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Risk Factors for Congenital Anomalies in Neonatal Intensive Care Unit in Baghdad City

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Abstract

Study Aim: to assess the possible risk factors of congenital anomalies and its patterns in Baghdad city.

Methodology: a cross sectional design carried out in NICU at two main governmental pediatric hospitals in Baghdad city. Sixteen newborns medically diagnosed with congenital anomalies were involved at time of data collection. The instrument of the study concerned with newborns and their mothers' data related to the possible risk factors that may lead to congenital anomalies. The data were analyzed by using SPSS program.

Results: the result of the study revealed that (60%) of neonate were boys, and (48.3%) was preterm. For systematic body anomalies (30%) documented for gastrointestinal system, (26.7%) cardiovascular and (23.3%) central nervous system. The result also showed (66.7%) of mother > 34 years, (61.7%) with BMI ≥30, (56.6%) with hypertension, (63.3%) anaemic, (60%) self medication, (80%) have positive family history, (58.3%) lived near mobile station, (56.6%) consanguinity, (70%) did not take folic acid, (65%) with low socioeconomic status.

Conclusion: most common anomalies were gastrointestinal, cardiovascular, and central nervous system. Elder mothers, increased BMI, chronic diseases, consanguinity, positive family history, and low socioeconomic status were related to increased incidence of congenital anomalies.

Recommendation: increased health awareness about the antenatal check up, concern about neonatal exam for early diagnosis, and folic acid supplements during pregnancy period.

Key words: *risk factors, congenital anomalies, NICU*

Introduction

Congenital anomalies are important health issue worldwide [(1)], it is considers one of leading causes for morbidity and mortality among infants in both developed and developing countries [(2 & 3 & 4)], approximately 12.3%-32% of infants' mortality caused by secondary complications of congenital anomalies [(4)], in 2014 a study by WHO mentioned that 20% of premature deaths result from such anomalies [(1)].

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Globally many studies reported an increased incidence of congenital anomalies [(2)]; but it is differing all over the world [(4)], in Islamic population the incidence was high 10-45% usually due to consanguinity marriage. In Iraq at Mosel city according to study in 2012 the mortality rate of congenital anomalies during perinatal period was 79.25% [(4)].

Multifactors contributing in developing this health problem [(1, 2 & 3)], most of them were unknown [(1)], because 80% of anomalies were caused by different environmental factors and 15-20% from genetic factors [(4)].

Congenital anomalies prediction and prevention is a serious challenge for health care specialties [(2 &3)], the

early diagnosis can contribute in reducing its incidence, possible complications, and adequate planning for suitable health services [1, 2, & 3]. The aim of the present study was assessing the potential risk factors and pattern of congenital anomalies in Baghdad city to reduce its burden

Method and Materials

Method

Research design: a cross sectional design was used, the study was conducted during the period first of November 2014- first of May 2015.

Setting: the study carried out in NICU at two main governmental pediatric hospitals in Baghdad city: children Welfare Pediatric Hospital and Child Center Hospital, which were newborns with congenital anomalies referral from different hospitals usually for these two hospitals.

Instrument of the study and procedure: A non probability (purposive) sample of 60 neonates with their mothers were included at time of data collection, they were selected based on neonatologist diagnosis as any functional or structural abnormalities during the first 30 days of neonates life. The consent form has been taken from neonates` guardians before data collection.

The instrument of the study was a constructed questionnaire developed by the researchers after a comprehensive literature review and researches related to the field of the study. The instrument consists of newborn and their mothers' data included their gestational age, age, sex, weight, and types of malformation system. Mother age, parity, abortion, history of previous delivery with congenital anomalies in the family, smoking history, consanguinity, socioeconomic status, mother's health during pregnancy, medication history, medical and surgical history.

Statistical Analysis: The data were analyzed by statistical package for social science (SPSS) version 23 was used for data analysis. The descriptive statistical measures of frequency, percentage, mean, and standard deviation were used.

Results

Table (1) Sociodemographic characteristic of newborn with congenital anomalies

Sociodemographic characteristic	F N=60	percentages 100 %
1. Age		
• 1-15 day	28	46.7
• 16-30 day	32	53.3
2. Gender		
• Boy	36	60
• Girl	24	40
3. Weight		
• Less 2.5 Kg	20	33.3
• 2.5-3 Kg	30	50
• 3.5-4 Kg	10	16.7
4. Feeding type		
• Normal	4	6.6
• Artificial	52	86.8
• Mixed	4	6.6
5. Gestational age		
• Preterm	29	48.3
• Full-term	25	41.7
• Post-term	6	10
6. Mode of delivery		
• Normal delivery	20	33.4
• Cesarean section	40	66.6

This table shows that (53.3%) of neonates were at age (16-30) days, (60%) were boys, (50%) within weight (2, 5-3 Kg), (86.8%) have artificial feeding, (48.3%) was preterm according to G.A., and (66.6%) were born with cesarean section mode.

In this figure the most common types of CAs were (30%) digestive system, (26.7%) circulatory and (23.3) central nervous system.

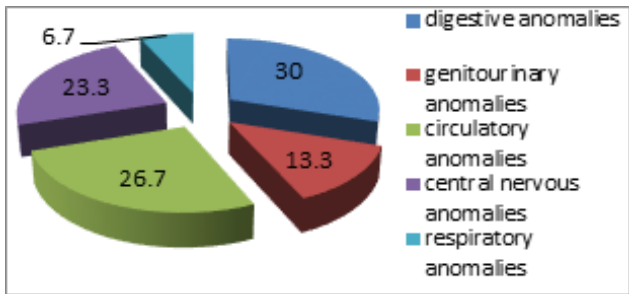

Figure (1) distribution of congenital anomalies according to body system

Table (2) incidence of congenital anomalies according to sub type of the body system

Congenital anomalies	**F**	**%**
1. Digestive system	18	100
• Imperforated anus	6	33.3
• Intussception	4	22.2
• Cleft lip	6	33.3
• Cleft lip and cleft palate	2	11.2
2. Central nervous system	14	100
• Hydrocephaly	4	28.5
• Spina bifida	10	71.5
3. Genitourinary system	8	100
• Ambiguous genitalia	4	50
• Obstruction uropathy	4	50
4. Cardiovascular system	16	100
• A cyanotic	10	62.5
• Cyanotic	6	37.5
5. Respiratory system		
• Diaphragmatic hernia	4	100

This table shows that high percentages of congenital anomalies related to body system: for digestive system was imperforated anus and cleft palate (33.3%) for both of them, central nervous system was spina bifida (71.5%), genitourinary was ambiguous and obstetric uropathy (50%) for both, cardiovascular was a cyanotic disorders (62.5%), and diaphragmatic hernia (100%).

Table (3) possible risks factors for congenital anomalies

Risk factors	Yes		No	
	F	%	F	%
Age of mother • > 34 years • < 19 years	 40 20	 66.7 33.3		
BMI ≥30	37	61.7	23	38.3
Have chronic disease	12	20	48	80
Diabetes	21	36	39	65
Hypertension	34	56.6	26	43.3
psychological stress	26	43.3	34	56.6
physical violence	12	20	48	80
Have sexual violence	6	10	54	90
Smoking	18	30	42	70
Oligohydramnios	18	30	42	70
Preeclampsia	33	55	27	45
Anemia	38	63.3	22	36.7
Self-medications	36	60	24	40
Family history of CAs	48	80	12	20
Exposure to radiation Living near mobile stations	12 35	20 58.3	48 25	80 41.7
Consanguinity	34	56.6	26	43.3
Infectious diseases	36	60	24	40
Previous child with CAs	20	33.3	40	66.7
History of abortion	35	58.3	25	41.7
Have recommended folic acid	18	30	42	70
Socioeconomic status • Low • Moderate • High	 39 16 5	 65 26.7 8.3		

This table shows that (66.7%) of mother > 34 years, (61.7%) with BMI ≥30, (80%) no chronic diseases, (56.6%) with hypertension, (63.3%) anaemic, (60%) self medication, (80%) have family history with CAs, (58.3%) lived near mobile station, (56.6%) consanguinity, (60%) have infectious diseases during pregnancy, (58.3%) previous abortion, (70%) did not take folic acid, (65%) with low socioeconomic status.

Discussion

The results of the present study showed that most of newborns (60%) were boys. This may due to most of

congenital anomalies found in boys for unknown causes. This result supported by previous studies carried out in Egypt, Ethiopia, Iran, and Pakistan which mentioned that anomalies in boys were more than girls [5, 6, & 10]. In Mosel city from 2009-2010 found that the prevalence of CAs was (0.69%) and the ratio of boys to girls was approximate 1:1.09, and their mean of GA was 36 weeks [4].

The result also showed (33.3%) of neonates borne less than 2.5 Kg, (48.3%) of them were premature neonates, and (66.6%) delivered by cesearan section mode. Usually abnormal fetal development affects on their normal weight gain and duration of gestational age, therefore the outcomes is abnormal. A study about CAs in Iran documented that (30.9%) were LBW, and (27.3%) were prematurely [10]. Another study about risk factors of CAs in Punjab revealed that (58.5%) of neonates born with low birth weight, and (30.8%) borne prematurely [2]. In Egypt study about risk factors of CAs reported LBW and prematurity were more documented with neonates delivered with CAs [5]. The incidence of CAs in India was increased with mother age, prematurity, and LBW [11].

Most common types of CAs in the present study were (30%) for digestive system, (26.7%) circulatory and (23.3) central nervous system. While the subtypes of systematic congenital anomalies as follow: for digestive system was imperforated anus and cleft palate (33.3%) for both of them, central nervous system was spina bifida (71.5%), genitourinary was ambiguous and obstructed uropathy (50%) for both, cardiovascular was a cyanotic disorders (62.5%), and diaphragmatic hernia (100%).

While a study in Mosel showed the abnormalities of central nervous system were the highest percentages [4]. In Egypt the incidence of digestive system anomalies was (38.0%), musculoskeletal system (32.9%), and circulatory system (11.0%) [5]. In Addis Ababa also showed the incidence of nervous system anomalies was (40.3%), orofacial clefts (23.3%), musculoskeletal anomalies (23.3%), and cardiovascular anomalies (8%) [8]. While in India the most common of CAs was cardiovascular, musculoskeletal and genitourinary anomalies [11]. A study concerning CAs reported gastrointestinal tract anomalies were the most common anomalies followed by genitourinary and cardiovascular anomalies [13]. A retrospective study from 2010-2015 reported that CNS malformations were the most common anomalies (52%), followed by genitourinary (20%), and musculoskeletal (9.33%). anencephaly was the most common anomalies of CNS (25.33%), hydrocephalus (12%), meningomyelocele (13.33%) [2]. A similar study showed CNS anomalies were (31.88%) and the most common types were anencephaly, meningocoele & hydrocephalus, while genitourinary anomalies was (40.58%) and cardiovascular system (8.70%) [7].

Concerning the possible risk factors of congenital anomalies, the present finding reported (66.7%) of mother > 34 years, (61.7%) with BMI ≥30, (80%) no chronic diseases, (56.6%) with hypertension, (63.3%) anaemic, (60%) self medication, (80%) have family history with CAs, (58.3%) lived near mobile station, (56.6%) consanguinity, (60%) have infectious diseases during pregnancy, (58.3%) previous abortion, (70%) did not take folic acid, and (65%) with low socioeconomic status.

Many previous studies showed mother age has related with CAs prevalence that may due to decreasing normal body function during age developed and effects of chronic diseases especially (hypertension, diabetes mellitus, and anemia) on blood circulation and maternal general fetus health. Low socioeconomic status also affects on mothers` health and fetus growth, by in adequate nutrition supplements and poor obstetric follow up. In addition mothers` low educational level affects negatively on their health awareness toward nutrition.

Many studies about risk factors of CAs showed association between increasing mother age and incidence of CAs [12, 13, 14, 16, & 17]. In 2019 a study about the prevalence of CAs in Ethiopia reported (3.6%) of mothers have previous delivery with CAs, (2.4%) have positive history of CAs, and most of them reported low iron folate intake during pregnancy [8]. The authors added in their study mothers' illnesses, infection, and malnutrition showed significant relation with CAs [8]. A study about CAs also documented (3.6%) of parents showed sibling positive history of CAs, and (14.5%) of mothers have chronic illnesses [10].

In a systematic review with 22 studies concerning the risk factors of CAs found an association between incidence of neonates' anomalies and mothers` smoking, increased BMI, and chronic illnesses [9]. In studies about maternal obesity and congenital anomalies revealed increasing BMI showed a significant relation with frequency of CAs [16 & 17].

In Pakistan 2014 a study related to the prevalence of CAs documented elder mothers and living in rural area showed increased CAs percentages [12]. Another study in Pakistan also showed the incidence of CAs was (3%), mothers' age more than 34 years and consanguinity showed double risk with CAs [2 & 15].

In Egypt 2013 a study about risk factors of birth defects revealed family positive history, consanguinity, residency, radiation exposure, and medication used, and chronic diseases showed significant relation with CAs prevalence [3]. A study about epidemiological risk factors of CAs 2016 reported mothers` age, educational level, iron folic intake, smoking, history of CAs, and abortion increased prevalence of CAs [13]. In Egypt also 2019 a study about risk factors of CAs revealed consanguinity, mothers` malnutrition, increases BMI, positive family history were the most common risk factors for CAs [5].

A study about risk factors of CAs 2015 documented elder mothers, low socioeconomic status, low educational level, residency, consanguinity, smoking, self medication, low vitamins and folic acid during pregnancy, and chronic diseases were increasing the factors for CAs [7]. WHO reported increasing incidence of CAs associated with lower socioeconomic status due to inadequate nutrition, hygiene, educational level, poor obstetrical history check-up and folic acid supplements [7]. In Mosel city a study about risk factors of CAs reported mothers` medication used, chronic diseases, infections, radiation, psychosocial stressors, and premature delivery documented as significant risk factors [4], in addition to low socioeconomic status and educational level, mothers` in adequate iron folic acid intake [4] with older mother , consanguinity the incidence of CAs increased [4].

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Conflict of Interest: None to declare.

Ethical Clearance: All experimental protocols were approved under the Pediatric Nursing Department, College of Nursing, University of Baghdad, Iraq and all experiments were carried out in accordance with approved guidelines.

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