

# Maternal complications of twin deliveries in Jimma University Specialized Hospital, Southwest Ethiopia: A facility-based cohort study

Güneybatı Etyopya, Jimma Üniversitesi Hastanesinde ikiz gebeliğe ait maternal komplikasyonlar: Kurum bazlı kohort çalışma

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## Abstract

Twin pregnancy is assumed to increase the risk of maternal and neonatal complications. This situation is worse in Sub-Saharan Africa because of lack of well-equipped facilities. Studies on twin pregnancy and maternal complications are limited in Ethiopia. Thus, this study aimed to fill this gap. A hospital-based cohort study was conducted in Jimma University Specialized Hospital on 144 twin deliveries and 288 singleton deliveries. Data were collected through face-to-face interview by using structured-questionnaire and analysed by SPSS V.20.0. The relative risks of twin deliveries were significantly higher for the occurrence of hypertension, preterm labor, poor progress of labor, premature rupture of membrane, polyhydramnos, cord prolapse, uterine atony, postpartum haemorrhage, puerperal sepsis and maternal death as compared with singleton deliveries. In conclusion, women with twin pregnancy were at a higher risk of medical and obstetric complications during antepartum, intrapartum and postpartum periods. Thus, special emphasis should be given to mothers with twin pregnancies during antenatal care, delivery and postnatal care so as to prevent or manage the complications earlier.

**Keywords:** Twin delivery, maternal complication, Southwest Ethiopia

## Özet

İkiz gebelik anne ve yeni doğanlar açısından artmış risk olarak kabul edilir. Bu durum iyi donanımlı tesislerin eksik olduğu Sahara altı Afrika bölgesinde daha belirgindir. Etyopya'da ikiz gebelik ve maternal komplikasyonlara dair yapılmış çalışmalar sınırlıdır. Bu çalışma, bu boşluğu doldurmak üzere yapılmıştır. Jimma Üniversitesi Hastanesinde 114 ikiz gebelik ve 288 tekli doğuma ait hastane temelli kohort çalışma yapılmıştır. Veriler yüz yüze görüşmelerde, yapılandırılmış sorularla toplanmış ve SPSS 20.0 versiyonu ile analiz edilmiştir. İkiz gebelik doğumu, hipertansiyon oluşumu, preterm doğum, doğum işleminin zorluğu, membranların erken rüptürü, polihidroamnios, kord prolapsusu, uterus atonisi, postpartum hemoraji, lohusalık sepsisi ve anne ölümü açısından, tekli doğuma göre yüksek bulunmuştur. Sonuç olarak, ikiz gebeliği olan kadınlar, antepartum, intrapartum ve postpartum dönemde artmış tıbbi ve obstetrik komplikasyonlara maruzdur. Bu komplikasyonları önlemek ve düzeltebilmek için ikiz gebeliği olan annelere erken dönemde özel bir dikkat verilmelidir.

**Anahtar kelimeler:** İkiz gebelik, maternal komplikasyon, Güneybatı Etyopya

## Introduction

Twin is a type of multiple birth in which the mother gives birth to two offspring from the same pregnancy. Its incidence is increasing all over the world. Twin fetuses are either dizygotic or monozygotic. It can occur after Assisted Reproductive Technology (ART) or spontaneously (1).

Twin pregnancy continues to be a focus of attention all over the world as it increases maternal and perinatal morbidity and mortality during pregnancy, delivery and the postpartum periods(2). This increase in maternal complications as a result of twin deliveries is worse in Sub-Saharan Africa, where there is lack of facilities to manage twin pregnancies

and deliveries. This is again contributed by poverty and the wide harmful cultural beliefs and practices in many Sub-Saharan African Countries (3, 4). The existing evidences also indicate that twin pregnancies are associated with increased financial, emotional, personal and social costs for the twin themselves and their families (4-6).

Ethiopia is also one of the Sub-Saharan African Countries with high maternal morbidity and mortality, 676 deaths per 100,000 live births (7). This may be as a result of inadequate access to facilities, skilled human power and shortage of equipment and supplies to identify and manage the risk factors including twin pregnancies and deliveries (7-9). Despite its importance, studies on the outcomes of twin deliveries and associated maternal complications are very limited in Ethiopia in general

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and in Southwest Ethiopia in particular. Therefore, this study aimed to fill this gap by conducting hospital-based cohort study

### **Methods and materials**

#### *Study design, setting and participants*

Hospital-based prospective cohort study was conducted in Jimma University Specialized Hospital (JUSH), which is located 346km Southwest of Addis Ababa, the capital of Ethiopia. Jimma University Specialized Hospital is found in Jimma zone of Oromia regional state and one of the oldest teaching hospitals in the country. It gives services to people living in Jimma zone and serves as a referral hospital in the Southwest part of the country. It has also been serving as a clinical postgraduate specialty teaching hospital for Obstetrics and Gynaecology, Internal Medicine, Paediatrics and Child Health since 2005.

Twin pregnancies were considered as exposed and singleton pregnancies were considered as non-exposed for this study. Multiple outcomes, including maternal complications during pregnancy, labour, delivery and after delivery until the time of discharge from hospital, were considered.

#### *Sample size and sampling techniques*

The sample size for this study was determined by using Epi-Info Version 7 by considering two-population comparisons of proportions based on the following assumptions. Antepartum haemorrhage (APH) was taken as one of the outcome variable (maternal complications). The proportion of mothers developing APH among exposed (twin deliveries) is assumed to be 11.3% ( $p_1 = 0.113$ ) and among non-exposed (singleton deliveries) is assumed to be 2.7% ( $p_2 = 0.027$ ) (9). A level of confidence of 95% and power of 90% were considered. A ratio of 1:2 was used for the exposed to non-exposed. After adding 10% for non-responses, the final sample size became 144 exposed (twin deliveries) and 288 non-exposed (singleton deliveries), a total of 432 deliveries.

By taking this study as open cohort, all twin deliveries were included in the study until the required sample (144 twin deliveries) were obtained, which took a year period from December 01, 2012 to November 30, 2013. For each twin delivery, two singleton deliveries happening just next to the twin delivery were taken as non-exposed. All twin pregnancies admitted to labour or maternity ward and terminated prior to gestational age of 28 weeks were excluded from this study. All mothers (both the exposed and non-exposed) were strictly followed from the time of admission to the labour ward to the time of discharge from hospital to observe any medical or obstetrical complications before, during and after delivery. All suspected twin pregnancies were confirmed by ultrasound at admission and observing the number of new-borns at expulsion.

#### *Data collection procedures*

A pre-tested structured questionnaire was developed

after reviewing similar literatures for the data collection. The questionnaire, which was prepared in English, was translated in to AfanOromo (regional language) and retranslated back to English by other people to maintain its consistency. Three Obstetrics and Gynaecology residents, one midwife nurse and two medical interns working in the labor ward were recruited, trained and completed the questionnaires. The diagnosis and management of the complications were a team approach (one resident, one midwife and one medical intern) and it was thought that no difference in the skills of the providers between the exposed and non-exposed that lead to observer bias. Training was given on the objective and relevance of the study, confidentiality of information, respondent's right, informed consent and techniques of interview. Basic socio-demography and past obstetric histories were collected at admission during history taking. The occurrences of any complications were observed by regular check up until the time of discharge from hospital. Medical complications like diabetes mellitus, hypertensive disorders of pregnancy, urinary tract infection, excessive vomiting and anaemia were identified with the help of their clinical evidences and appropriate investigations during regular check-up. All completed questionnaires were reviewed each night and morning sessions were conducted every day with the data collectors to discuss on the problem encountered during data collection procedures.

#### *Data processing and analysis*

The collected data were entered to, cleaned and analysed by using SPSS for windows version 20.0. Descriptive statistics such as proportions means and standard deviations were determined to describe the study participants by cross-tabulating according to their exposure status. Relative Risks (RR) along with their 95% confidence intervals (CI) were determined to measure the existence of significant associations between twin delivery and each maternal complication by using chi-squared ( $\chi^2$ ) test, Fisher-Exact test was used when the assumption of the  $\chi^2$ -test was not fulfilled.

#### *Ethical Considerations*

Ethical clearance was obtained from the Ethics Review Committee of the College of Public Health and Medical Sciences of Jimma University. Written informed consent was also obtained from every study participant before the interview by explaining the objective of the study. All the information collected from the study participants were handled confidentially through omitting their personal identification, conducting the interview in private place and using the data for the research purpose only.

### **Results**

#### *Socio-demographic characteristics*

Most of the respondents were, 337(78.1%), Oromoby ethnicity and Muslim was the predominant religion, 303(70.1%). Majority, 64.6% of the exposed and

66.3% of the non-exposed, were housewives in occupation. Most of the mothers, 52.8% (51.4 of exposed and 53.5% of non-exposed), were in the age group of 20-24years (Table 1).

**Table 1.** Socio-demographic characteristics of the study participants, Jimma University Specialized Hospital, Southwest Ethiopia, December 2012 to November 2013. This table shows the detail description of the distribution of the respondents, exposed and non-exposed groups, according to basic socio-demographic characteristics like place of residence, age, education, occupation and monthly household income.

| Socio-demographic variables | Exposure Status                              |   |            | Total<br>(n = 432) n (%) |
|-----------------------------|--|---|------------|--------------------------|
|                             | Exposed<br>(Twin delivery)<br>(n = 144) n(%) | Unexposed<br>(Singleton delivery) (n = 288) n (%) |            |                          |
| Age of mothers in years     | ≤19  | 4 (2.8)   | 20 (6.9)   | 24 (5.6)                 |
|                             | 20-24  | 74 (51.4)   | 154 (53.4) | 228 (52.8)               |
|                             | 25-29  | 37 (25.7)   | 79 (27.4)  | 116 (27.0)               |
|                             | 30-34  | 23 (16)   | 28 (9.7)   | 51 (11.8)                |
|                             | ≥35  | 6 (4.2)   | 7 (2.4)    | 13 (3.0)                 |
| Ethnicity                   | Oromo  | 107 (74.3)  | 230 (79.9) | 337 (78.0)               |
|                             | Amhara                                       | 14 (9.7)  | 24 (8.3)   | 38 (8.8)                 |
|                             | Gurage                                       | 4 (2.8)   | 10 (3.5)   | 14 (3.2)                 |
|                             | Dawuro                                       | 8 (5.6)   | 9 (3.1)    | 17 (4.0)                 |
|                             | Others*                                      | 11 (7.6)  | 15 (5.2)   | 26 (6.0)                 |
| Religion                    | Orthodox                                     | 40 (27.8)   | 58 (20.2)  | 98 (22.7)                |
|                             | Protestant                                   | 9 (6.2)   | 22 (7.6)   | 31 (7.2)                 |
|                             | Muslim                                       | 95 (66.0)   | 208 (72.2) | 303 (70.1)               |
| Occupation                  | House wife                                   | 93 (64.6)   | 191 (66.3) | 284 (65.7)               |
|                             | Employed                                     | 17 (11.8)   | 59 (20.4)  | 67 (15.5)                |
|                             | Farmer                                       | 26 (18.0)   | 30 (10.4)  | 56 (13.0)                |
|                             | Merchant                                     | 8 (5.6)   | 17 (5.9)   | 25 (5.8)                 |
|                             | Cannot read and write                        | 63 (43.8)   | 115 (39.9) | 178 (41.2)               |
| Educational status          | Read and write only                          | 13 (9.0)  | 26 (9.0)   | 39 (9.0)                 |
|                             | Grade 1-8                                    | 31 (21.5)   | 48 (16.7)  | 79 (18.3)                |
|                             | Grade 9-12                                   | 22 (15.3)   | 50 (17.4)  | 72 (16.7)                |
|                             | >Grade 12                                    | 15 (10.4)   | 49 (17.0)  | 64 (14.8)                |
|                             | Household monthly income                     | <50USD  | 58(40.3)   | 138 (48.3)               |
|                             | 50-100USD                                    | 59(41.0)  | 106 (36.5) | 165(38.2)                |
|                             | >100USD                                      | 27(18.7)  | 44 (15.2)  | 71(16.4)                 |

\*Others: Yem, Kafcho, Tigre USD: United States' Dollar

**Table 2.** Medical complications of twin deliveries versus singleton deliveries, Jimma University Specialized Hospital, Southwest Ethiopia, December 2012 to November 2013. This table shows the relative risks of medical complications of exposed and non-exposed groups

| Outcome<br>(Maternal Medical Complications) |     | Exposure status                    |   |                           | *RR (95%CI)         | p-value |
|---|-----|------------------------------------|---|---------------------------|---------------------|---------|
|   |     | Twin delivery<br>(n= 144)<br>n (%) | Singleton delivery<br>(n= 288)<br>n (%) | Total<br>(n=432)<br>n (%) |                     |         |
| At least one complication                   | Yes | 51(35.4%)                          | 14(4.9)                                 | 65(15.0)                  | 7.29 (4.18, 12.71)  | 0.001   |
|   | No  | 93(64.6)                           | 274(95.1)                               | 367(85)                   |                     |         |
| Hypertensive disorders                      | Yes | 36(25.0)                           | 13(4.5)                                 | 49(11.3)                  | 5.54 (3.30, 10.11)  | 0.001   |
|   | No  | 108(75.0)                          | 275(95.5)                               | 383(88.7)                 |                     |         |
| Excessive vomiting                          | Yes | 12(8.0)                            | 1(0.4)                                  | 13(3.0)                   | 24.0 (3.15, 182.77) | 0.035   |
|   | No  | 132(92.0)                          | 287(99.6)                               | 419(97.0)                 |                     |         |
| Anaemia                                     | Yes | 31(21.5)                           | 54(18.8)                                | 85(19.7)                  | 1.15 (0.77, 1.70)   | 0.247   |
|   | No  | 113(78.5)                          | 234(81.2)                               | 347(80.3)                 |                     |         |
| Diabetes Mellitus (DM)                      | Yes | 1(0.7)                             | 1(0.4)                                  | 2(0.5)                    | 2.00 (0.13, 31.75)  | 0.286   |
|   | No  | 143(99.3)                          | 287(99.6)                               | 430(99.5)                 |                     |         |
| Urinary Tract Infection                     | Yes | 2(1.4)                             | 1(0.4)                                  | 3(0.7)                    | 4.00 (0.37, 43.75)  | 0.148   |
|   | No  | 142(98.6)                          | 287(99.6)                               | 429(99.3)                 |                     |         |

\*Reference Group is Singleton delivery

**Table 3.** Antepartum obstetric complications of twin delivery versus singleton delivery at Jimma University Specialized Hospital, Southwest Ethiopia, December 2012 to November 2013. This table shows the relative risks of antepartum obstetric complications of exposed and non-exposed groups

| Outcome<br>(Antepartum and intrapartum obstetric complications) |     | Exposure status                     |  |                           | *RR (95%CI)        |
|---|-----|-------------------------------------|--|---------------------------|--------------------|
|   |     | Twin deliveries<br>(n=144)<br>N (%) | Singleton deliveries<br>(n=288)<br>N (%) | Total<br>(n=432)<br>N (%) |                    |
| <b>At least one complication</b>                                | Yes | 60(41.7)                            | 81 (28.1)                                | 141(32.6)                 | 2.00 (1.35, 3.11)  |
|   | No  | 84(58.3)                            | 207(71.9)                                | 291(67.4)                 |                    |
| <b>Preterm labour</b>   | Yes | 5(3.5)                              | 1(0.3)                                   | 4(0.9)                    | 6.61 (1.31, 57.64) |
|   | No  | 139(96.5)                           | 287(99)                                  | 428(99.1)                 |                    |
| <b>Premature rupture of membrane</b>                            | Yes | 22(15.3)                            | 9(3.1)                                   | 31(7.2)                   | 3.82 (1.66, 8.77)  |
|   | No  | 133(84.7)                           | 279(96.9)                                | 40 (92.8)                 |                    |
| <b>Poor progress of labour</b>                                  | Yes | 12(8.3)                             | 4(1.4)                                   | 16(3.7)                   | 4.19 (1.30, 13.55) |
|   | No  | 132(91.7)                           | 284(98.6)                                | 416(96.3)                 |                    |
| <b>Cord prolapse</b>  | Yes | 7(4.9)                              | 4(1.4)                                   | 11(2.5)                   | 2.23 (1.43, 7.91)  |
|   | No  | 137(95.1)                           | 284(98.6)                                | 421(97.5)                 |                    |
| <b>Polyhydramnos</b>  | Yes | 2(1.4)                              | 2(0.7)                                   | 4(0.9)                    | 1.29 (1.18, 9.32)  |
|   | No  | 142(98.7)                           | 286(99.3)                                | 428(99.1)                 |                    |
| <b>Cephalopelvic disproportion</b>                              | Yes | 3(2.1)                              | 21(7.3)                                  | 24(5.6)                   | 0.29 (0.10, 0.92)  |
|   | No  | 141(97.9)                           | 267(92.7)                                | 48(94.4)                  |                    |
| <b>Obstructed labor</b>   | Yes | 2(1.3)                              | 4(1.4)                                   | 6(1.4)                    | 1.00 (0.19, 5.30)  |
|   | No  | 142(98.7)                           | 284(98.6)                                | 426(98.6)                 |                    |
| <b>Antepartum haemorrhage</b>                                   | Yes | 7(4.7)                              | 13(4.5)                                  | 20(4.6)                   | 1.08 (0.44, 2.64)  |
|   | No  | 137(95.1)                           | 275(95.5)                                | 412(95.4)                 |                    |

\*Reference Group is Singleton delivery

**Antepartum medical complications**

From the study participants, 35.4% of the exposed (having twin deliveries) and 4.9% of the non-exposed (having singleton deliveries) had at least any one medical complication during pregnancy, which was statistically significant ( $p = 0.001$ ). The major ones were hypertensive disorders of pregnancy (25% among twins vs. 4.5% among singletons) ( $p = 0.001$ ), vomiting (8.0% vs. 0.4%) ( $p = 0.035$ ), Urinary Tract Infection (UTI) (1.4% vs. 0.4%) ( $p < 0.148$ ), Diabetes Mellitus (DM) (0.7% vs. 0.35) ( $p = 0.286$ ) and anaemia (21.5% vs. 18.8%) ( $p = 0.247$ ) (Table 2).

**Antepartum and intra-partum obstetric complications**

Sixty (41.7%) of twin pregnancies and 81 (28.1%) of singleton pregnancies had at least any one of the ante-partum and intra-partum obstetric complications, which were statistically significant, (RR=2.00; 95%CI: 1.35, 3.12). The major maternal complications were significantly higher among twin deliveries as compared with singleton deliveries; preterm labour (3.5% vs. 0.3%) (RR =6.61; 95%CI: 1.31, 57.64), premature rupture of membrane

(PROM) (15.3% vs. 3.1%) (RR = 3.82; 95%CI: 1.66, 8.77), poor progress of labour (8.3% vs. 1.4%) (RR =4.19; 95%CI: 1.30, 13.55), cord prolapse (4.9% vs. 1.4%) (RR =2.23; 95%CI: 1.43, 7.91) and polyhydramnos (1.4% vs. 0.7%) (RR =1.29; 95%CI: 1.18, 9.32). However, twin pregnancies had non-significant risk for obstructed labor (OL) (RR = 1.00; 95%CI: 0.19, 5.30) and Ante-partum Haemorrhage (APH) (RR =1.08; 95%CI: 0.44, 2.64) and had an inverse relationship with Cephalo-pelvic Disproportion (CPD) (RR = 0.29; 95%CI: 0.10, 0.92) as compared with singleton pregnancies (Table 3).

**Postpartum maternal complications**

Twenty-nine (20.1%) of twin deliveries and 19(6.6%) of singleton deliveries had at least one complication immediately after delivery, which was statistically significant (RR= 3.57, 95%CI: 1.92, 6.62). % The risks of uterine atony and post-partum haemorrhage (PPH) were about nine times (RR= 9.43, 95% CI: 2.64, 33.33) and three times (RR=3.24, CI: 1.66, 6.33), respectively among twin pregnancies as compared with singleton pregnancies. The risk of puerperal sepsis 3.13 (1.09,8.93) and maternal death (RR= 8.2, CI: 1.91, 74.05) were about three times and eight times

**Table 4.** Postpartum maternal complications of twin delivery versus singleton delivery at Jimma University Specialized Hospital, Southwest Ethiopia, December 2012 to November 2013. This table shows the relative risks of postpartum maternal complications of exposed and non-exposed groups.

| Outcome (Postpartum complications) | obstetric | Exposure status                  |                                       |                        | *RR (95%CI)       |
|------------------------------------|-----------|----------------------------------|---------------------------------------|------------------------|-------------------|
|                                    |           | Twin deliveries (n=144)<br>N (%) | Singleton deliveries (n=288)<br>N (%) | Total (n=432)<br>N (%) |                   |
| At least one complication          | Yes       | 23(16.0)                         | 16(5.6)                               | 39(9.9)                | 3.57 (1.92,6.62)  |
|                                    | No        | 121(84.0)                        | 272(94.4)                             | 393(90.1)              |                   |
| Uterine atony                      | Yes       | 13(9.0)                          | 3(1.0)                                | 16(3.7)                | 9.43 (2.64,33.33) |
|                                    | No        | 131(91.0)                        | 285(99.0)                             | 416(96.3)              |                   |
| Postpartum haemorrhage             | Yes       | 23(16.0)                         | 16(6.0)                               | 39(9.9)                | 3.24 (1.65,6.33)  |
|                                    | No        | 121(84.0)                        | 272(94.0)                             | 393(90.1)              |                   |
| Need for hysterectomy              | Yes       | 4(2.8)                           | 11(3.8)                               | 15(3.5)                | 1.94 (0.50,7.58)  |
|                                    | No        | 140(97.2)                        | 277(96.2)                             | 417(96.5)              |                   |
| Puerperal sepsis                   | Yes       | 9(6.4)                           | 6(2.0)                                | 15(3.5)                | 3.13 (1.09,8.93)  |
|                                    | No        | 423(93.6)                        | 282(98.0)                             | 417(96.5)              |                   |
| Maternal death                     | Yes       | 4(2.8)                           | 1(0.3)                                | 5(1.2)                 | 8.20 (1.91,74.05) |
|                                    | No        | 140(97.2)                        | 287(99.7)                             | 437(98.8)              |                   |

\*Reference Group is Singleton delivery

higher in the twin pregnancies than the singleton pregnancies, respectively. All maternal deaths were from PPH and the case fatality rate of twin delivery was 2.8 % (Table 4).

### Discussion

Twin pregnancies, in comparison with singleton pregnancies, are associated with increased maternal complications during pregnancy, delivery and after delivery (1, 2). According to this study, 35.4% of twin deliveries and 4.9% of singleton deliveries had at least any one of the antepartum medical complications. The major ones were hypertensive disorders of pregnancy, anaemia, UTI and vomiting. These findings are supported by a study conducted at Mekele Referral Hospital, North Ethiopia (9) and a study done at the University of Maiduguri Teaching Hospital, Nigeria (5).

In our study, 41.7% of twin pregnancies and 28.1% of singleton pregnancies had at least one obstetric complication like PROM, cord prolapse, poor progress of labour, polyhydramnos, intrapartum foetal death and preterm labour before or during delivery. These complications were significantly higher among twin deliveries as compared with singleton deliveries.

These findings are consistent with previous studies done in Ethiopia (9) and other African countries (6, 10, 11).

In this study, the occurrence of obstructed labour and APH was not significantly different between twin pregnancies and singleton pregnancies. However, CPD was three times more common among singletons as compared with twin deliveries. This

finding was also reported in a study done in Dar Es Salaam, Tanzania (12). This lower occurrence of CPD among twin deliveries may be explained by the fact that majority of cases of twin deliveries have antenatal complications that make them seek medical evaluation and thus necessitate admission before the onset of labour or early in labour for better management. Besides, in multiple pregnancies, the size of the foetuses, including the skull, are more likely to be smaller than that of singleton pregnancies, which reduces the occurrences of CPD.

Twin pregnancy is known to be associated with higher postpartum maternal complications as compared with singleton pregnancy (2). In line with this, the occurrence of the major postpartum maternal complications such as: PPH, uterine atony, puerperal sepsis and maternal deaths were significantly higher among twin deliveries as compared with singleton deliveries in this study. Similar findings had been reported in prior studies in the country and abroad (1, 3, 5, 6,9). These increased postpartum complications among twin deliveries may be explained by the uterine over distention leading to uterine atony and postpartum haemorrhage. The increased demand for operative interventions might have also contributed to this increased risk.

In conclusion, this study found that women with twin pregnancy were at a higher risk of medical and obstetrics complications during antepartum, intrapartum, and postpartum periods. Therefore, greater emphasis should be given for mothers with twin pregnancies during antenatal care, delivery and

after delivery so as to prevent or appropriately manage the maternal complications.

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#### *Competing interest*

The authors declare that they have no any competing interests.

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