

Pattern of birth defects at a university teaching hospital in Northern Nigeria: Retrospective review over a decade

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ABSTRACT

Background: Major birth defects are common causes of perinatal morbidity and mortality which have become a global phenomenon. Its occurrence in the developing nations like Nigeria requires due consideration most especially to its pattern and risk factors.

Objectives: This review was conducted to determine the pattern of birth defects and investigate the factors associated with birth defects and its outcome at Aminu Kano Teaching Hospital (AKTH), Kano.

Methods: This was a 10-year retrospective study conducted in the Department of Obstetrics and Gynaecology and the Department of Paediatrics (Special Care Baby Unit) of AKTH, Kano, between April 2007 and March 2017. Data retrieved from patients' file were collected using a purpose-designed proforma to obtain information on the required parameters and analyzed using IBM SPSS version 20, 2009 software. Frequencies and percentages were calculated and the results were presented in tabular forms.

Results: There were 6990 deliveries within the study period, out of which 305 babies had birth defects, giving a prevalence of 4.4%. Among women who delivered baby with birth defects, maternal age ranged from 16 to 45 years with a mean age of 30 ± 5 years. The highest incidence (48%) of birth defects occurred among the 26–35 years age group. Anomalies that affected single system are significantly higher than anomalies that affected multiple systems. A higher percentage (52.5%) of birth defects occurred in male neonates. The gastrointestinal system was the most commonly affected (32.5%), while musculoskeletal system was the least (3.75%) affected system. Drug intake among 120 mothers who delivered neonates with birth defects when considered as a risk factor was found to constitute 81% of traditional concoction/herbs; while 12.5% were orthodox and intake of social drug was found to be only 6.5%. Hypertension was found to be the highest chronic medical disorder, while chorioamnionitis following premature rupture of membrane was recorded as the most commonly occurring maternal infection. Sixty percent of these neonates with birth defects were managed conservatively, surgical treatment was given in 23.5%, while 16.5% underwent medical treatment. Discharge rate was 82.5%; 9% left against medical advice, while neonatal mortality rate was about 8.5% and a majority (91.8%) of the death occurred among the neonates with multiple birth defects.

Conclusion: The prevalence of birth defect in AKTH was 4.4% of the total deliveries over the study period. Gastrointestinal system was found to be the most commonly affected system. Hypertensive disorders of pregnancy and ingestion of traditional herbs were found to be the most common medical disorder and drug intake, respectively, among the mothers who delivered neonates with birth defects. Although the outcome of the management was good, and the study could not establish direct causation, there is need to counsel

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mothers on the inherent dangers of traditional herbs ingestion and the need to pay adequate attention to medical conditions in pregnancy.

Key words: Anomaly; birth defect; morbidity; neonate; prevalence rate.

Introduction

Birth defects are increasingly becoming a prominent cause of neonatal morbidity and mortality in most parts of the world.^[1-3] This is characterized generally by anatomical and physiological abnormalities that occur in pregnancy, especially during the period of organogenesis,^[2,4] with several disabilities affecting single or multiple systems of a neonate.

Globally, birth defects are estimated to account for 7% of all live births annually.^[3] The World Health Organization reported that 1 out of every 33 deliveries is affected with a birth defect annually.^[3] This is probably due to high intake of some social and illicit drugs during pregnancy in the developing countries.^[4,5] While in the developed countries, industrialization and modernization are reported to be likelihood contributors.^[3,5]

In Nigeria, a report has it that the prevalence of birth defects varies from 2.1% to 5.1% of total delivery during the study period in the northern part of the country.^[3] In south-western Nigeria, the prevalence of birth defects was reported to be 15.9%.^[3] The high prevalence rate is attributed to self-medication practices, patronage of traditional birth attendants, and ingestion of herbal concoction by pregnant women.^[3,4]

However, studies have shown that there is paucity of adequate information on related risk factors especially with respect to medical, obstetrics, drug, and social factors. On the other hand, information on the neonates' condition at delivery, further management after delivery, and final outcome of the affected babies were largely unreported in many publications.

A study conducted in Kano metropolis about six years ago reported the prevalence of birth defects to be 28.1 per 1000 live births.^[1] This study did not report the outcome of birth defects and the associated risk factors in the mothers. Furthermore, the exigency of the principles of audit cycle in maternal and child morbidity in healthcare delivery and inclusion in tertiary health centers cannot be overemphasized. Therefore, a study that would investigate a pattern of birth defects and its related risk factors as it concerns visible medical precaution on best medical practices is a welcome development. It is in this regard that this retrospective study

was conducted to determine the pattern of birth defects and investigate the factors associated with birth defects and its outcome in Aminu Kano Teaching Hospital (AKTH).

Methods

The review covered a period of 10 years (April 2007–March 2017) and was conducted in the Department of Obstetrics and Gynaecology and the Department of Paediatrics (Special Care Baby Unit), AKTH, Kano. Research approval from the Research and Ethics Committee of AKTH was obtained prior to the study. The lists (names and hospital numbers) of mothers who delivered babies with birth defects as well as the list of babies with various birth defects from the health record registers of the labor ward, postnatal ward, theater, and special care baby unit (SCBU) were reconciled, and their files were retrieved from central medical record library. In this study, a birth defect was defined as the gross structural or functional abnormality that occurred during pregnancy (period of embryogenesis) affecting single or multiple systems which manifest after birth. Only mothers/babies with the required information for the study were included.

Data were collected using a purpose-designed proforma sheet, including the maternal sociodemographic factors, obstetric factors, and neonatal birth outcomes among others. The data were analyzed using IBM SPSS software (Chicago, IL, USA; 2009; version 20) for frequencies and percentages. The significant levels of various investigated parameters in the study were determined using Chi-square test and *P* value was set at <0.05. The results were presented using tables.

Results

There were 6990 deliveries in AKTH over the study period, out of which 305 babies had birth defects giving an institutional prevalence of 4.4% of the total deliveries. Two hundred case notes were retrieved which contained complete information of both mothers and neonates giving a retrieval rate of 66%.

Table 1 shows the sociodemographic and reproductive characteristics of the parents of babies born with birth defects. Maternal age ranged from 16 to 45 years with a mean age of 30 ± 5 years. The highest incidence (48%) of

birth defects occurred among 26–35 years age group. About 76.5% of the birth defects occurred among the multiparous, while 23.5% was in primiparous. However, fathers who were 50 years and above have recorded significantly ($P \leq 0.001$) highest occurrence rate of 40.5% when compared with fathers of <50 years.

About 34.5% of mothers who delivered neonate with birth defects have primary school certificate as the highest form of education, while 24.5% of the mothers who delivered neonate with birth defects had no form of education at all. Educational level was significantly associated with having a baby with birth defects. More than half (59.5%) of the mothers who delivered neonates with birth defects were booked.

Table 2 shows the neonatal outcome of babies delivered with birth defects. The result shows no statistically significant difference between ($P = 0.064$) the male and female neonates delivered with birth defects. However, a higher percentage of birth defects (52.5%) occurred in male neonates.

About three-quarter of the neonates were delivered at term (37–42 weeks) with 58% of them having a birth weight ranging between 2.5 and 3.5 kg as documented in the labor ward register. While 23% of the neonates were delivered before 37 weeks of gestation, 4% were delivered post-term. About a quarter (23.5%) of the babies with birth defects had birth asphyxia.

In this review, about 86.5% of the birth defects in the neonate affected a single system. Gastrointestinal system is the most commonly affected system in the neonate with 32.50% followed by central nervous system (CNS) with 21.25% and face with 15.0%, while the urogenital system accounted for 10.0%. Other affected systems in descending order are respiratory 6.25%, cardiovascular 5.63%, multiple birth defects 5.63%, and musculoskeletal 3.75%.

Table 3 shows the distribution and types of anomaly among the various systems. The percentage and types of anomalies for urogenital system documented were posterior urethral valve as the most frequently occurred with 42.2%, but only a single case (7.2%) each of bladder extrophy, polycystic kidney disease, and epispadias were recorded in this review. But both hypospadias and atrophied genitalia each occurred among 10.1% of the babies and ambiguous genitalia occurred in 16.0% of them. Among the types of birth defects affecting respiratory system of a neonate, tracheoesophageal fistula was found to be the most frequent, occurring in 72.7% of the babies, followed by pulmonary hypoplasia seen in 27.3% which was diagnosed by radiological findings.

Table 1: Sociodemographic and reproductive characteristics of the parents

Parameters	Frequency	Percentage(%)
Maternal		
Age (years)		
15–25	60	30.0
26–35	96	48.0
36–45	44	22.0
Paternal		
≤40	58	29.0
40–50	61	30.5
≥50	81	40.5
Parity		
Primipara	47	23.5
Multipara	100	50.0
Grand multipara	53	26.5
Education		
Primary	61	34.5
Secondary	38	19.0
Tertiary	15	7.5
Quranic	29	14.5
None	49	24.5
Booking		
Booked	119	59.5
Unbooked	81	40.5

Table 2: Neonatal outcome of babies with birth defects

Parameters	Frequency	Percentage
Sex of neonate		
Male	105	52.5
Female	95	47.5
Gestational age		
Pre-term	47	23.0
At term	145	73.0
Post-term	8	4.0
Birth weight		
Macrosomia	10	5.0
Normal	146	73.0
LBW	44	22.0
Birth asphyxia		
Present	49	23.5
Absent	151	76.5

In this study, the congenital anomalies recorded for cardiovascular system (CVS) were transposition of great arteries [22.2% (2)], ventricular septal defects [33.3% (3)], and patent ductus arteriosus [44.5% (4)]. While record for musculoskeletal system are talipes equinovarium [70% (7)] and polydactyl [30% (3)].

The identifiable risk factors among mothers who delivered babies with birth defects indicate that about 12% of the mothers who delivered neonate with birth defects have family history of birth defects, while 11% had previous history of birth defects. The medical disorders investigated and

Table 3: Distribution and types of anomaly among the various affected systems

System affected	Birth defects	Frequency	Percentage
GIT	Omphalocele	17	31.5
	Intestinal obstruction	14	26.0
	Gastroschisis	9	16.5
	Imperforate anus	5	9.0
	Duodenal atresia	4	7.5
	Hirschsprung's disease	3	5.5
	Esophageal atresia	2	4.0
CNS	Myelomeningocele	27	82.0
	Hydrocephalus	3	9.0
	Encephalocele	3	9.0
Face	Cleft lip or palate	15	62.5
	Exophthalmos	8	33.3
	Choanal atresia	1	4.2
RS	Tracheoesophageal fistula	63	72.7
	Pulmonary hypoplasia	8	27.3
CVS	Patent ductus arteriosus	4	44.5
	Ventricular septal defects	3	33.3
	Transposition of great arteries	2	22.2
MSS	Talipes equinovarium	7	70.0
	Polydactyl	3	30.0
UGS	Posterior urethral valve	6	42.2
	Ambiguous genitalia	3	16.0
	Hypospadias	2	10.1
	Atrophied genitalia	2	10.1
	Bladder extrophy	1	7.2
	Polycystic kidney disease	1	7.2
	Epispadias	1	7.2

GIT: Gastrointestinal tract; CNS: Central nervous system; RS: Respiratory system; CVS: Cardiovascular system; MSS: Musculoskeletal system; UGS: Urogenital system

recorded were hypertensive disorders of pregnancy at 65.8%, epileptic seizure 19.7%, diabetes mellitus 9.7%, and others such as HIV accounted for 4.8%. While history of intake of traditional herbs was positive in 82% of them, about 11.5% of them were on prescription medications, while recreational drug intake was recorded in 6.5% of the women. Maternal infections recorded in this study are maternal Herpes zoster at 1.2%, malaria 4.8%, chlamydia 31%, and bacterial vaginosis 63%.

The management options and outcome of neonates with birth defects as shown in Table 4 show that 60% of the neonates were managed conservatively, 16.5% had medical treatment, and 23.5% had surgical intervention. However, the result of the outcome of the management was that 82.5% of the neonate had successful treatment and were discharged; 9% of them left against medical advice and 8.5% died.

Discussion

Birth defect is a distressing condition in any family globally. Babies born with birth defects contribute greatly to the

worldwide perinatal morbidity and mortality and are therefore of public health concern.^[1-3] The prevalence of birth defects of 44 cases per 1000 births in this study is in the downward trend when compared with the 55 cases per 1000 births reported 12 years ago from the same centre.^[1] Therefore, it could be said that this decrease may be related to the fact that there is an improvement in health seeking behavior of the populace as well as the service delivery provided over the study period by the center (personal experience). The prevalence of birth defects reported in this study is, however, twice that reported from the Niger Delta region, South-south Nigeria.^[5] This difference may likely be accounted for by the difference in number of years studied^[4] and also more grand-multiparous women with their associated chronic medical conditions were prevalent in our study. The difference may also be accounted for by the difference in the socioeconomic status between the southern and northern parts of Nigeria. Our prevalence is similarly 3–10 times higher than the reports from other regions of the country,^[3,5] even though the study by Fajolu *et al.*^[3] reported only “major” congenital anomalies; the prevalence in this study would therefore be expectedly higher.

Similar finding reported^[6] that anomaly affecting multiple systems was lower than that of the single system. Our finding agrees with the previous study^[1] that the digestive system had the most common birth defects in AKTH. However, some studies reported the CNS^[5] and CVS^[3] to be the most commonly affected, followed by digestive system. This may probably be as a result of the differences in the etiology and/or associated risk factors for birth defects in the population studied.

The mean age of mothers with highest birth defects in this study is found to be 30 years, as similarly reported,^[3] implying that delivery of babies with birth defects should not be underestimated among the young mothers. However, the results show that men who are 50 years had highest number (40.5%) of neonates with birth defects in this study as similarly documented by a previous report.^[2] This means that a man of age 50 years and above stands higher risk of giving birth to a baby with birth defects. Multiparous mothers were found to have the highest cases of neonates with birth defects in this review. This is in agreement with previous report^[2] which stated that multiparity was associated with increased prevalence of congenital malformations. The results of this study show that a majority of the mothers who delivered neonates with birth defects have little or no education. This perhaps suggests that higher educational status is a vital factor that influences the health seeking behavior of the populace and thus to have a good antenatal care. Although

Table 4: Management options of neonates with birth defects

System	Anomaly	Conservative		Medical		Surgical	
		Frequency	%	Frequency	%	Frequency	%
CNS	Hydrocephalus	3	1.5				
	Myelomeningocele	13	6.5			14	7
Face	Cleft lip/palate	6	3.0			9	4.5
	Exophthalmus	2	1.0	2	1.0		
CVS	TOF	3	1.5	3	1.5		
	TGA	2	1.0	3	1.5		
	PDA	4	2.0	4	2.0		
RS	Cong tracheoesophageal	7	3.5				
	Pulm hypoplasia	1	0.5				
GIT	Omphalocele					13	6.5
	Gastrochisis					7	3.5
	Intestinal obstr	14	7.0				
	Hirschsprung dx	5	2.5	2	1		
	Duodenal atresia	4	2.0	3	1.5		
UGS	Imperforate hymen						
	PUV					4	2
	Bladder extrophy	2	1.0	1	0.5		
	Ambiguous genitalia	3	1.5	1	0.5		
MSS	Polydactyl	11	5.5				
	Talipes equinovarus	9	4.5				
Multiple	Multiple anomaly	31	15.5	14	7		
	Total	120	60%	33	16.5%	47	23.5%

CNS: Central nervous system; CVS: Cardiovascular system; GIT: Gastrointestinal tract; UGS: Urogenital system; RS: Respiratory system; MSS: Musculoskeletal system; TOF: Tetralogy of Fallot; TGA: Transposition of Great Arteries; PDA: Patent Ductus Ateriosus; PUV: Posterior Urethral Valve

48% of these mothers booked and had antenatal care in AKTH, a relatively high number of these patients could have probably booked late and that they might have missed early screening and antenatal supplementations and/or preventive measures.

The gender distribution of neonates with birth defects in this study shows that the prevalence in both male and female neonates was comparable. This implies that prevalence of birth defects might not be indiscriminate of gender of the neonate. Similar finding was reported from an 8-year review of major congenital abnormalities in a tertiary hospital in Lagos state.^[3] It is, however, contrary to a previous report^[2] that showed more female babies were born with birth abnormalities.

The frequency of occurrence of neonates with birth defects without asphyxia in this study is significantly higher than the number of neonate with asphyxia. This apparently implies that the occurrence of asphyxia in babies born with birth defects could be based on the type, severity, system, and number of system affected, together with promptness and effective resuscitation of the neonates at birth. Almost 75% of babies delivered with birth defects had a normal birth weight, followed by the extremes of birth weight which was recorded as low birth weight in 22%, while macrosomia accounted for 5%, similar to a previous report.^[2] In this regard, it is possible

that these babies have actually sustained and withstand the stress of abnormalities having achieved an average weight *in utero*. The pre-term and post-term neonates with birth defects are significantly lower than term babies with birth defects. The finding in this study is similar to the report of Onyearugba *et al.*,^[6] but contrary to a previous report^[3] which stated that higher prevalence of birth defects was found among the preterm babies. It is likely that the occurrence of birth defect is regardless of a particular gestational age. Therefore different stages of basic reproductive health practices are recommended option, including preconception use of folic acid which could reduce birth defects.^[7,8]

The discharge rate of 82.5% in this study shows a better management practice in AKTH with low mortality rate of 8.5% which was significantly caused by multiple birth defects, while the discharge against medical advice was found to be 9% which calls for probing in to the immediate and remote reasons why these vulnerable group took this decision to forestall feature occurrence, reduce, and/or prevent the morbidity and mortality associated with birth defects.

Conclusion

There is reduction in the prevalence of birth defect in AKTH from 5.5% to 4.4% of total deliveries over the study

period. This prevalence is indiscriminate of gender of the neonates. Gastrointestinal system was found to be the most commonly affected system. Hypertensive disorders of pregnancy and ingestion of traditional herbs were found to be the most common medical disorder and drug intake, respectively, among the mothers who delivered neonates with birth defects. Although the outcome of the management was good, and the study could not establish direct causation, there is need to counsel mothers on the inherent dangers of traditional herbs ingestion and the need to pay adequate attention to medical conditions in pregnancy.

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Conflicts of interest

There are no conflicts of interest.

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