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ORIGINAL ARTICLE

PREVALENCE AND FACTORS ASSOCIATED WITH RUPTURE OF GRAVID UTERUS AND FETO-MATERNAL OUTCOME: A ONE-YEAR RETROSPECTIVE COHORT STUDY

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ABSTRACT

Introduction: *Uterine rupture remains a significant public health problem contributing to 13% of maternal mortality and 74%-92% for perinatal mortality in developing countries. This study assesses the prevalence and factors associated with rupture of gravid uterus and feto-maternal outcome in Ethiopian mothers with uterine rupture.*

Methods: *A retrospective cohort study was conducted to identify risk factors associated with rupture of gravid uterus and feto-maternal outcomes. The data source included clinical records of patients seen at Dilla University Referral Hospital over a one-year period. The data was collected using a structured data collection form developed for the purposes of the study. The study involved a total 2,498 women with a gravid uterus, gestational age of ≥28 weeks and registered in the labor and delivery registration books in the Obstetrics and Gynecology Department. Bivariate and multivariate regression analyses were carried out at 95% Confidence Interval to identify factors independently associated with uterine rupture.*

Results: *Out of 2,498 reviewed deliveries, 46 cases developed uterine rupture making an overall hospital prevalence of 1.8% or one in 53 deliveries. Malpresentation (80%), contracted pelvis (47.8%), vertex malposition (10.8%), and previous uterine scar (2.1%) were the causes of uterus ruptures. In multivariate analysis, clients' residence, parity, birth weight, Antenatal Care follow-up and duration of labor were statistically significantly associated with uterine rupture. Maternal and fetal case fatality rates were 8.7% and 97.8%, respectively.*

Conclusion: *Uterine rupture remains an important problem in the study area. Patients with identified risk factor(s) should stay close to the hospital in late pregnancy. Besides, strengthening antenatal care follow-up and referral linkage should be considered.*

Key Words: *Antenatal Care, Prevalence, Uterine Rupture, Dilla, Ethiopia,*

INTRODUCTION

Uterine Rupture has remained a major catastrophic obstetric event worldwide which results in high risk of maternal and neonatal mortality (1-10). It is associated with short-term maternal morbidities such as vesicovaginal fistula, recto-vaginal fistula, bladder rupture, foot drop, psychological trauma, anemia and in the long term because of surgical intervention, the woman might be sterilized which can lead to divorce and loss of economic support (1).

Currently, the overall incidence of uterine rupture is 0.05 % and differs in different parts of the world depending on obstetric services and awareness of antenatal care and effectiveness of family planning activities of a given community (11,12). In sub-Saharan Africa countries, uterine rupture remains the main cause of maternal death contributing around 13% of maternal mortality and perinatal mortality ranging from 74% to 92%.

But in developed countries it is in the order of 1% among women with previous caesarean section and extremely rare (<1%) among women without previous caesarean section (1).

A World Health Organization (WHO) systematic review showed that about 75% of uterine rupture case in Nigeria, Ghana, and Ethiopia were associated with unscarred Uterus and that maternal and neonatal mortality were 1-13% and 74-92%, respectively (12). A study conducted in Nnamdi Azikiwe, Nigeria has repotted an incidence of uterine rupture of 0.6% (1 in 161 deliveries) (4) and another two studies in the same country showed almost similar incidence of uterine rupture, 0.4% (1 in 290 deliveries) and 1.5% (14.6 in 1,000 deliveries) (7,8). Another study conducted in Dareses Salaam, Tanzania, showed an incidence of uterine rupture of 2.3 in 1,000 deliveries(13) and a study in Uganda reported an incidence of 0.5% (1 in 200 deliveries (9).

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Ethiopia is one of the less developed countries where maternal and perinatal mortality associated with uterine rupture are high. The incidence of uterine rupture varies from 0.91% (1 in 110 deliveries) to 3.85% (1 in 26 deliveries) (14,15). Uterine rupture is the second most common cause of maternal mortality, following obstructed labor, and contributes 12% to maternal mortality in Ethiopia. Shortage of skilled midwives, weak referral system at health center levels, lack of adequate medical equipment, and under-financing of health services have been identified as major challenges. Besides, cultural norms and societal emotional support conferred to mothers, distance from functioning health facilities and financial barrier have been other identified constraints (16).

The government of Ethiopia has developed a number of policies and strategies to improve maternal health. It has provided free maternal and child health services at the Primary Health Care Units (PHCUs), and trained and deployed large numbers of health extension workers to expand community health care services, including clean and safe delivery at the Health Post (HP)/community level. It has deployed health officers with master of science training in skills of Integrated Emergency Obstetric and Surgery (IEOS) and distributed ambulances to each district. However, maternal and neonatal morbidity and mortality associated with uterine rupture are still high (4). This study is designed to assess the prevalence and factors associated with rupture of gravid uterus and feto-maternal outcomes among clients with uterine rupture.

PATIENTS AND METHODS

We studied 2,498 women of reproductive age group with a gravid uterus, gestational age of ≥28 weeks, and recorded in labor and delivery clinical records including patient registration books in Dilla University Referral Hospital (DURH) obstetrics and gynecology department over a one year period (September 2013 to August 2014). Patient records were reviewed following a retrospective cohort study design and by using a form with structured questions including potential risk factors that may be associated with rupture of gravid uterus and feto-maternal outcomes. Mothers with incomplete information in the registers were excluded from the study.

Data were collected from eligible patient charts from delivery room, operation theater log book and Health Management Information system (HMIS) unit. Uterine rupture was the primary outcome whereas wound infection, vesicovaginal fistula, sepsis and maternal and neonatal death were secondary outcomes.

We considered some selected socio-demographic characteristic, distance from health institution, maternal height, parity, ANC follow up, mode of delivery, hospital stay and fetal weight as an independent variables.

The data in the data sources were checked for completeness and consistency. The data were then entered onto Statistical Program for Social Sciences (SPSS) Version 20. Descriptive statistics were run to see the overall distribution of the study variables. Odds ratios were used to determine the association between potential independent variables and the dependent variables. Finally, multivariate regression analysis was applied to control for possible confounding factors and identify independent predictor (s) of uterine rupture. The significance level was set at $\alpha < 0.05$.

RESULTS

***Socio-demographic characteristics*:** A total of 2,498 patient records eligible for the study were reviewed. The median age of the study subjects was 28 years with the range of 18-43 years. Over one-half of the study subjects, 1,492(59.7%), were in the age group >25years (Table 1).

***Hospital prevalence of uterine rupture*:** Of the total of 2,498 cases, 46 cases developed uterine rupture making an overall prevalence of 1.8 % or 1 in 53 deliveries. The highest prevalence was in age greater than 25 year and the lowest in <20 year age group.

***Site of uterine rupture*:** Among the 46 cases, the most common site of rupture was the lower segment of the uterus in 19 (41.2%), the left lateral segment 16 (34.8%), right lateral 7(15.2%), and posterior 4(8.7%). There were 2/46 (4%) who had rupture at the lower uterine segment also had rupture of the urinary bladder (Figure 1).

Presenting clinical features in the 46 cases included acute abdominal pain and tenderness in 19(41.3%), vaginal bleeding in 11(23.9%), hypotension in 7(15.2%), shock in 5(10.9%), and sepsis in 4(8.7%). The diagnosis was made based on signs and symptoms in 42(91.3%) and uterine rupture was identified at laparotomy in 2 patients (4.4%) (Table 2).

Table-1: Socio-demographic characteristics of patients with uterine rupture in Dilla University Referral Hospital, September 2013- August 2014

Variables	Frequency (n)	Percent (%)
Religion of the participants		
Protestant	2414	56.6
Orthodox	764	30.6
Muslim	284	11.4
Other	36	1.5
Ethnicity of the participants		
Gedio	1377	55.1
Gurage	332	13.3
Amhara	316	12.7
Wolayta	118	4.7
Sidamo	346	13.9
Others	9	0.5
Occupational status of the participants		
Housewife	1506	60.3
Merchant	226	9
Farmer	320	12.8
Governmental/NGO	223	8.9
Others	223	8.9
Educational level of participants		
Illiterate	252	10
Primary school	1790	71.7
Secondary and high school	456	18.3
Age categories (years)	254	10.2
18-22		
23–25	792	30.9
Above 25	1492	59.7
Residence of the participants		
Urban	1930	77.2
Rural	568	23

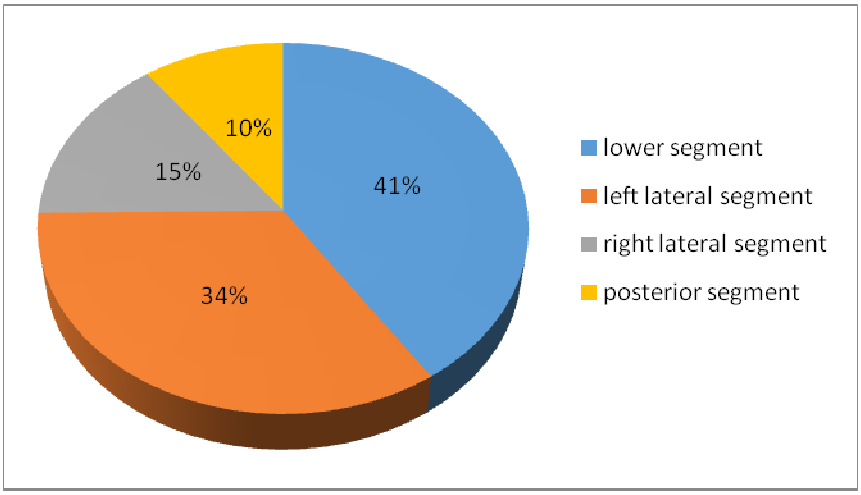

Figure-1: Common sites of uterine rupture in Dilla University Referral Hospital, September 2013 - August 2014

Table-2: Presenting features of uterine rupture in Dilla University Referral Hospital

Presenting features	Frequency (n)	Percent (%)
Abdominal pain	19	41.3
Vaginal bleeding	11	23.9
Hypotension	7	15.2
Sepsis	4	8.7
Shock	5	10.9

Management approach: Among the 46 cases of uterine rupture, 21(45.7%) had a total abdominal hysterectomy. Repair with or without bilateral tubal ligation was done for 20 (43.5%) of the cases. Of 46 cases 5 (10.8%) had a sub total abdominal hysterectomy. Blood transfusion was given to 39(84.8 %) of them.

***Post-operative complications*:** Among the 46 cases, 29 (63%) were discharged with no complication or just had minor complications. Post-operative complications included vesicovaginal fistula in 5(10.7%), sepsis in another 5(10.7%), and wound infection in 3(6.5%). Four (8.7%) of the patients were referred to another hospital for further management of postoperative complications. There were four maternal deaths (a case fatality of 8.7%), and 45 mothers died in hospital (perinatal maternal death of 97.8%) (Table 3).

***Perinatal outcomes*:** Among 46 cases with uterine rupture, 45(97.8%) resulted in stillbirth, whereas only 1(2%) resulted in a live birth**.**

Causes and risk factor for uterine rupture: It was found that the proportion of uterine rupture increased with increasing parity, with parity proportion for grand multipara that was 15(32.6%) as compared to 9(19.6%) among para two mothers. The majority of cases, 25/46 (54.4%) were not booked for antenatal care (ANC) and did not receive the service by a physician (clinician).

Table 3: Complications in postoperative period in patients with uterine rupture in Dilla University Referral Hospital, September 2013 - August 2014

Type of complication	Frequency (n)	Percent (%)
Cured with no or minor complications	29	63
Wound infection (deep or severe surgical site infection)	3	6.5
Vesicovaginal fistula	5	10.7
Sepsis	5	10.7
Death	4	8.7

Only 21(45.6%) of them ANC was provided by a physician (clinician) in public or private health facilities. Among the associated etiological factors (causes), contracted pelvis and malpresentation were the main causes, which accounted for 8(17.4%) and 18(39%), respectively. Other most frequent causes were vertex malposition and big baby (macrosomia), each accounting for 5(10.9%) and 14(30.4%) of the associated causes, respectively (Figure 2).

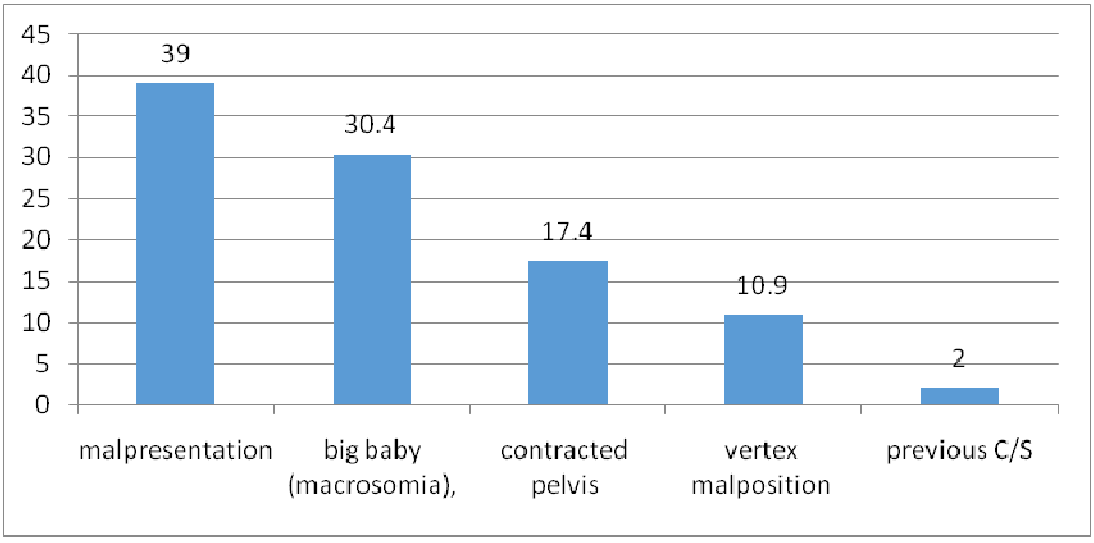

Figure-2: Causes of uterine rupture in Dilla University Referral Hospital

***Factors associated with uterine rupture*:** Those variables which were significant in bivariate analysis (P≤0.05) were entered into multiple logistic regression analysis. The results revealed that patients' residence, parity, birth weight, ANC follow up and duration of labor had statistically significantly and independently association with uterine rupture.

Rural women were 14 times more likely to develop uterine rupture than the urban women (Adjusted Odds Ratio (AOR) =14.2, 95% CI =7.01, 30.07). Women who didn't have ANC follow-up were more likely to have uterine rupture (AOR=1.3, 95% CI= 1.02, 3.37) as compared to those who had ANC follow up. Women who had a big baby (≥4000grams) were nine times more likely to develop uterine rupture as compared to those who had body weight of <4000gram at birth (AOR 9.2, 95% CI= 4.74, 18.0).

Mothers with prolonged labor were more likely to develop uterine rupture compared to women with normal labor (AOR=6.595%, CI=1.52, 28.01).Similarly, women with parity of more than two were more likely to develop uterine rupture as compared to women ≤ para 2 (AOR 6.31,95% CI=2.75,14.48) (Table 4).

Table-4: Bivariate and multivariate analysis of risk factors associated with uterine in Dilla University Referral Hospital, September 2013-August 2014

Variables	Uterine rupture		Unadjusted Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
	Yes	No		
ANC follow up				
Yes	21	1583	1	1
No	25	869	2.17(1.21-3.89)	1.30 (1.02-3.37) * *
Residence				
Urban	9	1921	1	1
Rural	37	531	14.87(7.13-31.00)	14.6(7.01-30.07) *
Parity				
≤ para 2	9	1493	1	1
Above para 2	37	959	6.4(3.07-13.32)	6.31(2.75-14.48)*
Birth weight				
<4000 gram	32	2351	1	1
≥ 4000 gram	14	101	10.18(5.26-19.68)	9.24(4.74-18.00) *
Labor duration				
≤24 hrs	2	534	1	1
>24 hrs	44	1918	6.12(1.14-25.35)	6.5(1.52-28.01) * *
Stay in hospital				
≤1 week	13	1598	1	1
>1week	33	854	4.75 (2.48-9.07)	6.31(3.23-12.52) * *

NB: **P <0.02, * P< 0.05

DISCUSSION

Uterine rupture is a major obstetric problem in developing countries. Studies conducted in developing countries show a wide variability in the prevalence of uterine rupture. Studies conducted in different parts of Ethiopia showed that the prevalence of uterine rupture varied in different regions of the country.

The prevalence of uterine rupture in this study was 1.8% (1:53 deliveries). which is lower than a study conducted in other parts of Ethiopia, like Debremarkos and Shashmene general hospitals where the prevalence was 1:26 and1:38 deliveries, respectively. A study conducted in Adgrat Hospital showed a lower prevalence, 1:110 deliveries, as compared to the finding in our study (5).This discrepancy might be due to lack of awareness about ANC, low access to health facilities mainly due to lack of transportation, inadequate healthcare delivery, and poor socioeconomic status (5,6).

The prevalence of uterine rupture in our study (1 in 53 deliveries) was higher than the results of three studies conducted in Nigeria showing uterine rupture prevalence of 14.6 in 1000 deliveries, 1 in 161 deliveries and 1 in 278 deliveries (7-9). A study conducted in Uganda (1 in 200 deliveries) and Dares Salaam (2.25 in 1000 deliveries) also showed a lower prevalence (1, 2) as compared to our finding.

Our study identified the association of uterine rupture with rural residence, multiparty and lack of ANC which is consistent with studies conducted in in other parts of Ethiopia and other African countries (1-3, 5-7, 9-11). Prolonged labor has also been identified as an independent risk factor for uterine rupture in a systemic review conducted by World Health Organization on studies undertaken in different countries around the world (1-3, 5-7,10-13).

Similar to other studies, the most common predisposing factors for uterine rupture in this study were cephalopelvic disproportion, malpresentation, and vertex malposition, which led to obstructed labor. The problem might be exacerbated by delayed referral system and poor transportation facilities (5,6). The common presenting features of uterine rupture at admission in this study were consistent with other studies. However, 2(4.3%) of uterine rupture cases were miss-diagnosed and the actual diagnosis was made during laparotomy. This shows that patient's clinical presentation can be vague and diagnosis depends on the high degree of awareness and suspicion (12).

In our study, the majority of cases had complete uterine rupture and the commonest sites were the lower uterine segment and left lateral uterine segment. There were 4 (8.7%) maternal deaths and 45(97.8%) stillbirths, which is lower than the reports from Shashmene general hospital, and Adgrat hospital and Yirgalem hospitals. This discrepancy might be due to differences in the service quality and patients utilization at these facilities (5). Hysterectomy was done in 26 (56.5%) case while 9(19.6%) had repair with bilateral tubal ligation which allows reproduction with estimated risk of future rupture for more than ten percent (5, 14).

As our study was based on secondary data some variables which were not included in the record couldn't be analyzed and many women deliver at home and the selected hospital receives through referral from other health centers; the prevalence or incidence of certain complications occurring in the hospitals could not be extrapolated to the general population.

In conclusion, common complications of uterine rupture were wound infection, vesicovaginal fistula, and sepsis, which are consistent with results reported from elsewhere. Overall, uterine rupture is highly prevalent in the study area carrying a high risk of maternal and neonatal mortality and morbidity. Hence, provision of proper ANC, the establishment of appropriate referral system for mothers with a risk factor for uterine rupture, availing transportation, training for health professionals in primary health facilities to develop skills for early identification and referral should be incorporated in healthcare delivery system.

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