

Frequency of Anomalies in Pediatric Population Presenting to Outpatients Department of a teaching hospital

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ABSTRACT

Aim: To see the frequency of various types of congenital anomalies in infants and determine its contributing factors.

Study design: Cross sectional study with retrospective study for etiological factors.

Place and duration of study: Department of Pediatrics, Jinnah Hospital Lahore. from 1st November 2017 to 30th September, 2018.

Methods: All infants of both sexes presenting to the pediatric unit of Jinnah hospital Lahore for routine checkup or vaccination and having congenital anomalies were enrolled and data entered on prescribed performa and analyzed on SPSS v 22.0

Results: In our study 994 patients were enrolled in study, 232 patients (23.3%) had congenital anomalies in central nervous system. 94 children (9.5%) had gastro-intestinal system anomalies, 222 patients (22.3%) had congenital anomalies in musculo skeletal system, 84 (8.5%) had of cardio vascular system and remaining 362 patients (36.4%) had anomalies of genito-urinary system. Among five important contributing factors for congenital anomalies (extreme maternal age i.e. less than 20 years and more than 40 years at time of conception, history of consanguinity, preterm births, maternal smoking and family history of birth defects) were equally distributed among patients with different anomalies.

Conclusion: It is concluded that congenital anomalies of genito-urinary system are highest followed by those of central nervous system and musculo skeletal system.

Keywords: Congenital anomalies, maternal, risk factors, Genito-urinary system, Central nervous system.

INTRODUCTION

An individual with unusual physical features is said to be dysmorphic or congenital malformation. In ancient times, birth defects were believed to result from the action of supernatural forces¹. According to WHO, congenital anomalies affect approximately 1 in 33 infants globally and result in approximately 3.2 million disabilities and 270 000 deaths in newborns during the first 28 days of life every year². Birth defects can be due to malformation, genetic causes, environmental factors, teratogenesis.

Malformations can be classified as major and minor. These often require surgical repair. As an example, the neural tube defects, such as meningomyelocele or orofacial cleft (cleft lip and palate), are common major malformations. Minor malformations have mostly cosmetic significance. Examples of minor anomalies include ear tags, clinodactyly, and single transverse palmar creases³.

The causes of congenital anomalies are genetic and non-genetic. Genetic abnormalities include chromosomal disorders (e.g., Down syndrome); single gene (monogenic) disorders, including those that are autosomal recessive (e.g., cystic fibrosis), autosomal dominant (e.g., Marfan syndrome), or X-linked (e.g., hemophilia); and multifactorial disorders that result from the interaction of multiple genes and environmental factors. The latter include cleft lip/palate, congenital heart disease, and neural tube

defects. Nongenetic etiologies include environmental factors, such as maternal phenylketonuria (PKU) or diabetes, teratogens (e.g., alcohol, oral isotretinoin), infections (CMV, rubella), and twinning⁴.

Teratogenesis usually occurs after fertilization. These include cell death (e.g., radiation), blocking of metabolic processes (e.g., thioureas, iodides), and alterations in cellular growth and proliferation, migration, apoptosis (e.g., fetal alcohol syndrome), and interactions between cells or between cells and tissues.

Exposure prior to conception may cause genetic mutations, a process known as toxic mutagenesis. Genetic defects may follow fetal exposure. Although the Food and Drug Administration requires that all prescription drugs be tested, it can be extremely difficult to determine whether a particular substance is teratogenic. Animal studies may be helpful, although results may not always apply to humans. For example, thalidomide is strongly teratogenic in humans, but weakly teratogenic in animals, while the opposite is true for aspirin. These do not always establish teratogenicity and often need validation by epidemiologic studies. Numerous teratogens in the environment can lead to birth defects⁵. Common agents are listed below

Infectious agents: Exposure to infectious agents like toxoplasmosis, rubella, cytomegalovirus, herpes, and syphilis (the so-called TORCH infections), as well as varicella and parvovirus B19.

Maternal illnesses: Several maternal illnesses are associated with birth defects like Insulin-dependent diabetes mellitus is associated with a two- to threefold

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increase in risk of congenital anomalies, including congenital heart disease and spina bifida. Maternal phenylketonuria is associated with microcephaly, intellectual disability (mental retardation), and congenital heart disease. Maternal antibodies can easily cross placenta and can affect fetus.

Physical agents: Not only pathological agents but physical agents can also affect the fetus. Elevation of maternal core temperature more than 1.5 degrees centigrade in the first trimester of pregnancy may be associated with an increased risk of neural tube defects.¹⁶ Excessive exposure to ionizing radiation has the potential to produce fetal death, growth disturbances, somatic abnormalities, mutation, chromosome fragmentation, and malignancy⁶.

Drug exposure: Maternal drug ingestion, both medical and recreational, can also cause adverse fetal and neonatal outcomes. Some common teratogenic medications include: Angiotensin converting enzyme inhibitors Anticonvulsant agents, Antineoplastic agents, Thalidomide, retinoic acid, misoprostol, penicillamine, fluconazole and lithium⁷.

Genetic and environmental causes of birth defects: Different studies have identified 5 important contributing factors for congenital anomalies which included⁸:

1. Extreme maternal age i.e., <20 years and >40 years at time of conception
2. History of consanguinity
3. History of preterm births
4. History of maternal smoking
5. Family history of birth defects.

Majority of mothers with babies having anomalies i.e., 54.92% were <20 years and >40 years while in control group 47.74% mothers belonged to extreme age group.^[4] Similarly frequency of consanguineous marriage and preterm birth was higher in anomalous babies 57.74% and 54.46% as compared to normal babies 49.66% and 48.64% respectively. Maternal smoking, family history of birth defects and presence of co morbid condition in pregnancy are also considered as contributing factors and their frequency was also higher in anomalous babies i.e., 18.1%, 19.4% and 15.7% respectively in a study conducted in Pakistan^{9,10}. Currently there is no data available showing comparison in normal babies so a proper relationship could not be established. There is scarce local data available regarding various types of congenital anomalies in infants and their contributing factors. Current study was undertaken for this purpose.

SUBJECTS AND METHODS

Non probability Consecutive Sampling technique was used. All infants of both sexes presenting to the pediatric unit of Jinnah hospital Lahore for routine checkup or vaccination and having congenital anomalies as per operational definition were included in the study.

Exclusion criteria: 1. Infants having congenital anomalies as part of a syndrome for example Down syndrome assessed clinically. 2. All Infants who will not be accompanied by parents.

Data collection procedure: Data collection tool: A proforma comprising of all variables was used for data collection. Data collection method: Consent was taken from parents before starting the study. Parents of all infants presenting to the pediatrics department and fulfilling the inclusion criteria were approached. An informed consent

was taken from the parents before including them in study. Data regarding the study variables was obtained from the mothers and noted in a proforma. Confidentiality of the data was ensured. X-ray and CT scan of skull and brain, echocardiography and clinical examination was carried out.

Data analysis: Data was entered and analyzed using SPSS v 22.0. Numerical variable i.e. age of infant and mother was summarized as mean and standard deviation. Qualitative variables like sex of infant, presence and type of congenital anomalies (CNS, CVS, MS, GI and genitourinary anomalies) and presence of contributing factors i.e. term of infant, extreme maternal age at time of conception, consanguineous marriage, maternal active smoking and presence of co-morbid condition during pregnancy were presented in the form of frequency and percentages. Data was stratified for gender. To remove effect of gender post stratification Chi square test was applied to check the statistical significance and p value < 0.05 was considered as statistically significant.

RESULTS

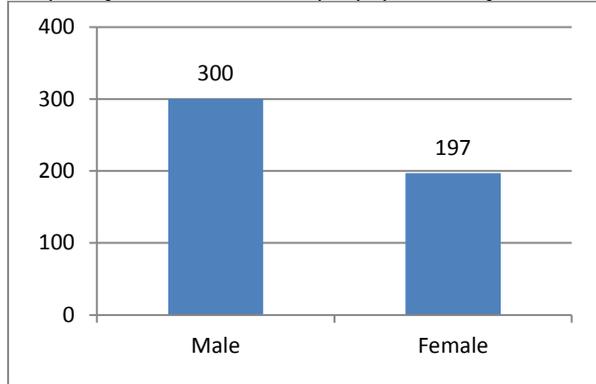
In our study population 497 patients were included with mean age of 4.66 ± 3.049 ranged from 1 to 12 months. 197 patients (39.6%) were female and remaining 300(60.4%) were male. 16 patients (23.3%) had congenital anomaly in central nervous system, 47(9.5%) had in gastro-intestinal system, 111 patients (22.3%) had congenital anomaly in Musculo skeletal system, 42(8.5%) had in cardio vascular system and remaining 181 patients (36.4%) had in genito-urinary system.

363 patients (73%) had Preterm birth. 163 patients (32.8%) had mothers with age between 20 to 39 years. 56(11.3%) patients of sampled population were born in result of cousin marriage. 21 patients (4.2%) had mothers with history of smoking. 52 patients (10.5%) had family history of anomalies whereas rest of 445 patients 89.5% had no such history. Mothers of 33 patients (6.6%) of sampled population had comorbidities. plag

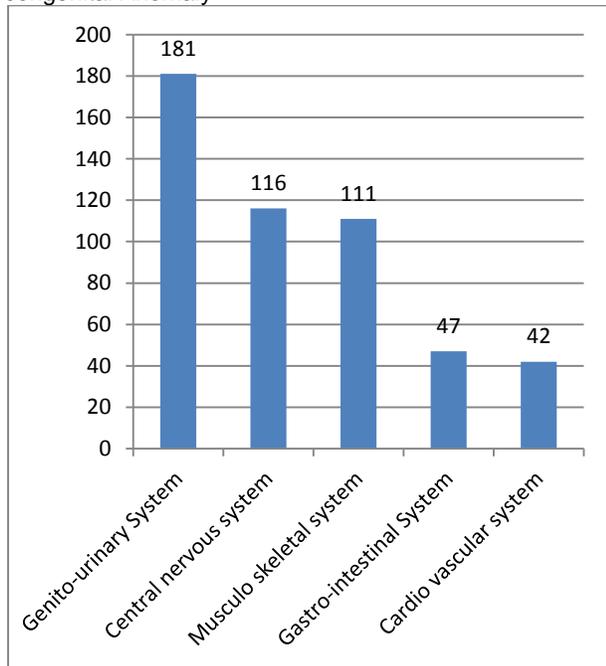
When we cross tabulated types of congenital anomalies with gender and applied Pearson chi square test, we came up with statistically non-significant results ($p=0.723$), which depicted that these anomalies were equally distributed among male and females. When we cross tabulated types of congenital anomalies with preterm birth and applied Pearson chi square test, we came up with statistically non-significant results ($p=0.999$). Our results showed that type of anomalies were equally distributed among preterm birth and normal birth. When we cross tabulated types of congenital anomalies with mother age between 20 to 39 years, results were non-significant ($p=0.165$), on applying Pearson chi square test. It showed anomalies had no significant relationship with age of mothers. On cross tabulating congenital anomalies with cousin marriage, difference came out statistically non-significant with p value 0.234, which depicted that cousin marriage pose no influence on congenital anomalies. When we cross tabulated type of congenital anomalies with maternal smoking, results showed us non-significant difference ($p=0.108$). Mothers of the patients that had history of smoking were equally distributed with patients of non-smoking mothers. When we cross tabulated types of congenital anomalies with Family History of anomalies and applied Pearson chi square test, we came up with

statistically non-significant results ($p=0.603$). Our results clearly indicated that family history of anomalies had no particularly significant effect on patients with congenital anomaly history. Cross tabulation of type of congenital anomaly with maternal comorbidities showed statistically non-significant results with p value 0.167.

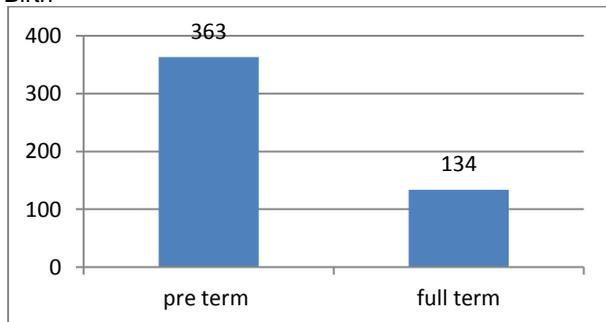
Frequency distribution of sample population by Gender



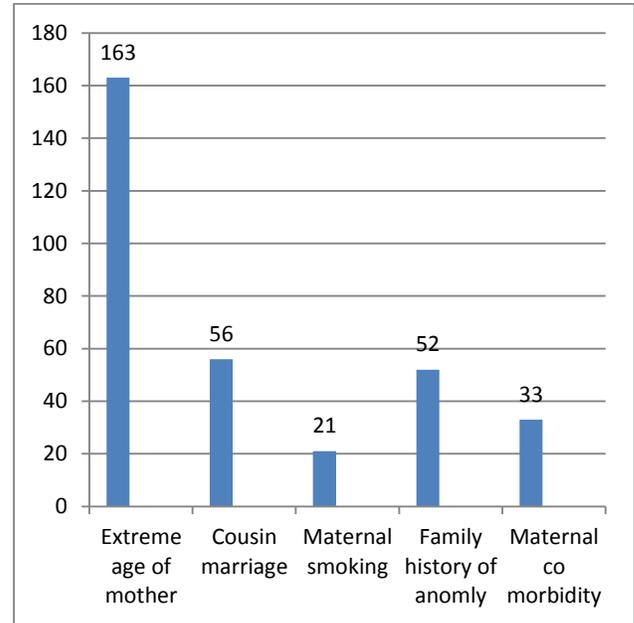
Frequency distribution of sample population by Type of congenital Anomaly



Frequency distribution of sample population by Preterm Birth



Risk factors for congenital anomaly



Cross tabulation between Type of congenital Anomaly & Gender

Congenital Anomaly	Female	Male	Total
Central nervous system	51	65	116
Gastro-intestinal System	20	27	47
Musculo skeletal system	39	72	111
Cardio vascular system	16	26	42
Genito-urinary System	71	110	181
Total	197	300	497

Pearson chi square test = 0.723 (non-significant)

DISCUSSION

In our study, 16 patients (23.3%) had congenital anomalies in central nervous system including spina bifida, hydrocephalus, and microcephaly. Our results are different from those reported by previous studies^{6,7,8}. In a previous study by Masood SN et al, CNS anomalies were found among 51.6% of included patients⁷ while it was reported 86.02% by Gul F et al⁸ and 45.94%⁴ by Babu RS et al. The reported difference may be secondary to sampled population and sampling technique. In our setting, pediatric neurosurgery department is not yet established so consecutive non probability sampling have led to lesser presentation by patients with CNS anomalies. In our study, 47 children (9.5%) had gastro-intestinal system anomalies, 111 patients (22.3%) had congenital anomalies in musculoskeletal system, 42(8.5%) had of cardio vascular system and remaining 181 patients (36.4%) had of genitourinary system. Our results are comparable with previous studies. In a previous local study⁵ genitourinary malformation were found the commonest 19.9%, followed by congenital anomalies of eye 16.9%. Similarly commonest congenital anomaly in our sampled population was those of genitourinary system. Raza MZ et al showed frequency of musculoskeletal system 12.9%, Faciomaxillary 12.1%, central nervous system (CNS) 10.9%, gastrointestinal 3.2% and cardiovascular system 2.9%. The difference reported may be secondary to population considered for study. Different studies have identified five important contributing factors for congenital anomalies which included extreme maternal age i.e., <20 years and

>40 years at time of conception, history of consanguinity, preterm births, maternal smoking and family history of birth defects. Maternal smoking, family history of birth defects and presence of co morbid condition in pregnancy are also considered as contributing factors. We studied all five factors and at current sample size we were unable to find the statistical difference. 197 patients (39.6%) were female and remaining 300(60.4%) were male. When we cross tabulated types of congenital anomalies with gender and applied Pearson chi square test, we came up with statistically non-significant results ($p=0.723$), which depicted that these anomalies were equally distributed among male and females. 363 patients (73%) had Preterm birth. When we cross tabulated types of congenital anomalies with preterm birth and applied Pearson chi square test, we came up with statistically non-significant results ($p=0.999$). Our results showed that type of anomalies were equally distributed among preterm birth and normal birth. 163 patients (32.8%) had mothers with age between 20 to 39 years. When we cross tabulated types of congenital anomalies with mother age between 20 to 39 years, results were non-significant ($p=0.165$), on applying Pearson chi square test. It showed anomalies had no significant relationship with age of mothers. 56(11.3%) patients of sampled population were born in result of cousin marriage. On cross tabulating congenital anomalies with cousin marriage, difference came out statistically non-significant with p value 0.234, which depicted that cousin marriage pose no influence on congenital anomalies.

When we cross tabulated type of congenital anomalies with maternal smoking, results showed us non-significant difference ($p=0.108$). Mothers of the patients that had history of smoking were equally distributed with patients of non-smoking mothers. When we cross tabulated types of congenital anomalies with Family 52 patients (10.5%) had family history of anomalies whereas rest of 445 patients 89.5%) had no such history. History of anomalies and applied Pearson chi square test, we came up with statistically non-significant results ($p=0.603$). Our results clearly indicated that family history of anomalies had no particularly significant effect on patients with congenital anomaly history. Mothers of 33 patients (6.6%) of sampled population had comorbidities. Cross tabulation of type of congenital anomaly with maternal comorbidities showed statistically non-significant results with p value 0.167.

CONCLUSION

Most of the patients had anomaly in genito-urinary system followed by congenital anomalies in central nervous system, musculo skeletal system, 9.5% children had gastro-intestinal system anomalies and 8.5% had anomaly of cardio vascular system. Among previously identified five important contributing factors for congenital anomalies

(extreme maternal age i.e. <20 years and >40 years at time of conception, history of consanguinity, preterm births, maternal smoking and family history of birth defects) were equally distributed among patients with different anomalies.

Conflict of interests: No conflict of interests to be declared

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