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ORIGINAL ARTICLE

Frequency of Congenital Malformation in Neonatal Intensive Care Unit in Benghazi- Libya

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ABSTRACT

Background: Birth defects, encountered frequently by pediatricians, are important causes of childhood morbidity and mortality. **Objectives**: The work is to detect the frequency of the occurrence of congenital anomalies in neoborn admitted to NICU in Benghazi – Libya in the previous 5 years (2012-2016). **Methods:** Studied all neonate admitted during the study period from (2012-2016). Data were collected with review of records in all files of neonates born with congenital anomalies in Jumhoria hospital and Benghazi Medical Center along the duration between January 2012 and the end of 2016. **Results**: Demographic data for newborns studied showed that most cases with congenital malformations were male (66.2%) and females (33.8%) of all neonates with congenital malformations. Mothers ranged in age from 19 to 49 years. The average age of the mother was 35 years. **Conclusions:** Most frequent congenital malformation in newborn admitted to NICU in Benghazi – Libya in the previous 5 years (2012-2016) was congenital heart disease (CHD) followed by congenital neural tube defects. The year 2016 had the highest annual rate of congenital malformations.

Keywords: Congenital malformation; newborn; Care Unit .

INTRODUCTION

Congenital anomalies are also known as birth defects, congenital disorders or congenital malformations. Congenital anomalies can be defined as structural or functional anomalies (for example, metabolic disorders) that occur during intrauterine life and can be identified prenatally, at birth, or sometimes may only be detected later in infancy, such as hearing defects [1].

The pattern and prevalence of congenital anomalies may vary over time or with geographical location, reflecting a complex interaction of known and unknown genetic and environmental factors including socio-cultural, racial and ethnic variables with improved control of infections and nutritional deficiency diseases, congenital malformations have become important causes of perinatal mortality in developing countries [2]. There are comparable studies from India which reported incidence of congenital neonatal malformation ranged from 1.9 to 2.72%. There are other reports from different parts of the world representing different frequency of congenital malformations, Congenital anomalies accounts for 8 - 15% of perinatal deaths and 13-16% of neonatal deaths in India [3], in the USA, the infant mortality from major congenital malformations is about 22%. [4].

More male babies with congenital anomalies than females were noted. It may be because of the fact that the females were afflicted with more lethal congenital malformations and could not survive to be born with signs of life [5]. Many structural congenital anomalies can be corrected with pediatric surgery and early treatment can be administered to children with functional problems such as thalassaemia (inherited recessive blood disorders), sickle cell disorders, and congenital hypothyroidism (reduced function of the thyroid) [6].

The aim of this study was to detect the frequency of the occurrence of congenital anomalies in neoborn admitted to NICU in Benghazi – Libya in the previous 5 years

(2012-2016), to assess the Frequency and patterns of congenital anomalies among neonate and to find the maternal and perinatal risk factors associated with congenital anomalies among neonate. All health records of neonate during the study period were assessed and reviewed.

METHODS

A cross sectional design (descriptive study) was applied. Data were collected with review of records in all files of neonates born with congenital anomalies in Jumhoria hospital and Benghazi Medical Center along the duration between January 2012 and the end of 2016. The total number of births during that period was reported according to month.

The work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans

Inclusion criteria: Any case with congenital anomaly reported in the files during neonatal care workup.

Ethical considerations: As no intervention or direct interview was made, no consent was taken from family or guardian. Anyhow, authorized consent from administration of the hospital has been obtained and all of workup was made with strict confidentiality.

All health records in Central Benghazi hospital from (2012-2016) were reviewed to collect data about:

- Maternal history and their risk factors.
- Physical examination of the admitted newborn in that period.
- Investigations: Ultrasonography, Echocardiography, Radiography and Other Investigations.

Statistical analysis

Data were collected, tabulated and analyzed by SPSS 20, software for Windows. The significance level was set at $P < 0.05$.

RESULTS

Table (1), showed that most of the cases with congenital malformations were males (66.2%) while females represented (33.8%) of total neonates with congenital malformations. Maternal age ranged between 19 years and 49 years. Median maternal age was 35 years. **Table (2),** showed that multiparity was present in 70.9% in mother whose babies had congenital anomalies. Also, there was positive past history of diseases such as diabetes mellitus and hypertension for only 4.2%. Rhesus factor was Negative in 15.7% of mothers of neonates having congenital malformations. Most prevalent blood group among mothers was A representing 45% of this group. Also, 49.3%was born by elective cesarean section (CS), 42.3% by normal vaginal delivery while 8.5%by emergency CS**. Table (3),** showed that the year 2016 had the highest Annual rate and prevalence of congenital malformations while the year 2014 had the least Annual rate and prevalence of congenital malformations. This finding was statistically significantly. **Table (4),** showed that the most prevalent isolated defects in our study was isolated CHD (20.4%) following by CNS defects (8.5%) while the least congenital defect was the vascular defect (Hemangioma). **Table (5),** showed that the most prevalent syndromes in our study was Down syndrome with/without CHD (43.7%) following by Ahondroplasia (3.5%). **Table (6),** showed that there is no statistically significant difference in the association between RH type and malformations. Also, there is no statistically significant difference between the medical past history of studied mother and congenital malformation **(Table S1)**.

Table 1. Demographic data of studied Malformed Babies

malformed baby		Number	Proportion of the total	p
Sex	Male	94	66.2%	P > 0.05 non significant
	Female	48	33.8%	
Birth weight	Macrocosmic	10	7%	P < 0.05 Significant
	N.B.WT	110	77.5%	
	L.B.WT	21	14.8%	
	VL.B.WT	1	0.7%	
Gestational age	Term	136	95.8%	> 0.05 non significant
	Premature	6	4.2%	> 0.05 non significant
Type of anomaly	Isolated	63	44.4%	> 0.05 non significant
	Compound	79	55.6%	> 0.05 non significant

Table 2. Demographic data of studied mothers

Maternal factor		Number	Proportion of the total	P
Age of the mother	mean	34.1	-	P < 0.001 Highly significant
	median	35	-	
	range	19 - 49	-	
Parity	Multiparity	101	70.9%	P < 0.05 Significant
	primgravida	41	29.1%	
Maternal history of disease(s)		6	4.2%	
Blood group	A	64	45.7%	P= 0.212 P> 0.05 No significant
	B	29	20.7%	
	AB	2	1.4%	
	O	45	32.1%	
RH	+ve	120	84.3%	P > 0.05 non significant
	-ve	22	15.7%	
Mode Of Delivery	Normal Vaginal	60	42.3%	P > 0.05 non significant
	C.S Emergency	12	8.5%	
	C.S Elective	70	49.3%	

Table 3. Time Distribution of Anomalies according to studied years

Year	Total of cases	Number of congenital	Proportion to admitted congenital malformation	Annual rate of congenital malformations (prevalence) (per 1000 live births)	P
2012	1690	17	12.0	**10.0**	P < 0.05 Significant
2013	2060	16	11.3	**7.8**	
2014	2511	13	9.2	**5.2**	
2015	4158	42	29.6	**10.1**	
2016	3843	54	38.0	**14.1**	
Total	14262	142	100.0	**9.4 (average annual rate)**	

(Pearson chi square = 13.37, P = 0.004)

Table 4. Distribution of isolated malformation

Defect		Number	Proportion of the total	Rate of defects	P
CHD (isolated)		29	20.4%	46.0%	
Gastrointestinal (11; 7.7%)	Oesophageal atresia	5	3.5%	7.9%	P < 0.05 Significant
	Duodenal atresia	5	3.5%	7.9%	
	Imperforate anus	1	0.7%	1.6%	
Nervous (12; 8.4%)	Hydrocephalus	7	4.9%	11.1%	P < 0.05 Significant
	NTD	4	2.8%	6.4%	
	NTD with hydrocephalus	1	0.7%	1.6%	
Craniofacial (4; 2.8%)	Cleft lip/palate	3	2.1%	4.8%	P < 0.05 Significant
	Choanal atresia	1	0.7%	1.6%	
Genital anomaly		5	3.5%	7.9%	
Hemangioma		2	1.4%	3.2%	
Total		63	44.4%	100.0%	

Table 5. Distribution of syndromes

Syndrome	Number	Proportion of the total	Rate of syndromes
Down's syndrome (no CHD)	45	31.7%	57.0%
Down's syndrome with CHD	17	12.0%	21.5%
Achondroplasia	5	3.5%	6.3%
Potter's syndrome	2	1.4%	2.5%
Klipple Fiel syndrome	2	1.4%	2.5%
Piere Robin syndrome	1	0.7%	1.3%
Wolf syndrome	1	0.7%	1.3%
Goldenhar syndrome	1	0.7%	1.3%
Edward's syndrome	1	0.7%	1.3%
DiGeorge syndrome	2	1.4%	2.5%
Vatter's syndrome	1	0.7%	1.3%
Prader willi syndrome	1	0.7%	1.3%
Total	79	55.6%	100.0%

This table for prevalence only

Table 6. Maternal Rh association with type of malformation

Outcome measured	Value (Pearson's χ^2	*P*
Congenital heart disease	2.38	0.123
Hydrocephalus and neural tube defects	*	1.0
Trisomy	2.7	0.1
Syndrome	0.37	0.542

* Fisher exact test

DISCUSSION

Congenital anomalies can be a cause of infant mortality; among infants with malformation who do not survive, more than 70% die in the first month of life. Approximately 40% to 60% of congenital anomalies are of unknown origin. The etiology of Congenital Malformation is genetic (30-40%) and environmental (5 to 10%). Among the genetic etiology, chromosomal abnormality constitutes 6%, single gene disorders 25% and multifactorial 20- 30%; however, for nearly 50% of congenital anomalies, the cause is yet to be known. Consanguineous marriages have been described as an important factor contributing to increased congenital malformations. Studies have shown a significantly higher incidence of malformations in offspring of consanguineous parents [7].

In the present study, as regarding demographic data of the studied neonates, it was found that most of the cases with congenital malformations were males (66.2%) while females represented (33.8%) of total neonates with congenital malformations, while many studies documented a male preponderance among congenital malformed babies [8]. It may be because of the fact that the females were afflicted with more lethal congenital malformations and could not survive to be born with signs of life [1] .

As regarding maternal health factors, the present study demonstrated multiparity was present in 70.9% in mother whose babies had congenital anomalies. This association of multiparity and congenital anomalies has been well documented in a study done by Prasad and Sukladas [9], who reported significantly higher incidence of malformations among the multipara in comparison with primiparas.

There was positive past history of diseases such as diabetes mellitus and hypertension for only 4.2%. Rhesus factor was negative in 15.7% of mothers of neonates having congenital malformations. This was in agreement with Francine et al., [10] who reported that mother's drugs intake during pregnancy was positively, but non-significant association with congenital malformation. Most prevalent blood group among mothers was A representing 45% of this group. This finding is close to result of a study done at Libya from July 2013 to January 2014 that studied frequency in western part of Libya and they found that the percentage of blood group A is highly prevalent representing 23.43% of population [11]. Distribution of cases with congenital malformation according to blood group of mother was 45.7% for blood group A, 32.1% for blood group O, 20.7% for blood group B and 1.4% for blood group AB. The present study showed that distribution of case of congenital malformations according to mode of delivery was that 49.3%was born by elective cesarean section (CS), 42.3% by normal vaginal delivery while8.5%by emergency CS, which is in conformity with the previous study reported that mode of delivery showed a significant association with congenital anomalies with cesarean section being more commonly associated than normal delivery [1]. As regarding neonatal factors, distribution of case of congenital malformations according to birth weight status was 77.5% of cases had normal birth weight, 7% had large birth weight (macrosomia), 14.8% had low birth weight (LBW), while 0.7% had very low birth weight (VLBW). This was in contrast to many studies that reported increased risk of malformations with low birth weight [12]. Distribution of case of congenital malformations according to gestational age was 95.8% of cases were born full term, while 4.2% were born premature. This was also in contrast to many studies showed increased risk of malformations with prematurity [13].

The present study reported that the year 2016 had the highest annual rate of congenital malformations. This finding was statistically significant (P = 0.004). Also, there was a trend for higher monthly rate of congenital malformations in the first three months of every year. The trend was statistically significant (P= 0.0025). this finding was approved in study done by De La Vega and López-Cepero [14] who detected a statistically significant increase in the incidence and relative risk during the summer months of conceiving a child with open neural tube defects (1.03/1000, RR: 1.33), cardiac anomalies (5.22/1000, RR: 1.39), or cleft lip and palate (1.68/1000, RR: 1.89) and so higher rate of congenital anomalies in winter months. However, this finding wasn't approved in other study done by Castilla et al., [15] that found no seasonal variation was proven ($p<0.01$) for Sixteen malformation types tested: anencephaly, spina bifida, cephalocoele, hydrocephaly, microtia, cleft palate, cleft lip, oesophageal atresia, anal atresia, hypospadias, pes equino-varus, pes talovalgus, postaxial polydactyly, pre-axial polydactyly, diaphragmatic hernia, and Down's syndrome.

The present study showed The monthly rate of congenital malformations after the last armed conflict in Benghazi (born 6 months after October 2014) was 13.7 per 1000 live births which was statistically significantly higher than 10.0 per 1000 live births; before that date (P = 0.029). Many studies supported this finding in presence of significant positive correlation between war and prevalence of congenital anomalies [16]. An increased prevalence of birth defects was allegedly reported in Iraq in the post 1991 Gulf War period, which may be due to largely attributed to exposure to depleted uranium used in the war. Another study revealed that ongoing civil conflicts or wars in Democratic Republic of Congo (DRC) during the period 1993-2001 was a contributing factor to the increasing incidence of congenital malformations seen in North-Eastern DRC [17].

As regarding prevalence of syndromes in studied neonates, Down syndrome was the most common syndrome representing 78.5% of syndromes and 43.7% of total population studied, followed by Achondroplasia then Potter's syndrome. Down syndrome is the

most common chromosomal anomalies worldwide and this is approved by many studies. Moorthie et al. [18] demonstrated that Down syndrome is the most common chromosomal anomalies among live broth worldwide. Another study showed that of the total 186 393 births recorded during the study period, 226 Down syndrome cases were listed, giving a prevalence of 1.21 per 1000 births. The median maternal age was 36.5 years with a percentage of maternal age ≥35 years of 60.6% that is close to median of maternal age in the present study [19].

Analytical study showed that gender of the baby had no significant association with any of outcomes measured indicating types of malformation. Many studies have documented a male preponderance among congenital malformed babies in the study of Gupta et al. [2]. Maternal age showed significant association with occurrence of both trisomy and syndromes. This is approved in many studies as before. This may be due to abnormal homologous recombination, defective spindle assembly, biological aging, reduction of cohesion complexes, endocrine disorders, oocyte selection model, and single nucleotide polymorphisms of genes that maintain chromosome stability, etc. In the present study neither Rh type nor past history of disease was associated with any significant difference in the described types of malformations. Although the present study reported that there was a trend for higher monthly rate of congenital malformations in the first three months of every year, Seasonal variation seems to have no effect on distribution of types of congenital malformations. This finding was approved in other study done by Castilla et al. [15] that found no seasonal variation was proven ($p<0.01$) for Sixteen malformation types tested: anencephaly, spina bifida, cephalocoele, hydrocephaly, microtia, cleft palate, cleft lip, oesophageal atresia, anal atresia, hypospadias, pes equino-varus, pes talovalgus, postaxial polydactyly, pre-axial polydactyly, diaphragmatic hernia, and Down's syndrome.

Conclusion: Most frequent congenital malformation in newborn admitted to NICU in Benghazi – Libya in the previous 5 years (2012-2016) was congenital heart disease (CHD) followed by congenital neural tube defects. The year 2016 had the highest annual rate of congenital malformations.

Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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Table S1 is shown in online supplement

REFERENCES

1-Sarkar S., Patra C., Dasgupta M., Nayek K. and Karmakar P. (2013): Prevalence of congenital anomalies in neonates and associated risk factors in a tertiary care hospital in eastern India. Journal of clinical neonatology, 2 (3): 131.

2-Gupta R., Singh A. and Gupta R. (2005): Pattern of congenital anomalies in newborn at birth: A hospital based prospective study. In Proceedings of the 42nd National Conference of Indian Academy of Pediatrics (Pedicon). (pp. 6-9).

3-Vikram D. and Pushpa C. (2000): Congenital malformations in rural Maharashtra. Indian pediatrics. 37(9), 998-1001.

4- Lee K, Khoshoond B and Chen L. (2001): Infant mortality from congenital malformations in the USA, 1970-1990. Obstet Gynecol;98:620-70.

5-Deshpande N., Borle M., and Agarkhedkar S. (2015): Congenital Malformations: Patterns and Prevalence at Birth. Webmed Central Paediatrics; 6 (10).

6- Madi S., Al Naggar R., Al Awadi S. and Bastaki L. (2005): Profile of major congenital malformations in neonates in Al-Jahra region of Kuwait. East Mediterr Health J.; 11 (4) :700-706.

7- Rajangam S. and Devi R. (2007): Consanguinity and chromosomal abnormality in mental retardation and or multiple congenital anomaly. J Anat Soc India, 56 (2): 30-33.

8-Jehangir W., Ali F., Jahangir T. and Masood M. (2009): Prevalence of gross congenital malformations at birth in the neonates in a tertiary care hospital. In APMC. Vol. 3 (1) : 47-50.

9- Prasad U. and Sukladas S. (2016): A study on Prevalence of Congenital Anomalies in Neonates in a Tertiary Care Hospital. Annals

of International Medical and Dental Research, 2 (3): 87.

10- **Francine R., Pascale S. and Aline1a H. (2014) :** Congenital anomalies: prevalence and risk factors. Universal Journal of Public Health, 2 (2): 58-63.

11- **Saad K. A. (2016):** Distribution of ABO Blood Groups And Resus Factor (RH) in ALBIYDA/LIBYA. Journal of Medical and Dental Science Research. 3 (9): 28-31.

12- **El Koumi M., Al Banna E. and Lebda I. (2013):** Pattern of congenital anomalies in newborn: a hospital-based study. Pediatric reports, 5(1).

13- **Egbe A., Uppu S., Lee S., Stroustrup A., Ho D., and Srivastava S.** Congenital malformations in the newborn population: A population study and analysis of the effect of sex and prematurity. Pediatrics & Neonatology, 56 (1): 25-30.

14- **De La Vega A. and López-Cepero R. (2009):** Seasonal Variations in the Incidence of Congenital Anomalies in Puerto Rico based on the Timing of Conception. Puerto Rico health sciences Journal, 28 (2).

15- **Castilla E., Orioli I., Lugarinho R., Dutra G, Lopez-Camelo J., Campana H. et al., (1990):** Monthly and seasonal variations in the frequency of congenital anomalies. International journal of epidemiology, 19(2), 399-404.

16-**Al-Hadithi T., Al-Diwan J., Saleh, A. and Shabila N. (2012):** Birth defects in Iraq and the plausibility of environmental exposure: a review. Conflict and health, 6 (1): 3.

17- **Ahuka O., Toko R., Omanga F. and Tshimpanga B. (2006):** Congenital malformations in the North-Eastern Democratic Republic of Congo during civil war. East African medical journal, 83 (2): 95-99.

18- **Moorthie S., Blencowe H., Darlison M., Gibbons S, Lawn J., Mastroiacovo P. et al. (2017):** Chromosomal disorders: estimating baseline birth prevalence and pregnancy outcomes worldwide. Journal of community genetics, 9 (4): 377-386.

19-**de Graaf G., Buckley F., Dever J. and Skotko B. (2017):** Estimation of live birth and population prevalence of Down syndrome in nine US states. American Journal of Medical Genetics Part A, 173 (10): 2710-2719.

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