Original Article

INCIDENCE OF HEAD AND NECK BIRTH DEFECTS IN IRAN: A CROSS-SECTIONAL STUDY FROM SOUTHWEST REGION

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ABSTRACT

Objective: The aims of the study were to assess the prevalence of birth defects (BDs) in Ahwaz, Iran amongst the live births born between 1 Oct 2006 and 31 Oct 2007.

Methodology: There were a total of 4176 live births in Ahwaz during this study period. The interview included the Father and mother's date of birth, Number of gravidity, paternal smoking, maternal delivery age and the occupation of the mother and father.

Results: Out of 4176 subjects, 1.43 per 1000 live births presented with multiple anomalies. The overall occurrence of malformation among working mothers were 1.67 and 7.42 for working fathers. Parents in the occupational group 'Commerce' had the highest rates (3.83 per 1000 live births). The frequencies of BDs in smokers were 3.5 (per 1000 live births). The gravidity profiles showed that all three types were very close to each other. The occurrence rate of BDs increased in the maternal delivery age of 18-35 years (5.74 per 1000 live birth).

Conclusion: The prevalence of BDs in Southwest of Iran is comparable to those in other countries. Some of the birth defects are not diagnosed at birth and may occur later in the life.

KEY WORDS: Birth defects (BDs), Gravidity, Paternal smoking, Maternal delivery age, Occupation of mother and father.

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INTRODUCTION

Birth defects constitute the leading cause of infant death among all racial/ethnic groups.[1,2] A broad definition would include functional and metabolic disorders that, although present, may not necessarily be recognizable at birth, but are determined only when the child is older.[3] There are two most commonly used classification systems: (A) the Birth defect classification according to the International Classification of Diseases;[4,5] and (B) the International Clearinghouse for Birth Defects Monitoring System (ICHBD).[6] Worldwide surveys have shown that the frequency of Birth defects varies greatly from country to country. The frequency depends on the time of observation after birth, the types of malformation included, and the

differences in reporting and statistical procedures.[7] In a multiracial and heterogeneous population like that of Iran, it is important to know the significance of various Birth defects and their possible associated factors. It is vital to ascertain the epidemiology of Birth defects, as a Birth defect can be a significant medical, psychological and socio-economic burden on both the family and the community. Occupational and environmental agents are the suspected causes for about 60% of birth defects with unknown etiology.[8] The existence of hazards in the workplace has raised concerns about the potential of these substances for adverse reproductive effects. Historically, studies assessing the role of occupational exposure as etiological agents for birth defects focused on maternal exposures during pregnancy. The role of paternal exposure received less attention despite animal evidence showing that exposures of males to toxic agents may result in congenital malformations in offspring.[9-11]

With increasing concern about male reproductive function in the past decade, epidemiological studies are being published considering the role of paternal exposures by evaluating paternal occupations and risk of birth defects. Several studies have investigated whether parental cigarette smoking increased the risk of having offspring with BDs.[12,13]

In this observation the epidemiological evidence about the relation between paternal and maternal occupations, paternal smoking, maternal delivery age, gravidity with distribution of birth defects is summarized.

METHODOLOGY

Subjects: The subjects included all live births born to Ahwazian parents between 18th Oct 2006 and 31st Oct 2007, who were registered at the Imam Khomeini and Apadana Hospitals. Birth defects eligible to be included in the study were all live births with the presence of one or more BD during the data collection period. The inclusive criteria were based on the classification of cases according to the International Clearinghouse for Birth Defects Monitoring System (ICHBD).

Paternal and Maternal Interviews: The study was approved by the Institutional Ethics Committee of Ahwaz Jondishapour University of Medical Sciences (AJUMS).Written consents were taken from all the participants of this study. Interviews were conducted with mothers and fathers of study cases in Persian. Interviews were completed an average of two months for cases after the date of delivery.

Data Collection: Information on live births and BD cases obtained from the filled questionnaire and interview included the Father and mother's date of birth, Number of gravidity (Gravidity means number of previous pregnancies. The gravidity was classified in three groups include; 1: one previous pregnancy; 2: two previous pregnancies; 3: more than two previous pregnancies), paternal smoking, maternal delivery age and the occupation of the mother and father (if employed, the industrial sector involved).

Data processing and statistical analysis: Before being added to the final database, all the raw data from the different sources were checked and merged to produce a unique record number for each subject. The entire database was then re-examined to identify and resolve any discrepancies. New variables were created from the basic information in the raw data. The final dataset comprised a comprehensive list of variables that included an array of potential risk factors as well as socio-demographic information. Statistical analyses were performed with standard contingency tables using the SPSS program, version 15.0, on a personal computer.

RESULTS

During the one year period (2006–2007) covered by this study, there were 31 cases with one or more congenital defects retrieved from the records of a total of 4176 registered live newborns in Imam Khomeini and Apadana Hospitals, Ahwaz. The overall rate of BDs was 7.42 per 1000 live births. The occurrence of congenital defects (per 1000 live births) across the period was 8.62 in 2006 and 7.02 in 2007—showing a downward trend from 2006 to 2007.

Table-I: The distribution and diagnosis of the major Birth defects: Ahwaz 2006-2007

Country/City	*Year*	*Frequency per 1000 live births*	*Reference*
UAE	1995	10.5	[21]
Bahrain	1995	27	[22]
black South Africa	1995	11.9	[23]
China	1995	11.5	[24]
Lebanon	1998	16.5	[25]
Turkey	1998	1.1	[26]
Russia	2001	12.3-15	[27]
India	2002	21.1	[28]
California	2003	17.6-25.2	[29]
Gorgan, Islamic Republic of Iran	2005	10.1	[30]
Czech Republic	2007	34.9	[31]
Southern Region in Iran	2008	7.42	This Study

Among the live born with congenital defects in this study, 1.43 (per 1000 live births) had multiple anomalies. The commonest single BD was 'Cleft lip and Palate Cleft', which accounted for 3.35 (per 1000 live births) of all malformations (Table-I).

Maternal delivery age: The mean maternal delivery age was 30.3 ± 4.7 years (mean ± SD) for all live births, with 30.3 ± 4.7 years for non-defects and 30.7 ± 5.0 years for defects. There was a significant increase of distribution of the defect rates in maternal delivery age of 18-35 years with a value of 5.74 per 1000 live birth (Fig-1).

Gravidity: The gravidity profiles showed that all three types were very close to each other (Fig-2).

Table-II: Prevalence of congenital heart diseases at global level as cited in the available literature and our study

Types of BD	*No.*	*Occurrence (per 1000 livebirths)*
Cleft lip and Palate Cleft	14	3.35
Palate Cleft	2	0.47
Atresia of Choana	5	1.19
Bronchial Fistula	3	0.71
Microtia	1	0.23
Multiple Birth Defects	6	1.43
Total	31	7.42

Distribution of BDs by parental and maternal occupation: In total, 97.2% of mothers reported that they were not working; 2.8% held a clerical occupation. In contrast to the large group of non-working mothers, all the fathers were employed. The proportions of the fathers in other occupations ranged from 18 to 24%. The overall malformation occurrences (per 1000 live births) of working mothers versus non-working mothers were 1.67 versus 5.74, and 7.42 for working fathers. In paternal occupational classification: the lowest defect rate of 1.19 per 1000 was recorded for 'Clerical workers', while the

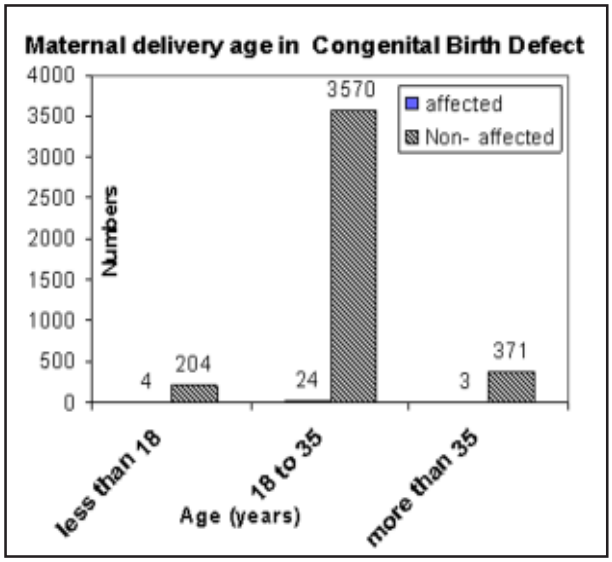

Fig-1: Maternal delivery age in Congenital Birth Defect among study subjects

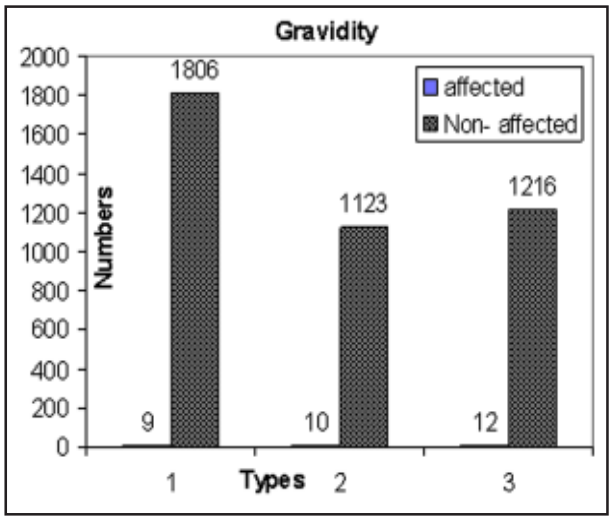

Fig-2: Different types of gravidity among the study groups; Gravidity means number of previous pregnancies: 1: one previous pregnancy; 2: two previous pregnancies; 3: more than 2 previous pregnancies.

highest rate of 3.83 per 1000 was found for 'Commerce' and 2.39 per 1000 was found for 'Agricultural Workers' (Figure 3 a & b).

Paternal Smoking: Among all paternal groups who participate in this study 1980 individuals have shown history of smoking and the rest had no smoking history. The relevant frequency of BDs in smokers were 15 (3.5 per 1000 live births) and in non-smokers were 16 (3.8 per 1000 live births), respectively (Fig-4).

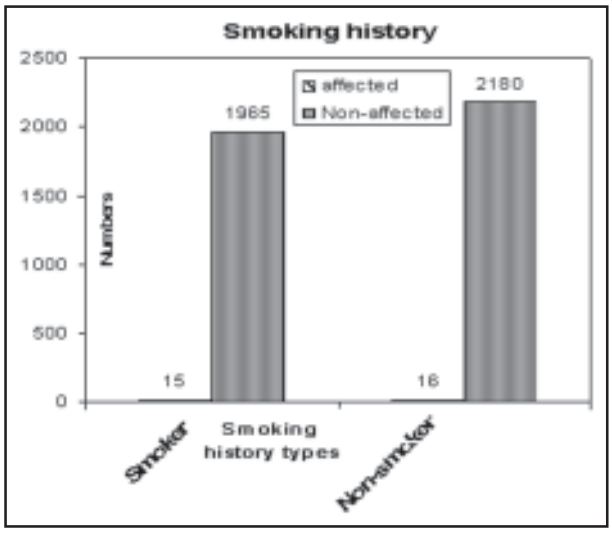

Fig-4: The classification of paternal groups based on smoking history.

DISCUSSION

Based on our findings, the prevalence rate of BD was 0.74% (7.42/1000). Comparison of international frequencies of BD that is available in literature to our study described in Table-II.[14-24] Previous studies have suggested an association between these non-occupational risk factors and adverse reproductive outcomes.[7] Father's drinking and coffee consumption also were not available.

These variables could be potential confounders, which may over or underestimate the asso-

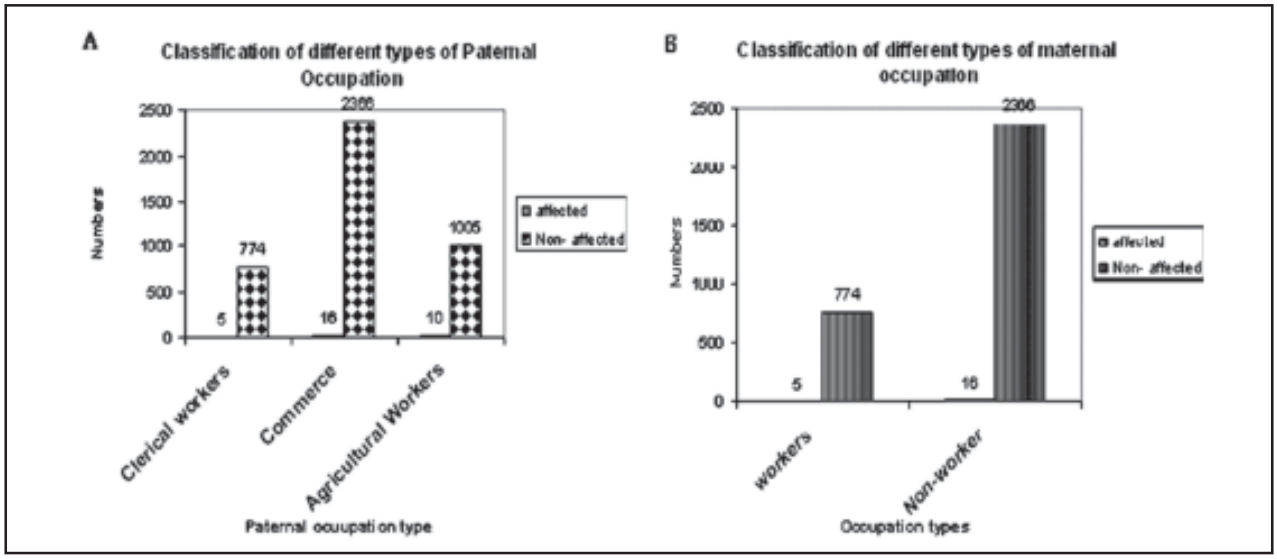

Fig-3: A: Classification of different types of paternal occupation among study groups; B: Classification of different types of maternal occupation among study groups.

ciations of fathers' occupations and BDs. We found the prevalence of overall BDs (7.42 per 1000) in our study to be fairly close to that of other studies. According to the Finnish register of BDs, the prevalence of BDs among newborns in Finland varied from 13 to 20 per 1000 in 1963–1980, and the mean for the period was 14 per 1000.[5] Not many studies have reported national BD rates. Most published data are based on hospital births over a period of time, and are not population based.

Dryden[25] studied the rate of BDs in 10 000 babies born consecutively in a general hospital in Papua New Guinea and reported an overall prevalence of congenital defects of 11.6 per 1000. Riley et al.[26] reported that 32 per 1000 babies had at least one malformation during a 13 year study period (1983–1995) in Victoria, Australia. However, the study included 25 231 infants (born at 20 weeks or more) and 1566 terminations of pregnancy before 20 weeks' gestation. Between January 1992 and January 1995, a total of 24 233 babies born consecutively in Corniche Hospital, which is the only maternity hospital in Abu Dhabi, United Arab Emirates, were surveyed for the presence of major congenital malformations. A total of 401 infants (16.6 per 1000) had a major defect.[27] The time trend during our five year study indicated that, in the first four years, the overall occurrence of BDs in live births decreased. Meanwhile, increasingly sophisticated prenatal diagnostic procedures have been developed to detect congenital defects in utero. The detection of serious congenital anomalies earlier in pregnancy and with greater accuracy has led to a corresponding increase in elective terminations of affected pregnancies.[28] There were also considerable variations in the distribution of different malformations.+

These results highlight the need to conduct a more detailed study to identify the possible associations between parental occupations and BDs. In summary, the prevalence of BDs in Ahwaz, Iran is comparable to those in other countries. Comparison of international reports of most frequent type of BDs that is available in literature to our study that shows Cleft lip and Palate Cleft is most frequent type of BDs (3.35 per 1000), has been discussed here. The prevalence of cleft lip and palate in different studies are, in the United States 1.42 per 1000,[30] Brazil 0.19 per 1000,[31] Ireland 1.14 per 1000,[32] 1.03 per 1000 in Ireland,[33] 1.84 per 1000 in Lithuania,[34] China 0.61 per 1000,[35] Korea 1.81 per 1000,[36] 0.62 per 1000 in Oman,[37] 1.4 per 1000 in Japan,[38] 5.2 per 1000 in Tehran,[39] and other Asian countries 1.22 per 1000.[40]

In conclusion, the reasons of inconsistency between our results which represents congenital abnormalities ever investigated in Iran and other studies are probably as bellow: Some of the birth defects are not diagnosed at birth and may occur later in the life, therapeutic advances, application of appropriate preconception care, and prenatal diagnosis program. Also this inconsistency might be explained by diagnosis of both minor and major BD in all systems.

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