

Assessment of the Prevalence of Intrauterine Fetal Death (IUFD) Among Pregnant Women Attending Hospitals and Clinics in Takai Local Government, Kano State

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Abstract

Stillbirth is one of the most dreaded consequences of pregnancy and is distressing when it occurs without warning in pregnancy. The aim of study was to determine the incidence of intrauterine fetal death (IUFD) among pregnant women and relationship between the risk factors and incidence of IUFD. A cross-sectional study design was adopted in this study to determine the incidence of IUFD among high-risk pregnant women and the relationship between the risk factors and incidence of IUFDs among high-risk pregnant women. The study was conducted at the labor and maternity ward of the hospitals and clinics in Takai local government, Kano State, Nigeria. There were 40/372 (0.12%) stillbirths which were divided into three groups: 21/372 (0.07%) were in the second trimester group and 6/372 (0.02%) were in the third trimester group. In addition, there were 13/372 (0.04%) stillbirths that occurred at term pregnancy. Takai Local Government Area is not an exemption to the effect of IUFD as this study shown that most of the pregnant women suffer from issues related to IUFD due to the lack of awareness and high level of illiteracy or exposure to the effect of IUFD. Reducing high fetal mortality ration is not just a technical and medical challenge but largely a

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political one which requires the attention and commitment of political leaders. Attention should be paid to rural areas that are far from medical and nursing health services.

Keywords: *Prevalence, Intrauterine Fetal Death (IUFD), Pregnant Women*

Introduction

Fetal death is an obstetric death accounting for approximately half of perinatal death. Stillbirth is an event which has always challenged the obstetricians. The intrauterine fetal demise is, for a woman and for a couple, always an enormous psycho-affective trauma.¹ The search for the cause is not only a due act, but is fundamental to improve care by acting on prevention measures. The mode of antenatal care has changed in past 50 years. The mode of ante partum and intrapartum surveillance for fetal wellbeing has advanced in last few decades. There are so many maternal conditions and diseases that are responsible for poor obstetrical outcomes. Stillbirth is a useful index to measure the values of antenatal and intranatal care. By proper antenatal check-ups, the high-risk cases associated with poor outcomes can be identified.²

Intrauterine fetal death (IUFD) is defined as fetal death after 20 weeks of gestation. It can be classified into early or late. Early IUFD occurs before 24 weeks of pregnancy, whereas late IUFD occurs after 24 weeks.³ It is synonymous with stillbirth as defined by the WHO and is “defined as no signs of life at or after 28 weeks of gestation.”⁴ The United States National Center for Health Statistics defines stillbirth as a fetal death that occurs after 20 weeks of pregnancy until or up to the delivery, with further classification into early stillbirth, which occurs from 20 to 27 completed weeks; late stillbirth, occurs from 28 to 36 completed weeks; and term stillbirth, which occurs from 37 completed weeks.⁵ This heterogeneity in the definition of fetal death or “stillbirth” makes it difficult to compare incidences in the different populations observed and to accurately assess the extent of the problem.

In addition, the result of studies showed that several factors prevent pregnant women for going to the hospital for health care checkup or inconsistent antenatal care such as illiteracy, poor socioeconomic condition and social status of women, and misbelieves. These important contributory factors were responsible for a higher fetal mortality rate.⁶

Materials and Methods

Study Location

The study was conducted at labor and maternity wards in Obstetrics and Gynecology Department of clinics and hospitals in Takai ward, Takai LGA (A237 highway, Area 598 km²) which lies between latitude 11° 34' 32.48" N and longitude 9° 06' 31.68" E located in the southern part of Kano state,

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northern region of Nigeria.

Study Population

The study was conducted on the population of pregnant women attending hospitals/clinics in Takai ward of Takai LGA, Kano state.

Inclusion criteria

All parturient of ≥ 20 weeks gestation attending ANC in hospitals and clinics in Takai LGA, Kano state.

Exclusion criteria

All non-pregnant women and women whose pregnancy is less than 20 weeks gestation. Fetus weighing below 1000 g and twin babies were also excluded. All pregnancy of twin fetus.

Ethical Consideration

Prior to commencement of the study, a letter of introduction was submitted to the managements of the hospitals and clinics in Takai for ethical clearance. It was emphasized to the participants that are involved in the study is voluntary, the purpose and value of the study as well as the role of the participants in the study was fully explained.

Study Design and Sampling Technique

A cross-sectional study design was adopted in this study to determine the incidence of IUFD among high-risk pregnant women and the relationship between the risk factors and incidence of IUFDs among high-risk pregnant women.

Simple random sampling was employed to select samples from the population; Number of samples included in this study was computed using the formula of single sample proportion:

$$n = \frac{z^2 (1 - p)}{E^2}$$

E2

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Where; n = sample size

Z = linked to 95% confidence interval using (1.96) P =
expected prevalence (as fraction of 1)

q = expected non-prevalence (1- p) E =
relative desired precision

Methods

This study was conducted in the PHC and clinics of Takai ward, Takai LGA in Kano state. The center has 333,300 inhabitants and approximately counting 1488 deliveries per year identifying intrauterine fetal deaths (IUFDs) that occurred ≥ 20 gestational weeks, for the months September to December 2023, by date of report, date of delivery and birth center were taken into consideration, this is to analyze the time trend in the number of IUFDs, fetus weighing below 1000 g and twin babies were excluded. The choice of this gestational week and weight cut-off was made based on the reasons mentioned in the Introduction section. The data was collected from pregnant women admitted to the labor and maternity ward in the study areas. The details of complaints at admission, obstetrics history, menstrual history, examination findings, per vaginal examination findings, mode of delivery and fetal outcomes, placental examination, condition of cord and investigation reports were assessed from hospital records.

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The participants were explained on the purpose of the study to obtain consent for their participation in the study. Each woman was interviewed individually using a structured interviewing schedule. The tools were filled by the researcher via questionnaire administration. The questionnaire was developed by the researcher and modified according to the definition of IUFD from different perspectives.

The first part of the questionnaire consists of socio demographic information such as age, level of education, residence, and occupation; Obstetric history was presented in the second part of the questionnaire which include data related to LMP, gestational age, TPAL, previous pregnancy and delivery complications, and previous occurrence of IUFD. Medical history such as hypertension, diabetes mellitus, autoimmune diseases, and cardiac diseases, as well as previous surgical history were addressed in the third part of the questionnaire. Physical assessment was carried out and shall include data related to weight, medications, result of ultrasound, and occurrence of IUFD and its underline cause. This interview takes about 10–15 min with each pregnant woman.

All stillbirths were divided into two groups according to gestational age: the second trimester group included stillbirths occurring between 20 weeks and 0 days, and 27 weeks and 6 days of gestation, and stillbirths after 28 weeks and 0 days of gestation were assigned to the third trimester group.

The analysis was performed based on births registered in clinics and hospitals, basic characteristics collected from the medical records, including maternal and fetal conditions.

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Data Analysis

After obtaining oral informed consent and completing the data check, all analyses were carried out using analysis tools (IBM SPSS version 20.0). Comparisons of data between the groups were made using Chi-square test for categorical data. A p value <0.05 in the two-tails hypothesis represented significance. All data were presented as frequencies, percentages, mean \pm SD; the prevalence of IUFD over the period of study will be presented in a line graph and bar chart. For the comparison of variables between the two groups, a descriptive correlation analysis was conducted to describe and examine the relationship between the variables under investigation and the incidence of occurrence of IUFD.

Results

There was a total of 372 births and 40 stillbirths for intrauterine fetal demise after pregnancy at 20 weeks at four months during the period from September to December, 2023. Out of 372 births from 95 participants, there were 40/372 (0.12%) stillbirths which were divided into three groups: 21/372 (0.07%) were in the second trimester group and 6/372 (0.02%) were in the third trimester group. In addition, there were 13/372 (0.04%) stillbirths that occurred at term pregnancy (after 37 weeks of gestation) Table 1 shows that the present study consisted of 40/372 (0.12%) cases of intrauterine fetal death or stillbirths which occurred during the study period. A total of 372 deliveries from 95 participants were conducted during this study period. The stillbirth rate was 107 per 1000 births. Of 40 stillbirths, there was a history of previous stillbirth in 25.3%. Among the medical disorders in which 2 (2.1%) cases were due anemia, maceration and true knot, only 1 (1.1%) account for oligohydramnios and cephalopelvic disproportion, 3 (3.2%) were reported due to eclampsia, 7 (7.4%) is associated with hypertension, 65 (68.4%) which carries the majority of the report were still unidentified, 8 (8.4%) are from cases reported from pelvic inflammatory diseases, 4 (4.2%) are on account of ruptured uterus.

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Table 1: Study the causes associated with intrauterine fetal death among pregnant women

	Frequency		Perce nt
Causes of fetal death	ANE	2	2.1
	CPD	1	1.1
	ECL	3	3.2
	HYP	7	7.4
	MAC	2	2.1
	NIL	65	68.4
	OLI	1	1.1
	PID	8	8.4
	RAP	4	4.2
	TRU	2	2.1
	Total	95	100. 0
Incidence of occurrences	0	43	45.3
	1	27	28.4
	2	11	11.6
	3	4	4.2
	4	7	7.4
	7	2	2.1
	Total	94	98.9
Total		95	100. 0

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Pathological conditions recorded as presented in Table 2 indicate percent by ration of the causes of intrauterine fetal death which shows significant relationship with the incidence of IUFD. The occurrences of fetal death by death: life% as reported cases were; 100%-0% ration in anemia, macerations, oligohydramnios raptured uterus and true knot. 66.7%-33.3% ration as a result of hypertension, 71.4%-28.6% due to hypertension, and 75%-25% due to PID. These signifies the relationship between the factors and the incidence of occurrences of IUFD.

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Table 2: identifying the relationship between the risk factors and prevalence of IUFD among high-risk pregnant women

PATH * LIFEDEATH Cross tabulation

PATH	ANE	D	LIFE/DEATH		Total
			L		
		Count	2	0	2
		Expected Count	.8	1.2	2.0
		% within PATH	100.0%	0.0%	100.0%
	CPD	Count	0	1	1
		Expected Count	.4	.6	1.0
		% within PATH	0.0%	100.0%	100.0%
	ECL	Count	2	1	3
		Expected Count	1.3	1.7	3.0
		% within PATH	66.7%	33.3%	100.0%
	HYP	Count	5	2	7
		Expected Count	2.9	4.1	7.0
		% within PATH	71.4%	28.6%	100.0%
	MAC	Count	2	0	2
		Expected Count	.8	1.2	2.0
		% within PATH	100.0%	0.0%	100.0%
	NIL	Count	16	49	65
		Expected Count	27.4	37.6	65.0
		% within PATH	24.6%	75.4%	100.0%
	OLI	Count	1	0	1
		Expected Count	.4	.6	1.0
		% within PATH	100.0%	0.0%	100.0%
	PID	Count	6	2	8

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RAP	Expected Count	3.4	4.6	8.0
	% within PATH	75.0%	25.0%	100.0%
	Count	4	0	4
	Expected Count	1.7	2.3	4.0
	% within PATH	100.0%	0.0%	100.0%
<hr/>				
TRU	Count	2	0	2
	Expected Count	.8	1.2	2.0
	% within PATH	100.0%	0.0%	100.0%

Chi-Square Tests

Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	30.772 ^a	.000
Likelihood Ratio	35.578	.000
N of Valid Cases	95	

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Significant difference of $p = 0.043$ was observed in table 4. 3 as the average age at delivery and parity between the second trimester group and the third trimester group. The average fetal birth weight for all stillbirths 3Kg. The overall incidence for intrauterine fetal demise was 0.12% (40/372).

The most common cause from both second trimester group and third trimester intrauterine fetal demise was unexplained causes, and are also associated with the history of previous abortion.

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Table 3: comparing the incidence of occurrence of IUFD between second and third trimester

gestational age * IUFD Cross tabulation								
		IUFD						Total
		0	1	2	3	4	7	
second trimester	Count	0	5	0	0	1	0	6
	Expected Count	2.7	1.7	.7	.3	.4	.1	6.0
	% within gestational age	0.0%	83.3%	0.0%	0.0%	16.7%	0.0%	100.0%
third trimester	Count	43	22	11	4	6	2	88
	Expected Count	40.3	25.3	10.3	3.7	6.6	1.9	88.0
	% within gestational age	48.9%	25.0%	12.5%	4.5%	6.8%	2.3%	100.0%
Total	Count	43	27	11	4	7	2	94
	Expected Count	43.0	27.0	11.0	4.0	7.0	2.0	94.0
	% within gestational age	45.7%	28.7%	11.7%	4.3%	7.4%	2.1%	100.0%
Chi-Square Tests								
		Value		df		Asymp. Sig. (2-sided)		
Pearson Chi-Square		11.477 ^a		5				.043
Likelihood Ratio		13.010		5				.023
Linear-by-Linear Association		.477		1				.490
N of Valid Cases		94						

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Discussion

Out of the 40 cases of IUFDs from the data had done a ≥ 20 weeks ultrasound screening for fetal congenital malformations. Through this screening, no major malformations were identified. With regards to maternal characteristics in the study, there was significant difference in the average maternal age and parity between the two stages of pregnancy, these was positively associated with stillbirths in the later stages of pregnancy. The trend of increased maternal age at delivery increases the risk of adverse perinatal outcomes. The association between smoking, whether being a smoker during pregnancy or through passive exposure to environmental smoke as second party smoker, and increased risk of stillbirth due to alcohol consumption is not well documented, as the subjects of the study area has lesser or no proportion of smokers or alcohol consumers. This study showed a more significant influence from hard labor on stillbirths in the second trimester than the third trimester. through education and improvement of health literacy, opportunities are presented to reduce the potential and preventable stillbirths. In this study, the average sex ratio (male/female) at birth was 1:1 this data supported the finding of⁷, that there is no association between stillbirth rate and fetal sex. However, significantly male dominant stillbirths were observed in the third trimester compared with the second trimester stillbirths. This may be due to the small sample size, and further study is needed on this association. In the present study, pelvic inflammatory diseases were the third most common cause of stillbirth in the third trimester, but became the leading cause in the second trimester and with the exception of un-identified cause which is the leading cause in both groups.

A significantly increased risk of stillbirths due cord complication in the third trimester may be due to more fetal movement and growth in late pregnancy, where a sufficiently long umbilical cord may tighten over the fetal body and compress the cord in the relatively small intrauterine space, resulting in vessel compression and the ceasing of blood flow and fetal perfusion in the higher risks. Most cord accidents are sudden and unpredictable, and the prognosis for future pregnancies is believed to be favorable. In this study, unexplained cases accounted for the most stillbirths in the second trimester (68.4%).

The result from this current study was in similar trend with the results of⁸ which reported; Maternal medical conditions represented the fifth most common cause of stillbirth in the second trimester, becoming the second most common in the third trimester and the third most common cause of total stillbirths, with an incidence of 1.383/1000 births in the study. In general, when pregnancies occur along with maternal disease, the estimated stillbirth rate would be 6– 7/1000 births, and hypertension and diabetes mellitus are the most common problems.⁸

The trend of maternal medical conditions having a greater responsibility for stillbirths in late pregnancy may be because of the prominent disease's impact on the overall change of pregnancy as it progresses. Fetuses born with abnormal anatomy may result from infection, genetic abnormalities, or maternal diseases such as diabetes mellitus.⁹ Multifetal gestation has a higher rate of complication, including fetal abnormalities, growth restriction, or twin-twin transfusion syndrome. Twin pregnancies complicated by growth restriction or growth discordance were associated with a high

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risk of intrauterine fetal demise. When one fetal demise in twin pregnancy occurs, the adverse effect on the surviving co-twin can be favorable.¹⁰ More careful and intensive monitoring and investigation for multifetal gestation is necessary to reduce preventable complications.

Women who have experienced a stillbirth event require, not only a complete evaluation for this fetal loss, but also detailed information about the risk of recurrence to prepare for future pregnancy. When the current pregnancies are complicated with preterm delivery, growth restriction, placental abruption, or preeclampsia, the women are at increased risk of fetal demise in their subsequent pregnancies.¹¹ This study showed that most stillbirths were due to multigravida and recurrent fetal demise, and umbilical complication was only seen in few cases. The significant recurrence in late pregnancy may have resulted from the small sample size. The rarity of fetal demise means a promising outcome for the next pregnancy. However, this study offers several elements for the discussion of unresolved issues related to IUFD cases, which make it difficult, among other things, to assess the phenomenon in the various areas observed, limiting interventions, both on a clinical and health management basis, aimed at reducing its incidence to the minimum.

Conclusion

IUFD has been described as the death of foetus during pregnancy or within ≥ 20 weeks of gestation, irrespective of the duration of the pregnancy. Takai Local Government Area is not an exemption to the effect of IUFD as this study shown that most of the pregnant women suffer from issues related to IUFD due to the lack of awareness and high level of illiteracy or exposure to the effect of IUFD. Some of the most peculiar problems facing women in Takai are; ignorance, poverty, home delivery and inadequate maternal centres which are some of the factors that contribute to foetal death in Takai community.

References

1. Heazell AEP, Siassakos D, Blencowe H. et al. Stillbirths: economic and psychosocial consequences. *Lancet*. 2016; 387(10018):604–616. doi: 10.1016/S0140-6736 (15) 00836-3.
2. Sharma S, Sidhu H, Kaur S. Analytical Study of Intrauterine Fetal Death Cases and Associated Maternal Conditions. *International Journal of Applied and Basic Medical Research*, 2016; 6: 11-13. <https://doi.org/10.4103/2229-516X.173986>
3. Ara S, Nisar S, Bashir U. Incidence and risk factors of intra uterine fetal death: a retrospective study at a tertiary care center in Kashmir, India. *Internatinal Journal of Reproductive Contraception Obstetrics and Gynecology*, 2019; 8:1517.
4. World Health Organization. ICD-11 for mortality and morbidity statistics (ICD-11 MMS) 2018 version. 2020; Available at: <https://icd.who.int/browse11/l-m/en>.
5. Center for Disease Control and Prevention (CDC). What is Stillbirth? 2020; <https://www.cdc.gov/ncbddd/stillbirth/facts.html>.

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6. Kumar AK, Kanakeri R, Anjanappa B. Clinical study of various risk factors with intrauterine fetal death. *International Journal of Reproductive, Contraceptive, Obstetrics and Gynecology*, 2017; 6:5293–5298.
7. Efkarpidis S, Alexopoulos E, Kean L, Liu D, Fay T. Case-control study of factors associated with intrauterine fetal deaths. *Medscape General Medicine*. 2004; 6: 53.
8. Simpson LL. Maternal medical disease: risk of antepartum fetal death *Semin Perinatol*, 2002; 26: 42-50

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9. Chen CP, Shih SL, Liu FF. Jan Cebocephaly, alobar holoprosencephaly, spina bifida, and sirenomelia in a stillbirth. *Journal of Medical Genetics*, 1997; 34: 252-255.
10. Wu HY, Huang SC, Huang HC, Hsu TY, Lan KC. Cytomegalovirus infection and fetal death in one monozygotic twin. *Taiwan Journal of Obstetrics and Gynecology*. 2011; 50 (2011), pp. 230-232.
11. Rasmussen S, Irgens LM, Skjaerven R, Melve KK. Prior adverse pregnancy outcome and the risk of stillbirth *Obstetrics and Gynecology*, 2009; 114: 1259-1270.