Risk of stillbirth at term and optimum timing of delivery in uncomplicated south Asian singleton pregnancies

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Abstract

Objectives Aims of this study were to compare the perinatal mortality rate and the prospective risk of stillbirth for each given gestational age and to ascertain whether it is safe to continue the pregnancy beyond 40 weeks of gestational age and induce labour at 41 weeks in low risk singleton pregnancies.

Methods This was a retrospective study. The perinatal mortality and prospective risk were calculated per 1000 total births and 1000 ongoing pregnancies respectively in well dated singleton pregnancies. 38^{+0} to 39^{+6} gestational age was taken as the reference.

Results A total of 12,595 deliveries after 28 weeks of gestation were included. The risk of stillbirth at 38^{+0} to 39^{+6} weeks was 1.43 (95% CI, 0.9 to 2.4) per 1000 on going pregnancies. The perinatal mortality rate at 38^{+0} to 39^{+6} weeks was 2.9 (95% CI, 1.9 to 4.5) per 1000 total births. The perinatal mortality rate decreased throughout gestation and it was lowest at 40^{+0} - 41^{+6}. In contrast, risk of stillbirth increased with advancing gestation and peaked at 40^{+0} - 41^{+6} (2.57, 95% CI, 1.4 to 4.7). However, risk of stillbirth at 40^{+0} - 41^{+6} was not statistically different from 38^{+0} to 39^{+6} (OR 1.79, 95% CI, 0.80 to 3.98). To prevent one stillbirth, 886 pregnancies should be induced at 38^{+0} to 39^{+6}.

Conclusions Risk of stillbirth is more informative than perinatal mortality at term. Frequent antenatal fetal surveillance should be adopted towards term in order to identify high risk pregnancies. Elective delivery before 40 weeks in low risk pregnancies is not justified.

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Introduction

The gestation specific stillbirth rate is the number of stillbirths per 1000 total births for a particular gestational age. It is usually considered equal to the risk of stillbirth. However, all pregnant women are at risk of stillbirth. Therefore it is more appropriate to calculate the prospective risk of stillbirth using the number of ongoing pregnancies as the denominator rather than the total number of births [1, 2]. In contrast, it is rational to calculate the neonatal mortality rate by considering the number of live births, as a neonate is at risk of dying only after the baby is born live. Prolonged pregnancy poses a number of risks to the fetus including birth asphyxia, meconium aspiration and hypoxic injuries, all of which can be prevented by timely delivery [3, 4].

In Sri Lanka, stillbirths are under-reported, therefore accurate national perinatal mortality rates are not available [5]. However, a substantial amount of the health budget is spent on improving neonatal care, assuming high perinatal mortality rates in preterm births, whereas the risk of stillbirth can be reduced by improving antenatal care at term consisting of proper and close monitoring of the pregnancy at and near term [2, 5]. Unfortunately, the resources available for this task are inadequate. Maturity of 39 week Asian fetuses are equal to that of a 41 week Caucasian fetus, implying that Asian fetuses mature sooner than Caucasians [7]. Aims of this study were to compare the perinatal mortality rate and the prospective risk of stillbirth for each given gestational age and to ascertain whether it is safe to continue the pregnancy beyond 40 weeks of gestational age and to induce labour at 41 weeks in low risk singleton pregnancies.

Methods

This was a retrospective study of data from General Hospital, Ampara, Sri Lanka collected from March 2010 to October 2013. Gestational age was determined by the fetal crown-rump length between 11-14 weeks of gestation and the head circumference after 14 weeks [8, 9]. All well-dated singleton pregnancies were included. Decisions regarding mode and timing of delivery were made according to individual patient's wants and circumstances. All routine pregnancies were managed expectantly till 40^{+6} and induction of labour was offered at 41 weeks [8]. Delivery was accomplished in all cases before 42 weeks. When vaginal births were indicated before term, timing of

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induction of labour was decided by the clinical severity of the condition. Elective cesarean sections were planned after 38^{+} weeks of gestation. Pregnancies of unknown dating, multiple pregnancies and deliveries before 28 weeks' gestation were excluded from this study. All ultrasound data were retrieved from patients' records and information on delivery data and neonatal data were taken from the respective registries. Retrieved perinatal mortality data from delivery and neonatal registries were cross checked with the hospital monthly perinatal mortality review minutes. Approval for the study was obtained from the Ethics Review Board of General Hospital, Ampara.

The perinatal mortality rate and the risk of stillbirth were calculated for each given gestational age interval from 28^{+0} weeks to 41^{+6} weeks. The perinatal mortality rate was calculated per 1000 total births. The risk of stillbirth was calculated by dividing the number of stillbirths in a particular two-week gestational age block by the number of ongoing pregnancies at the beginning of that particular week. As term starts at the beginning of the 38th week, 38^{+0} to 39^{+6} weeks gestation was taken as the reference. The data were analysed using Microsoft Excel.

Results

A total of 12,925 maternities were recruited for this study. Three hundred and thirty maternities were excluded due to unavailability of pregnancy dating data, delivery before 28 weeks and multiple gestations. 12595 maternities were considered for the analysis. Basic characteristics of the study population are shown in Table 1. The mean maternal age was 27 years and the mean gestational age at delivery was 274 days. The majority of study participants were Sinhalese. Mean birthweight was 2883 g.

Table 1. Study population characteristics

Total	*12595*
Mean maternal age (SD)	27.2 (6.06)
Sinhalese %	89.09
Muslim %	9.7
Tamil %	1.2
Number of nulliparous women (%)	5049 (40.1)
Median GA at birth in days (IQR in days)	274 (6)
Mean birthweight in grams (SD)	2883 (483)

The number of perinatal deaths for each two week interval from 28^{+0} to 41^{+6} weeks gestation is shown in Table 2. The perinatal mortality rate was significantly higher during 28 to 33 weeks gestation compared to 38^{+0} to 39^{+6} weeks gestation (at 28^{+0} to 29^{+6} weeks 419.4 perinatal deaths per 1000 total births, OR 248.0 95% CI 106.71 to 576.7 and at 32^{+0} to 33^{+6} weeks 78.4 perinatal deaths per 1000 total births OR 29.23 95% CI 12.48 to 68.44). Gestation perinatal mortality rate was lowest at 40^{+0}- 41^{+6} (Table 2 and Figure 1).

The prospective risk of stillbirth is shown in Table 3. The stillbirth risk remains constant between 28 and 37 weeks and starts to rise beyond 38 weeks (Figure 2). Prospective risk of stillbirth is higher at 40^{+0} to 41^{+6} weeks compared to 38^{+0} to 39^{+6} weeks but this difference is not statistically significant (OR 1.79 95% CI, 0.80 to 3.98). Eight hundred and eighty six women need to deliver at 38^{+0} to 39^{+6} weeks to prevent one stillbirth.

Table 2. Perinatal mortality rate from 28^{+0} weeks to 41^{+6} weeks

Weeks	*Perinatal deaths*	*Delivered*	*Perinatal mortality (95 % CI)*	*Odds ratio (95% CI)*
28^{+0} - 29^{+6}	13	31	419.4 (264.2 to 592.3)	248.0 (106.7 to 576.7)
30^{+0} - 31^{+6}	13	56	232.1 (141.0 to 357.7)	103.0 (48.2 to 223.5)
32^{+0} - 33^{+6}	8	102	78.4 (40.3 to 147.2)	29.23 (12.5 to 68.4)
34^{+0} - 35^{+6}	10	302	33.1 (18.1 to 59.9)	11.76 (5.4 to 25.5)
36^{+0} -37^{+6}	12	1661	7.2 (4.1 to 12.6)	2.49 (1.2 to 5.2)
38^{+0} - 39^{+6}	**19**	**6545**	**2.9 (1.9 to 4.5)**	**Reference**
40^{+0} - 41^{+6}	10	3898	2.6 (1.4 to 4.7)	0.88 (0.4 to 1.9)

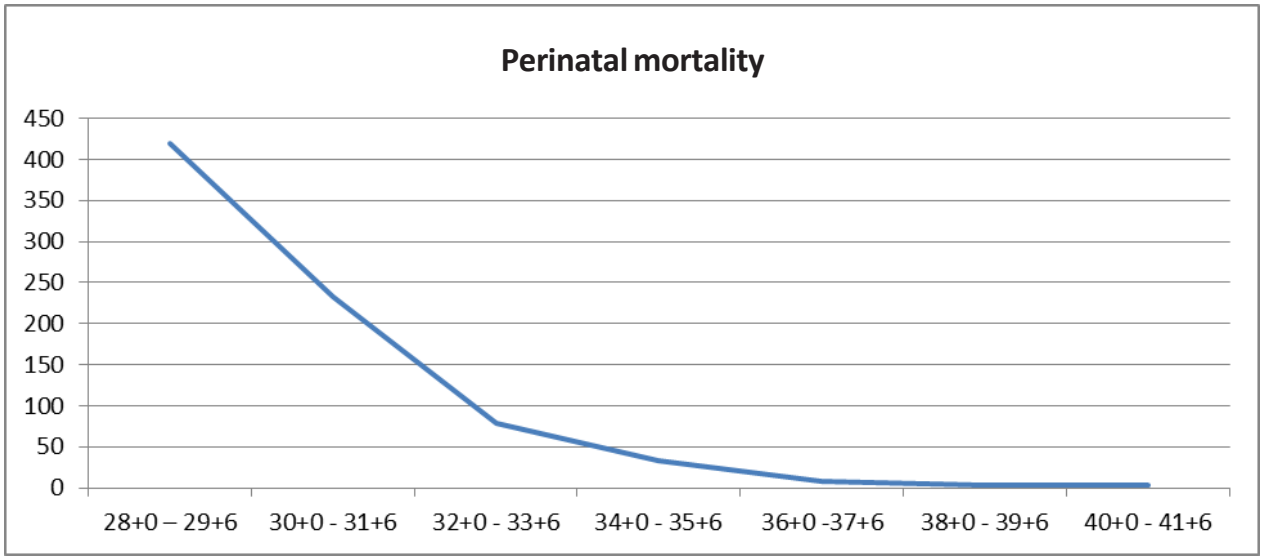

Figure 1. **Line graph for perinatal mortality rate.**

Table 3. Prospective risk of stillbirth from 28^{+0} weeks to 41^{+6} weeks

Weeks	*Stillbirths*	*Ongoing pregnancies*	*Prospective risk of stillbirth (95 % CI)*	*Odds ratio*
28^{+0} - 29^{+6}	11	12595	0.87 (0.5 to 1.6)	0.6 (0.3 to 1.3)
30^{+0} - 31^{+6}	6	12564	0.48 (0.2 to 1.0)	0.3 (0.1 to 0.9)
32^{+0} - 33^{+6}	7	12508	0.56 (0.3 to 1.2)	0.3 (0.2 to 0.9)
34^{+0} - 35^{+6}	9	12406	0.73 (0.4 to 1.4)	0.5 (0.2 to 1.2)
36^{+0} -37^{+6}	8	12104	0.66 (4.1 to 12.6)	0.45 (0.2 to 1.1)
38^{+0} - 39^{+6}	15	10443	1.43 (0.9 to 2.4)	1.0 40+0 - 41+6
40^{+0} - 41^{+6}	10	3898	2.57 (1.4 to 4.7)	1.79 (0.8 to 3.9)

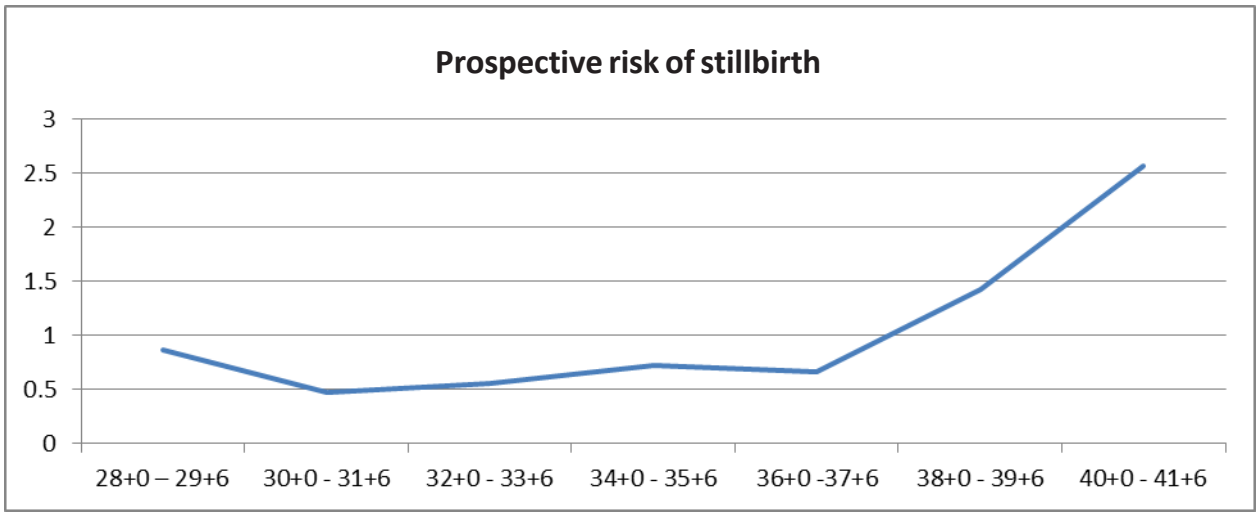

Figure 2. **Line graph for prospective risk of stillbirth.**

Discussion

The current antenatal care model is characterised by highly concentrated clinic visits in the third-trimester. This implies that either most complications occur at this late stage of pregnancy or most adverse outcomes are unpredictable in the early pregnancy. It is common knowledge that stillbirths are less common at 28 weeks and most pregnancy complications including stillbirth occur at late stage of the pregnancy. The data of the current study demonstrates that the perinatal mortality rate decreases significantly with advancing gestation. In contrast, the prospective risk of stillbirth remains stable up to 38 weeks gestation and rises steeply thereafter. Thus, it is more appropriate to interpret the actual risk of in utero-death per 1000 ongoing pregnancies rather than per 1000 total births.

The World Health Organisation defines post term pregnancy as beyond 41 completed weeks from the first day of the last menstrual period [9]. This definition was later challenged because firstly, it was based on epidemiological data and secondly, it was calculated from the statistical distribution of the timing of delivery from the last menstrual period (LMP) [7]. Moreover, this definition did not consider the risk of pregnancy complications including stillbirth during late gestational ages. It is now accepted that gestational age assessment by LMP is not accurate [8]. Gestational age assessment by ultrasonography in the first half of pregnancy reduces the proportion of pregnancies classified as post term by up to 63% [11]. Most guidelines suggest induction of labour in all women after 41 weeks of gestation [8]. South Asian and black women have shorter length of gestation compared to Caucasian women indicating the likelihood of high early perinatal complications in south Asian and black women [7]. The perinatal mortality rates in the present study, at 38^{+0}-39^{+6} (2.9 per 1000 total births) and at 40^{+0}- 41^{+6} (2.6 per 1000 total births) are similar. In contrast, when ongoing pregnancies are used as the denominator, the stillbirth rate increases progressively with advancing gestation from 1.43 per 1000 ongoing pregnancies at 38^{+0} to 39^{+6} weeks to 2.57 per 1000 ongoing pregnancies at 40^{+0} to 41^{+6} weeks of gestation.

Advancing the timing of induction of labour in south Asian women is still debatable. Some studies have suggested that elective induction of labour (the induction of labour in the absence of medical indications) after 37 weeks gestation is associated with increased obstetric intervention, particularly caesarean delivery [12,13]. Conversely, when induction of labour is carried out after 37 weeks of gestation it reduces the risk of adverse perinatal outcomes [14,15]. According to our results a prospective risk of stillbirth increases progressively with gestation beyond 38 weeks and induction of labour between 38 and 41 weeks has the potential to improve neonatal outcomes. Cost implication should also be considered in early timing of delivery as 886 women should deliver at 38^{+0} to 39^{+6} weeks to prevent one stillbirth after 40 weeks. Results of this study support monitoring the fetus closely at term to prevent stillbirths and carryout timely delivery.

The main strength of this study is the assessment of gestational age in all pregnancies according to internationally agreed guidelines [8]. Therefore, bias of pregnancy dating has been greatly reduced. Most previously published studies on prospective risk recruited immigrant south Asian populations with variable physical, social and psychological wellbeing [7]. In contrast we manage to conduct this study in a south Asian population resident in their own country. The main limitation of this study is its retrospective nature.

Conclusions

Our data indicate that the risk of stillbirth increases progressively after 38 weeks when expressed as per 1000 ongoing pregnancies. This warrants appropriate assessment of fetal wellbeing around term in order to prevent stillbirths. The decision regarding the expectant versus interventional management at term to prevent fetal death would depend on balancing the cost effectiveness of induction of labour against the effectiveness of increased fetal surveillance. A routine elective delivery before 40 weeks in low risk pregnancies is not justified.

References

1. Yudkin PL, Wood L, Redman CWG. Risk of unexplained stillbirth at different gestational ages. *Lancet* 1987; **1**: 1192- 4.
2. Hilder L, Costeloe K, Thilaganathan B. Prolonged pregnancy: evaluating gestation-specific risks of fetal and infant mortality. *British Journal of Obstetrics and Gynaecology* 1998; **105**: 169-73.
3. Claussona,B, Gardosi J, Francis A, Cnattingiu S, Perinatal outcome in SGA births defined by customised versus population-based birthweight standards. *British Journal of Obstetrics and Gynaecology* 2001; **108**: 830-4.
4. Wennerholm U, Hagberg H, Brorsson B, Bergh C. Induction of labor versus expectant management for post-date pregnancy: Is there sufficient evidence for a change in clinical practice? *Acta Obstetricia et Gynecologica* 2009; **88**: 6-17.
5. Johnson TJ, Patel AL, Jegier BJ, Engstrom JL, Meier PP. Cost of Morbidities in Very Low Birth Weight Infants. *Journal of Paediatrics* 2012; **18**. PMID: 22910099
6. Senanayake H, Goonewardene M, Ranatunga A, Hattotuwa R, Amarasekera S, Amarasinghe I. Achieving Millennium Development Goals 4 and 5 in Sri Lanka. *British Journal of Obstetrics and Gynaecology* 2011; **118**: 78-87.
7. Balchin I, Whittaker JC, Patel RR, Lamont RF, Steer PJ. Racial variation in the association between gestational age and perinatal mortality: prospective study. *British Medical Journal* 2007; **334**: 833.

8. National Collaborating Centre for Women's and Children's Health, commissioned by the National Institute for Clinical Excellence. Antenatal Care: Routine Care for the Healthy Pregnant Woman. March 2008.
9. Gunawardane BANP, Kumarasiri SG, Wanigasekara RV, Abeyesekara C, Padeniya T, Dias T. The dating scan – Is pragmatic in Sri Lanka? Proceedings of Annual Scientific Sessions of Perinatal Society of Sri Lanka (Abstract), 2012.
10. WHO. Recommended definitions, terminology and format for statistical tables related to the perinatal period and use of a new certificate for cause of perinatal deaths. Modifications recommended by FIGO as amended October 14, 1976. *Acta Obstetricia et Gynecologica Scandinavica* 1977; **56**: 247-53.
11. Savitz DAP. Comparison of pregnancy dating by last menstrual period, ultrasound scanning, and their combination. *American Journal of Obstetrics and Gynecology* 2002; **187**: 1660-6.
12. Vahratian A, Zhang J, Troendle JF, Sciscione AC, Hoffman MK. Labor progression and risk of cesarean delivery in electively induced nulliparas. *Obstetrics and Gynecology* 2005; **105**: 698-704.
13. Luthy DA, Malmgren JA, Zingheim RW. Cesarean delivery after elective induction in nulliparous women: the physician effect. *American Journal of Obstetrics and Gynecology* 2004; **191**: 1511-5.
14. Koopmans CM, Bijlenga D, Groen H, *et al*. Induction of labour versus expectant monitoring for gestational hypertension or mild pre-eclampsia after 36 weeks' gestation (HYPITAT): a multicentre, open-label randomized controlled trial. *Lancet* 2009; **374**: 979-88.
15. Stock SJ, Ferguson E, Duffy A, Ford I, Chalmers J, Norman JE. Outcomes of elective induction of labour compared with expectant management: population based study. *British Medical Journal* 2012; **10**: 344.