ORIGINAL ARTICLE

Stillbirth at Tikur Anbessa Hospital a retrospective study

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Abstract

Background: *Stillbirths are believed to contribute to the overwhelming majority of perinatal mortality in some developing countries. Though the facilities and expertise for perinatal post mortem examination are lacking in Ethiopia, studies have indicated that useful information could be obtained from careful review of clinical records.*

Objective: *This study is aimed at identifying probable causes, comparison of selected fetal and maternal variables between cases and controls and suggests possible preventive options.*

Methods: *This study was a retrospective comparative study of stillbirths with sex matched live births. It was conducted at Tikur Anbessa Hospital. Addis Ababa, Ethiopia from Sept. 11, 2000-Sept. 10 2001, based on information retrieved from individual patient records and using a structured data entry format. The main study variables were maternal socio-demographic features, antenatal care(ANC) attendance, and gestational age of index pregnancy, birth weight, modes of delivery and probable causes of stillbirths.*

Results: *The stillbirth rate (SBR) was 55.3/1000 births and contributed to 77.2% of the gross perinatal mortality (GPNM). ANC attendance (85.7%) and residence in Addis Ababa (82.3%) were significantly higher among controls than cases which had corresponding figures of 69.4% and 55.1%, respectively. There was a statistically significant difference in low birth weight (40.5%) and preterm (32.1%) stillbirths than controls with the respective figures of 15% and 11%, respectively. Mechanical factors were the commonest probable causes of death accounting for 44.2% of all stillbirths, while 21.8% were unexplained stillbirths and ante partum hemorrhage contributed to 15.7%.*

Conclusion: *It is suggested that proper antenatal and intra partum care can reduce stillbirth.*

Keywords: Stillbirth rate, peri-natal mortality, intra-partum care

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Introduction

Stillbirth is defined as babies born with no signs of life after the 28th completed weeks of gestation or a corresponding birth weight of 1000 grams when the gestational age is unknown. The stillbirth rate in Africa is largely unknown because of the very few studies done. A hospital based study in western Kenya reported a stillbirth rate of 30.5 per 1000 births (1). The same study showed that intrapartum asphyxia was responsible for 45.8% of all stillbirths. A prenatal and maternal death review by Frost at Tikur Anbessa Hospital(TAH) in 1980 indicated a stillbirth rate of 52.6 per 1000 births (2). Perinatal mortality is accepted as one of the most sensitive indicator of levels of obstetric and neonatal care in a given community (3).

A perinatal mortality survey conducted at Ibadan University College revealed that 74% of the perinatal mortality were due to stillbirths. Clinico-pathological analysis of causes of death of the same study indicated that cephalopelvic disproportion, antepartum hemorrhage, malpositions and malpresentations contributed to a significant proportion of the perinatal deaths (59.8%). In the same study, it was shown that 65% of the stillbirths occurred before admission and 35% after admission to hospital (4). Woods *et al* also indicated that aprubtio placentae, gross amniotic fluid infection and severe congenital abnormality were the commonest causes of stillbirth in Cape Town (5).

The proportion of stillbirth was generally reported to be very high in the lower weight group (6,7,8). Male stillbirths numbered from 110 to 120 for every 100 female stillbirths, and the ratio has recently declined to 1.08. This affects all causes of death with the exception of congenital malformation where females predominate by about 2 to 3 (9, 10)

Fetal maceration is said to suggest only a very approximate estimate of period of fetal death and onset of labour is usually delayed if the fetus dies before term (6, 11). The ratio of fresh stillbirth to macerated stillbirth was 7.7:1 and 0.6:1 for mothers who had ANC attendance at least once and those who had not, respectively (1). However, Were found the lowest stillbirth rate in mothers older than 35 years (1).

Studies have shown that good number of stillbirths could be prevented by identification of pregnancy at risk and fetal surveillance (12). This study is designed to explore correlates, probable causes of stillbirth and provide recommendations for appropriate diagnosis and timely intervention.

Methods and Materials

Records of all stillbirths and matched live births were retrieved from Tikur Anbessa Hospital (TAH) archives after identification of mothers' names and record numbers on the labor ward log book from Sept. 11, 2000 up to Sept 10, 2001. Cards were retrieved by employees of the hospital. Information on the cards was entered into a predesigned data collection format, which consisted of maternal demographic characteristics, antenatal care status of the index pregnancy and fetal birth outcome variables.

Ethical clearance was obtained from research and Publication Committee of the Department of Obstetrics and Gynecology, Faculty of Medicine, Addis Ababa University.

To estimate sample size P1 and P2 were taken from unpublished report from the Department of Obstetrics and gynecology, Addis Ababa University.

P1 = BVD among SB =17% and

P2=BVD among LB= 7%

Using the single population proportion formula for calculating sample size with a standard normal deviate Z of 1.96 and a degree of precision of 0.05, a sample size of 96 was calculated.

Inclusion and Exclusion Criteria

All stillbirths delivered during the study period plus randomly selected live births delivered on the same day and having the same sex as the stillbirths were included in this study.

Poorly documented records or undocumented records, gestational age less than 28 weeks and a birth weight less than 1000 grams when the corresponding gestational age is unknown, served as exclusion criteria.

Data were entered into a computer after coding. EPI INFO version 6 statistical package was used for data analysis. Information generated was presented using tables, percentage, proportions, odds ratio, and confidence interval and P values.

Results

A total of 3793 deliveries were included in this study. Out of these deliveries, 210 were stillbirths making the stillbirth rate 55.3/1000 births. Records of 185 stillbirths were identified making the card retrieval rate 88%. Of these 148 cases were selected for analysis based on the inclusion criteria and calculated sample size.

The mean gross perinatal mortality rate (PMR) was 102.8/1000 births. Stillbirths accounted for 77.2 % of the gross PMR. There were 57.8% male and 42.2% female stillbirths making the male to female ratio 1.4: 1. The fetal heart beat was absent on admission in 131 (89.1%) of stillbirths, while 16 (10.9%) had positive fetal heart beat on admission. Birth weight and gestational age distribution is illustrated in Table 1. The mean birth weight was 2543$\pm$820 grams for cases and 3029 $\pm$544 grams for controls (P<0.05). The mean gestational age for cases and controls were 37.7$\pm$3.85 weeks and 39.2 $\pm$2.45 weeks, respectively (P<0.05). Gestational age was unknown in 63 (42.9%) of the cases and 35 (23.8%) of controls (OR=2.4). Preterm were seen more frequently in the cases of 27 (32.1%) than 13 (11.6%) controls with P<0.05. There was a statistically significant difference in low birth weight between 60 (40.8%) stillbirths and 22 (15%) controls P<0.05.

Table 1: Birth weight and gestational age distribution of stillbirths and controls

Variables	Cases		Controls		T. Value	P. Value
	No.	(%)	No	(%)		
I. Birth weight in grams	17	(11.6%)	1	(7%)		
< 1500	22	(14.9%)	2	(12.2%)		
1500-1999	21	(14.3%)	18	(2%)		
2000-2499	84	(57.1%)	118	(80.3%)		
2500-3999	3	(2.1%)	7	(4.8%)		
≥4000						
Mean birth weight in ± SD	1543± 820		3029± 544		5.99	(<0.05)
II. Gestational age in wks						
< 29	5				1	
30-32	5				2	
33-35	12				4	
36-38	18				22	
39-42	40				81	
>42	4				2	
Unknown	63	(42.9%)			35	(23.8%)
Mean gestational age ±SD	37.7±3.85		39.2±2.45		3.46	(<0.05)

Addis Ababa was residential address of 121 (82.3%) of controls and 81 (55.1%) of the cases (P<0.05). ANC attendance was significantly higher among controls 126 (85.7%) compared to 102 cases (69.4%) P<0.05) (Table 2). Maternal age greater than 35 years was higher in the cases than controls and this was statistically significant (P<0.05). The mean maternal age was 26.6±5.98 years for cases and 25.9± 4 for controls (P=0.297). An increased trend of stillbirths was seen for maternal age beyond 35 years which was statistically significant (OR=2.83).

Table 2: Comparisons of stillbirths and controls by selected maternal and fetal variables

Variables	Cases		Controls		OR	95% CI
	No	(%)	No	(%)		
Maternal Address						
Addis	8.1	55.1	121	82.3		(0.15 - 0.47)
Out of Addis	66	44.9		17.7	0.26	
ANC attendance						
Yes	102	69.4	126	85.7		
No	45	30.6	21	17.7	0.33	(0.17 -0.64)
Gestational age in weeks						
< 37 weeks	27	32.1	13	11.6		
> 37 weeks	57	67.9	99	88.4	3.61	(1.62-8.13)
Birth weight in grams						
< 2500	60	40.8		15		
> 2500	87	59.2	125	85	3.92	(2.15-7.18)

Table 3: Maternal age and parity distribution for cases and controls

	Cases		Controls				
Characteristics	No	(%)	No	(%)	OR	95% CI	t-value	p-value
I. Maternal age							
15-24	52		(35.4%)	56	(38.1%)	1	
25-34	74		(50.3%)	82	(56.5%)	0.96	.57-1.61
35-44	21		(14.3%)	8	(5.4%)	2.83	1.07-7.67
Mean maternal age +SD	26.6+5.98		25.9±4.9			1.044	0.297
II. Parity							
I	87		(59.2%)	73	(49%)	1.0	
II	23		(15.6%)	29	(19.7%)	0.67	(0.34-1.31)
III	6		(4.1%)	27	(18.4%)	0.19	(0.06-0.51)
IV	12		(8.2%)	.5	(3.4%)	2.01	(0.62-9.1)
≥ V	19		(12.9%)	13	(8.9%)	1.23	(.53-2.84)
Mean parity +SD	2.88±2.23		3.12±1.56			1.05	0.29

The mean maternal parity was 2.1±1.6 and 1.9±2.1 children for cases and controls, respectively. An increased trend of stillbirths was also seen as maternal parity exceeds three.There was a statistically significant result in para four mothers between 12 (8.2%) cases and 5(3.4%) controls with OR=2.01.(Table 3).

Higher breech vaginal delivery (BVD) was observed in 19 cases (12.5%) than controls OR=3.28. Possible causes of stillbirths in decreasing order of frequency were mechanical 65 (44.2%), unexplained 32 (21.8%), and antepartum hemorrhage (APH) 23 (15.7%).

There was no statistically significant difference in the low birth weight and preterm stillbirths between those cases who had positive fetal heart beat on admission and those who had no fetal heart beat on admission. Stillbirths with positive fetal heart beat on admission had no explicable causes in eight (50%), while cord prolapse, complications of pre-eclampsia and eclampsia were possible causes for others. It is elicited that 61(46.7%) of stillbirths with absent admission fetal heart beat were due to mechanical causes. It is computed that 13(40.6%) stillbirths of unknown cause were low birth weight and the corresponding figure for preterms was three (13.6%) (Table 4) Previous history of stillbirths was elicited in 18 (12.2%) of cases compared to six (4.1%) of controls (OR=3.7).

Table 4: Comparisons of stillbirths of unknown cause by weight and gestational age

Variables	Stillbirths of unknown case		Stillbirths of known case		OR	95% CI
	No	%	No	%		
1. Birth weight in grams						
< 2500	13	(40.6%)	47	(40.9%)		
≥ 2500	19	(59.4%)	68	(59.1%)	1.01	0.42-2.42
2. Gestational age in weeks						
< 37 weeks	3	(13.6%)	22	(36.7%)		
≥ 37 weeks	19	(86.4%)	38	(63.8%)	3.67	17.6

Discussion

This study showed stillbirth to be a common occurrence at Tikur Anbessa teaching hospital accounting for a stillbirth rate (SBR) of 55.3/1000 births. This compares favorably with 52.6/1000 in 1980 observed at TAH (2), and a 69.7/1000 from a Nigerian study (4), in contrast to a Kenyan study that has reported a lower stillbirth rate of 30.5/1000 births (1).

The Gross perinatal mortality rate (GPNMR) was 102.8/1000 comparable to a Nigerian study of 112.6/1000 (4). Stillbirths were also found to be responsible for 77.2% of GPNMR, while a similar study at TAH revealed a 68.5% contribution to perinatal death of 11(2). The contribution of stillbirths to GPNMR in an African study was 74% (4). All of them indicating stillbirths to take the lions share of the GPNMR.

The stillbirth rate in rural Ethiopia could be much higher than the rate in this study. A greater proportion of controls in this study were from Addis Ababa (82.3%) and had higher ANC attendance rate (85.7%) than the cases with corresponding figures of 55.1% and 69.4%, respectively. This could indicate the role of access to health care facilities in the prevention of stillbirths.

In this study, there were statistically significant number of mothers with advanced age above 35 years (14.3%) and higher parity of four (21%) in the cases than controls. This finding was seen from studies both in the developed and developing countries (12,13), which might indicate the greater chance of accruing chronic illness, congenital malformations, and high rate of obstetrical complications like APH with increasing age and parity. Pre-terms (32.1%) and low birth weight (LBW) (40.8%) were seen quite frequently among cases compared to controls, which had significantly lower pre-terms 16.6% and 15%, respectively. This could probably be due to the lower economic status of women with its associated adverse health consequences and poor prenatal and intrapartal care. While spontaneous vaginal delivery (SVD) was the commonest route of delivery for both cases (43.5%) and controls (49.5%), BVD was significantly higher in cases (12.5%) than controls (3.4%). Two Kenyan studies also revealed a higher BVD rate for stillbirths 15.1% and 10.8%, respectively (1,14). This could be explained by frequent associations of breech with LBW, prematurity, congenital malformations and its inherent nature to end up in a poor perinatal outcome.

Caesarian section was the second most frequent route of delivery 41(27.9%) for controls compared to craniotomy and laparotomy for ruptured uterus (26.4%) for the cases, thus showing the important contribution of obstructed labor in causing stillbirths. Ventouse delivery for cases and controls were two(1.4%) and eight(5.4%), respectively. Mechanical factors were the most important causes of stillbirths in 44.2% of the cases, while previous studies from Addis Ababa and Nigeria reported 31.9% and 35.6%, respectively (2,4). The increase in mechanical causes of stillbirths in this study could be due to handling of large

number of complicated labor since the hospital is serving as a referral center. APH accounted for 21(15.7%) of the stillbirth causes; of this antepartum accounted for 16(10.9%) and postpartum seven (4.8%).

There were 17 (11.5%) hypertensive disorders of pregnancy (HDP). About nine (6.1%) of the HDP occurred from eclampsia and the rest eight (5.4%) from preeclampsia. Anencephally four (2.7%) and multiple malformation four (2.7%) are the two causes of congenital anomalies eight (5.4%) contribution. Rhesus isommunization accounted for one(1.4%) of the causes of stillbirths and unexplained causes accounted for 32(21.8%) of stillbirth possible causes.

In this study 21.8% of the stillbirths had no explicable causes whereas unexplained stillbirths in a Kenyan study were 26.4% (1).

The reduction in unexplained stillbirth rate in this study may be due to a better record keeping, attempt to identify causes or higher number of referrals with mechanical problems. The contribution of congenital anomalies for stillbirths was 5.4% which is similar to that of a Kenyan study (5.2%) (1). The male to female ratio for congenital malformation was 1 to 7, which is lower than a 2 to 3 ratio mentioned by Morrison (7).

Last menstrual period (LNMP) was unknown in a significantly greater number of cases 63 (42.9%) than controls 35 (23.8%) [OR=2.4]. This finding corroborates an Ethiopian study that uncertainty of LNMP was significantly related to adverse pregnancy outcomes that is high PMR, LBW, and spontaneous preterm deliveries which were independent of unfavorable maternal characteristics (15). Previous history of stillbirths was much more frequently elicited in 18 cases (12.2%) than in six controls (4.1%) [OR=3.28]. This makes the stillbirth recurrence rate 19% higher than a 7% recurrence rate stated in other studies (16). The higher stillbirth recurrence rate in this study could be due to the lower ANC attendance in the cases, which could have helped in identification of respective causes and initiation of appropriate plan of management both in the antepartum and intrapartum period. History of maternal disease like diabetes, HDP was also frequently observed in 20(13.6%) cases than six (4.1%) controls, for which the aforementioned explanation could apply as well. SVD is a frequently applied mode of delivery in both 64 (77.1%) cases and 72(93.5%) controls than 19(22.9%) BVD cases and five (6.5%) controls. The Fetal presentation shows vertex cases were 117(79.6%) and 130 controls (88.4%). Breech cases were 20 (13.6%), which was more frequent than 12 control (8.5%). There were no cases of brow but only one (0.7%) in the control group. Face had the second least cases which were three (2%) and one controls (0.7%) than the aforementioned variables.

Stillbirths are the most important determinants of GPNMR at TAH Maternal age above 35 years, parity of $\geq$ 4, having no ANC, living out of Addis Ababa, history of chronic maternal disease, previous history of stillbirths and unknown LNMP were important maternal factors associated with stillbirths. Moreover, mechanical factors were also the major causes of stillbirths. LBW, prematurity and BVD were highly

associated with stillbirths. Thorough history taking and proper examination of products of conception were useful at arriving at the most probable cause of stillbirths.

Provision of appropriate antenatal and intrapartum care will help in identifying avoidable maternal and fetal factors associated with stillbirths making timely intervention or referral possible. Every attempt should be made to make comprehensive emergency obstetric care (EmOC) within the reach of laboring mothers, especially for those coming out of Addis Ababa, as mechanical factors are the most important cause of stillbirths.

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