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Research Article

A study on incidence of congenital anomalies in newborns and their association with maternal factors: a prospective study

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ABSTRACT

Background: Congenital malformation represents defects in morphogenesis during early fetal life. Congenital anomalies account for 8–15% of perinatal deaths and 13-16% of neonatal deaths in India. The objective was to study incidence of clinically detectable congenital malformations in newborns delivered at a tertiary hospital and their association with maternal factors.
Methods: The present study is a prospective study of all the newborns delivered at Obstetrics and Gynecology Department, GMERS Medical College, Dharpur-Patan, Gujarat, India for a period of three years from 1st January 2013 to 31st December 2015. Total 2760 consecutive births including both live born babies and still born babies were examined after taking verbal and written consent of their mothers for a visible structural anomalies to determine the overall incidence of congenital malformations and their association with maternal factors. Data were statistically analyzed using SPSS software (trial version).
Results: A total of 2760 babies were born out of which 38 were twins. Total numbers of malformed babies were 34, so total point incidence of congenital anomalies turned out to be 1.23%. Out of total 2722 mothers 1815 (66.7%) were in the age group of 21-35 years and out of them 30 (1.70%) malformed babies were born. 167 (6.13%) mothers had consanguineous marriage and out of them 5 (2.99%) had malformed babies. 9 (0.33%) mothers had previous malformed child and out of them 3 mothers gave birth of 3 (33.33%) malformed babies. 397 (14.58%) mothers had history of previous abortion and out of them 10 (2.51%) had malformed babies. 151 (5.54%) mothers had severe anemia and out of them 09 (5.90%) had malformed babies.
Conclusions: From present study it has been concluded that congenital anomalies in newborns were significantly associated with maternal factors like maternal age, consanguinity, previous child with malformation, history of previous abortion and severe anemia.

Keywords: Congenital anomalies, Congenital malformations, Still births, Birth defects, Maternal factors

INTRODUCTION

The most traumatic experience for a gravid woman, her husband and their family is, undoubtedly, the unheralded birth of deformed child, precipitating feeling of horror, inadequacy and failure in parents.[1]

Congenital malformation represents defects in morphogenesis during early fetal life. According to the World Health Organization (WHO) document of 1972, the term congenital malformations should be confined to structural defects at birth.[2] The leading causes of infant morbidity and mortality in poorer countries are malnutrition and infections, whereas in developed countries they are cancer, accidents and congenital malformations. Congenital anomalies account for 8–15% of perinatal deaths and 13–16% of neonatal deaths in India.[3,4]

Patients with multiple congenital anomalies present a relatively infrequent but tremendously difficult challenge to the pediatrician. The proportion of perinatal deaths due to congenital malformations is increasing as a result of reduction of mortality due to other causes owing to the improvement in perinatal and neonatal care. In the coming decades, this is going to be a leading cause of morbidity and mortality in centers providing good neonatal care. Also, increased use of irridiation, alkylating agents, antimetabolites, self-drugging, smoking, alcohol consumption has contributed to increased incidence of congenital malformation.

It is estimated that 1 in 40 or 2.5% of newborns have a recognizable malformation or malformation at birth.[5] In India with decreasing mortality due to infection and nutritional disorders, incidence in death due to congenital malformation are increasing.[6] A study done at AIIMS show that congenital malformations contributed to 13.4% of perinatal deaths as compared to 9% a decade back.[7] Major malformation accounts for 15% of neonatal death.[8]

Studies like present series and other ongoing multicentre study programmes are expected to alert us with regard to new teratogen, better understanding of the epidemiological implications and thereby helping us in preventing the occurrence and better management of congenital malformation. This study has been conducted to throw light on overall and individual incidence and of clinically detectable congenital malformations in newborns delivered at a tertiary hospital and their association with maternal factors.

METHODS

The present study is a prospective study of all the newborns delivered at Obstetrics and Gynecology Department, GMERS Medical College, Dharpur-Patan, Gujarat, India for a period of three years from 1st January 2013 to 31st December 2015. Before conducting the study approval was obtained from institutional ethical committee for human research. Data safety and confidentiality was also given due consideration. The file containing identity related details was kept password protected and the filled Performa were kept in lock with key accessible only to researcher. Total 2760 consecutive births including both live born babies and still born babies were examined after taking verbal and written consent of their mothers for a visible structural anomalies to determine the overall incidence of congenital malformations and to establish various etiological factors which seems to have a causal relationship. To cover all the findings of relevant history and of examination, a performa was predesigned. According to it a complete medical history and family history for any congenital malformation, antenatal history for exposure to infection, drugs and irradiation, maternal history for age, consanguinity and parity and personal history was taken. High risk neonates were examined in detail by a neonatologist. All the babies were examined within 12 hours of birth. Thorough physical examination of newborn babies was done. Immediate outcome of all the malformed babies was recorded during the period of mother's hospital stay and attempt was made to find out any history of congenital malformations in other family members.

Any malformed baby suspected of having syndromic congenital malformation was also confirmed by investigations e.g. ultrasonography, x-ray, echo and also by taking expert opinions of pediatrician. Data were statistically analysed using SPSS software (trial version).

RESULTS

In the present study, we studied the total numbers of babies born in GMERS Medical College, Dharpur-Patan for a period of 3 years from 1st January 2013 to 31st December 2015. A total of 2760 babies were born out of which 38 were twins. Total numbers of malformed babies were 34, so total point incidence of congenital anomalies turned out to be 1.23% (Table 1).

Table: 1 Incidence of congenital anomalies.

Total No. of deliveries	2722
Total No. of twin deliveries	38
Total No. of newborns	2760
Total No. of malformed newborns	34
Incidence of congenital anomalies	1.23%
Incidence of congenital anomalies/1000 births	12.32

Table: 2 Association of maternal age with congenital anomalies.

Maternal age	Total no. of mothers	No. of malformed cases	Percentage
< 20 yr	595	3	0.5%
21-35	1815	30	1.65%
>35	312	1	0.32%

$p=0.0286$, $\chi^2 = 7.107$

Out of total 2722 mothers 1815 (66.7%) were in the age group of 21-35 years and out of them 30 (1.70%) malformed babies were born. Statistically significant association was found between congenital malformation and maternal age (Table 2). Out of total 2722 fathers, 434 (15.9%) fathers were above the age of forty and out of them 6 (1.38%) had malformed babies. No statistically significant association was found between congenital malformation and paternal age (Table 3). Out of total 2722 mothers, 167 (6.13%) had consanguineous marriage and out of them 5 (2.99%) had malformed babies. Statistically significant association was found between congenital malformation and consanguineous marriage (Table 4). Out of total 2722 mothers, 9 (0.33%) had previous malformed child and out of them 3 mothers gave birth of 3 (33.33%) malformed babies. Statistically

significant association was found between congenital malformation and previous child with malformation (Table 5). Out of total 2722 mothers, 397 (14.58%) mothers had history of previous abortion and out of them 10 (2.51%) had malformed babies. Statistically significant association was found between congenital malformation and history of previous abortion (Table 6).

Table: 3 Association of paternal age with congenital anomalies.

Paternal age	Total no. of fathers	Total no. of malformed cases	Percentage
<40 yr	2288	28	1.22%
>40 yr	434	06	1.38%

p=0.78, $\chi 2 = 0.072$

Table 4: Association of consanguinity with congenital anomalies.

Consanguinity	Total no. of mothers	Total no. of malformed cases	Percentage
Yes	167	5	2.99%
No	2555	29	1.13%

p=0.0401, $\chi 2 = 4.216$

Table 5: Association of previous child with malformation with congenital anomalies.

Previous child with malformation	Total no. of mothers	Total no. of malformed cases	Percentage
Yes	9	3	33.33%
No	2713	31	1.14%

p<0.0001, $\chi^2 = 55.87$ (Yates corrected)

Table 6: Association of history of previous abortion with congenital anomalies.

H/O Previous abortion	Total No. of mothers	Total No. of malformed cases	Percentage
Yes	397	10	2.51%
No	2325	24	1.03%

p=0.0154, $\chi 2 = 5.865$

Table 7: Association of severe anemia with congenital anomalies.

Severe anemia (Hb </= 7gm%)	Total no. of mothers	Total no. of malformed cases	Percentage
Present	151	09	5.90%
Absent	2571	25	0.90%

p<0.00001, $\chi 2 = 26.883$

Out of total 2722 mothers, 151 (5.54%) mothers had severe anemia and out of them 09 (5.90%) had malformed babies. Statistically significant association was found between congenital malformation and severe anemia (Table 7).

DISCUSSION

In our study incidence of congenital anomalies was 1.23%. Other studies like Datta, et al, Swain et al, Taksande A. et al, Anand et al and Karla et al showed incidence of congenital anomalies were 1.24%, 1.2%, 1.91%,2% and 1.98% respectively.[4,6,9-11] Studies like Desai N, et al and Saifullah, et al showed slightly higher incidence (3.6%) than our study.[12,13] The true incidence of congenital malformations depends upon several factors and no two studies are strictly comparable. It depends upon ethnic background, population sample (hospital or community based, live birth or total birth), nature of study (prospective or retrospective), age at the time of diagnosis ,duration of follow up, autopsy rate, diagnostic facility available and enthusiasm and acuteness of physician. In the present series, low incidence in comparison to other studies is possibly because of malformations only present at birth were included. All those malformations recognized as result of autopsy study or which were diagnosed later on was excluded.

In our study statistically significant association was found between congenital malformation and low birth weight. Low birth weight was associated with increased risk of congenital malformations. This highlights the fact that the presence of congenital anomaly itself hampers the growth of a developing foetus. This fact is also highlighted in other studies such as Taksande A et al, Karla et al, Desai N et al and Saifullah et al.[9,11-13] In our study statistically significant association was found between congenital malformation and prematurity. This is particularly a cause of concern as prematurity and stillbirths are a major cause of perinatal mortality. Similar findings were also obtained in other studies such as Taksande A et al, Karla et al, Desai N et al and Saifullah et al. [9,11-13]

In our study statistically significant association was found between congenital malformation and maternal age. Other studies, such as Swain, et al, Taksande A, et al, Desai N, et al and Sagunabai, et al have found statistically significant association of increased maternal age and congenital anomalies.[6,9,12,14] Other studies such as Datta et al, Khanna M et al and Karla et al have found no statistically significant association between congenital malformation and maternal age.[4,5,11] In our study no statistically significant association was found between congenital malformation and paternal age. Yang, et al also observed a correlation between increasing paternal age and offspring with esophageal atresia.[15] Findings of Fisk R et al suggest that paternal age may be a risk factor for some multifactorial birth defects.[16] In our study out of total 2722 mothers, 167 (6.13%) had consanguineous marriage and out of them 5 (2.99%) had malformed

babies. Statistically significant association was found between congenital malformation and consanguineous marriage. Agarwal SS and Desai N et al found highly significant correlation between congenital malformation and consanguinity.[1,12] In our study statistically significant association was found between congenital malformation and previous child with malformation. Similar findings was also obtained in the study of Agrawal et al while Anand et al and Sagunabai et al did found such significant association between congenital malformation and previous child with malformation.[1,10,14] In our study significant association of congenital malformation with previous history of abortion and severe anaemia was found. Similar findings was also obtained in the study of Saifullah et al.[13]

This study was conducted in a tertiary care centre with specialized maternal and neonatal care. Therefore the number of mothers and babies with complications could be more than that in the community. Hence the rate of occurrence of malformations among babies also could be more than that in the general population.

CONCLUSION

From present study it has been concluded that congenital anomalies in newborns were significantly associated with maternal factors like maternal age, consanguinity, previous child with malformation, history of previous abortion and severe anemia. More emphasis should be given on prevention by regular antenatal care and avoidance of known teratogens and probable teratogenic agents. Antenatal diagnosis, genetic counselling, better diagnostic and management facilities should be provided to improve the outcome.

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