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Alteration in incidence and pattern of congenital anomalies among newborns during one decade in Azarshahr, Northwest of Iran

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ABSTRACT

Background and aims: Congenital anomalies are as the major causes of stillbirths, neonatal death, disability and childhood health problems all over the world. The aim of this study was to determine the incidence and pattern of congenital anomalies in newborn during the first 24 hours of life in Shahid-Madani hospital, Azarshahr, Tabriz, during two periods 2002-2003 and 2012-2013 years.

Methods: This is a records-based descriptive study with 4515 newborns who were delivered at Shahid-Madani hospital.

Results: The incidence of congenital anomalies in newborns during 2002-2003 and 2012-2013 years was 1.31% and 1.06 respectively. We found that the incidence rate of congenital anomalies has declined during one decade, and also the pattern of these has varied. In 2002-2003, the most common anomaly was musculoskeletal system anomaly whereas in 2012-2013, the genitourinary system was the most frequent anomaly.

Conclusion: Our findings showed incidence and pattern of congenital anomalies have changed during one decade. Research into the etiology, prevention and prenatal care planning must focus on in prevalent congenital anomalies in this city.

Keywords: Congenital, Abnormalities, Epidemiology, Newborn, Iran.

Original article

INTRODUCTION

Congenital anomalies, cancer and accidents are the main causes of infant morbidity and mortality, in the developed countries whereas in the poorer countries infections and malnutrition are the dominant causes.[1-3] Congenital anomalies are one of the major causes of stillbirths, neonatal death, disability and childhood health problems all over the world.[4] Congenital anomalies, congenital malformations and birth defects refer to any abnormality of structure, function or body metabolism of any body part, whether genetic or not, that can be present at birth or become clinically manifest anytime later in life.[1,5] Approximately, 66% of major malformations have no recognized etiology and most of them have multifactorial inheritance.[6-8]

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The etiology of congenital anomalies can be divided into: genetic (multifactorial: 20-30%, Single gene: 25%, or chromosomal: 6%), environmental factors and teratogenic agents, maternal condition (alcoholism, smoking, diabetes, endocrinopathy, nutritional deficiency), infections, mechanical problems, chemicals agents, drugs, radiation, hyperthermia and unknown.[9] Consanguineous marriages are one of the important factors that increased congenital anomalies.[3] Advanced maternal age also increases the risk of some chromosomal abnormalities including Down syndrome.[4] It has been shown that the season of birth and sex of the infant are important factors associated with congenital anomalies.[10]

Treatment and rehabilitation of children with congenital anomalies is costly and complete recovery is usually impossible.[3] Early recognition of congenital anomalies is the principal for prevention and care planning, because for some congenital anomalies immediate medical and surgical therapies are essential for survival.[11] However, the prevention of these disorders is available in 60 percent of cases.[12] For example an adequate intake of folic acid, iodine, vaccination, and adequate antenatal care are keys.[4] In addition, a prenatal diagnosis is possible in 2nd trimester on maternal sonography.[5] Primary prevention of congenital anomalies in the population based on controlling environmental risk factors is a crucial policy priority, including preconceptional care and whole population approaches.[13] The present study was performed to determine the incidence and pattern of congenital anomalies in newborns during the first 24 hours of life in Shahid-Madani hospital, Azarshahr, Tabriz.

METHODS

In this study we determined the incidence of congenital anomalies among newborns in two periods, 2002-2003 and 2012-2013 to recognize and compare the different forms of anomalies seen among these infants and to describe the effect of various infant and maternal characteristics in congenital anomalies.

This is a records-based descriptive study with 4515 live born neonates who had been delivered at Shahid-Madani hospital (general hospital with maternity service) in Northwest of Iran, Tabriz, Azarshahr over a period from 2002-2003 and 2012-2013.

In this study, any deviation in structure or form of normal position which is present at birth is considered as congenital anomalies. In this hospital all of the newborns were clinically examined and screened for general health, maturity and congenital malformations by a pediatrician during the first 24 hours of life and whenever there was any deviation from normal physical structure it was recorded. The medical folders (case files) of all newborns were reviewed from archive department and subsequently the data was extracted individually by the investigator for detailed study.

Clinical examination by doctors was based on diagnosis of congenital anomalies which was recorded in the patient medical folders. Maternal characters including age, history of chronic illness, drug intake, parental consanguinity, history of reproduction (including gravidity, parity and abortion) were obtained from these folders. Additional data about neonatal characters including gestational age, sex, existence of congenital anomalies and type of them were collected from medical records.

The incidence rate of congenital anomalies was calculated as a percent of the total number of newborns with congenital anomalies divided to total number of newborns delivered in every period of the study in this hospital. The type of congenital anomalies was classified by the diagnostic standardization of congenital anomalies from the international classification of disease (ICD-10) codes. Data analysis was performed by SPSS for Windows program. The

level of significance was determined at P<0.05. The results obtained were compared with those of the other populations where these were available.

RESULTS

Characteristics of maternal and newborns from 2002-2003 years are considerd as following.

During this two years investigation period 2738 newborns were delivered among whom 1383 and 1355 newborns were males and females respectively. Out of these, 36 newborns were diagnosed with congenital anomalies. Incidence of congenital anomalies in this study was 1.31% (15 males, 21 females). There was a higher frequency of congenital anomalies in female as compared to male newborns (58.33% vs 41.66%). The average maternal age with fetuses' congenital anomalies was 26.27 and 77.77% of this mothers were ≤ 30 years and 22.22% were ≥ 30 years. From 36, 9(25%) of the newborns were from consanguineous marriages, while 27(75%) were from non-consanguineous marriages. The mean gestational age of the abnormal newborn was 38.02 weeks and 4(11.11%) deliveries occurred before the 37th week of gestation.

Characteristics of maternal and newborns from 2012-2013 years are considered as is followed in below.

During this two years study period 1777 newborns were delivered among whom 930 and 847 newborns were males and females respectively. Out of these, 19 newborns were diagnosed with congenital anomalies. Incidence of congenital anomalies in this study was 1.06 (7 males, 12 females). There was a higher frequency of congenital anomalies in female as compared to male newborns (63.15% vs 36.84%).

The average maternal age with fetuses' congenital anomalies was 26.27 and 73.68% of this mothers were ≤ 30 years and 26.31% were ≥ 30 years. From 19, 3(15.78%) of the newborns were from consanguineous marriages, while 16(84.21%) were from non-consanguineous marriages. The mean gestational age of the abnormal newborn was 38.02 weeks and 8 (42.1%) deliveries occurred before the 37th week of gestation. Table 1 shows characteristics of mothers and newborns with congenital anomalies (Table 1).

Table 1: Descriptive of maternal and newborns with congenital malformation

Newborns' characters		n(%)	
		2002-2003	2012-2013
Gender	Male	15(41.66)	7(36.82)
	Female	21(58.33)	12(63.15)
Type of delivery	NVD*	1590(58.07)	656(36.91)
	C/S†	1148(41.92)	1121(63.08)
Gestational age	≤37	4(11.11)	8(42.1)
	≥37	32(88.88)	11(57.89)
Type of birth	Live	8(22.22)	16(100)
	IUFD‡	-	-
Maternal age	≥30	8(22.22)	5(26.31)
	≤30	28(77.77)	14(73.68)
Gravid	G=1	21(58.33)	7(36.82)
	G≥2	15(41.66)	12(63.15)
Abortion	Ab§=0	30(83.33)	15(78.94)
	Ab≥1	6(16.66)	4(21.05)
Marriages	Consanguin	9(25)	3(15.87)
	Non-Consanguineous	27(75)	16(84.21)

**: Normal Vaginal Delivery; †: Cesarean Section; ‡: Intrauterine Fetal Death; §: Abortion*

Characteristics of newborns with congenital anomalies are explained from 2002-2003 years.

The musculoskeletal system was the most affected, involving 16 out of 36 patients (44.44%). Among this group, the most frequent anomaly was congenital dislocation of hip (CDH). Congenital cardiovascular diseases were second in frequency that involved 9 out of 36 patients (25%) and it had the high incidence (75%) among female newborns. Genitourinary system involved 5 out of 36 patients (13.88%). Male newborn infants had a greater incidence of genitor- urinary tract anomalies (80%). The risks for other congenital anomalies did not vary significantly according to sex.

During from 2012-2013 years, the genitourinary system was the most affected involving 8 out of 19 patients (42.1%). Among this group, the most frequent anomaly was hypospadias. The musculoskeletal system was second in frequency which involved 4 out of 19 patients (21%). Central nervous system involved 2 out of 19 patients (10.52%). Table 2 shows frequency and pattern of congenital anomalies by System according to the International Classification of Disease (ICD-10) (Table 2).

Table 2: Frequency of major congenital anomalies by systems according to the International Classification of Disease (ICD-10) in Shahid-Madani hospital, Azarshahr

System	Congenital anomalies	Number of Malformations	
		2002-2003	2012-2013
Musculoskeletal	CDH*	14	0
	Clubfoots	1	0
	Polydactyly	1	3
	Reduction defect of upper limb	0	1
Cardiovascular	Cardiovascular	9	0
Genitourinary system	Undescended testicle (Cryptorchidism)	2	0
	Hypospadias	2	5
	Vaginal	1	0
	Hydrocell	0	1
	Ambiguous genitalia	0	2
Central nervous	Meningomyelocele	2	1
	Anencephaly	1	0
	Hydrocephaly	1	0
	NTD†	0	1
Chromosomal abnormality		1	1
Respiratory system		0	0
Digestive system		0	1
Other anomalies		1	3
Total		36	19

**: Congenital dislocation of hip; †: Neural tube defects.*

DISCUSSION

This study was a records-based descriptive survey in which the data were extracted from medical folders. In hospital based survey, there is a very large collection of data that we can easily analyze, but this data cannot be random because of

preference in hospital base selection on many factors by peoples. However, there is no other way to survey congenital anomalies in large samples.

We have investigated the incidence of congenital anomalies among newborns in Shahid-Madani hospital, Azarshahr, Tabriz during 2002-2003 and 20012-2013 years, with emphasis on the different forms of anomalies. The incidence rate of congenital anomalies in newborns during 2002-2003 and 2012-2013 years was 1.31% and 1.06 respectively. We found that the incidence rate of congenital anomalies has declined during one decade also the pattern of these have varied. In 2002-2003, the musculoskeletal system was affected the most, whereas in 2012-2013, the genitourinary system was the most affected frequently. These differences may be due to variation in lifestyle (nutrition, prenatal care approach) or environmental factors (air pollution). Comparing the frequency of congenital anomalies base on sex, we observed that the rate of anomalies during two periods of this study in female newborns was higher than male newborns.

Base on World Health Organization (WHO) reports, congenital anomalies affect approximately 1 in 33 infants (2-3% of babies) and estimated 270,000 newborns die during the first 28 days of life every year from congenital anomaly.[4] European Surveillance of Congenital Anomalies (EUROCAT) recorded a total prevalence of major congenital anomalies about 23.9 per 1,000 births for 2003-2007.[11] The rate and pattern of congenital anomalies could vary based on regional differences over time.[1,5] It is estimated that about 94% of serious birth defects occur in middle and low-income countries, where mothers are more susceptible to macronutrient and micronutrient malnutrition and may have increased exposure to any agent or factor that induces or increases the incidence of abnormal prenatal development, particularly infection and alcohol.[4]

As mentioned, the most common congenital anomalies in our study during 2002-2003 was musculoskeletal anomalies which was consistent with a survey in researchers;[14-17] but in other studies such as Tabriz and Urmia the central nervous system anomalies were the most frequent congenital anomalies.[18,19] This variety can be due to difference in risk factor for congenital anomalies in different populations. CDH malformation was the most common anomaly between musculoskeletal anomalies which was seen in male higher than female newborns.

In 2012-2013 the rate of genitourinary system anomalies was the most frequent anomaly (23.52%), similar to a study in Kashan and Tehran.[20] Respiratory system, chromosomal, eye and digestive system anomalies were rare in this study which may be due to risk factors differences, under-diagnosis or the small sample size.

In both periods of study, the average maternal age with fetuses' congenital anomalies was 26 and the majority of these mothers were $\leq$ 30 years. This may be due to the effects of genetic factors more than environmental factors in this area.

In the present study, the rate of congenital anomalies in consanguineous marriages was low in comparison to non-consanguineous marriages. Our findings showed that parity, gravidity, multiple pregnancy, positive history of previous abortion, drug intake, maternal illness and having prenatal care were not independent risk factors for congenital anomalies. Diversity of congenital anomalies in different populations may be due to differences in genetic or environmental factors. Thus, it is necessary to develop screening schedules to identify the rate and pattern of congenital anomalies based on the population. This can help determining the

exact risk factors which in turn will be helpful for primary prevention planning.

This study had some limitations. Firstly, newborns were examined by different doctors and this reduced the accuracy of diagnosis. Secondly, we could not access the genetic tests in newborns with genetic disorder and diagnosis was only based on clinical examination.

CONCLUSION

This is the first time the incidence and pattern of congenital anomalies in Azarshahr, a city in Northwest of Iran, is studied. Our findings showed incidence and pattern of congenital anomalies have changed during one decade. Research into the etiology, prevention and prenatal care planning must focus on preventing congenital anomalies in this city.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest.

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