

Original Article

POTENTIAL RISK FACTORS FOR CONGENITAL MALFORMATIONS IN NEONATES: A CASE SERIES STUDY IN TWO TERTIARY CARE HOSPITALS OF LAHORE CITY

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Objective: 1.To Study the potential risk factors for congenital malformations in neonates admitted at two tertiary care hospitals of public sector in Lahore city. 2.To find out the frequency of systems affected in congenital anomalies.

Methods: It was a “case series” study conducted at Children hospital and Services hospital Lahore. All the congenital malformations from 1st April to 30th April, 2013, in neonates admitted in these institutions were included in the study. Mothers of 40 cases of congenital malformations were interviewed after taking verbal consent, using self-administered, pre-tested questionnaire. Data was analyzed by using SPSS version 14.

Results: The frequency of cousin marriages in parents with congenitally malformed children was considerably high i.e. 65%. Majority of mothers i.e. 62.5% were below metric, 87.5% belonged to low income group, 62.5% did not made an increase in diet during pregnancy, 35% suffered from stress during pregnancy and 30% had previous abortion. The number of anomalies of urogenital system and GIT were higher with frequency of 45% and 30% respectively with a cumulative frequency of 75%.

Conclusion: The frequency of congenital malformations was considerably higher among parents with consanguinity, in low income groups, mother's education less than metric and paternal age greater than 30 years. The number of anomalies of urogenital system and GIT were higher in our subjects with frequency of 45% and 30% respectively with a cumulative frequency of 75%.

Keywords: Public hospitals, congenital malformation, congenital anomalies, cousin marriage, stress during pregnancy, diet during pregnancy.

Introduction

Congenital anomaly is a defect at birth and occurs in approximately 5% of babies. Congenital anomalies are categorized in to two groups.¹ First group: Malformations is a primary defect of organ or tissue development in the embryo or fetus. Second group: Deformation is damage caused by external factors influencing previously normal structure. Malformation & deformations occur in a ratio of 3:2. These conditions are important cause in neonatal & prenatal mortality accounting for about 40% of deaths.² Congenital malformations affect 2.5% of infants at birth and are responsible for about 15% of perinatal mortality in India.^{3,4} In United States in 2013, infant mortality rate was 5.96 infant deaths per 1000 live births and the leading cause of infant death was congenital malformations accounting for 20% of all infant deaths.⁵ Birth defects account for 1530% of all pediatric hospitalizations. They exert a proportionately higher health care cost than other hospitalizations and impact a significant burden to families and society.⁶ Children with congenital

malformations in Egypt, male were more affected than female (1.8:1). According to ICD-10 classification of congenital malformations the system involved in descending order of frequency were nervous system, chromosomal abnormalities, genital organ anomalies, musculoskeletal system, urinary system, circulatory system, eye ear face and neck anomalies, other congenital malformations, digestive system, cleft lip and cleft palate anomalies, respiratory System.⁷ Congenital Malformations are not rare in Pakistan, studies show that 2.9 to 7% of newborns had various congenital anomalies in Pakistan.^{8,9} According to the latest WHO data published in May 2014; congenital anomalies deaths in Pakistan reach 26,353 or 2.34% of total deaths and ranks Pakistan #5 in the world.¹⁰ In many cases, the cause of congenital anomalies is unknown, however, several factors are known to be associated with congenital anomalies including genetic factors i.e. achondroplasia, cystic fibrosis, hemophilia, neural tube defects. Socioeconomic and demographic factors i.e. Low-income may be an indirect determinant of congenital anomalies, with a higher frequency among resource-constrained families and

countries. It is estimated that about 94% of severe congenital anomalies occur in low- and middle-income countries.¹¹ Factors often associated with lower-income may induce or increase the incidence of abnormal prenatal development. Dietary factors (Folate insufficiency and excessive vitamin A intake) and poorer access to healthcare may also be indirect determinants of congenital anomalies. Advanced maternal age increases the risk of chromosomal abnormalities, including Down syndrome. Environmental factors i.e. Maternal exposure to certain pesticides and other chemicals, as well as certain medications (thalidomide, streptomycin, tetracycline, phenytoin), alcohol, tobacco and radiation during pregnancy, may increase the risk of having a fetus or neonate affected by congenital anomalies. Maternal infections (rubella, cytomegalovirus, toxoplasmosis, syphilis & exposure to Zika virus) may affect the normal development of an embryo or fetus.¹¹ Recently, it is assumed that the health effects of maternal stress may include increased risk of certain birth defects.¹² A large number of malformations are incompatible with life and they involve one system or multiple systems of the fetus. Congenital malformations cause mental trauma to the parents since it puts the entire life of child with congenital malformations into jeopardy. The congenital malformations are collectively major health problem and leads to lifelong disabilities in children that compromises the quality of life from the very beginning. In Pakistan very few studies have been conducted so far, the data of this study will contribute to explore the risk factors of congenital malformations and some hypothesis can be generated by this descriptive data.

Methods

The Study Design was a “Case Series” conducted at Neonatal Intensive Care Unit, Surgical Neonatal Intensive Care Unit, Cardiac Intensive Care Unit of Children hospital Lahore and pediatrics department of Services hospital, Lahore, after obtaining written permission from higher authorities of these settings. All neonates with congenital malformations admitted in these institutions during 1st April to 30th April, 2013, were included in the study. Mothers of malformed neonates were interviewed after taking informed consent using self-administered, pre-tested questionnaire. Mothers too sick to give interview were excluded from the study. SPSS computer software version 14 was used for entry, compilation, analysis of the data. The

outcome variables were listed as frequencies and proportions.

Results

The results shows that out of 40 subjects, 23(57.5%) mothers having anomalies in their babies, were below 30 years of age while 17(42.5%) were 30 years and above. Overwhelming majority i.e. 37(92.5%) mothers were housewives while only 3(7.5%) were workers. Out of 40 mothers, 25(62.5%) were under matriculation while 15(37.5%) were metric and above. Regarding the age of the fathers, 13(32.5%) fathers were 30 years and below while 27(67.5%) were above 30 years. The frequency is considerable high in age above 30year.Regarding the monthly family income, 35(87.5%) families were up to 3000 and 5(12.5%) were above 3000 rupees. The frequency is considerably high in low income group i.e. rupees 3000 and below and constitutes 87.5 %.Regarding the mode of delivery, out of 40 subjects, 30(75%) mothers had SVD while 10(25%) had C-section. As for as the parity is concern, 14(35%) were prime-para and 26(65%) were multiparous. **Table-1** shows that out of 40 subjects, 14(35%) mothers married outside the family while 15(37.5%) married with paternal relatives and 11(27.5%) married with maternal relatives. The frequency is considerably high for cousin marriage i.e. 65%. Out of 40 subjects in our research, 4(10%) of the siblings of the malformed babies were also congenitally malformed. Out of 40, not a single of mother or father suffered from any congenital malformation and not a single mother was drug addict. Out of 40 subjects, 2(5%) of mothers took anti-allergic, 2(5%) took anti-hypertensive, 7(17.5%) took other drugs and 29(72.5%) did not take any drug at all during pregnancy. Out of 40 mothers, 14(35%) suffered from Psychological stress during pregnancy. Out of 40 subjects, 25(62.5%) of mothers didn't make any increase in diet while just 15(37.5%) made an increase in different sort of diets. Out of 40 mothers, 12(30%) had previous abortion while 28(70%) did not have any abortion previously. Only 1(2.5%) of mother had radiation exposure to X-rays, 4(10%) had other types of radiation exposure and 35(87.5%) did not have any kind of radiation exposure. Out of 40, only 1(2.5%) mother gave the history suggestive of rubella infection during pregnancy while remaining mothers i.e. 39(97.5%) did not give any history suggestive of rubella infection during pregnancy.**Table-2** reveals that out of 40 subjects in our research, 18(45%) of the children showed urogenital anomalies, 12(30%) showed GIT anomalies, 3(7.5%) showed CVS anomalies, 2(5%) showed CNS anomalies and

Table-1: Frequency distribution of potential risk factors for congenital malformations

Risk Factors	Frequency (n=40)	Percentage
Relation with spouse		
Married outside family	14	35.0
Married with paternal relative	15	37.5
Married with maternal relative	11	27.5
Anomaly in siblings		
Yes	04	10.0
No	36	90.0
Congenital anomaly in parents		
Mother No anomaly	40	100.0
Father no anomaly	40	100.0
Mother's illness		
Diabetes	02	5.0
Hypertension	01	2.5
Any other	07	17.5
None	30	75.0
Addiction in mothers		
None	40	100.0
Drugs taken during pregnancy		
Anti-allergic	02	5.0
Anti-Hypertensive	02	5.0
Any Other	07	17.5
None	29	72.5
Psychological stress during pregnancy		
Yes	14	35.0
No	26	65.0
Diet during pregnancy		
No increase in diet	25	62.5
Yes in meat	03	7.5
Yes in fruits and vegetable	10	25.0
Yes in milk	01	2.5
Yes in vitamins and iron supplements	01	2.5
H/O of previous abortion		
Yes	12	30.0
No	28	70.0
Radiation exposure		
X-ray	01	2.5
Any other	04	10.0
History suggestive of Rubella infection		
Yes	01	2.5
No	39	97.5

Table-2: Frequency of Systems affected in congenital anomalies.

Systemic involment of congenital anomalites	Frequency (n=40)	Percentage
Urogenital anomaly	18	45.4
GIT	12	30.0
CVT	03	7.5
CNS	02	5.0
Facial	05	12.5
Total	04	100.0

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Discussion

In our research women less than 30 years of age have highest prevalence of anomalies i.e. 57.55% which is in contrary to research done by Crone and Shaw in California¹³ in which it was stated that, the overall prevalence of all congenital anomalies across the age distribution was shown as a J shape, with pregnant women aged 20-29 years having the lowest prevalence, teenage pregnant women having an intermediate prevalence and pregnant women more than 40 years old having the highest prevalence. Findings of another research done by Seda Ates et al with topic of "Pregnancy Outcome of Multiparous Women Aged over 40 years"¹⁴ in which it was found that, less than one tenth of the mothers were adolescence and also less than one tenth were old mothers and the infants of the older mothers showed a higher incidence of stillbirth (5.1% versus 0%), admission to the neonatal intensive care unit (5.1% versus 1.03%), and fetal malformation (3.09% versus 0.8%) than younger mother. The reason may be the difference of sample size, place and socioeconomic status of the populations.

Regarding the paternal age, in our research it was found that fathers with age more than 30 years have higher frequency of abnormal babies i.e. 67.5% which goes in accordance with the research conducted at Cairo University, Tehran¹⁵ which showed that overall there were no differences in the prevalence of malformations as a function of paternal age. However, the prevalence of malformations of extremities and syndromes of multiple systems, as well as Down's syndrome, increased with increasing paternal age which is in accordance. In our study population 62.5% women did not make an increase in diet during

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Answer Picture Quiz

Granulomatosis with polyangitis (wegener's Granulomatosis)