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Original Research Article

A cross sectional study on the prevalence of structural congenital anomalies among neonates delivered in a tertiary care hospital, Chennai from January 2016 to February 2017

Vinodh Muthu[1], Mekalai Suresh Kumar[2]*, Anitha Ram Ponnappan[3]

[1]Department of Pediatrics, Institute of Social Pediatrics, Government Stanley Medical College, Chennai, Tamil Nadu, India
[2]Department of Pediatrics, Pediatrics, Government RSRM Hospital, Chennai, Tamil Nadu, India
[3]Public Health consultant, Chennai, Tamil Nadu, India

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***Correspondence:**
Dr. Mekalai Suresh Kumar,
E-mail: mekalaisureshkumar@ymail.com

ABSTRACT

Background: Congenital anomalies are important contributors to infant and childhood deaths, chronic illness and disability. The pattern and type of anomaly varies regionally. The planning and the implementation of public health programs for congenital anomalies are dependent on the prevalence data. Adequate data is unavailable in our country. The objective of this study was to study the prevalence of congenital anomalies and the factors influencing them, in Government RSRM lying in hospital, Chennai from January 2016 to February 2017.
Methods: This is a cross-sectional study conducted in Government RSRM lying-in hospital, a tertiary care neonatal unit, from January 2016 to February 2017. The case records of neonates delivered during the study period were studied to identify those with congenital anomalies. The factors possibly influencing congenital anomalies were studied.
Results: The number of case records analyzed was 11242, out of which 157 neonates were reported to have structural congenital anomalies; the prevalence was 1.4%. Congenital heart disease formed the majority, 46.5% (73/157) of congenital anomalies identified. The most common extra-cardiac congenital anomalies noted were cleft lip/cleft palate (15/157) 9.6%, followed by single umbilical artery which was noted in 5.7% (9/157). Down's syndrome was seen in 3.8% (6/157) and neural tube defects in 3.2% (5/157) of the babies with congenital anomalies.
Conclusions: The prevalence of commonly occurring congenital anomalies in the study hospital was comparable to the prevalence in other similar studies in India. The prevalence of neural tube defects was lower in our area compared to other countries whereas, that of acyanotic heart diseases were higher than in other studies.

Keywords: Congenital anomalies, Congenital diaphragmatic hernia, Congenital heart disease, Neural tube defects

INTRODUCTION

Congenital anomalies make an important contribution to the burden of infant and childhood deaths, chronic illness and disability. Congenital anomalies can be defined as structural or functional anomalies that occur during intrauterine life and can be identified prenatally, at birth or later in life. Congenital anomalies may be caused by single gene defects, chromosomal disorders, multifactorial inheritance, environmental teratogens and micro-nutrient deficiencies.[1] Approximately 4-5% of newborns have major birth defects and may require genetic analysis.[2] Major malformations are those which have medical and cosmetic consequence. Statistics

regarding congenital anomalies in the community is required for the planning and implementation of public health programs and also to know whether a particular geographic area or ethnic group is prone for certain congenital anomalies. Tamil Nadu has an infant mortality rate of 21 per 1000 live births, against a national average of 40 per 1000 live births.[3] The Tamil Nadu government is committed to reducing the Infant Mortality Rate (IMR) to below 13 by 2017 and reaching up to the standards of developed nations by 2023 according to a policy note of the Health Department. With the decreasing number of infant deaths, congenital anomalies gain more importance, as appropriate action has to be taken to reduce the morbidity and mortality due to the same.

METHODS

The objectives of this study were to study the prevalence of various structural congenital anomalies in a tertiary care neonatal unit and to study the factors that may possibly influence various congenital anomalies.

Inclusion criteria

All neonates delivered during the above period were included in the study. The study was conducted as a retrospective observational: cross-sectional study during the period from January 2016 to February 2017.

Exclusion criteria

Neonates suspected to have metabolic disorders were excluded from the study.

Data collection

After obtaining the approval of the institutional ethics committee, the case sheets of all neonates born during the study period were analyzed. The identification of congenital anomalies at birth in the study area is usually done by clinical examination of the neonates and supportive investigations like imaging studies. Data on the type of anomaly, maternal age, parity, history of abortions in the mother and details of the neonate such as birth weight, gestational age etc. were gathered. The final outcome of these babies was also noted.

Statistical analysis

Data entry and analysis were done using SPSS software version 21. Chi-square test and Fischer's Exact test were done to find any association between congenital anomalies and maternal/neonatal factors studied. The significance of p value was considered to be <0.05 for this study.

RESULTS

The total number of deliveries during the study period of January 2016 to February 2017 was 11242. Total number of neonates identified with congenital anomalies was 157. The prevalence of congenital anomalies during the study period was 1.4%.

The mean (SD) birth weight of the neonates with congenital anomalies was 2.482 (0.618) kg. The lowest weight was 760 grams and the maximum weight noted was 4.10 kg. The mean (SD) age of the mothers was 24.73 (2.850) years. A majority 84.7% (133/157) of the mothers belonged to the age group of 21-30 years, 7% (11/157) were more than 30 years, 8% (13/157) were less than 20 years of age. On analyzing the details of maternal factors, 36.3% were primigravidae and 63.7% were multigravidae. A past history of abortions was found in 22.3% (35/157) mothers.

Congenital anomalies were found to be more in male neonates (56.7%, 89/157) compared to females (43.3%, 68/157). Almost 51% of the deliveries were conducted by caesarean sections, and 42.7% were normal vaginal deliveries. Vacuum delivery and forceps delivery constituted 5% of total deliveries and hysterotomy was done for 2 cases.

Term babies constituted 61.8% (97/157) and preterm 38.2% (60/157) of the neonates. Most of the neonates, 81.5% (128/157), in terms of birth weight, were appropriate for gestational age. Out of 157 neonates 17 expired during the course in the hospital and 11 were referred for surgical management. The various congenital anomalies identified are given in the following Table 1.

Table 1: Frequency of congenital anomalies (N=157).

Congenital anomaly	Frequency	%
Congenital heart disease	68	43.3
Cleft lip/ cleft palate	17	10.8
Single umbilical artery	9	5.7
Imperforate anus	8	5.1
Urogenital anomalies	7	4.5
Congenital talipes equinus varus	7	4.5
Limb anomalies	7	4.5
Down syndrome	6	3.8
Neural tube defects	5	3.2
Polydactyly	4	2.5
Preauricular skin tag/ear anomalies	4	2.5
Other syndromes	4	2.5
Congenital diaphragmatic hernia	3	1.9
Hydrocephalus	3	1.9
Trachea-esophageal fistula	1	0.6
Intestinal obstruction	1	0.6
Skeletal dysplasia	1	0.6
Developmental dysplasia of hip	1	0.6
Ocular albinism	1	0.6
Total	157	100

Congenital heart disease formed a major portion of congenital anomalies identified constituting 46.4% (73/157, 5 cases of Down's syndrome had cardiac

anomaly). The most common extra cardiac congenital anomalies noted was cleft lip/cleft palate (17/157) 10.8% followed by single umbilical artery which was noted in 5.7% (9/157). Urogenital anomalies constituted 4.5% (7/157), Congenital Talipes Equinus Varus 4.5% (7/157). Neural tube defects were found in 3.2% (5/157), imperforate anus 5.1% (8/157) and congenital diaphragmatic hernia in 1.9% (3/157). Down's syndrome was diagnosed in 3.8% (6/157) of the babies with congenital anomalies.

Congenital heart disease was found in 46.4% (73/157) cases and acyanotic heart diseases constituted 86.3% (63/73) of the diagnosed cases. A total of 10 cases of cyanotic heart disease were diagnosed (13.6%). Among those with congenital heart disease, single heart lesion was found in 72.6% (46/73 cases) and remaining 36.98% had multiple heart diseases (27/73). Cyanotic congenital heart disease had the worst prognosis with 40% mortality (4/10); 1 case was transferred out and 5 cases were discharged from the unit. Among the cases with acyanotic heart disease, 4 died (4/63, 0.06%) and 59 cases were discharged from hospital. On comparing the birth weight, it was found that all cases of cyanotic heart disease had a birth weight of more than 2.5 kg. Ten cases of gastrointestinal anomalies (8 cases of imperforate anus, 1 intestinal obstruction, and 1 tracheo-esophageal fistula) were identified out which 8 cases were transferred out for pediatric surgery department. More than half, 60% of the cases with gastrointestinal anomalies were term babies (6/10) and 40% were preterm. Five cases of neural tube defects were identified out of which 40% (2/5) were term babies and 60% (3/5) were preterm.

The frequencies of congenital heart disease, neural tube defects, gastrointestinal disease were higher in multiparous women but there was no statistically significant association. The presence of history of abortion/s in the past had no statistically significant association with the occurrence of congenital anomalies, but was found in 33% (2/6) of cases of multiple acyanotic heart diseases (ASD and PDA), 50% (2/4) of cases of imperforate anus and (60%) of neural tube defects, 50% (3/6) cases of single umbilical artery, 33% (1/3) of multiple cyanotic heart disease, 20% (1/5) of ventricular septal defect.

Chi-square tests performed found that the association between gender of the neonate and neural tube defects was statistically significant X^2 (1, N = 157) = 3.946, p = 0.047, with all the 5/157 cases being reported in males. The association between gender of the neonate and occurrence of heart disease was also statistically significant, X^2 (2, N= 157) = 6.058, p = 0.048, with 41.6% (37/89) of the male children studied having some cardiac anomaly.

A significant association was also found between the outcome of pregnancy and heart disease, X^2 (2, N = 157) = 6.692, p=0.035, with 64 of the 73 children with heart disease being alive at the time of discharge. A strong statistically significant association was found between the outcome of pregnancy and the type of anomalies identified: X^2 (96, N= 157) = 218.172, p=0.000, with 129 of the 157 cases being discharged alive. There was also a highly significant association between age group of the mother and congenital anomalies identified, X^2 (96, N= 157) = 202.542, p=0.000, with 143 of the 157 neonates being born to mothers in the age group of 21 to 29 years. Most (80/157) of the neonates were delivered by caesarean section, and this was statistically significant, X^2 (192, N = 157) = 235.503, p=0.018.

DISCUSSION

According to a study conducted by Abqari S et al in Uttar Pradesh, acyanotic heart disease constituted 72.50% of congenital heart disease and in one by Shah et al in Kathmandu, it was 69%, whereas this study found a higher prevalence of 86%.[4,5] The prevalence of congenital heart disease was found to be 5.8/1000 hospitalized patients by Shah GS et al, 13.28% by Sawant SP et al conducted at Mumbai whereas in the present study it was 6.49%.[5,6] Acyanotic heart disease constituted 27.50% of the congenital heart disease according to Abquari S.[4] In the present study the prevalence was found to be 13.69%. A study by Shah GS estimated the prevalence of cyanotic congenital heart disease to be 31%.[5] The increased prevalence of acyanotic heart disease may possibly be due to the increased prevalence of gestational diabetes mellitus in the state of Tamil Nadu. The prevalence of cleft lip and palate was found to be 11% to 15.3% by Pavri S et al, conducted at Canada, whereas in the present study it was 9.6%.[7] Neural tube defects identified by Omer IM et al in Sudan was 2.8/1000 live births, and that identified by Seidahmed MZ et al in Riyadh was 1.2/1000 live births.[8,9] In the present study the prevalence was only 0.44/1000 live births. This may be attributable to folic acid supplementation given to women of the reproductive age group in the state, through various public health programs. The prevalence of congenital diaphragmatic hernia in this study was found to be 2.66/10000 live births, whereas that in a study done by Burgos CM et al in Sweden, it was found to be 3.5/10000 deliveries, and in a study done by Grizelj R et al in Croatia it was found to be 2.67/10000 live births.[4,10]

In this study the prevalence of structural congenital anomalies at the time of birth before discharge were analyzed.

Limitations of this study are that it has been done in a resource limited setting, and all cases are not routinely screened with imaging studies to pick up occult anomalies which have not presented during the hospital stay. There is a possibility of more cases with anomalies being identified at a later point in life, like ventricular septal defect. As our hospital caters to the population belonging predominantly to the lower socioeconomic

status in an urban area, the results from this study might not be generalizable to the entire population.

Studies of this sort, if conducted on a large scale in various neonatal units throughout the country, would hugely contribute to an improved understanding of the prevalence and pattern of congenital anomalies; this would in turn contribute to better planning and implementation of National Health Programs. If the requisite resources were available, the birth cohort of the neonates with congenital anomalies could be followed up to study the prognosis of the neonates with various anomalies and the quality of life of those affected by them. The anomalies scan could be done for all antenatal women attending Government Hospitals to screen for structural anomalies and to implement preventive measures.

CONCLUSION

This study has estimated the prevalence of structural congenital anomalies in a tertiary care neonatal unit. The prevalence of surgically correctable congenital anomalies was lower in the study area compared to other countries, whereas that of acyanotic heart diseases was higher than other studies. Early identification is required for early intervention at an appropriate center. The formulation of screening protocols and the implementation of various programs for management of congenital anomalies are dependent on the incidence and prevalence data. Further studies are required so that effective programs can be implemented for early intervention to prevent, abort or treat these cases..

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