Original Article

Congenital Anomalies among Newborns Admitted in Tertiary Hospital; Iraqi Experience

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Summary:

Background: Congenital anomaly is any alteration present at birth of normal anatomic structure and has cosmetic, medical or surgical significance

Objective: To determine the pattern of congenital anomalies in neonates admitted to tertiary neonatal care unit and to determine the impact of some factors related to congenital anomalies with and without congenital anomalies.

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Patients and methods: A case control study was carried out during 6 months period (1St of January to 30th of June 2011). Neonates with and without congenital anomalies admitted to Children Welfare Teaching Hospital were included in the study as a case and control group. Demographic characteristics of both parents and neonates, Consanguinity, Parity, Gestational age, Mode of delivery and type of congenital anomaly were studied. All neonates were examined thoroughly by pediatrician; confirmation of internal defects was done by various imaging modalities

Results: Sixty (4.8 %) of 1235 admitted neonates were diagnosed to have congenital anomalies, of whom 70% were males, 86% were term newborn, 55% were delivered by caesarian section, 73.3% were from consanguineous marriage and the mothers of 75% of them were multipara and cardiovascular anomalies was the most common .

Conclusions: Surveillance and monitoring of congenital conditions is important for identifying patterns of malformations and planning to improve the outcomes.

Key words: Congenital anomaly, Newborn.

Introduction:

Congenital anomaly (CA) is defined as structural, functional, and/or biochemical molecular defects presenting at birth (1). Early intrauterine period during 3rd – 8th weeks of gestation is the vital period of life for the normal development of organs and organ system or organogenesis (2).

A congenital anomaly may be narrowly defined in terms of physical structure as a malformation, an abnormality of physical structure or form usually found at birth or during the first few weeks of life; or defined more widely to include functional disturbance as a defect, any irreversible condition exiting in a child before birth in which there is sufficient deviation in the usual number, size, shape, location or inherent character of any part, organ, cell or cell constituent to warrant its designation as abnormal(3,4). Available literature shows that CA contributes highly to prenatal mortality and postnatal physical defects (5, 6, 7). Parents are likely to feel anxious and guilty on learning of the existence of CA and require sensitive counseling (8). Written records of CA have come down to us from the ancient inhabitants of Babylonia, in 19th century (9), the worldwide incidence of CA is estimated at 3-7%, but actual numbers vary widely between countries (10).

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Patients and methods

Case control study was carried out during 6 months period (1st of January to the 30th of June 2011). All neonates with CA admitted to Children Welfare Teaching Hospital were included in the study as a case group and a control group of neonates without CA admitted to the same hospital for reasons other than CA.

A detailed questionnaire form was prepared to collect data concerning age of both parents, consanguinity, parity, gestational age, mode of delivery, sex of the neonate, status of the baby and wellbeing, type of CA and systems affected were filled by direct interview with the parents or caregivers for both groups.

Regarding ethical consideration; Official agreement was obtained from Research Ethical Committee, Children Welfare Teaching Hospital- Medical City Health

Directorate. Before collecting the information, the purpose of the study was explained to the parents and /or caregiver, confidentiality and privacy was considered and the parents were given the right to participate, or not, in the study without any reward or, otherwise, penalties, none of them refused to participate.

All neonates were examined thoroughly by pediatrician; confirmation of internal defects was done by various imaging modalities as radiography, ultrasound, echocardiography, and CT scan. The anomalies diagnosed on prenatal maternal ultrasound were confirmed by appropriate radio diagnostic method soon after birth.

SPSS version 18 was used for data input and analysis. Discrete variables presented as numbers and percentages and continuous variables presented as mean ± SD (standard deviation). Chi square test for independence and Fisher's exact test (used in situations where Chi square test not applicable) used to test the significance of association between discrete variables , t test for two independent samples used to test the significance in observed difference in mean of continuous variables. Findings with P value less than 0.05 considered significant. Odds ratio was obtained and any ratio with 95% confidence interval where number one not included considered significant.

Results

During the study period 60 (4.8 %) of 1235 were diagnosed to have CA, among those with CA, 42 were boys (70%), boys to girls ratio was nearly 2:1and the association was statistically significant (table 1).

Most of those with CA were born at term (86.7%), more than half of them (55%) delivered by CS, (26.7%) were with low birth weight, the majority of them (85%) survived, most of them (73.3) were the result of consanguineous marriage and the mothers of (76.7%) of them were multipara, yet the association between gender and the studied factors (maturity at birth, mode of delivery, birth weight, parity, status of the baby and consanguinity) were found to be statistically not significant (table 2).

Higher percentage of boys was found among both cases (70%) and controls (56.7%) with statistically not significant association.

Full term were higher than preterm babies among both cases (86.7%) and controls (71.7%) with statistically significant association and full term babies have significantly 2.6 more risk of developing CA than preterm babies (table 3).

Deliveries by caesarian section (CS) were more among cases (55%), whereas normal delivery (NVD) were more among controls, although statistically not significant NVD have 0.6 less risk of developing CA than CS (table 3).

Babies with normal birth weight (≥ 2500 gm) were higher than LBW babies (< 2500gm) among both cases (73.3%) and controls (65%) and although statistically not significant, normal birth weight babies have 1.5 more risk of developing CA than low birth weight babies (table 3).

Regarding parity; higher percentage of multiparas was found among both cases (76.7%) and controls (70%) and the association was statistically not significant, yet, multiparious women have 1.4 more risk of developing CA than primipara. Those with history of parental consanguinity had significantly 2.4 more risk of developing CA than those without such history (table 3).

On classifying the mothers according to their age into risky (below 20 and equal or more than 35 years old) and perfect age (between 20 and >35 years old), it was found that mothers with perfect age were more among both cases (68.3%) and controls (66.6%) (Table 4).

Classifying the anomalies according to the system affected and sex revealed that anomalies of genitourinary system (GUS) were found among boys only, anomalies of cardiovascular (CVS), gastrointestinal (GIT), central nervous system (CNS), Multiple system anomalies and syndromes were more among boys than girls, anomalies of the respiratory system were more among girls, whereas anomalies of the skeletal system, skin and cutaneous tissue were equally distributed among boys and girls.

Among boys; CVS and GUS were the 1st on the list of congenital anomalies, second common anomaly among boys was GIT, whereas among girls CVS and multiple CA were the most commonly affected, followed by GIT (table 5).

Table (1) Association between gender* and congenital anomalies among all admitted newborns

Congenital anomalies	Males		Females		Total	
	No.	%	No.	%	No.	%
Positive	42	70.0	18	30.0	60	4.8
Negative	415	35.3	760	64.7	1175	95.1
Total	457	36.9	778	63.1	1235	100

* The association is statistically significant ($\chi 2 = 29.4$, df= 1, P< 0.005).

Table (2) Association between gender and factors related to congenital anomalies among children with congenital anomalies

Variables		Males N=42		Females N= 18		Total N=60		P value
		No.	%	No.	%	No.	%	
Maturity (Gestational age)	Term	35	83.3	17	94.4	52	86.7	0.415 NS*
	Preterm	7	16.7	1	5.6	8	13.3	
Mode of Delivery	NVD	20	47.6	7	38.8	27	45.0	0.533 NS*
	CS	22	52.4	11	61.2	33	55.0	
Birth weight	≥ 2500	30	71.4	14	77.8	44	73.3	0.75 NS**
	< 2500	12	28.6	4	22.2	16	26.7	
Parity	Primi	11	26.2	3	16.7	14	23.3	0.52 NS**
	Multipara	31	73.8	15	83.3	46	76.7	
Baby status	Well	38	90.5	13	72.2	51	85.0	0.081 NS**
	Died	4	9.5	5	27.8	9	15.0	
Consanguinity	Yes	29	70.8	15	79.0	44	73.3	0.75 NS**
	No	12	29.2	4	21.0	16	26.7	

* The association was statistically not significant; ($\chi 2$ test)

** The association was statistically not significant; (Fisher's Exact Test)

Table (3) Distribution of patients and control groups by factors related to congenital anomalies

Variables		Patients		Controls		P value	OR	95% CI
		No.	%	No.	%			
Baby> Gender	Males	42	70.0	34	56.7	0.13 NS*	1.8	(0.8 - 3.8)
	Females	18	30.0	26	43.3			
Maturity (Gestational age)	Term	52	86.7	43	71.7	0.04	2.6	(1.01– 6.5)
	Preterm	8	13.3	17	28.3			
Mode of Delivery	NVD	27	45.0	34	56.7	0.201 NS*	0.6	(0.3 - 1.3)
	CS	33	55.0	26	43.3			
Birth weight	≥ 2500	44	73.3	39	65.0	0.323 NS*	1.5	(0.7- 3.2)
	< 2500	16	26.7	21	35.0			
Parity	Multipara	46	76.7	42	70.0	0.409 NS*	1.4	(0.6 – 3.2)
	Primi	14	23.3	18	30.0			
Baby status	Well	51	85.0	55	91.7	0.255 NS*	0.5	(0.2 -1.6)
	Died	9	15.0	5	8.3			
Consanguinity	Yes	44	73.3	29	48.3	0.005	2.9	(1.4 - 6.3)
	No	16	26.7	31	51.7			

Table (4) Distribution of patients and control groups by parental age in years

Parental age (in years)	Age at Birth	Cases		Controls	
		No.	%	No.	%
Maternal age* >35	< 20	10	16.7	10	16.7
	20 - <35	41	68.3	40	66.6
	>35	9	15.0	10	16.7
	Total	60	100.0	60	100.0
Paternal age	< 20	5	8.4	0	0.0
	20 -< 35	39	65.0	38	63.3
	>35	16	26.6	22	36.7
	Total	60	100.0	60	100.0

* The association is statistically not significant ($\chi 2 = 0.06$, df= 2, P=0.9)

Table (5) Distribution of the study group by gender and system affected

Systems	Males		Females		Total	
	No.	%	No.	%	No.	%
Cardiovascular system	9	69.2	4	30.8	13	21.8
Gastrointestinal system	8	72.7	3	27.3	11	18.3
Genitourinary system	9	100	0	0	9	15
Central nervous system	3	60	2	40	5	8.3
Respiratory system	1	33.3	2	66.7	3	5
Skin & Cutaneous tissue	1	50	1	50	2	3.3
Skeletal system	1	50	1	50	2	3.3
Syndromes	3	75	1	25	4	6.7
Multiple congenital anomalies	7	63.6	4	36	11	18.3
Total	42	70	18	30	60	100

Discussion:

The present study showed that congenital anomalies are important paediatric problem constitute 4.8 % of total admission which is nearly similar to the finding of Saima et al (11) (4.23 %), the observed similarities probably due to fact that both studies were done in referral institutions where major congenital defects are admitted, while it is low in other studies like Gupta 1.5% (12) , 1.7% in Hasan S (13), 2,8% in Herbert A Obu et al (14), this variation could be explained by different nature of various studies like hospital versus community based, difference in geographical, environmental factors, genetic, racial backgrounds, nutritional and socioeconomic differences. The rate of 4.8% obtained in this study does not reflect the picture in the general population as this was purely a hospital based study with no attempt whatsoever to obtain a sample that would be representative of the general population. Be that as it may, it is possible that a community based study or one taking into account all deliveries occurring in the larger society may yield a higher prevalence. In our part of the world, for instance, some babies with congenital abnormalities brought to teaching or specialist hospitals do not present to the neonatal care unit but are seen at other specialist units such as pediatric surgery unit or neuro-surgery unit etc. Some that are born outside the hospital with congenital abnormalities are not taken to hospitals for care but are taken to traditional healers or other alternative practitioners while some are just left at home to their fate.

In this study, it was found that 9.2 % of the males admitted to this hospital have congenital anomalies ,while only 2.4% females with a ratio of 2:1 which agrees with the study done by Mohanty C (15) ,but in the study by Waqas Jehangir et al(16)as well as Bahtia(17) there were no significant role of gender in congenital malformations .

Contrary to the fact that congenital malformations are more in mothers who deliver prematurely ,because, it is known that abnormal foetuses are likely to have premature deliveries or aborted based on that significant number of babies have chromosomal abnormalities according to the phenomenon of nature selection, this study had found that congenital abnormalities are more in term newborns 86.7% and this is probably due to that the premature ones with severe abnormalities may be so tired and their condition does not permit referral so they will be lost either at home or in a local hospital where they were born. While in most of other studies preterm predominates as in Wagas Jehangir(16) it was 83.34% .

In this study babies with birth weight of more than 2500g (73.3%) had congenital anomalies which is almost similar to the study done by Aiyarl(18) where the highest incidence was in full term normal birth weight newborns and this is relatively much higher than other studies in which babies with low birth weight having a higher incidence of congenital anomaly like AkrutiParmar et al (19) while in the study of Waqas Jehangir et al (16) there was no relation among weight of neonates. This is explained by the same theory that congenital malformations are more in preterm who are supposed to have low birth weight. All these are hospital based studies which may not reflect the overall status of the problem, community studies need to be undertaken for getting a better picture of the problem.

There was a significant relation between the parity and the prevalence of malformations which was 76.7% in our study which is statistically significant; this agrees with Waqas Jehangir et al (16)88.89%. On the other hand the study of AkrutiParmar et al (19) revealed more congenital anomaly in primigravida mothers 42%, while in the study done by Anand et al (20) there was no significant relation.

Parental consanguinity was an important cause for most of the malformations73.3% which is statistically significant and agrees with the study done by Waqas Jehangir et al (16).

The current studied samples did not show any association between maternal age and malformation a result similar to that of a study in Chile by Pardo et al. (21) But still the frequency (68.3%) of congenital anomalies higher in the perfect age group (20 – ,(35<Tennat and co -workers(22) noted that high pregnancy rates among mothers in this age range could account for this.

The most common anomalies was in the cardiovascular system (21.8%), while in Saima(11) CNS anomalies(31%) , and in Arjun Singh (23) musculoskeletal anomalies is the highest (30.6%) and the lowest is the CVS (4%).

Conclusions: Surveillance and monitoring of congenital conditions is important for identifying patterns of malformations. A nationwide surveillance can recognize the disease burden in pre and post natal period and related risk factors. This will be helpful for strategic planning to improve the outcomes.

Author's contribution:

Dr .Manal Behnam Naoom & Dr .Yasir Ibrahem ALSaadi: research idea ,examining neonates ,collecting data and the writing.

Dr .Batool Ali Ghalib Yassin :Methodology ,Data analysis and interpretation

Dr .Huda Yousif Matloob ;examining neonates and collecting data

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