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Original Research Article

Epidemiological Profile and Risk Factors of Stillbirth in a Tertiary Care Hospital in South Assam

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Abstract

Background: Stillbirth is a major obstetric catastrophe. It's a significant public health concern projected to 1.9 million stillbirths globally in 2021. Data collection, review, identification of obstacles, and public awareness are needed to reduce stillbirths. Research has indicated that there are determinants for stillbirth including income, economic status, and educational status, and occupation, place of residence, standard of living index score, and medical comorbidities. Unequal access to healthcare prevents the proper distribution of healthcare services.

Aims and Objectives: To assess the Epidemiological profile and the risk factors associated with stillbirth cases.

Methodology: Pregnant women attending and admitted to the Department of Obstetrics and Gynaecology of Silchar Medical College. All intrauterine demise with gestational age of more than 28 weeks of pregnancy and occurring in the intrapartum or before delivery were included. All foetal deaths below 28 weeks and after delivery were excluded. All relevant investigations and proforma were analyzed to determine the stillbirth's cause and risk factors.

Result: Stillbirths were common above 20 years of age from rural regions, one fourth of mothers were illiterate, one-third of patients belonged to lower socioeconomic status and consanguinity was present. Fewer patients had two ANC visits. The majority of them were unbooked. A high incidence of stillbirth is seen in early preterm gestation and with a mild degree of anemia. The cause of stillbirth was Hypertensive disorder of pregnancy, meconium-stained amniotic fluid, and hydrops.

Conclusion: Stillbirths are one of the areas in obstetrics that may be improved. The important epidemiological factors are literacy, lower socioeconomic status, place of residency, unregulated reproduction, lack of awareness, and low checkups. A mild degree of anaemia was present. The commonest causes of stillbirth are Hypertensive disorder of pregnancy, meconium-stained liquor, and hydrops foetalis. Effective screening and diagnosis are crucial in identifying high-risk factors and treating them.

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Introduction

Stillbirth is a major obstetric catastrophe at any gestational age. For both the parents and the doctor who treats you, intrauterine foetal death is the most distressing occurrence. A stillbirth is characterized as foetal mortality that happens at or beyond 28 weeks of pregnancy [1]. Stillbirths, a significant public health concern, are an "unfinished business" with a projected 1.9 million stillbirths globally in 2021. (World Bank Group, 2023) [2].

Stillbirths result in significant financial losses as well as psychological and mental health issues. Nevertheless, compared to other unfavourable pregnancy outcomes, the economic cost of stillbirths is still primarily unquantified and thus undervalued (Veettil et al., 2023) [3]. Compared to other childhood deaths, stillbirth rates have decreased less quickly both globally and in India (Hug et al, 2021). [4] Amongst 2000 and 2021 the anticipated SBR in India reduced by 58.9%, from 29.8 to 12.2 per 1,000 total births, 4.2% of Annual Reduction Rate. (World Bank Group, 2023) [2].

According to the HMIS analysis, the overall SBR from 2017-2020 was almost 12.9 per 1000 total births. While the number hasn't changed much over time, it has varied greatly throughout the states, with Kerala having the lowest SBR (3.7) and Chandigarh and Meghalaya having the highest (22.5 and 22.3 in 2019–2006). [5] Eight categories comprise the common causes of stillbirth, as per the "Stillbirth Collaborative Research Network of

the National Institute of Child Health and Human Development": obstetrical complications (29%), fetal malformations (14%), placental abnormalities (24%), infections (13%), abnormalities of the umbilical cord (10%), medical problems (8%), hypertensive disorders (9%), and undetermined (24%). (Obstetric care consensus no. 10, 2023). [6]

Throughout 2021, almost 1.9 million infants were stillborn, equating to one stillbirth every 16 seconds globally (WHO UNICEF) [7]. Advanced age of the mother, typically defined as age 35 and older, and is related to an increased chance of stillbirth because of higher rates of chromosomal abnormalities and other pregnancy-related complications [8]. Consanguineous marriages elevate the chances of both parents carrying the same recessive genetic mutation, thereby heightening the risk of these conditions in their offspring. [9] In economically weaker countries, there exists a substantial disparity in stillbirth numbers in contrast to high-income countries. [10]

ANC plays a pivotal role in safeguarding mother and child wellbeing by enabling healthcare providers to early identify and manage high-risk pregnancies, monitor fetal development, teach expectant mothers about potential complications, devise birth plans, and provide interventions and supplementation.

These comprehensive measures are designed to prevent stillbirths, as emphasized by Lawn et al. (2009). Regular ANC visits enhance pregnancy outcomes and empower women with the knowledge and support necessary for a healthy pregnancy and childbirth. [11] The impact of ASHA is shown in some studies have reported positive impacts such as community mobilization, reduced neonatal mortality, improved adherence to antiretroviral therapy among HIV-positive women, and higher immunization rates, there are notable gaps in their knowledge and practices.(George et al., 2020) [12] Increasing parity is prone to unfavorable maternal and newborn outcomes, including prenatal depression., a higher probability of undergoing caesarean section, and increased rates of neonatal mortality. [13]

Studies consistently indicate that mothers with previous unexplained stillbirths face a major danger of experiencing another stillbirth compared to those without such a history. (Sharma et al., 2006) [14]. HDP is a major factor causing neonatal death accounting for around 15% of all perinatal fatalities worldwide.

Among the documented 2.6 million stillbirths occurring yearly worldwide, about 16% happen in pregnancies affected by HDP. Endothelial damage, oxidative stress, and vascular complications are characteristics of these conditions that can compromise placental function. This ultimately results in the fetus receiving insufficient nutrition and blood flow, which has a negative impact on perinatal outcomes. [15] Abnormal glycaemic control before and during pregnancy is related to more chance of stillbirth. The incidence of stillbirth in type I diabetes is 16.1 per 1000 births and 22.9 per 1000 births in type 2 diabetes. A higher glycosylated haemoglobin level and an elevated BMI prior to pregnancy are also significant factors. [16]

Aims and Objectives

1. To estimate the prevalence of stillbirth cases.
2. To assess the Epidemiological profile of stillbirth cases in Silchar Medical College.
3. To assess the risk factors associated with stillbirth cases and finally analyze the probable causes or etiology of stillbirth cases attending Silchar Medical College as a representation of South Assam which is essential for preventing stillbirth and delivery of a healthy newborn.

Methodology

Study design: This study was a Cross-Sectional Observational study.

Study population: Pregnant women attending ANOPD and patients admitted to the Department of Obstetrics and Gynaecology of Silchar Medical College and Hospital during one year study period.

Sample size: According to research done by Smith and Fretts (2007) [17], the prevalence of stillbirth in India is 17.3%. The Daniel sample size formula is employed to determine the sample size: So, utilizing the formula for sample size N={(Z2) x p x q}/d2 Where, N= Sample Size Z =statistics for the level of confidence (for the level of confidence of 95percent, which is convention Z, the value is 1.96) P= 17.3 q= 100 – p = 82.7 d = precision (d is predicted to produce good precision and a decreased estimate error at 0.05.) Hence, the calculated sample size = 219.8 rounded off to 220

Selection Criteria

Inclusion Criteria

- All those cases which are diagnosed as IUFD at the time of admission with gestational age more than 28 weeks of pregnancy and stillbirths.
- Stillbirth those occurring in the intrapartum period or immediately prior to delivery were included.

Exclusion criteria

- All the cases of intrauterine foetal death below 28 weeks of gestational age
- Foetal deaths that happened after delivery were excluded.

Statistical analysis: The data was examined by employing SYSTAT 7.0 software developed by SPSS Inc. in the United States. An independent t-test was used to examine the differences between mean percentages. Any statistical significance was determined at a significance level of $P<0.05$. All measures have been presented as the mean value ± the standard error.

Ethical Consideration: This research has been approved by the institutional ethical committee of Silchar Medical College. IRB number: No. SMC/14.193 Dated on 30/08/2023.

Methodology

Study comprises every stillbirth that took place in the hospital over the course of the year-long study. All newborns delivered after 28 weeks of pregnancy and not exhibiting any signs of life will be deemed stillborn.

1. The study participants received an explanation of the study protocol in detail.
2. All the data collected were analyzed in Microsoft Excel later
3. Informed consent and patient particulars are collected.
4. Epidemiological data is collected from patients and relatives in terms of area of residency, residency type rural or urban area, maternal education details, marriage was consanguineous or not. Socioeconomic status was assessed according to the Kuppuswamy classification
5. Sanitation facility availability was enquired, and a history of any substance abuse in terms of alcohol, smoking, or tobacco use was enquired about. History of excess caffeine/coffee use was enquired.
6. Antenatal period checkup history- booked case or not, number of ANC visits, whether ASHA accompanied her for assistance.
7. Patients' past pregnancy details concerning gravida, parity, number of previous abortions, number of prior childbirths, no living issue at an earlier pregnancy, interpregnancy interval, mode of previous delivery.
8. A detailed history was taken regarding the period of gestation and whether any ultrasound was done previously, data was collected from previous investigations and reports, if no ultrasound was done previously, it was also noted.
9. General Physical, Systemic, and obstetrics Examination was done on admission. BMI was calculated.
10. Blood investigations were done, ABO Rh typing, haemoglobin on admission, random blood sugar, serum TSH, coagulation profile, and virology.
11. Detailed history of the patient was, asked about any significant complaints, history of reduced fetal movements, and history of any bleeding or draining per vagina.
12. The dead fetus born was analyzed in terms of sex and weight.
13. The mode of delivery was documented.
14. The most probable cause of stillbirth was analyzed and documented in Microsoft Excel.
15. The Total number of normal vaginal delivery and caesarean section collected from the labor room and data on stillbirths collected and the prevalence of stillbirths in Silchar medical college was analyzed.

Results

The present study was conducted in the Department of Obstetrics and Gynaecology, Silchar Medical College and Hospital, Silchar. A total of 220 patients were included in the current study.

- More than half of patients with stillbirth were between 20-30 years of age (68.2%), followed by >30 (24.5%) and <20 (7.3%). The majority of patients with stillbirth were in the 26.55±5.29 years age group, ranging from 18 to 42 years.
- As per the distribution of patients with stillbirth according to type of residency, the majority of patients live in rural areas (95%).
- About one-fourth of mothers with stillbirth were illiterate (28.6%) followed by primary school (28.2%), high school (21.8%), middle school (20.5%), and intermediate/diploma (0.9%).
- More than one-third of patients belonged to SES V (44.5%) followed by IV (39.1%), III (14.5%), and II (1.8%) as per kuppuswammy classification. Consanguinity in marriage was present among about one-third of patients (31.4%)
- Caffeine consumption in mothers was present among 45% of patients with stillbirth. More than one third of patients with stillbirth had tobacco habit (36.4%) followed by smoking (35.5%) and alcohol (8.2%).
- Two ANC visits were among 25.5% of patients with stillbirth. Four and five ANC visits were among 19.5% and 17.7% of patients, respectively 3.6% of patients with stillbirth had no ANC visits.

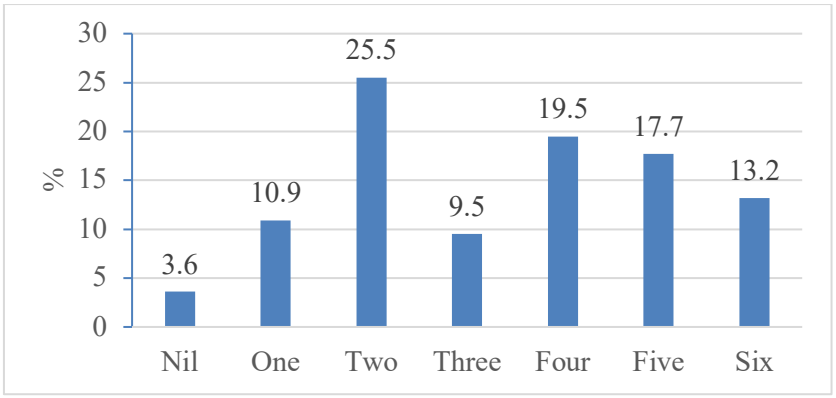

Figure 1: Distribution of patients with stillbirth according to Number of ANC visits

- ASHA assistance was present among 60% of patients.
- Unbooked delivery was present among 57.3% of patients with stillbirth.
- Primi parity was among more than one-third of patients with stillbirth (44.1%) followed by gravida 2 & 4+ (20%) and gravida 3 (15.9%)

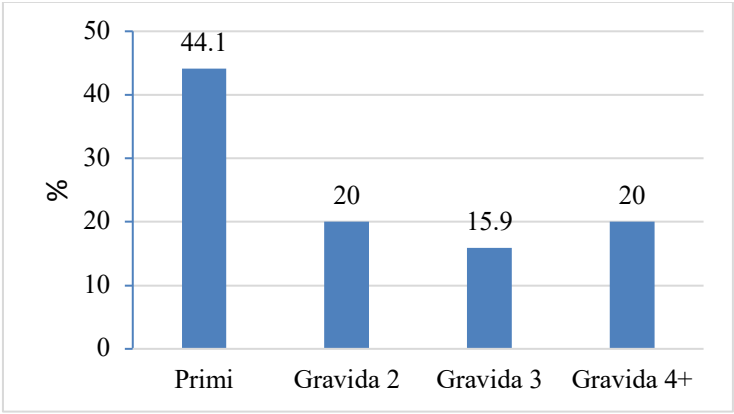

Figure 2: Distribution of patients with stillbirth according to Parity

- Interpregnancy interval was 3 years among about half of patients (51.2%) followed by 2 years (24.8%), 4 years (18.2%), 5 years (4.1%), and 1 year (1.7%).
- Living issues were 6.6% of patients. 93.4 % of patients with stillbirth who had no previous living issues
- NVD mode of previous delivery was among majority of patients (86.8%) with stillbirth."
- The gestational age 36-40 weeks was among about one-third of patients with stillbirth (35.9%) followed by 28-32 (30.5%), 32-36 (26.8%), and >40 (6.8%) weeks.

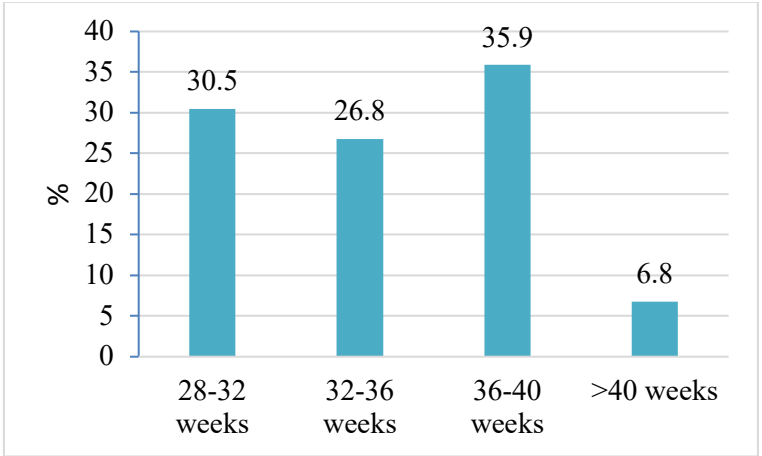

Figure 3: Distribution of patients with stillbirth according to gestational age

- About half of patients with stillbirth had normal weight (51.8%) followed by underweight (27.3%) and overweight (20.9%).
- AB+ve blood group was most common (22.7%). B+ve was the second most common blood group (17.3%). All positive and negative blood group was among 69.1% and 30.9% patients with stillbirth.
- According to the WHO grading for anemia in pregnancy we derive a conclusion from our study that the majority (38.2%) of the patients with stillbirth had mild degree of anemia followed by moderate (26.4%), normal range (22.7%) and severe grade of anemia (12.7%).
- Almost three-fourths of the patients with stillbirth were normotensive 83.1% and 16.8 % of the patients with stillbirth had pregnancy-induced hypertension.
- The majority of patients with stillbirth had normal RBS (91.4%) followed by Hyperglycemia (8.2%) and Hypoglycemia (0.5%). TSH 0.30-3.50 was among the majority of patients with stillbirth (82.7%) followed by 3.51-5.0 (10.9%), >5 (5.5%), and <0.30 (0.9%). Normal coagulation profile was among the majority of patients with stillbirth (86.4%) followed by abnormal (13.6%). More than half of the patients are afebrile (66.3%) and 33.6% of the patients with stillbirth are febrile
- The reduced fetal movement was among 32.7% of patients with stillbirth and draining pervagina was in 28.6% of patients with stillbirth. Bleeding pervagina was in 13.6% of patients with stillbirth.
- About one-third of patients with stillbirth had no USG in the majority of the patients 34%. Gestational age on USG between 34-36 weeks (22.27%) followed by 28-30 (18.6%), 31-33 (16.81%), 37-39 (6.81%), and >39 (1.3%) for the patients with stillbirth who had done USG.
- Weight <2.5kg was among more than half of stillborn (60.9%) followed by more than 2.5kg (39.1%). Male gender was among more than half of the stillborn (55%) followed by female (45%).
- Vaginal delivery was among more than half of patients with stillbirth (65.5%) followed by caesarian section (34.5%).
- Pregnancy-induced hypertension is the most common cause (16.8 %) of stillbirth (APE, PIH, Preeclampsia, APH-Preeclampsia). Meconium-stained liquor (MSL) was the second most common cause of stillbirth (13.6%). Hydrops was the third most common cause of stillbirth (13.1%).

Table 1: Distribution according to cause of stillborn

Cause	No. (n=220)	%
Maternal Causes		
Antepartum Eclampsia	16	7.3
APH Preclampsia	1	0.5
PIH	7	3.2
Abruptio Placenta With PIH	3	1.36
Preclampsia	9	4
Coagulopathy	1	.5
GDM	13	5.9
GDM + PIH	1	.5
T2dm	3	1.36
Hypothyroidism	3	1.36
Impending Rupture	1	0.5
Post-Cs Rupture	3	1.36
Severe Anemia	3	1.36
Foetal Factors		
Anomaly	11	5
Hydrops	29	13.18
Hand Prolapse	6	2.73
Reduced Foetal Movement	2	0.9
IUGR	5	2.3
Postdated	4	1.81
Cord Prolapse	4	1.81
Placental Factors		
Abruptio Placenta	12	5.45
Placenta Previa	3	1.36
Combined Factors		
MSL	30	13.7
Polyhydramnios	1	0.5

Oligohydramnios	8	3.63
Obstructed Labor	16	7.3
Undetermined	25	11.4

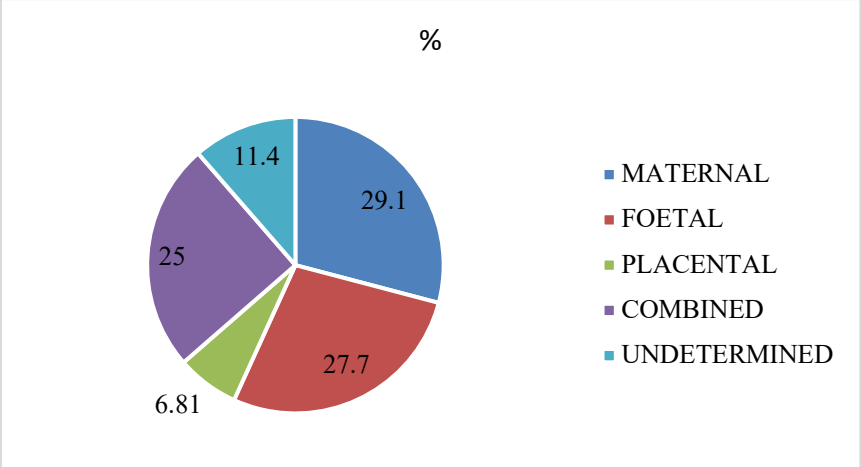

Figure 4: Distribution according to the cause of stillborn

Out of the total deliveries in the hospital during the study period, the prevalence of stillbirth was 4.9%.

Table 2: Distribution according to the prevalence of stillbirth in SMCH

Stillbirth	No. (n=9627)	%
Yes	475	4.9
No	9152	95.1

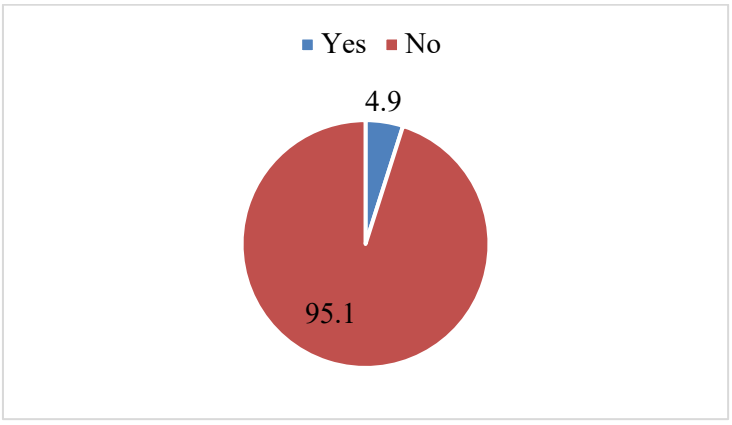

Figure 5: Distribution according to the prevalence of stillbirth in SMCH

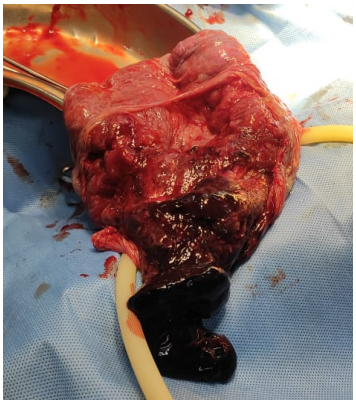

Figure 6: Clinical photograph of placenta with retroplacental clot following delivery of stillborn with Abruptio placenta

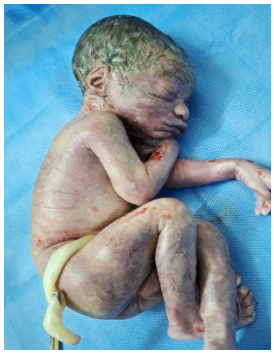

Figure 7: Clinical photograph of stillborn of antepartum eclampsia patient

Figure 8: Clinical photograph showing stillborn presented with hand prolapse

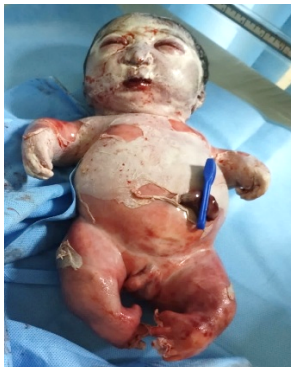

Figure 9: Clinical photograph showing stillborn with congenital anomalies

Discussion

My study was conducted in the Department of Obstetrics and Gynecology, Silchar Medical College and Hospital, Silchar, Assam to estimate the prevalence of stillbirth cases. A total of 220 patients with stillbirths were included in the study.

In this study, more than half of the patients were between 20-30 years of age (68.2%) followed by >30 (24.5%) and <20 (7.3%). The mean age of patients was 26.55 ± 5.29 years ranging from 18 to 42 years. Changede et al. (2022) [18] discovered that most mothers fell within the age range of 26–30 years, constituting 32.7% of the sample. In the study by Asalkar et al (2018) [19], 56.25% patients were in the 21-25 years age group. Singh and Kumar's study in 2019 found that the age of mothers surveyed ranged from 18 to 40 years. The largest proportion, constituting 44.7%, fell within the 24–28 years age, with 268 out of 600 participants [20].

According to our study, most patients belonged to rural areas (95%) in the present study. In contrast to this study, Changede et al. (2022)18 observed that nearly all the mothers, specifically 98.5%, hailed from urban areas. Prüst et al. (2020) observed in their study conducted in Latin America that the SBR in rural areas was almost two to three times more than urban areas [21].

In our study, more than one-third of patients belonged to SES V (44.5%) followed by IV (39.1%), III (14.5%), and II (1.8%). In the study conducted by Changede et al. (2022) [18], 2.19% were classified as belonging to the lower class, 71.79% were categorized as upper lower class. Additionally, 24.9% were identified as belonging to the lower middle class, and 1.09% were

categorized as upper middle class. In the present study, two ANC visits were among 25.5% of patients. According to research by George et al. (2020) [12], the odds of stillbirth were four times higher among individuals who had no ANC care

In our study, ASHA assistance was present among 60% of patients. Unbooked delivery was present among 57.3% of patients in the current study. According to Poorna et al. (2021) [22], a comparative study showed that un-booked females remained nearly twofold as likely as booked women to deliver preterm babies. The study also reported significant differences in the occurrence of stillbirth and early neonatal death between booked and un-booked women. Specifically, booked women had lower odds of experiencing stillbirth and early neonatal death compared to un-booked mothers.

In the present study, primi parity was among more than one-third of patients (44.1%) followed by gravida 2 & 4+ (20%) and gravida 3 (15.9%). Changede et al (2022) [18] found that 31.2% had primigravida. In the study by Singh and Kumar (2019)20, 41.3% of the women with stillbirth nulliparous women. According to WHO grading for anaemia in pregnancy, we derive a conclusion from our study that the majority (38.2%) of the patients had mild degree of anaemia followed by moderate (26.4%), normal range (22.7%) and severe grade of anaemia (12.7%). Huifeng Shi et al. (2022) [23] in his study found that 17.78% were diagnosed with anaemia during pregnancy among these included 9.04% with mild anaemia, 2.62% with moderate anaemia, 0.21% with severe anaemia, and 5.90% with anaemia of unknown severity. Compared to no anaemia, the severity of anaemia during pregnancy was associated with stillbirth, with adjusted odds ratios (aOR) of 0.79 for mild anaemia, 1.86 for moderate anaemia, and 0.59 for severe anaemia, each with a 95% confidence interval.

In this study, Pregnancy-induced hypertension (it includes PIH. APE, Preeclampsia, and APH preeclampsia) was the most common cause (15%) of stillbirth. MSL was the next common cause (16.3%) of stillbirth. Hydrops was the third most common cause (13.1%) of stillbirth. McClure et al. (2022) [24] identified the main causes of stillbirths as follows: hypertensive disorder accounted for 36% of cases, severe anaemia for 11%, and maternal and fetal vascular malperfusion for 47%. Intrauterine hypoxia was seen as the primary fetal cause in 72% of stillbirths. The study also noted that 19% of stillbirths were attributed to a combination of intrauterine hypoxia, placental malperfusion, and conditions like eclampsia or pre-eclampsia as primary causes of death. Infections affecting the placenta, membranes, and fetus, as well as congenital anomalies, were also identified as contributing factors to stillbirths. Prüst et al. (2020) [21] demonstrated that antepartum stillbirths were attributed to hypoxia in 46% of cases. Asalkar et al. (2018) [19] documented that preeclampsia, placental abruption, and anaemia were prevalent high-risk factors associated with stillbirth. They found that 54.6% of the cases remained unexplained, while IUGR was noted in 23.4% of cases. Additionally, other identified factors included prematurity, congenital anomalies, and cord or placental issues in the study. Mengistu et al. (2022) [25] identified LBW, prematurity, PROM, antepartum haemorrhage, obstructed labor, and preeclampsia as factors independently related to stillbirth.

This study showed that the majority of patients had normal RBS (91.4%) followed by Hyperglycemia (8.2%) and Hypoglycemia (0.5%). According to Mackin et al. (2019) [16], the stillbirth rates were reported as 16.1 per 1000 births in women with type 1 diabetes and 22.9 per 1000 births in women with type 2 diabetes According to Sharma et al. (2022) [26], during the study period involving a population of 1.5 million with 77,336 deliveries, a total of 1,327 stillbirths occurring after 28 weeks of gestation was noticed. This resulted in a stillbirth rate of 18.3 per 1000 total births. The study reported an overall institutional delivery rate of 92.8%, with 6.3% of total stillbirths occurring at home and 0.9% occurring in the hospital. Mali et al. (2021) [27] reported a stillbirth rate of 29.71 per 1000 births, resulting in a stillbirth rate of 2.97%. Asalkar et al. (2018) [19] observed a stillbirth rate of 20.4 per 1000 deliveries in their study.

Conclusion

Stillbirths are one of the areas of obstetrics that may be improved. Literacy, lower socioeconomic status, a long distance from the place of residency to the health care facility, unregulated reproduction, lack of awareness of health education and health checkups i.e. low ANC checkups and ASHA assistance, and delayed enrolment in hospitals for medical care are the important epidemiological factors that lead to stillbirth. Poor levels of nutrition lead to a mild degree of anaemia. The commonest cause of stillbirth is Hypertensive disorder of pregnancy, followed by Meconium-stained liquor, and hydrops. Many causes of stillbirth were found to be preventable like HDP, GDM, APH, maternal infection, anemia, etc can be overcome by proper antenatal checkups. Hypertensive disorder of pregnancy is the most common cause leading to stillbirth. Early diagnosis, proper foetal surveillance and timely intervention can lead to the delivery of a healthy newborn and fewer postpartum complications in the mother. Meconium-stained liquor is another cause leading to stillbirth and foetal compromise which in turn is caused by post maturity, oligohydramnios, IUGR,

maternal distressing conditions, and uteroplacental insufficiency which can also be prevented by proper surveillance and treatment.

Recommendations

Effective screening and early diagnosis are crucial in identifying high-risk factors and treating them, which can significantly reduce the stillbirth rate. It's important to offer expert counselling to parents about postmortem examinations, as they can provide valuable insights into the potential causes of intrauterine fetal demise and inform future pregnancy management. Evaluating and enhancing maternal and child health services is essential. Health organizations, public health and social workers, and traditional birth attendants should receive thorough training in providing adequate antenatal care, and early recognition of threats helps to reach healthcare facilities to prevent intrauterine death.

List of Abbreviations

- ANC – Antenatal Care
- ANOPD- Antenatal outpatient
- aOR – Adjusted Odds Ratio
- APH – Antepartum Haemorrhage
- APE – Antepartum eclampsia
- ASHA – Accredited Social Health Activist
- BMI – Body Mass Index
- GDM – Gestational Diabetes Mellitus
- HDP – Hypertensive Disorders of Pregnancy
- HIV – Human Immunodeficiency Virus
- HMIS – Health Management Information System
- IUFD – Intrauterine Fetal Death
- IUGR – Intrauterine Growth Restriction
- LBW – Low Birth Weight
- MSL – Meconium-Stained Liquor
- PIH – Pregnancy-Induced Hypertension
- PROM – Premature Rupture of Membranes
- RBS – Random Blood Sugar
- SBR – Stillbirth Rate
- SES – Socioeconomic Status
- T2DM – Type 2 Diabetes Mellitus
- UNICEF – United Nations International Children's Emergency Fund
- WHO – World Health Organization – World Health Organization

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