Prevalence of preterm birth and associated maternal factors at Teaching Hospital Anuradhapura, Sri Lanka

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Abstract

Background: Preterm birth is a primary cause of newborn morbidity and mortality. Preterm birth rate in Sri Lanka ranges from 10-15 per 1000 live births.

Objectives: To assess the prevalence and maternal factors associated with preterm birth at Teaching Hospital Anuradhapura, Sri Lanka

Method: A hospital-based descriptive cross-sectional study was conducted among all mothers attending postnatal wards, Obstetrics and Gynaecology Unit during October 2023 at Teaching Hospital Anuradhapura. Details of pregnancy, obstetrics and birth profile were collected using an interviewer-administered questionnaire and data extraction sheet.

Results: Data were collected from all mothers (n=597) during their postnatal hospital stay. Prevalence of preterm birth was 9.5%. Mode of delivery, pregnancy outcome (singleton/twin), previous history of preterm labour, previous history of gestational diabetes mellitus, consanguinity, stressful events during pregnancy, pregnancy complications like premature rupture of membranes, pregnancy induced hypertension, placental abruption, oligohydramnios, cervical incompetence, chorioamnionitis and vaginal candidiasis were significantly associated with preterm birth.

Conclusions: Prevalence of preterm birth was 9.5% in Anuradhapura Teaching Hospital. Mode of delivery, pregnancy outcome, previous history of preterm labour, previous history of gestational diabetes mellitus, consanguinity, stressful events during pregnancy, pregnancy complications and vaginal candidiasis were significantly associated with preterm birth.

(Key words: Preterm birth, Maternal health, Pregnancy complications, Anuradhapura Teaching Hospital)

Background

Preterm labour is defined as "onset of regular uterine contractions associated with cervical changes starting before 37 completed weeks of gestation, with or without intact fetal membranes".[1] In Sri Lanka, around 24,500 babies are delivered prematurely each year.[2] Many preterm births are unexplained in both wealthy and poor countries.[3] Most premature births are caused by spontaneous preterm labour or preterm membrane rupture. A minority of interventions are fetal and maternal.[4]

Mother's age less than 18 years or greater than 35 years, maternal body mass index (BMI), current pregnancy and inter-pregnancy space (<6 months) are important risk factors in increasing the risk of preterm delivery.[5] Mothers with previous preterm birth or abortion in the second trimester, a history of infertility and multiple pregnancy are at higher risk of preterm labour.[6] Women who have a history of vaginal bleeding, polyhydramnios or oligohydramnios or fetal malpresentation are more likely to experience preterm labour.[7] Urinary tract infections and bacterial vaginosis are significant risk factors for preterm delivery.[8] Outcome of early labour and delivery is closely related to the degree of antenatal care received by the woman during her pregnancy.[9]

Teaching Hospital Anuradhapura is the main hospital in the Anuradhapura district, and people come there from all over the district. It is the largest hospital in the North-central province, but until recently, no research was done to find out the factors associated with preterm birth.

Objectives

To assess the prevalence and maternal factors associated with preterm birth at Teaching Hospital Anuradhapura (THA), Sri Lanka.

Method

A hospital based descriptive cross-sectional study was conducted in three postnatal wards, Obstetrics and Gynaecology Unit at THA between 1st October and 1st November 2023. All mothers admitted to the postnatal wards after delivery in October 2023 were included. Data were collected from mothers during their hospital stay. An interview-administered questionnaire comprised socio-demographic, lifestyle and obstetric details of mother, and birth profile as well. Information regarding research purpose, outcome, benefits, and procedure was adequately explained to participants before data collection.

Ethical issues: The study was approved by the Ethics Review Committee of the Faculty of Medicine, University of Jaffna, Sri Lanka on 27.9.2023. Purpose of the research and outcome of study were provided in a detailed type format by the investigators to the mothers attending maternity wards in THA for delivery. A consent form from parents or a legally acceptable representative was used for teenage mothers in postnatal wards.

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Statistical analysis: Associations between categorical variables were analysed using chi square test. In case of less numbers, Fisher Exact Test was used. Pregnancy associated factors for preterm births were identified using bivariate analysis. $p<0.05$ was considered statistically significant.

Results

In the present study, the mean gestational age of the babies was 38.57 ± 2.0 weeks. Frequency of preterm birth in our study was 9.5%; 51.6% preterm babies were female and ratio between female and male babies was 1.1: 1.0.

Table 1 shows the association between gestational age and socio–demographic factors related to the mother. Of the mothers 80.6% were aged 20–34 years, 81.2% were Sinhalese and 78.2% were housewives.

Table 2 shows the association between the gestational age and the obstetric factors related to the mother.

Table 1: ***Association between gestational age and socio–demographic factors related to mother***

Socio-demographic factor	Category	Preterm *(n=57)* n (%)	Term *(n=540)* n (%)	OR (95% CI)	*p*-value
Age of mother	Advanced age and teenage Normal age	42 (73.7) 15 (26.3)	439 (81.3) 101 (18.7)	0.644 (0.344-1.207)	0.168
Marital status	Unmarried Married	0 (0.0) 57 (100.0)	02 (0.3) 538 (99.7)	1.004 (0.999-1.009)	0.646
Religion	Hindu/Islam/Christian Buddhist	13 (22.8) 44 (77.2)	98 (18.3) 442 (81.9)	1.333 (0.691-2.569)	0.390
Maternal occupation	Unemployed (Housewife) Employed	40 (70.2) 17 (29.8)	427 (78.2) 113 (21.8)	1.606 (0.878-2.938)	0.122
Monthly income (Sri Lankan rupees)	<27,000 27,000-55,999	09 (15.8) 48 (84.2)	69 (12.8) 471 (87.2)	1.280 (0.601-2.724)	0.521
Type of family	Nuclear Extended	33 (57.9) 24 (42.1)	279 (52.3) 261 (47.7)	1.286 (0.740-2.234)	0.371
Maternal education	Passed G.C.E (O/L) Grade 12 and above	25 (43.9) 32 (56.1)	263 (48.7) 277 (51.3)	0.823 (0.475-1.426)	0.487
Educational status of father	Passed G.C.E (O/L) Grade 12 and above	31 (54.4) 26 (45.6)	293 (54.3) 247 (45.7)	1.005 (0.581-1.739)	0.985

Table 2: ***Association between gestational age and obstetric factors related to the mother***

Obstetric factor	Category	Preterm *(n=57)* n (%)	Term *(n=540)* n (%)	OR (95% CI)	*p*-value
Current pregnancy	Planned Unplanned	34 (59.6) 23 (40.4)	342 (63.3) 198 (36.7)	0.856 (0.490-1.494)	0.584
Conception	Spontaneous Assisted	56 (98.2) 01(01.8)	532 (98.5) 08 (01.5)	0.842 (0.103-6.856)	0.872
Consanguinity	Yes No	08 (14.0) 49 (86.0)	34 (06.3) 506 (97.3)	2.430 (1.066-5.540)	**0.030**
Stressful events	Yes No	20 (35.1) 37 (64.9)	121 (22.4) 419 (77.6)	1.872 (1.048-3.344)	**0.032**
Maternal allergy	Yes No	03 (05.3) 54 (94.7)	61 (11.3) 479 (88.7)	0.436 (0.132-1.438)	0.162
Past medical history	Yes No	16 (28.1) 41 (71.9)	102 (18.9) 438 (81.1)	0.597 (0.322-1.106)	0.098
Past obstetric history	Yes No	16 (28.1) 41 (71.9)	102 (18.9) 438 (81.1)	0.294 (0.164-0.527)	**<0.001**
Sexual intercourse 2 weeks before delivery	Yes No	14 (24.6) 43 (75.4)	134 (24.8) 406 (75.2)	0.986 (0.523-1.859)	0.966
Pregnancy complications	Yes No	07 (12.3) 50 (87.7)	366 (67.8) 174 (32.2)	0.067 (0.030-0.150)	**<0.001**
Gravidity	Primigravida Multigravida	18 (31.6) 39 (68.4)	191 (35.4) 349 (64.6)	0.843 (0.470-1.515)	0.569
Maternal height	<145 cm ≥145 cm	10 (17.5) 47 (82.5)	52 (09.6) 487 (90.4)	1.993 (0.951-4.177)	0.064
Booking visit body mass index	Normal weight Underweight/Overweight/Obese	31 (54.4) 26 (45.6)	293 (54.3) 247 (45.7)	0.843 (0.470-1.515)	0.985
Pregnancy haemoglobin level	<11.0 g/dl ≥11.0 g/dl	24 (42.1) 33 (57.9)	232 (43.0) 308 (57.0)	0.966 (0.556-1.678)	0.901
Sexually transmitted disease of mother	Yes No	02 (03.5) 55 (96.5)	05 (0.9) 535 (99.1)	3.891 (0.737-20.528)	0.085
Pre-conception folic acid	Yes No	32 (56.1) 25 (43.9)	360 (66.7) 180 (33.3)	0.640 (0.368-1.113)	0.112
Antenatal clinic visits	≥4 visits <4 visits	57 (100.0) 0 (0.0)	534 (99.3) 04 (0.7)	0.904 (0.880-0.928)	0.514
Mode of delivery	Normal vaginal delivery Caesarean section	22 (38.6) 35 (61.4)	349 (64.6) 191 (35.4)	0.344 (0.196-0.603)	**<0.001**
Pregnancy outcome	Singleton Twin	54 (94.7) 03 (05.3)	539 (99.8) 01 (0.2)	0.033 (0.003-0.327)	**<0.001**

According to their past medical history, 2.5% mothers had diabetes mellitus, 10.4% had bronchial asthma, 1.7% had epilepsy, 1.3% had hypertension, 2.8% had hypothyroidism, and 1.5% had psychiatric disease. When considering the past obstetric history, 17.4% had abortions, 17.1% had previous caesarean sections, and 9.5% had sub -fertility. Among the mothers 56% did not have pregnancy complications. Recorded pregnancy complications included premature rupture of membrane (10.2%), pregnancy induced hypertension (9.4%) and gestational diabetes mellitus (9.7%).

Table 3 shows the association between gestational age and past obstetric history related to the mother.

Table 4 shows the association between gestational age and pregnancy complications related to the mother

Table 3: ***Association between gestational age and past obstetric history related to mother***

Past obstetric history	**Preterm** ***(n=57)*** **n (%)**	**Term** ***(n=540)*** **n (%)**	**FET (p-value)**
Abortion			
Yes	21 (36.8)	83 (15.4)	**<0.001**
No	36 (63.2)	457 (84.6)	
Gestational diabetes mellitus			
Yes	06 (10.5)	11 (02.0)	**<0.001**
No	51 (89.5)	529 (98.0)	
Previous caesarean section			
Yes	16 (28.1)	87 (16.1)	**0.023**
No	41 (71.9)	453 (83.9)	
Previous preterm labour			
Yes	01 (01.8)	0 (0.0)	**0.002**
No	56 (98.2)	540 (100.0)	

Table 4: ***Association between gestational age and pregnancy complications related to mother***

Pregnancy complication	**Preterm** ***(n=57)*** **n (%)**	**Term** ***(n=540)*** **n (%)**	**FET (p-value)**
Premature rupture of membranes			
Yes	21 (36.8)	40 (07.4)	**<0.001**
No	36 (63.2)	500 (92.6)	
Pregnancy induced hypertension			
Yes	13 (22.8)	43 (08.0)	**<0.001**
No	44 (77.2)	497 (92.0)	
Placental abruption			
Yes	03 (05.3)	01 (0.2)	**<0.001**
No	54 (94.7)	539 (99.8)	
Oligohydramnios			
Yes	08 (14.0)	0 (0.0)	**<0.001**
No	49 (86.0)	540 (100.0)	
Cervical incompetence			
Yes	06 (10.5)	0 (0.0)	**<0.001**
No	51 (89.5)	540 (100.0)	
Chorioamnionitis			
Yes	02 (03.5)	0 (0.0)	**0.006**
No	55 (96.5)	540 (100.0)	
Vaginal candidiasis			
Yes	02 (03.5)	04 (0.7)	**0.046**
No	55 (96.5)	536 (99.3)	

Discussion

The majority of mothers in this study were aged between 20 and 34 years, indicating that most participants were within the reproductive age group. Nearly all of them were married, showcasing the traditional marital structure prevalent among the study population. Among the participants 81.2% were Sinhalese, reflecting the demographic composition of the region. The majority of mothers were housewives, suggesting that most participants were primarily engaged in household responsibilities rather than formal employment. Most families reported monthly incomes ranging between 27,000 and 55,999 Sri Lankan Rupees, indicating a middle-income bracket for most participants. The majority were living in nuclear families, which is increasingly common in modern Sri Lankan society. A significant proportion of mothers had completed their General Certificate of Education Ordinary Level demonstrating basic secondary-level education. Similarly, their partners also displayed comparable educational qualifications suggesting a moderate level of educational alignment between spouses.

Preterm birth is categorized, based on gestational age as very preterm (28 to <32 weeks) and moderate to late preterm (32 to <37 weeks).[10] In our study, the mean gestational age of the babies was 38.57 ± 2.0 weeks. In Korea, the mean gestational age of preterm babies was 33.2 ± 2.5 weeks[11] and in the United Kingdom, mean gestational age of preterm babies was 34.9 ± 1.2 weeks.[12]

The frequency of preterm birth in our study was 9.5%, while worldwide, 11.1% of all pregnancies end in preterm delivery, of which 84% are born moderately preterm, i.e. born between 32^{+0}- 36^{+6} weeks of gestation.[13] In Netherlands 84% mothers delivered moderate to late preterm babies.[14]

In the current study, 51.6% preterm babies were female and the ratio between female and male babies was 1.1: 1.0. However, in studies in Korea and Sarajevo, 54.9% and 54% respectively were male babies. Table 1 shows the association between the gestational age and the socio–demographic factors related to the mother. The rate of preterm birth was 73.7% among the advanced age and the teenaged mothers. However, there was no statistically significant association between maternal age and preterm birth. In a study in the Jaffna district, 84.4% mothers were in the 20–34 age range, and 15.6% were advanced maternal age and teenage mothers. Those findings differed from our study[16]. In the current study, 100% mothers who delivered preterm babies were married, while in other studies frequency was 98.8%,[16] and 89.8%.[17]

In the present study, among the 57 preterm babies, 13 (22.8%) were born to Tamil/Christian/Muslim mothers, and it was 1.316 times the risk of delivering preterm babies. However, no statistically significant association was obtained between ethnicity and gestational age (p=0.390). In another Sri Lankan study, all mothers delivering premature babies were Tamil, and 72.3% were Hindu.[16] In our study, prevalence of preterm birth was 70.2% among housewives. There was no statistically significant association obtained between maternal occupation and preterm birth (p=0.122). In another Sri Lankan study, 86.1% were housewives.[16] Another study found that almost all mothers were full–time housewives.[18] In the current study, mothers educated only up to Ordinary level or less reported 43.9% preterm pregnancies, whereas mothers educated up to advanced level or above reported 56.1% preterm pregnancies. No statistically significant association was found between maternal education and gestational age.

Table 2 shows the association between gestational age and obstetric factors related to the mother. Among the 57 preterm births, 23 (40.4%) were unplanned. However, no statistically significant association was observed between planned/unplanned pregnancy and gestational age (p=0.584). Our study reported that 56 conceptions occurred spontaneously and only one was assisted conception; but no significant association was found. Among mothers who had consanguineous marriage, 8 and 34 delivered preterm and term babies respectively. It was observed that mothers who had consanguineous marriage had 2.430 times risk of delivering preterm births and consanguineous marriage was significantly associated with preterm birth (p=0.030).

Mothers who experienced stressful events during pregnancy had 1.872 times risk of delivering preterm babies and it was significantly associated with preterm birth (p=0.032). Maternal allergy and past medical history of mother were not associated with preterm birth. Among the 57 preterm births, 14 had sexual intercourse two weeks before delivery and this was not statistically significant. However, in a study in Jaffna district, 52.8% mothers reported that they had sexual intercourse during last two weeks before delivery, and 9.7% delivered very preterm babies.[16]

The past obstetric history of the mother had a statistically significant association with preterm birth (p<0.001). When considering past obstetric history of mother (Table 3) abortion (p<0.001), previous history of gestational diabetes mellitus (p<0.001), previous caesarean section (p=0.023) and previous preterm labour (p=0.002) were significantly associated with preterm birth. Previous preterm delivery was associated with preterm birth also in other studies.[19,20] In another study all 17 mothers who had a history of caesarean section delivered preterm babies by caesarean section.[16]

In our study, pregnancy complications like premature rupture of membranes (PROM), pregnancy-induced hypertension (PIH), placental abruption, oligohydramnios, cervical incompetence, chorioamnionitis, and vaginal candidiasis were significantly associated with preterm birth (Table 4). In a study at Kenyata National Hospital, mothers with PIH had a 5-fold increase in risk of preterm birth (OR: 5.203).[21] Approximately 27% mothers who had preterm delivery and 8% who delivered at term had history of PROM for more than 18 hours.[20] Our study showed that hypertensive disorders of pregnancy were a risk factor for preterm labour, and it was matched with a study carried out in General Hospital Matara, Sri Lanka.[1]

PROM was a risk factor in our study. This finding was consistent with findings in another study.[1] Among the 57 preterm births in our study, 18 were primigravida and 39 were multigravida. However, in our study gravidity was not associated with gestational age at delivery (p=0.569). A study in France showed that primipara as compared with parity 2–3 increased risk of preterm birth by 1.8 times.[22] In one study, the frequency of primigravida mothers was 47.4%, and second, third, fourth, fifth, and seventh parity mothers were 28.9, 15.0, 3.5, 4.6, and 0.6% respectively. This frequency distribution indicated that primigravida mothers had a higher percentage of preterm deliveries.[16]

In our study, ten mothers of the preterm group had a maternal height <145 cm and there was 1.993 times risk of delivering preterm birth but maternal height was not significantly associated with preterm birth. (p=0.064). Among the 57 preterm births in our study, 30 had normal BMI and 27 were underweight/overweight/obese at the booking visit. However, in another study 17.3% mothers had BMI less than 18.5 kgm^{-2}, while 39.9% mothers had BMI above 25.0 kgm^{-2}. Thus, the number of mothers who were obese was twice higher than those who were underweight.[16] About 0.7% of mothers in the term group and 0.0% in preterm group had less than 4 antenatal care visits but this was not statistically significant (p=0.514). Approximately 3.5% of preterm mothers and 0.9% of term mothers have had sexually transmitted diseases (STDs). There was no association between STD status and preterm delivery (p = 0.085).

The proportion of women who had anaemia during pregnancy was the same for the two groups (p = 0.901). Those who had taken pre-conceptional folic acid and those who hadn't were not significantly associated with preterm birth in our study. Antenatal clinic (ANC) attendance as well as number of antenatal visits was not associated with

preterm birth in our study. This is different from another international study.[23] This may be due to the Focused Antenatal Care (FANC) approach in Sri Lanka which has emphasized the need to have four targeted antenatal visits which ensures women start ANC attendance much earlier. Among the 57 mothers who delivered preterm babies 35 (61.4%) delivered their babies via caesarean section, and caesarean delivery was significantly associated with preterm birth. This was similar to a study done at the National Hospital Kenyata.[20] Twin gestation was a risk factor for preterm labour and this is consistent with previous studies.[1] In our study, twin birth ($p<0.001$) had a significant association with preterm birth.

Conclusions

In this study prevalence of preterm birth was 9.5%. Pregnancy complications such as PROM, PIH, placental abruption, oligohydramnios, cervical incompetence, chorioamnionitis and vaginal candidiasis were significantly associated with preterm birth. Mode of delivery, pregnancy outcome (singleton/twin), previous history of preterm labour, previous history of gestational diabetes mellitus, consanguinity, and stressful events during pregnancy were also significantly associated with preterm birth.

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