

Sexual Intercourse and Preterm Delivery: Any Correlation?

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Abstract

Objective: To determine the association between sexual intercourse during pregnancy and preterm delivery. The study hypothesis is that women who have preterm birth have had more sexual intercourse during pregnancy than women who carry their pregnancies to term.

Materials and Methods: This was a case controlled study. The study group were women who had preterm delivery. For each study case, two controls were selected. The first control comprised women delivered at term matched for age and parity and the second control comprised women selected from the antenatal clinic with ongoing pregnancy and matched for age, parity and gestation age with the study case. Structured questionnaire was used to extract data from the study and control groups and neonatal data was extracted from the babies' files. Data was fed into computer using Instat statistical package. Student *t*-test and χ^2 or Fisher's exact test were used to test for significant difference between observations.

Results: Ninety-five percent of the entire study population had coitus during pregnancy. In the last 4 weeks of the pregnancy, 84% of the study group had sexual intercourse and this was significantly higher than the 76% in the matched controls but not statistically different from 94.7% in ongoing pregnancy group. Male superior position was commonly employed by all the women who engaged in coitus during pregnancy and there was no significant difference in assumed coital positions among the study and control groups ($p=0.5406$). Perinatal outcome was better in the matched controls than in the study group in terms of birth weight (3.1 ± 0.3 vs 2.2 ± 0.6 ; $p=0.0001$); Apgar score at 5 minutes (9.8 ± 0.6 vs 9.1 ± 1.1 ; $p=0.001$); special care baby unit admission (57.3% vs. 18.6%; $p\leq 0.0001$) and neonatal death (12% vs 0%; $p=0.003$) There was no significant difference in perinatal outcome assessed in terms of birth weight, Apgar score, special care baby unit admission and neonatal sepsis rates between the subgroups who had coitus and those who did not, in the study group and the matched controls.

Discussion: Coitus during pregnancy is not a risk factor for preterm delivery and it does not adversely affect neonatal outcome.

Keywords: sexual intercourse, pregnancy, preterm delivery, neonatal outcome

Özet

Cinsel İlişki ile Preterm Doğum Arasında Bağlantı Var mıdır?

Amaç: Bu çalışmada cinsel ilişki ile preterm doğum arasındaki bağlantı belirlenmeye çalışılmıştır. Çalışma hipotezi, preterm doğum yapan kadınların, gebeliklerini miada kadar taşıyabilen kadınlara göre gebelikte daha fazla cinsel ilişkiye girdikleri idi.

Materyal ve Metot: Çalışma vaka kontrollü olarak planlandı. Çalışma grubu, preterm eylem sonrasında spontan preterm doğum yapan veya preterm erken membran rüptürü olan hastalardan oluşturuldu. Her çalışma grubu hastası için iki kontrol belirlendi. İlk kontrol vakaları (matched kontrol grubu), yaş ve pariteleri birbiri ile aynı olan ve miadında doğum yapan kadınlardan oluşturuldu. İkinci kontrol vakaları (devam eden gebelik grubu), gebe polikliniğine kontrole gelen yaş, parite ve gestasyonel yaşları aynı olan gebe kadınlardan oluşturuldu. Hastalara sistematik bir anket formu uygulanarak çalışma ve kontrol gruplarının demografik verileri, cinsel hayat verileri toplandı. Neonatal veriler bebeklerin doğumdan sonraki dosyalarından derlendi. Tüm veriler bilgisayara yüklenerek "Instat" istatistik programına aktarıldı. Ortalama ve oranlar arasındaki anlamlı farkları saptayabilmek için uygunluğuna göre Student *t*-testi, χ^2 veya Fischer's exact testi kullanıldı.

Sonuçlar: Çalışma ve kontrol vakalarının %95'i gebelikte cinsel ilişkiye girmişti. Çalışma grubunda son 4 hafta içinde ilişkiye giren kadınların oranı (%84) matched kontrol grubuna göre (%76) anlamlı derecede yüksekti, devam eden gebelik grubuna göre (%94.7) istatistiki olarak farklı değildi. Erkeğin üstte olduğu pozisyonlar, gebelikte cinsel ilişkiye giren kadınlar ara-

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sında en sık uygulanan pozisyon idi. Çalışma ve kontrol grupları arasında ilişki pozisyonları açısından fark yoktu ($p=0.5406$). Perinatal sonuçlara bakıldığında, matched kontrol grubunda çalışma grubuna göre bazı parametrelerde daha iyi değerler saptandı: Doğum ağırlığı (3.1 ± 0.3 'e karşı 2.2 ± 0.6 ; $p=0.0001$); 5. dakikada Apgar skoru (9.8 ± 0.6 'ya karşı 9.1 ± 1.1 ; $p=0.0001$); yenidoğan yoğun bakım ihtiyacı (%57.3'e karşı %18.6; $p\leq 0.0001$) ve neonatal ölüm (%12'ye karşı %0; $p=0.003$). Çalışma grubu ile devam eden gebelik grubu karşılaştırıldığında, cinsel ilişkiden bağımsız olarak perinatal sonuçlar (doğum kilosu, Apgar skoru, yenidoğan yoğun bakım ihtiyacı ve neonatal sepsis) arasında fark yoktu.

Tartışma: Gebelik sırasında cinsel ilişki preterm eylem ve doğum açısından bir risk faktörü değildir ve neonatal sonuçları olumsuz etkilemez.

Anahtar sözcükler: cinsel ilişki, gebelik, preterm doğum, neonatal sonuç

Introduction

Preterm delivery is a leading cause of perinatal morbidity and mortality worldwide (1,2). Different rates of preterm delivery have been reported. In the USA the incidence varies from 8-10% (1) while 4.5-5.5% has been reported from hospital based studies from Nigeria (2-5).

Though causes and risks factors associated with preterm delivery have been widely documented, (6-11) new risk factors are continually being reported in the literature. The contribution of sexual intercourse to preterm delivery has not been sufficiently investigated. The physiological activity following orgasm such as muscle contractions and the effect of prostaglandin contained in semen (12) may initiate preterm uterine contractions. In developing countries with poor facilities for the management of preterm infants, the best approach for reducing the contribution of preterm delivery to perinatal mortality is to prevent it. One of the ways to achieve this is to identify and eliminate where possible potential risk factors of preterm delivery.

Previous studies on sexual intercourse and preterm delivery have presented conflicting reports. Pugh and Ternandez (13) reported that sexual intercourse during pregnancy was generally harmless, but associated the occurrence of preterm birth a shorter interval since with last sexual intercourse compared to the pregnancies without such complications. In 1981, Naeye and Ross (14) conducted a comparative study with three groups of pregnant women. The first group refrained from sexual intercourse and the second and third groups had sexual intercourse with and without condom respectively. They found that preterm labour and preterm premature rupture of fetal membranes and low birth weight were more frequent where orgasmic sexual intercourse had been recent, without condom and an amniotic fluid infection was present. Petridou et al. from Greece also reported an increased risk of preterm birth with coitus during the last weeks of pregnancy while Goorgakopoulos et al., (15) Sayle et al. (16) and Yost et al. (17) did not find any association between coitus during pregnancy and preterm birth. Zachau-Christiansen and Ross (18), and Naeye et al. (19) reported an association between sexual intercourse during pregnancy and low birth weight with increased perinatal morbidity and mortality.

The studies by Naeye et al. (14,18,19) suggest a complex relationship between coitus in pregnancy that may lead to preterm delivery and infection of fetal membranes

through the coitus and such infection may lead to production of prostaglandin, a potent oxytocic that may initiate the contractions. However, available studies have reported histological chorioamnionities in only 11-25% of preterm births (14,20) which suggest that coitus in pregnancy acting through infectious causation is not a strong causal factor.

Apart from the study by Naeye et al., (14) no other study has exclusively focused on the role of coitus in pregnancy as a causal factor in its own right without the pathway of prior infection to initiate preterm labour. It is also possible that coitus is a strong causal factor. There has also not been any study from Nigeria on coitus in pregnancy as a possible risk factor for preterm labour and delivery.

The aim of this study is to evaluate the association between sexual intercourse in pregnancy and preterm delivery among Nigerian women in a way to determine the risk status of coitus during pregnancy in the causation of preterm delivery.

Study design

This was a case-controlled study conducted in the Department of Obstetrics and Gynecology of the University of Benin Teaching Hospital (UBTH) Benin City, Nigeria, which is a tertiary hospital with a yearly delivery rate of about 2500. The patients were recruited over a 20-month period from 1st March 2002 to 31st October 2003.

The study group comprised all women who had preterm delivery following spontaneous preterm labour or preterm premature rupture of fetal membranes during the study period.

Two controls were selected for each study case. The first control group which was a matched control was selected from among the women who had term deliveries at about the same period but matched for age (within 3-years) and parity with the study case (matched control group). The second control was selected from women with ongoing pregnancy from the antenatal clinic, matched for age (within 3-years), parity and gestational age with the study case (Ongoing pregnancy group). For all women recruited, confirmation of gestational age was based on:

1. Reliable last menstrual period with previous regular menstrual cycles and no history of hormonal contraception in the three months preceding index pregnancy.
2. Ultrasound scan done before 24 weeks gestation.

The purpose of the study was explained to each patient and a verbal consent was obtained. A structured questionnaire was given to both the study group and the controls by trained resident staff of the department. The questions were in three sections: A, B and C. Section A included details on bio-data such as age, parity, gestational age, marital, educational and employment status. Section B focused on prevalence of traditional risk factors for preterm delivery such as previous abortion, previous preterm delivery, and cervical cerclage in index pregnancy, medical diseases and treatment in index pregnancy. Section C dealt with details of sexual activity in the index pregnancy and neonatal outcome for the study and matched controls. After delivery, the placentas of the study and matched controls were preserved in formalin and later sent to the Histology Department for histology to exclude or confirm histological chorioamnionitis following the procedure set out in Rosai and Ackerman’s Surgical Pathology (21). After fixing for 24 hours, sections from the center, amnion, chorion and decidua were taken for histology. The presence of inflammatory cells in the sections of the chorion and amnion was accepted as confirmation of chorioamnionitis.

For this study, a woman was regarded as being sexually active if she had coitus in the previous 4 weeks before recruitment for the study.

Exclusion criteria

All patients with clinical chorioamnionitis (with symptoms such as fever, uterine tenderness foul-smelling vaginal discharge, foetal or maternal tachycardia) were excluded.

All induced preterm deliveries were also excluded from the study group while women with induced labour at term were excluded from the matched controls. Also, excluded were women with cervical cerclage and intrauterine fetal death.

Outcome measures

Outcome measures analysed included presence or absence of traditional risk factors for preterm delivery in the study group and controls, coital frequency in the index pregnancy,

coital positions employed, placental histology and neonatal variables such as Apgar score, birth weight, neonatal unit admission and perinatal deaths.

Data management

A computer database was generated with the completed questionnaires and a comparative analysis of the result was done using “Instat” statistical package. The student *t*-test and Fisher’s exact test (with Yates correction) and χ^2 were used to test for significant difference between means and proportions respectively. Significant difference is value of $p \leq 0.05$.

Results

One hundred and fifty cases of preterm deliveries (98 spontaneous preterm delivery and 52 following premature rupture of fetal membranes=study group) and 300 controls (matched controls=150; ongoing pregnancy group=150 as described above) were recruited for this study.

Demographic characteristics of the study group and controls

The study group and the controls were similar in age and parity but the Controls were significantly better educated. (Table 1).

Antenatal illness/obstetric factors in the study group and controls compared

The study group and controls had similar antenatal antecedents in terms of frequencies of malaria attacks, urinary tract infection and anaemia in pregnancy. The frequency of previous preterm delivery was also similar in both groups and the outcome of the last pregnancy was similar in both the study group and controls. However, the study group reported significantly more occurrence of purulent vaginal discharge in the two weeks prior to recruitment into the study and they also reported more termination of pregnancies per person in the past. See Table 2.

Sexual activity

Ninety five percent of the entire study population (study group=144, matched controls=142, ongoing pregnancy group=142) reported ‘having had sexual intercourse’ in the index pregnancy while 84.9% and 69.8% had sexual

Table 1. Demographic characteristics of the study group and controls

Variables	Study group (n=150)	Matched controls (n=150)	Ongoing pregnancy group (n=150)	p value
Age (yrs)	29.2±5.6	29.7±4.5	29.2±5.6	NS*
Parity	1.6 ±1.5	1.6±1.5	1.6±1.5	NS*
Gestation age (days)	233.4±19.6	272.7±8.8	239.6±11.2	0.0001*
Education				
Primary	34 (22.7%)	8 (5.3%)	16 (10.6%)	$\chi^2=27.31$
Secondary	64 (42.6%)	58 (38.7%)	70 (46.7%)	df=4
Tertiary	52 (34.6%)	84 (56.0%)	64 (42.7%)	$p=0.0001^{**}$
NS= $p > 0.05$				
*p value calculated using One-way ANOVA test				
**p value calculated using χ^2 test				

Table 2. Antenatal illness/obstetric factors in the study group and controls

Illness/Obstetric factors	Study group (n=150)	Matched controls (n=150)	Ongoing pregnancy group (n=150)	p value
Malaria	62 (41.3%)	66 (44.0%)	68 (45.3%)	NS
Urinary track infection	12 (8.0%)	6 (4.0%)	8 (5.3%)	NS
Purulent vaginal discharge	24 (16.0%)	8 (5.3%)	8 (5.3%)	0.0009
Anemia	18 (12.0%)	14 (9.3%)	24 (16.0%)	NS
Previous induced abortion	110 (73.3%)	92 (61.3%)	106 (70.7%)	NS
(Mean no induced abortion)	2.3±1.6	1.6±1.5	1.7±1.5	0.0001
Previous Preterm delivery	12 (8.0%)	4 (2.7%)	8 (5.3%)	NS*
Outcome of Last Pregnancy				
Term Delivery	86 (57.3%)	106 (70.6%)	86 (57.3%)	NS
Abortion	18 (12.0%)	22 (14.7%)	24 (16.0%)	NS

NS= $p>0.05$
*p value calculated using "One-way ANOVA" test, otherwise calculated using χ^2 test

intercourse in the previous 4 and 2 weeks respectively. One hundred and sixteen (77.3%) of the study group were sexually active in the last 2 weeks and this was significantly more than the 72 (48.0%) of those in the matched controls who were sexually active in the same period ($p=0.0001$, calculated using χ^2 test) but it was similar to the 126 (84%) of those in the ongoing pregnancy group that were sexually active ($p=0.1880$, calculated using Fisher's exact test). The mean coital frequency for the study group was 1.9 ± 0.9 . This was similar to the mean of 1.9 ± 1.1 of the matched controls ($p=0.9999$) but significantly lower than the mean of 2.2 ± 0.9 of the ongoing pregnancy group ($p=0.0001$, calculated using One-way ANOVA test).

With regards to the positions adopted during sexual intercourse, 79 (52.8%), 48 (31.9%) and 23 (15.3%) of the study group adopted the male superior, male behind and combination of both, respectively. The corresponding figures for the matched controls and ongoing pregnancy group were 66 (43.7%), 47 (31.0%), 38 (25.4%) and 68 (45.1%), 42

(28.2%) and 40 (26.8%) respectively ($p=0.1377$, calculated using χ^2 test).

Neonatal outcome of the Study group and matched controls (See table 3)

There were more female neonates among the study group than in the matched controls; [98 (65.3%) vs 50 (33.3%), $p=0.0001$, OR=3.77] and the study group had significantly lower mean birth weights (2.2 ± 0.6 vs 3.1 ± 0.3 ; $p=0.0001$) and Apgar scores at 1 and 5 minutes (6.7 ± 1.4 vs 7.2 ± 1.1 ; $p=0.0007$ and 9.1 ± 1.1 vs 9.8 ± 0.6 , $p=0.0001$ respectively).

The frequency of admission into the Special Care Baby Unit and histological evidence of placental infection was significantly higher amongst the study group than in the matched controls. The indication for Special Care Baby Unit admission amongst the study group was prematurity with sepsis as an added problem in 19 cases. In the matched controls, sepsis was the indication in 18 (12%) neonatal admission and while 6 babies were admitted for intrauterine

Table 3. Comparison of neonatal outcome between the study group and the matched controls

Variables	Study group (n=150)	Matched controls (n=150)	p value	Odds ratio (95% confidence interval)
Male	98 (65.3%)	50 (33.3%)	0.0001	3.77 (2.33-6.08)
Birth weight (kg)	2.2 ± 0.6	3.1 ± 0.3	0.0001**	
Apgar score 1 min	6.7 ± 1.4	7.2 ± 1.1	0.0162**	
5 min	9.1 ± 1.1	9.8 ± 0.6	0.0001**	
*SCBU admission	86 (57.3%)	28 (18.7%)	<0.0001	5.86 (3.47-9.89)
*SCBU admission for sepsis	19 (12.7%)	18 (12%)	1.0000	1.06 (0.53-2.12)
Days in SCBU*	15.2 ± 8.6	5.8 ± 3.1	0.0001**	
Neonatal death	14 (9.3%)	0 (0%)	0.0001	31.97 (11.88-541.49)
Placenta infection	24 (16%)	4 (2.7%)	0.0001	6.95 (2.35-20.58)

*SCBU = Special Care Baby Unit
NS= $p>0.05$
**p value calculated using "Unpaired t-test" with "Welch" correction, otherwise calculated using "Fishers exact test" with "Woolfs" approximation

growth restriction. Neonatal jaundice was the reason for 4 admissions (Not shown on the table).

Histological chorioamnionitis was significantly more amongst the study group than in the matched controls (16.0% vs 2.6%; $p=0.0001$).

Twenty-four of the 28 patients with histological chorioamnionitis were in the study group. The proportion of these who were sexually active in the last 4 and 2 weeks was significantly less than those with negative histology; 50.0% (12) vs 90.5% (114), $OR=0.1$, $p=0.0026$ and 50.0% (12) vs 82.5% (104), $OR=0.2$, $p=0.0230$ respectively (Not shown on the table).

There were 14 neonatal deaths among the study group and none in the matched controls. There was no significant difference in sexual activity in the last 2 weeks between the study group who had neonatal deaths and those who did not; 11 (78.6%) vs 105 (77.2%), $OR=1.1$, $p=1.000$. Presence of histological chorioamnionitis was similar amongst the 14 neonatal deaths and 136 neonates that survived amongst the study group; 2 (11.1%) vs 22 (16.6%), $OR=0.86$, $p=1.000$ (Not shown on the table).

Sexual activity in the last two weeks before delivery and Neonatal outcome (See Table 4)

Analysis of the sexual activity two weeks prior to delivery and neonatal outcome among the study group and matched controls showed no significant difference in neonatal outcome between women who were sexually active and those who were not. One hundred and sixteen (77.3%) of the 150 women in the study group were sexually active in the last two weeks while 34 were not. The birth weight, Apgar score at 1 minute, special care baby unit admission and neonatal sepsis rates were similar in both groups (2.2 ± 0.6 vs 1.9 ± 0.4 , $p=0.0113$; 6.8 ± 1.4 vs 6 ± 1.6 ,

$p=0.0011$; 55.2% vs 64.7%, $p=0.6430$ and 20.7% vs 41.2%, $p=0.1421$ respectively).

Seventy-two (48%) of the women in matched controls were sexually active in the last two weeks while 78 were not. The birth weight, Apgar score at 1 minute and special care baby unit admission of the babies and neonatal sepsis rates were also similar between these two groups (3.0 ± 0.3 vs 3.1 ± 0.5 , $p=0.1366$; 7.5 ± 0.9 vs 7.1 ± 1.3 , $p=0.1052$; 13.8% vs 23.0%, $p=0.2080$ and 13.8% vs 10.0%, $p=0.6168$ respectively).

There were however more special care baby unit admissions and neonatal sepsis amongst the study group than the matched controls irrespective of their sexual activity prior to delivery (Table 4).

Discussion

The prevalence of sexual intercourse during pregnancy found in this study is high compared to reports from elsewhere (22,23). About 95% of the study population were sexually active during the index pregnancy. However, the frequency of intercourse declined as the pregnancy progressed. The few women (5%) who abstained did so for fear of harming the fetus.

Previous studies on coitus and preterm delivery compared preterm and term delivery (15,24) Using term delivery as controls is inappropriate because factors like difference in gestational age and abdominal size between the groups may influence sexual interest and coital frequency.

The novelty of this study is the inclusion of two control groups: One made up of women of comparable parity and age that delivered at term and a second made up of women with ongoing pregnancy of comparable parity, age and gestational age.

Table 4. Sexual activity in the last two weeks before delivery and neonatal outcome			
Study group (Preterm)			
	Sexually active (n=116)	Not active (n=34)	p value
Birth weight (kg)	2.2±0.06	1.9±0.4	0.0113
Apgar score 1 min	6.8±1.4	6±1.6	0.0011
5 min	9.1±1.1	9.2±1.1	NS
*SCBU admission	64 (55.2%)	22 (64.7%)	NS***
Neonatal sepsis	12 (10.3%)	7 (20.6%)	NS***
Matched controls (Term)			
	Sexually active (n=72)	Not active (n=78)	p value
Birth weight (kg)	3.0±0.3	3.1±0.5	NS
Apgar score 1 min	7.5±0.9	7.1±1.3	NS
5 min	9.8±0.5	9.8±0.6	NS
*SCBU admission	10 (13.8%)	18 (23.0%)	NS***
Neonatal sepsis	10 (13.8%)	8 (10.0%)	NS***
*SCBU=special care baby unit			
NS= $p>0.05$			
***p value calculated using "Fishers exact test" with "Wolfs" approximation, otherwise calculated using "Unpaired t-test" with "Welch" correction			

Both the study group and controls had similar historical obstetric and medical risk factors for preterm delivery. The prevalence of reported past purulent vaginal discharge was however significantly higher amongst the study group than in the controls.

This study showed that the women who delivered preterm (study group) were significantly more sexually active in the last two weeks before delivery than the women in the matched controls (term delivery). However when compared to the ongoing pregnancy group, the study group were significantly less sexually active. The decline in sexual activity observed among the matched controls may be due to the size of the abdomen which may make coitus uncomfortable at advanced gestational age. They were probably more sexually active 4-6 weeks before as indicated by sexual activity of women in the ongoing pregnancy group. Women in the ongoing pregnancy group were more sexually active with higher mean sexual frequency than women in the study group. Sexual intercourse thus appears unrelated to the occurrence of preterm delivery. This finding contradicts some previous reports (17,25), but confirms the findings of Mills et al. (26) and others (13,26-29) who found no causal relationship between sexual intercourse and preterm delivery. Mills et al. even insinuated that abstinence may be associated with unfavourable outcome in the seventh and eight months of pregnancy (26). The mechanism for the beneficial effect of coitus during pregnancy may be through the increased pelvic blood flow that occurs during sexual intercourse with consequent improved foetoplacental health and therefore continuation of the pregnancy to term.

This study also investigated the relationship between coital positions and preterm delivery. Although, the respondents in this study more commonly adopted the male-superior position, this position was not more frequent amongst the study group contrary to a previous report by Ekwo et al. (24) who found a significant association between the male-superior position and spontaneous preterm delivery.

A previous study by Naeye et al. (17) suggested a link between sexual intercourse and neonatal sepsis via chorioamnionitis. This study was unable to confirm this link since the Apgar score, neonatal sepsis rate and frequency of Special Care Baby Unit admission were comparable between the delivered respondents who were sexually active two weeks prior to delivery and those who were not in both the study group and matched controls (Table 4).

The 16% frequency of chorioamnionitis found amongst the study group in this study is lower than the 23% reported by Naeye et al. (14). There was no association between sexual frequency and histological chorioamnionitis in this study. The women with histological chorioamnionitis were less sexually active than those without it, suggesting that other factors may be at play. The difference in Special Care Baby Unit admission and neonatal sepsis rates between the

study group (preterm delivery) and the matched controls (term delivery) may therefore be a consequence of prematurity rather than the effect of sexual intercourse.

There were 14 perinatal deaths and all were in the preterm group (study group). Sexual activity and chorioamnionitis were however not more frequent among the women with these neonatal deaths when compared to women whose preterm babies survived (42.9% vs 56.5%, $p=0.4014$ and 11.1% vs 16.6% respectively). Furthermore, closer analysis of sexual activity within the study group showed that, the cases with histological chorioamnionitis were significantly less active than those without histological chorioamnionitis.

Further within group analysis of neonatal outcome of the study group and matched controls showed that sexual intercourse had no adverse effect on neonatal outcome irrespective of gestational age (See Table 4).

In conclusion, this study has shown that a very high proportion of the respondents had sexual intercourse during pregnancy but there is a decline in sexual activity with increasing gestational age. There is however no proven causal relationship between sexual intercourse and preterm delivery or adverse neonatal outcome.

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