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A 6-Year Review of Cord Prolapse in a Tertiary Health Facility in Bayelsa State

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Authors' contributions

This work was carried out in collaboration between both authors. Authors IJA and IDA designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author s IJA and IDA managed the analyses of the study. Author IDA managed the literature searches. Both authors read and approved the final manuscript.

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ABSTRACT

Background: Prolapse of the umbilical cord remains a life threatening obstetric emergency for the fetus. This study sought to evaluate the prevalence, associated factors, and outcomes of cord prolapse in Niger Delta University Teaching Hospital (NDUTH), Okolobiri, Nigeria.
Methodology: In a retrospective, descriptive, cross sectional study design, cases managed for cord prolapse between January 2012 and December 2017 were audited using a self-developed proforma. Data collected include sociodemographic information, obstetric history, antenatal care in the index pregnancy, associated factors, management and outcome (morbidity and mortality) of cord prolapse in the centre.
Results: Of the 3172 deliveries that occurred during the 6year period of study, 22 deliveries were complicated by cord prolapse, affecting 6 in 1000 live birth in the centre. Unbooked status (72.7%), malpresentation (72.7%), multiparity (45.5%), prematurity (45.5%), and abnormal lie (45.5%) were identified associated factors among the parturients. Other associated factors seen were polyhydramnious, abdominal massage in pregnancy and twin gestation.
The perinatal mortality due to cord prolapse was 1.6 per 1000 live births. All the babies with

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umbilical cord pulsation had immediate delivery by caesarean section. A Diagnosis-Delivery interval (DDI) < 30minutes was associated with better neonatal outcome and babies delivered within this time frame all required no admission into the SCBU.

Conclusion: In this study umbilical cord prolapse was associated with increased perinatal morbidity and mortality, especially amongst unbooked patients. The major associated factors identified were unbooked status, malpresentation, multiparity, prematurity and abnormal lie. A substantial number of parturients with cord prolapse had a history of culturally based abdominal massage in pregnancy prior to presentation. The possible aetiological contribution of this culturally based practice, with respect to cord prolapse needs further investigation.

Keywords: Umbilical cord prolapsed; associated; perinatal mortality; NDUTH.

1. INTRODUCTION

The umbilical cord connects the fetus via blood vessels to the placenta and is essential for transfer of nutrients and oxygen to the fetus and disposal of fetal waste products of metabolism via maternal circulation. Foetal umbilical cord prolapse is an important obstetric emergency that is associated with a high risk of perinatal morbidity and mortality [1] Cord prolapse is when the umbilical cord descends to lie adjacent to (occult cord prolapse) or below the foetal presenting part (overt cord prolapse) if the membranes are ruptured [1]. When the above occurs and the foetal membranes are not ruptured, it is called cord presentation. In cord prolapse, compression of the umbilical cord and its blood vessels between the foetal presenting part and the maternal pelvis, cervix or vaginal walls leads to interference of blood flow to the fetus. In addition, vasospasm from exposure of the overtly prolapsed cord to a cooler temperature outside the vagina worsens the interference with blood flow to the foetus. Persistence of foetal circulatory interference can lead eventually to hypoxia, fetal brain damage or death [1].

The incidence of umbilical cord prolapse as reported in several studies varies between 0.1% and 0.6% [2-10]. Studies in Nigeria have reported incidences between 1 in 500 and 1 in 200 deliveries (0.2 – 0.5%).[3,4] The incidence of overt cord prolapse varies with the foetal presentation and lie. It is highest in transverse lie (20%) and footling breech presentations (15%) [1]. It is 5% in complete breech presentations [1]. The incidence is lowest in frank breech and cephalic presentations in which it is as low as 0.5% [1].

The risk for cord prolapse are multifactorial and include conditions that interfere with snug fitting of the foetal presenting part to the lower uterine segment and the pelvic brim such as abnormal foetal lie, foetal malpresentation, foetal malposition and cephalopelvic disproportion [1,5]. Other risk factors are multiparity, multiple pregnancy, prematurity, polyhydramnios, and spontaneous rupture of foetal membranes or forewater amniotomy before engagement of the presenting part [1,5]. Recent studies in Nigeria have identified unbooked status as a modifiable risk factor [6,7]. In the Niger delta region of Nigeria, abdominal massage in pregnancy is a common cultural practice in which there is manipulation of the anterior abdominal wall and the contents of the uterus and this may inadvertently lead to cord prolapse. It is an age long trado-medical practice seen in the Niger Delta, especially among the Ijaw ethnic extraction and it is wrongly believed by natives to be beneficial to the baby and mother [11].

The diagnosis of overt cord prolapse is clinical and easy, as the cord can be seen protruding from the introitus or palpated in the vaginal canal. In occult cord prolapse, the cord is rarely palpated during pelvic examination and the diagnosis is often deduced from abnormal foetal heart rate changes (variable decelerations, bradycardia, or both) suggestive of umbilical cord compression on continuous or intermittent foetal heart monitoring in labour [1].

Once the diagnosis of cord prolapse is made immediate action to preserve the life of the fetus is required. Prompt relief or prevention of cord compression, intrauterine foetal resuscitation and immediate delivery, often times, by caesarean section, is the rule to salvage the live foetus with umbilical cord prolapsed [1,5,7,8]. Vaginal delivery is only considered when the cord prolapse occurs in the second stage of labour, where cephalopelvic disproportion has been ruled out and vaginal delivery is imminent and viewed as achievable earlier than an emergency

caesarean section. It is also the preferred route of delivery when there is foetal demise [8].

Relief or prevention of pressure on the prolapsed cord while preparations are made for immediate delivery can be achieved through measures such as digital disengagement of the presenting part to lift and maintain the fetus away from the prolapsed cord, raising the maternal pelvis (by placing the parturient in the knee-chest position, trendelenburg position or left lateral position with a pillow under the pelvis) or filling of the maternal urinary bladder with 400 - 700ml of saline [1,5,8]. Other important aspects of the intrauterine foetal resuscitation, include administration of oxygen and intravenous hydration of the parturient in a bid to improve uteroplacental blood flow and foetal oxygenation [1,5].

In general, the treatment for cord prolapse with a live foetus is prompt delivery by emergency caesarean section, with a neonatologist on standby for immediate neonatal resuscitation, which is usually required. However, with a fully dilated cervix, assisted vaginal delivery with ventouse or forceps may achieve a faster delivery if all the prerequisite conditions for quick vaginal delivery are fulfilled [5,8]. Foetal outcome is improved with prompt diagnosis, prompt and effective foetal resuscitation and a short decision to delivery interval [1] Although a short decision to delivery interval has been emphasized, [9] maternal safety must be taken into consideration while making haste to salvage the fetus. [9].

Measures to prevent foetal umbilical cord prolapse and its consequent perinatal morbidity and mortality, especially during labour include delaying forewater amniotomy until the foetal presenting part fits well into the maternal pelvis; performing a pelvic examination to rule out cord prolapse at the time of spontaneous rupture of foetal membranes; avoiding amniotomy with recourse to caesarean section in instances where cord presentation is diagnosed in labour [1,10,12]. In addition prompt detection of foetal heart rate abnormalities by continuous electronic monitoring, prompt intervention and better fetal outcome.9 Also, it is important to recognize the presence of risk factors for cord prolapse to preemptively manage the patient accordingly. Prompt diagnosis, resuscitation, and delivery are the keys to minimizing perinatal morbidity and mortality in any case of cord prolapse with the fetus alive.

Fetal cord prolapse is rarely associated with maternal mortality. Maternal complications are mainly those arising from the mode of delivery employed, such as fever, anaemia, wound infection, septicaemia and genital tract injury in caesarean section and instrumental vaginal delivery. Perinatal outcome following foetal umbilical cord prolapse in labour is considered an indicator of the quality of intrapartum care offered by an obstetric unit [13,14,15]. Assessing the management and outcome of this condition in our facility is thus a proxy measure of quality of care in our centre and offers an opportunity to document baseline information in relation to cord prolapse care. A care which had never been audited in our centre. This study was therefore conceptualized to determine the prevalence of cord prolapse, investigate the factors influencing the outcomes of management of fetal cord prolapse at the Niger Delta University teaching Hospital, Bayelsa state.

2. METHODS

2.1 Study Area

The study was carried out in the Obstetrics and Gynaecology department of the Niger Delta University Teaching Hospital (NDUTH),Okolobiri, Bayelsa State, Nigeria. The study centre is a tertiary health institution with major roles of teaching, research and health services. The hospital is domiciled in Bayelsa state as one of the two leading referral centers for other health facilities within and outside the state.

2.2 Study Design

This study was a 6 year retrospective, descriptive study that reviewed all cases of cord prolapse managed at the Niger Delta University Teaching Hospital, between 1st January 2012 to 31st December 2017.

2.3 Study Population

The records of all parturients with a diagnosis of cord prolapse in the period under review was retrieved from the heath information and management unit of the hospital and included in the study.

2.4 Study Instrument

A self-developed, 4-sectioned proforma with 34 items was used for data collection. Section 1 explored the sociodemographic characteristics (age, religion, ethnicity, marital and educational

status) of the patients. Section 2 captured the gynecological and obstetric history, including antenatal care (booking status and number of visits) in the index pregnancy, while Section 3 investigated intervention in labor, mode of delivery, decision- delivery interval, post-delivery care and outcome of care in the parturient. Section 4 of the proforma explored the fetal perinatal features and outcome of care in the fetus.

2.5 Study Procedure

The study was carried out in 2019 after an approval from the Ethical committee of the hospital and permission from the head, health information and management systems of the hospital to review records. The labor ward and theatre registers of the hospital were perused to obtain identification number of parturient in the hospital with a diagnosis of fetal cord prolapse in the period under review. Case notes of identified parturients were thereafter retrieved from the archives and data for the study was extracted based on the study proforma.

2.6 Data Analysis

Data collected was entered into Microsoft excel spread sheet where it was cleaned and thereafter imported into Statistical Package for the Social Sciences (SPSS version 22) for analysis. Continuous variables were summarized as mean and standard deviation, and categorical variables with frequencies and percentages.

3. RESULTS

In the period under review, there were 3721 deliveries with 22 cases of cord prolapse, giving an incidence of 6 cases per 1000 deliveries. Of the 22 parturients, 18 had singleton gestation and 4 had twin gestation, so the total number of babies delivered were 26 babies.

3.1 Socio-demographic Characteristics of the Parturients

The socio-demographic characteristics and obstetric features of the patients under study are shown below in Tables 1 and 2, respectively. Majority of parturient (77.3%) were aged between 20-39yrs. About 4 in every 5 of the women were married while half of the mothers had less than secondary level of education. Majority (86.4%) were of the Christian faith (Table 1).

3.2 Obstetric Features of the Parturients

Most of the women were not booked for antenatal care (72.7%) in the index pregnancy and 40.9% of the parturients were multiparous women. About a third of the women (31.8%) had visited a traditional birth attendant for culturally based abdominal massage in the index pregnancy (Table 2). Most parturients presented to our facility when labor was already established (81.8%), with majority coming from either a Traditional Birth Attendant(TBA)'s place or their (the parturient's) homes (54.5%).

3.3 Associated Factors for Cord Prolapse among Parturients

Fig. 1 shows the associated factors for cord prolapse among the patients. Almost three quarters of the parturients (72.7%) were unbooked for antenatal care in the index pregnancy, malpresentation was also reported in the same proportion (72.7%) of women. Multiparity, abnormal lie and prematurity were identified in 45.5% of parturient with cord prolapse (Fig. 1).

3.4 Characteristics of Pregnancy at Presentation

At presentation, cord pulsation was present in 16 women (72.7%), while 6 women (27.2%) had absent cord pulsation with absent fetal heart rate (Table 3). Cervical dilatation was less than 7cm in majority of the women (81.8%).

3.5 Management Features of Parturients with Cord Prolapse

Table 4 shows the mode of delivery depending on the presence and absence of cord pulsation at presentation. All those with positive cord pulsation had some intervention which aided the survival of the fetus while preparing for emergency caesarean section. These interventions included relieving pressure on the umbilical cord by replacing the cord in the vagina and simultaneously manually elevating the presenting part high up in the pelvis and also filling the bladder with 500 ml normal saline (Vago method). Parturients who had intrauterine fetal death were allowed spontaneous vaginal delivery (SVD), where there was no contraindication to SVD.

Table 1. Sociodemographic status of parturient

Characteristics	Frequency (N = 22)	Percentage (%)
Age of pregnant woman		
< 20 years	3	13.6
20 - 39 years	17	77.3
> 40 years	2	9.1
Educational status of woman		
None	2	9.1
Primary	9	40.9
Secondary	8	36.4
Tertiary	3	13.6
Marital status		
Single	4	18.2
Married	18	81.8
Religion		
Christian	19	86.4
Islam	3	13.6
Ethnicity		
Yoruba	4	18.2
Igbo	6	27.3
Hausa	2	9.1
Ijaw	8	36.4
Others	2	9.1
Woman's Occupation		
Unemployed	10	45.5
Civil Servant	5	22.7
Self-employed*	7	31.8
Husband's Highest Education status		
None	1	4.5
Primary	4	18.2
Secondary	13	59.1
Tertiary	4	18.2
Husband's Occupation		
Unemployed	3	13.6
Civil Servant	4	18.2
Self-employed*	15	68.2

**The Self-employed were farmers, fishermen and traders*

A decision-delivery interval of less than 30 minutes was achieved in 27.8% of those who had emergency caesarean section.

3.6 Fetal and Maternal Outcome in the Management of Cord Prolapse Cases

There were 26 babies delivered to the 22 parturients who presented with cord prolapse in the period under review. Six babies (27.3%) of the 26 babies died, hence cord prolapse accounted for 1.6 perinatal deaths per 1000 birth in this period. For those that were alive, 6 babies (30%) had APGAR scores less than 5 while 14 babies (70%) had APGAR scores > 5. Of the 20 babies that were alive 13 (65%) had need for care in Special care baby unit (SCBU). Only 2 of the mothers had mild complications which include post- operative anemia and wound infection.

4. DISCUSSION

Cord prolapse is an obstetric event that can suddenly change a pregnancy without previous complications, that had been labeled low risk pregnancy, to a tragic emergency with poor outcome [7,15]. The condition is associated with high perinatal morbidity and mortality and maternal risk may become increased during delivery [7]. Early diagnosis and prompt delivery usually results in good outcome, especially where there are competent labor ward staff who can identify the condition early and anesthetists and operating theatre are readily available for swift surgical intervention. As a result of the dire

emergency situation it presents, the outcome becomes even better when the obstetrician preemptively identifies the risk factors in individual patients early enough in pregnancy and in labour [1,16]. Although fetal and maternal factors influence successful outcome, the approach to management, and the attitude of staff upon the diagnosis of cord prolapse is extremely important.

The prevalence of cord prolapse in our study was(0.6%) 6 per 1000 deliveries. The incidence of umbilical cord prolapse in studies from other centres have been reported to range between 0.14% and 0.62% [2,10].

From this study unbooked status was a major factor in the occurrence of cord prolapse, identified in 72.7% of the parturients in this review. This is much higher than 47.8%, 52.4%, and 44% reported from studies at Abakaliki [15], Calabar [7] and Lagos [16] respectively. The proportion of unbooked patients among patients presenting with cord prolapse in our centre may be higher than in other parts of Nigeria due possibly to the fact that in Bayelsa State many pregnant women undergo culturally based abdominal massage in pregnancy, which may be contributory to rupture of fetal membranes and cord prolapse. However unbooked status is a modifiable factor as it can be avoided if early booking is encouraged and becomes acceptable to pregnant women, as poor health seeking behaviour is common amongst our women in the Niger delta region of Nigeria [11].

Multiparity, a known predisposing factor for cord prolapse, was present in 45.5% of the parturients in this study. A similar finding of a high percentage of multiparity among parturients was noted in studies on cord prolapse in Lagos (53.8%) [16] and Abakaliki (78.3%) [15] in Nigeria. It is explained by the fact that the engagement of the presenting part occurs late in multiparous women and, as a result, when the fetal membrane ruptures, the cord may slip down into the vagina [8] Also multiparity may be associated with lax anterior abdominal wall muscles which may be associated with malpresentations.

Table 2. Various characteristics of parturients diagnosed with cord prolapsed

Characteristics	Frequency (N = 22)	Percentage (%)
Parity		
Nulliparous women	5	22.7
Primiparous women	7	31.8
Multiparous women	9	40.9
Grand multiparous women	1	4.5
Booking status		
Booked	6	27.3
Unbooked	16	72.7
Number of Antenatal care visits		
None	16	72.7
3 – 4 visits	5	22.7
> 5 visits	1	4.5
History of Abdominal massage		
Yes	7	31.8
No	15	68.2
Presentation in Labour		
Yes	4	18.2
No	18	81.8
Place where labour commenced		
NDUTH	3	13.6
General Hospital	3	13.6
Primary health centre	4	18.2
TBA/Home	12	54.5
Cervical Dilatation		
< 7cm	18	81.8
> 7cm	4	18.2

TBA – Traditional Birth attendance, NDUTH – Niger Delta University Teaching Hospital. Grandmultiparous woman is ≥ Para 5

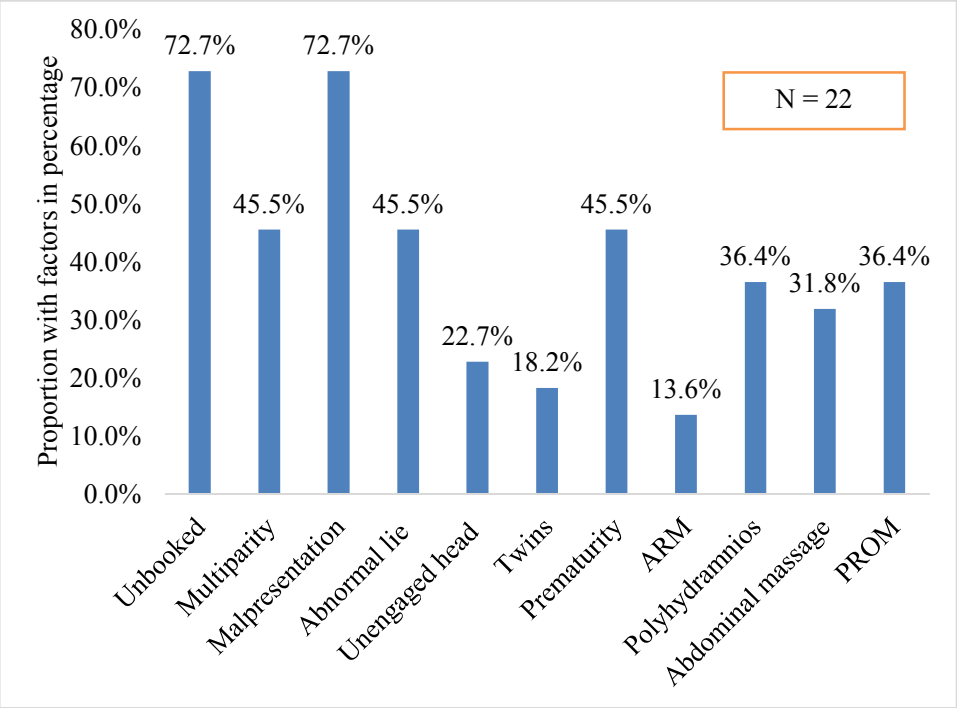

Fig. 1. Factors associated with cord prolapse found among parturients in this study. ARM – Artificial rupture of membrane, PROM – premature rupture of membrane

Table 3. Pregnancy characteristics of parturients with cord prolapse at presentation

Characteristics	Frequency (N = 22)	Percentage (%)
Estimated gestation age		
< 34 weeks	2	9.1
34 – 36 weeks	8	36.4
≥ 37 weeks	12	54.5
Number of Fetus		
Singleton	18	81.8
Twin	4	18.2
Lie		
Longitudinal	12	54.5
Oblique	6	27.3
Transverse	4	18.2
Presentation		
Cephalic	6	27.3
Non-Cephalic	16	72.7
Fetal Heart Rate		
No Fetal heart rate	5	19.2
Normal	3	26.9
Bradycardia	5	19.2
Tachycardia	9	34.7
Cord Pulsation		
Present	17	77.3
Absent	5	22.7
Cervical Dilatation		
< 7cm	18	81.8
> 7cm	4	18.2

Table 4. Management features of Parturient with cord prolapsed

Characteristics	Frequency (N = 22)	Percentage (%)
Intervention before Delivery		
Yes	17	77.3
No	5	22.7
Mode of Delivery		
Spontaneous vaginal delivery	4	18.2
Emergency caesarean section	18	81.8
Decision Delivery Interval		
< 30mins	6	27.3
30 – 60 mins	13	59.1
> 60mins	3	13.6

Table 5. Fetal and maternal outcomes in the management of cord prolapse cases

Characteristics	Frequency	Percentage (%)
Fetal Outcomes		
Fetal Status	(N = 26)	
Alive	20	72.7
Dead	6	27.3
Birth weight	(N = 26)	
< 2.5kg	13	50.0
>2.5kg	13	50.0
APGAR Score	(N = 20)	
< 5	6	30.0
> 5	14	70.0
Fetal wellbeing	(N = 20)	
Admission to SCBU	13	65.0
Alive and well	7	35.0
Maternal Outcome	(N = 22)	
Maternal Status		
Alive and well	20	90.9
Complications	2	9.1

SCBU – Special care baby unit

Malpresentation was present in 16 (72.7%) cases and breech presentation was the commonest malpresentation. Prematurity is reportedly associated with malpresentation and in this study almost half (45.5%) of the neonates were preterm. Other studies on factors associated with cord prolapse have also reported similar findings [12,14,17].

The perinatal mortality in our study was 1.6 per 1000 births. All these deaths were unavoidable as all had absent cord pulsations at the time of presentation. Other studies have also reported high perinatal mortality for unbooked patients [2,16,18]. The literature suggests that cord prolapse occurring outside the hospital is consistently associated with a high perinatal mortality rate which range between 38% and 42%. However, perinatal mortality is reduced drastically (0% - 3%) when cord prolapse occurs in a labor room where the patient is under monitoring [17,19].

The cause of fetal distress in cord prolapse is cord compression and urgent caesarean section relieves that compression. Studies have revealed that a Decision Delivery Interval (DDI) greater than 30 minutes is associated with lower Apgar scores in babies diagnosed with cord prolapsed [12,17]. In this study, a DDI >30 minutes was similarly associated with low Apgar scores and required admission into the SCBU. According to guidelines for perinatal care jointly developed by the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists (ACOG) the time required to perform an emergency cesarean section should not exceed 30 minutes [20-21]. The ACOG also recommends DDI of ≤ 30minutes in patients with cord prolapse. Literature suggests that the DDI

alone is not the only factor that affects perinatal outcome [20]. The perinatal morbidity and mortality due to cord prolapse has significantly improved over the past century as a result of advances in labor management, improved surgical techniques and neonatal intensive care [22,23]. Studies have also shown that the perinatal outcome can further be improved by multi-professional, obstetric emergency training sessions [21,22].

In this study, the few patients that had cord prolapse in the facility had a DDI within 30minutes and they all had good Apgar scores and had no need for SCBU admission. Those who presented in labor from outside our centre (parturients that were unbooked) with cord prolapse with live babies had a DDI greater than 30mins with lower Apgar scores and this was largely because of the extra time required in preparing patients for operation in the theatre. Although these babies had lower Apgar scores, and were admitted into the SCBU, there was no perinatal death while in SCBU and they were all discharged home.

Studies have shown that the main reason why units fail to comply with the 30 minutes target is delay in moving patient to theatre [22,19]. Thus, in order to achieve the advocated DDI of <30 minutes, planned protocols for the management of cord prolapse and the necessary drills for labor ward staff to promptly move the patient on to operating theatre table needs to be diligently rehearsed in labor rooms [24,19].

5. CONCLUSION

In this study umbilical cord prolapse, a dire obstetric emergency, was associated with increased perinatal morbidity and mortality, especially amongst unbooked patients. The major factors identified were unbooked status, malpresentation, multiparity, prematurity and abnormal lie. A substantial number of parturients with cord prolapse had a history of culturally based abdominal massage in pregnancy prior to presentation. The possible aetiological contribution of this culturally based practice with respect to cord prolapse needs to be investigated further by future studiesy. In addition, there should be intensification of the efforts of both governmental and non- governmental advocacy groups currently educating pregnant women on the dangers of culturally based abdominal massage in pregnancy, and encouraging them to register in orthodox health facilities early in pregnancy.

CONSENT

It is not applicable.

ETHICAL APPROVAL

The study was carried out in 2019 after an approval from the Ethical committee of the hospital and permission from the head, health information and management systems of the hospital to review records.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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