%) mothers had preterm delivery. According to Branum et al, primiparae aged 40 years and older had a reduced risk of very preterm birth compared with women of 25-29 years (OR 0.74 [95% CI=0.66, 0.84]). Among multiparae, women 40 years and older had the same risk of very preterm birth compared with women of 25-29 years (OR 1.00 [95% CI=0.90, 1.12]). The effect of maternal age on very preterm birth depends on parity and education.<sup>6</sup>

These findings are consistent with the findings of the present study. Another study conducted by Medhi R et al showed that adolescent mothers had a higher incidence of preterm deliveries (OR: 1.655, 95% CI p=0.03). These findings did not match the findings of the present study. More preterm birth in the older age of the parents is because of the higher birth order. However this study was conducted in the hospital settings and findings cannot be compared with the present study.

Hospital based cross-sectional study conducted in Northern India by Saini et al showed that type of family affects the pregnancy outcome. They found that, this association between type of family and low birth weight was statistically significant. (OR-2.8, 95% CI 1.8-3.8, p-0.03).8 Nuclear family has positive impact by having good socio economic status and more leisure. Joint family provides good antenatal mother care and support. So we can see more adverse outcomes in three generation family. According to the study conducted by Etuk et al to determine the the factors influencing the incidence of preterm birth in Calabar, Nigeria. It was observed that, Previous pre-term delivery, Multiple pregnancies, Antenatal complications were significantly associated with Pre-term birth. Similar to our study, Anemia, Preeclampsia, Premature rupture of membranes, Previous spontaneous abortion were not significantly associated with pre-term birth.9

However association of preterm birth with Gestational diabetes mellitus could be because of the early opting of the elective caesarean section by the health care provider. The present study showed that that age of the father was the independent predictor of Preterm birth and higher the age of father risk of having preterm baby is 7.57 times higher. This results are consistent with the study conducted by Alio et al in which highest rates of stillbirths and preterm births are observed in infants whose fathers had advanced paternal age, suggesting that in utero development and survival are influenced by both maternal and paternal age. However it is advised to conduct similar studies in the Indian setup to determine the effects of paternal factors on pregnancy outcome.

# **CONCLUSION**

Though presence of 'high risk' factors are attributed to the adverse pregnancy outcomes like preterm birth, socio demographic characteristics of the antenatal mother and her family play a vital role. Gestational diabetes mellitus, Education of the mother and type of the family found to have association with the preterm birth and Age of the father was found to be the independent predictor of preterm birth. Hence the antenatal mothers should be strictly monitored in this regard.

#### Recommendations

Effective monitoring of the antenatal mothers for presence of high risk factors and reporting if, any adverse outcome occurs. Education regarding age of marriage for both men and women should be given. Overall improvement in the educational status of the population which play a vital role in utilization of health services.

Funding: No funding sources Conflict of interest: None declared

Ethical approval: The study was approved by the

Institutional Ethics Committee

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Cite this article as: Rashmi A, Narayanamurthy MR, Vidya GS, Vidyalaxmi K, Renuka M. Risk factors for preterm birth: a community based longitudinal study in rural Mysuru, Karnataka, India. Int J Community Med Public Health 2016;3:3576-80.