International Journal of Clinical Obstetrics and Gynaecology

ISSN (P): 2522-6614
ISSN (E): 2522-6622

www.gynaecologyjournal.com
2023; 7(3): 308-313
Received: 15-03-2023
Accepted: 20-04-2022

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An analysis of intrauterine foetal demise in a tertiary care hospital

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DOI: https://doi.org/10.33545/gynae.2023.v7.i3b.1326

Abstract
Background: Intrauterine foetal demise or still birth refers to an antepartum or intrapartum foetal death occurring after 20 weeks of gestation. The majority of these deaths would probably be prevented with better access to expert healthcare and providing health education to the women.
Aims: To find out the associated risk factors for antepartum intra uterine foetal demise and determine the probable cause of antepartum foetal demise
Materials& methods: This is a prospective study conducted at R.L JALAPPA Hospital attached to Sri Devaraj Urs Medical College, Tamaka, Kolar included all antepartum intrauterine foetal demises after 24 weeks of gestation between January 2021 to December 2022.
Results: In the present study, the maternal causes of intrauterine foetal demise, hypertensive disorders contributed to 46.65% followed by anaemia. Amongst the foetal factors, foetal growth restriction seen in 26.6%. Statistically significant difference was found between birth weight and gestational age, attributing to the foetal growth restriction. In placental causes abruption placenta accounted for 15.23% and idiopathic constituted 26.7%. Decreased perception of foetal movements was seen in majority of the cases.
Conclusion: Finding the causes of IUFD will enable the development of a successful prevention strategy, preventing maternal problems in the process. Good antenatal care and detection of risk factors like preeclampsia, anaemia, FGR, congenital malformations are necessary to plan the next level of management. Not only that a potential life is lost, mothers experiencing intrauterine foetal demises suffer psycho-social consequences like anxiety, depression, stress disorders and stigmatization and also the future prospects of fertility and pregnancy outcome becomes one the major concerns for them, DC.

Keywords: Intrauterine foetal demise, still birth, maternal factors, preeclampsia, anaemia, abruptio placenta

Introduction

Due to the challenge of establishing causation, there are global data on the causes of stillbirth [1]. The most often documented cause, which is reported in 76% of instances worldwide, is an unexplained stillbirth [2]. The majority of these deaths would probably be prevented with better access to expert healthcare; however, intrapartum problems are responsible for 50% of stillbirths worldwide. Over 2.6 million pregnancies worldwide, or 18.4/1000 live births, occur in third-trimester stillbirths each year [3]. Foetal demise, according to the "American College of Obstetricians and Gynaecologists" is the death of a foetus after 20 weeks of gestation or when it weighs 500 g or more [4]. Antepartum and intrapartum foetal deaths make up the greatest subgroup of perinatal mortality globally, are caused by a variety of maternal disorders and illnesses.

In the past few decades, antepartum and intrapartum monitoring for the health of the foetus has improved. The high-risk instances linked to poor outcomes can be recognized by appropriate prenatal examinations.

The most common cause of foetal mortality includes maternal causes (25-35%), fetal causes (25-40%), placental reasons (5-10%), and unknown causes (25-35%) [5].

Families with known genetic disorders may get counselling regarding reproductive alternatives, such as prenatal and preimplantation genetic diagnostics. Counselling on quitting smoking and weight loss in obese women may help lower the number of stillbirths. For patients whose previous pregnancies ended in foetal mortality, antenatal surveillance is generally advised. But with more recent innovations like color Doppler, fetal karyotyping, placental assessment, and effective prenatal screening, it is possible to significantly reduce the rate of intrauterine foetal mortality [5].

In the analysis, the most prevalent risk indicators for intrauterine foetal mortality were studied, along with screening and detection of moribund situations, knowledge of preventive risk factors, and a decrease in the psychosocial effects on mothers.

Aims and objectives

To determine the associated risk factors and the probable cause for antepartum intra uterine foetal demise.

Materials and Methods

This prospective observational study was carried out in the Department of Obstetrics & Gynaecology RL JALAPPA and Research Centre attached to Sri Devaraj Urs Medical College, affiliated to Sri Devaraj Urs Academy of higher Education and Research Tamaka, Kolar- 563101, with ethical consent from the research institution. This research included all the eligible pregnant women admitted to the labour room with antepartum intrauterine foetal demise after 24 weeks of gestation, during the study period January 2021 – December 2022. And the exclusion criteria consisted foetus less than Gestational age of less than 24 weeks of gestation and intra partum foetal demise.

Every study subject gave written informed permission, and only those were enrolled in the analysis. The risks and benefits involved in the study were explained to the participants before obtaining consent as well as voluntary participation. The confidentiality of the study participants was maintained. A well-organized research proforma included documentation of all relevant parameters. Sample size was estimated by using the proportion of antenatal risk factor hypertension in subjects with still birth was 20.7% from the study by Abha Singh, *et al*. using the formula.

Sample Size = $\underline{Z_{1-\alpha/2}{}^2 P (1-P)}\ d^2$

$Z_{1-\alpha/2}$ = is standard normal variant (at 5% type 1 error (P<0.05) it is 1.96 and at 1% type1 error (*p*<0.01) it is 2.58). As in majority of studies P values are considered significant below 0.05 hence 1.96 is used in formula.

P = Expected proportion in population based on previous studies or pilot studies

D = Absolute error or precision

P = 20.7% or 0.207

Q = 79.3 or 0.793

D = 8% or 0.08

Using the above values at 95% Confidence level a sample size of 99 subjects included in the study. Statistical analysis, the SPSS 22 version software was used to analyse the data, which was put into a MS Excel data sheet. Frequencies and proportions were used to represent categorical data. Standard deviation and mean were used to depict continuous data. Various types of graphs generated using MS Excel and MS word. Data analysis was done using MS Excel**,** SPSS version 22 **(**IBM SPSS Statistics, Somers New York, United States America).

Methodology

A thorough maternal history was obtained, paying particular attention to any high-risk factors for intrauterine foetal demises in the current and prior pregnancies. General physical and systemic check-up of the mother at the time of admission to the hospital was carried out. Review of prenatal data to rule out any abnormal clinical outcomes. All the mothers with antepartum intra uterine foetal demise were treated according to the hospital protocol.

All investigations such as Complete blood count, Blood grouping and typing, Thyroid profile, Serology (HIV, HBsAg, VDRL), FBS, PPBS, Oral Glucose Challenge Test, Ultrasonography, Liver function tests, Renal function tests, Coagulation profile done. Additional tests such as antiphospholipid antibody test (anticardiolipin, lupus anticoagulant, and anti-B2 glycoprotein-1 antibodies), indirect combs test, TORCH titres done if required.

Mode of delivery and birth weights of foetuses noted. Head to toe gross examination, weight and anthropometry of baby done. The evaluation of the development (term or preterm) and the signs of maceration noted. All the foetuses examined for any malformations and detailed macroscopic examination of the placenta. Placenta checked for its appearance, weight, retro-placental clot/infarcts and calcification. Cord observed for any abnormality. If no reason could be found, histopathology of placenta done. Photograph of stillborn baby with gross congenital anomalies and infantogram done. Fetal autopsy done (if consent given). Pre structured proforma filled for every case.

Results

Table 1: Demographic parameters

Parameters	Frequency (N=105)	Percentage (%)
Age group		
19-20yrs	19/105	18.1
21-25yrs	43/105	41.0
26-30yrs	29/105	27.6
> 30yrs	14/105	13.3
Educational status		
Primary school	7/105	6.7
Middle school	10/105	9.5
High school	63/105	60.0
Graduate	25/105	23.8
Socioeconomic status		
Lower class	18/105	17.1
Lower middle class	38/105	36.2
Middle class	1/105	1.0
Upper middle class	46/105	43.8
Upper class	2/105	1.9
Parity status		
Primigravida	44/105	41.9
Multigravida	61/105	58.1

Consanguineous marriage		
Consanguinity	61/105	58.1
Non Consanguinity	44/105	41.9
Booked/Not booked		
Booked	89/105	84.8
Not booked	16/105	15.2
Decreased perception of foetal movements		
Yes	103/105	98.1
No	2/105	1.9
Previous History of intrauterine foetal demise		
No	97/105	92.4
Yes	8/105	7.6
Mode of delivery		
Vaginal delivery	87	82.9
Caesarean section	18	17.1
Fetal gender		
Male	60/105	57.15
Female	45/105	42.85
Intrauterine fetal demise		
Fresh	88/105	83.8
Macerated	17/105	16.2
Placental weight (in grams)		
<150	9	8.6
151-300	39	37.1
301-500	47	44.8
>500	10	9.5

Table 1 shows the demographic details of the study population of the present study. Among the 105 patients in this study, most of them belonged to 21-25 years of age. 60% studied up to high school followed by 23.8% graduate. Most of the study subjects belonged to upper middle class (43.8%), followed by lower middle class (36.2%). 61(58.1%) were multigravida and 44(41.9%) were primigravida. 61(58.1%) had consanguineous marriage, 44 (41.9%) had non-consanguineous marriage.

There were no prior antenatal visits in 16(15.2%) whilst 89 (84.8%) were booked outside and were referred. 103 out of 105 subjects had decreased perception of foetal movements. Previous history of intrauterine foetal demise noted in 8(7.6%) subjects out of 105.

87(82.9%) out of 105 had vaginal delivery of which 8 subjects (7.6%) had vaginal birth after caesarean section and 18(17.1%) had undergone caesarean section and the indications for caesarean section are as mentioned in table 3.

According to the induction procedures, as shown in table 2, misoprostol was mostly used comprising of about 52(59.7%), followed by Foley bulb induction 49(56.3%), and dinoprostone gel induction were 7(8%). Augmentation of labour was done with oxytocin in about 75 subjects comprising about 86.2%.

Table 2: Method of induction of labour

Method of induction of labour	Frequency	Percentage (%)
Foley bulb	49	56.3
Misoprostol	52	59.7
Dinoprostone gel	7	8

Table 3: Indications for LSCS

Indications for caesarean section	Frequency(N)	Percentage (%)
APH	1/18	5.5
Complete Placenta Previa	2/18	11.11
Failed induction	1/18	5.55
Obstructed labour	2/18	11.11
Preterm breech failed induction	1/18	5.5
Shoulder dystocia	1/18	5.5
Previous LSCS	8/18	44
Previous LSCS with Abruptio placenta	2/18	11.11

Table 4: Factors contributing to intrauterine foetal demise

Maternal Factors	Frequency	Percentage (%)
Preeclampsia	30	28.57
Anemia	20	19.04
Eclampsia	15	14.28
Diabetes	8	7.61
HELLP syndrome	4	3.80
Oligohydramnios	1	0.95
Sepsis	1	0.95
Placental / cord Factors		
Abruptio placenta	16	15.23
Loop round Neck	9	8.57
Placenta previa	5	4.76
Cord Prolapse	2	1.90
True Knot	2	1.9
Foetal factors		
Foetal growth restriction	28	26.66
Prematurity	23	21.9
Post maturity	1	1.0
Idiopathic	28	26.7

In the maternal factors, Preeclampsia (28.57%), eclampsia (14.28%) and HELLP syndrome (3.80%) accounted for a total of 46.65% of the maternal factors followed by anemia (19.04%). 28 out of 105 subjects that is 26.66% had foetal growth restriction followed by prematurity (21.9%), (Table 4).

Table 5: Gestational age and weight

Gestational age	< 1.5kg		1.5-2.5 kg		2.5 kg	
	N	%	N	%	N	%
<28wks	11	100.0%	0	.0%	0	.0%
29-32wks	30	88.2%	4	11.8%	0	.0%
33-36wks	5	15.6%	20	62.5%	7	21.9%
37-42wks	4	14.3%	7	25.0%	17	60.7%

Table 5 shows a P value < 0.001, there was statistically significant difference found between birth weight and gestational age.

And 17 foetuses out of these 105 subjects gave consent for fetal autopsy. Fetal autopsy carried out after infantogram showed no significant histopathological changes.

Discussion

In this study of the total 105 study subjects 41% were among 21-25 years age followed by 26-30 years of age, which is about 27.6% which is similar to Sharma, *et al.*, Singh N, *et al.* Kanavi JV, *et al.*, Manocha, *et al.* and Froen JF study [6-10]. The reason for maternal complications and adverse birth outcomes in young mother pregnancies was believed to be biological immaturity and poor birth outcomes is confounded by poverty and socioeconomic status. Compared to adult mothers, young mothers are at greater exposure to stress, have worse mental health, higher substance abuse problems, and are at an elevated risk for posttraumatic stress disorder [11].

Among the 105 patients in the present study, 63(60%) subjects had high school education followed by 25 (23.8%) graduate females. Also studies by Sharma *et al* and Froen JF showed that majority of distribution of subjects (64.6%) were illiterate (no formal education) concluded that improving institutional capacities and raising women's health and education awareness levels is an important perspective in supporting safe and healthy pregnancies [6, 10].

In the current study, the upper middle class made up most participants (43.8%), followed by lower middle class (36.2%). In a comprehensive analysis of research Amiu, *et al*. Di Mario *et al*. identified a lack of maternal awareness and poverty as linked factors in addition to others [12, 13].

A rise in the number of pregnant women who also have other significant risk factors, like primiparity, high BMI, and maternal age of more than 35 years may eventually result in a rise in the number of stillbirths [14]. Sharma *et al*. and Manocha, *et al*. also studied the distribution of subjects according to parity and concluded that most were primigravida [6, 9]. But in contrast to the above studies the present study reported that out of 105 study population, 61 subjects (58.1%) were multigravida and 44(41.9%) were primigravida.

Consanguineous marriage has been associated with higher rates of perinatal mortality, infertility, subfertility, diabetes, epilepsy, mental retardation, asthma in the progeny. In addition to congenital defects and low birth weight, consanguineous marriage is also related to greater chances of stillbirth risk.[15] In the present study also, out of the 105 subjects, 61(58.1%) had consanguineous marriage, 44(41.9%) had nonconsanguineous marriage, which is similar to S Aminu, *et al*. study [12].

In contrast to current research, Rahmani SA, *et al* in her study reported that 4696(79.8%) of marriages were non consanguineous and 1189(20.12%) were of consanguineous type [16]. Preconception and premarital counselling on consanguinity should be part of the training of health care providers particularly in highly consanguineous populations [15].

In this study, 103 out of 105 subjects that is 98.1% had history of decreased perception of foetal movements. The window of opportunity for useful evaluation and intervention may be expanded by minimizing delayed presentation for decreased foetal movements [17]. Similar to this, Mutihir JT, *et al*. and Stringer EM *et al* stated that decreased perception of foetal movements is an important factor for assessing stillbirth as stated by in their study which is in line with the present study [18-19].

In the present study 87 had a vaginal delivery, which is about 82.9% and 18 had undergone LSCS, that is 17.1%. In Sharma *et al*. study only four (5.1 percent) of the 5282 institutional deliveries carried out during two years were caesarean sections, out of which the most (75; 94.9 percent) were vaginal births (p<0.0001) [6].

According to earlier systematic studies, inadequate antenatal care, absence of a trained attendant at delivery, poor socio-economic status, inadequate nutrition, previous stillbirths and advanced maternal age were the most commonly documented reasons of stillbirths in underdeveloped nations [13, 20].

In this study, 60 (57.15%) of them had dead male foetuses and 45(42.85%) were female foetuses. The male foetus may be more susceptible to a variety of stressors, such as endocrine changes, nutritional deficiency, and oxidative stress. Recent scientific investigation in animal models has shown that placental development in males is more vulnerable to nutritional deficit than that in females and that placental gene expression in the murine placenta is adaptable and changed with nutrition. Male new born have higher premature birth risks than female babies, and studies have shown that pregnancies complicated by preterm delivery vary sex-specifically in placental functioning as well as structure [21]. According to Singh N, *et al*., a large Indian 40 obstetric cohort exhibited a male preponderance and a greater frequency of IUFD during term pregnancy (69 percent) in comparison to Preterm (31 percent) [7]. While Feresu *et al*. discovered no statistically considerable difference in the probability of stillbirth in males and females [18]. In this study, most of the intra uterine fetal demise belonged to fetal weight less (47.6%) which is consistent with Sharma *et al*. study [6].

Maternal Factors

In this study, Preeclampsia (28.57%), eclampsia (14.28%), and HELLP syndrome (3.80%) accounted for about 46.65% of the maternal factors. Comparable to the current study, Sharma *et al* and manocha *et al*. and had similar findings that is Preeclampsia contributed to 39 percent and 29.1% respectively. According to them MVM ("Maternal vascular malperfusion) was the most frequent obstetric complication and hypertensive problems of pregnancy were the most common cause of IUFD [6, 9].

Placental / cord Factors

In the present study, 15.23% were showing Abruption, which was similar to Walfisch A noted that foetal/placental variables such as placental abruption and FGR are among the most significant and well-researched risk factors for IUFD [22].

In the present study, loop of cord round neck (4.76%), 1.90% had cord prolapse and in 1.9% there was true knot. In Manocha *et al* research noted that difficulties with the umbilical cord are usually listed as significant causes of IUFD [9]. In their investigation, Kuti O, *et al*. and Turnbull E, *et al*. discovered that umbilical reasons were often cited as the cause of 2.9-12% of stillbirths [23, 24].

Foetal Factors

So in the present study, prematurity (21.9%) was the most associated risk factor for antepartum IUFD and Post maturity (1%). Impaired placental perfusion resulting in placental insufficiency is the principal factor causing foetal growth limitation. Foetal anomalies and environmental issues such as maternal illness, congenital infection, and maternal substrate abuse are other factors. It is believed that poor trophoblastic invasion of the maternal spiral arteries results in impaired placental perfusion [25].

Conclusion

In the present study preeclampsia-eclampsia were the main

contributors for intrauterine foetal demise followed by anaemia and Abruptio placenta. Statistically significant difference was found between birth weight and gestational age, attributing to the foetal growth restriction leading to IUFD. Decreased perception of foetal movements was seen in majority of the cases.

Most of the causes of IUFD in our study were preventable. Early diagnosis of preeclampsia and prompt referral, adequate treatment and timely delivery can help to prevent IUFD. Improving the maternal nutrition and prevention and adequate treatment of anaemia in pregnancy is important in preventing stillbirth. Educating the women about foetal movement count and to approach the health care facility in case of decreased perception of foetal movements at the earliest for active intervention and management.

Good antenatal care and detection of risk factors like preeclampsia, anaemia, FGR, congenital malformations, etc are necessary to plan the next level of management.

Limitations of this study are its small sample size. Chromosomal studies have not been done. Multicentre study will give better idea about the causes of stillbirths prevalent in this area. This study is one of the few studies reported from this state on this important aspect. The knowledge about reason for the foetal loss can help in taking measures to prevent recurrence in subsequent pregnancies.

Conflict of Interest: Nil

Financial Aid: Nil

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How to Cite This Article
Bhavanam N, Munisamaiah M, Kalyani R. An analysis of intrauterine foetal demise in a tertiary care hospital. International Journal of Clinical Obstetrics and Gynaecology 2023;7(3):308-313.