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Investigating the socio-economic status of parents of children with congenital heart diseases

Abstract

The present study investigates the socio-economic status of parents of children with congenital heart disease in Shahid Motahari Hospital from March 21, 2019, to March 21, 2020. The present study was a descriptive study conducted to examine CHD children. The present study was conducted after obtaining permission and making the necessary arrangements with the Ethics Committee of Urmia University of Medical Sciences. In the present study, a total of 133 patients diagnosed with CHD were examined. The results revealed that the parents of patients with CHD had a low socio-economic status. The level of education (33.8 percent of fathers and 44.4 percent of mothers had elementary education or were illiterate) and the income level of most parents was low (75.2 percent of families had low income, 19.5 percent had moderate income). Congenital heart disease was present in a small percentage of parents, relatives of parents, and other family members. A small percentage of parents had consanguineous marriage (24.1%), and the most common congenital heart disease was VSD (43.6%) and ASD (24.8%), respectively. The low socio-economic status of parents through factors such as unhealthy living environment, lack of necessary skills in making healthy and correct decisions, and nutritional deficiencies in the mother affects the children's health and can be a risk factor in the occurrence of CHD in children.

Keywords: *Socio-economic status, Congenital heart disease, Parents, Urmia*

Mohammad Radvar [*]
Kamran Dehghan Avat Ghasemi,

Department of Pediatrics, Faculty of Medicine, Urmia University of Medical Sciences, Urmia, Iran
Research Committee, Urmia University of Medical Sciences, Urmia, Iran

Tel +98 914 341 0696
**Correspondent*
email: mradvar15@gmail.com

Introduction

Congenital heart diseases are the most common (6 to 13 per 1000 live births) type of congenital disorder among newborns. CHD is still one of the main causes of death in infants and children (1). CHD risk factors include premature birth, family history, genetic syndrome, extracardiac anomalies, factors related to the mother (diabetes, hypertension, obesity, phenylketonuria, thyroid disease, connective tissue disease, and seizures), use of assisted reproductive methods and intrauterine infection is similar influenza during pregnancy (2). Its prevalence has increased in the last few decades thanks to diagnostic procedures such as echocardiography, early diagnosis of congenital heart diseases, and mild congenital heart diseases. Several studies have indicated that multiple supports can significantly reduce the risk of congenital heart disease. Low socio-economic status is an important risk factor in increasing the incidence of congenital cardiovascular diseases (3).

The determining factors of SES are almost similar in different studies. In general, income, education level, and parents' occupation have been identified as effective factors in SES. Studies have indicated that low SES increases the rate of congenital anomalies by 40%. Similarly, factors such as maternal age, marital status in terms of the divorce or common life, parents' residence, level of education, income, and smoking and alcohol consumption are among important risk factors related to the socio-economic level of parents, which increase the risk of CHD (1). One of the influential risk factors in CHD is related to the socio-economic status of the infants' parents (4). The determining factors of SES are almost similar in different studies. In general, income, education level, and parents' occupation are considered effective factors in SES. Some studies have indicated that low SES increases the rate of congenital anomalies by 40% (5). Maternal nutrition is also effective in the occurrence of most types of congenital anomalies.

Studies have indicated that consumption of saturated fats, hyperglycemia, and high BMI are risk factors for CHD. Carmichael et al. (2003) in California examined the SES effect on the risk of conotruncal heart defect and orofacial clefts. The study's results were moderated regarding race, taking mineral and multivitamin supplements, smoking, and using alcoholic beverages. The results showed that low SES increases the risk of dTGA (OR < 1.4) but reduces the risk of tetralogy of Fallot (OR < 0.7) and has no effect on the risk of orofacial cleft (OR = 1) (6). Glazzire et al. carried out a study from 1994 to 2007 in Ontario to investigate the relationship between SES and the incidence of CHD. In the mentioned study, 1871760 children were born, of which 22% were in the lowest income level, and 16% were in the highest income level. The mean age of mothers was 29.3 years. Among the 127896 children diagnosed with congenital anomalies, heart problems were the most common, with a prevalence of 23%. Based on the results of this study, the birth of an infant with CHD was more in areas with low income and low levels of education (3).

In a study conducted from 1996 to 2002 in Denmark, Morales et al. examined the effect of SES on the rate of major congenital anomalies. The results of the mentioned study

showed that the low socio-economic level is only related to increased respiratory system anomalies and other anomalies. However, there is no significant relationship between other cardiac and nervous abnormalities. Maternal age, gestational age, smoking, alcohol consumption, folic acid intake, and BMI factors were moderated. The mentioned study found that the incidence of congenital heart disease was higher in families where both parents had a low socio-economic level (7). In a study in Baltimore, Washington, Villasenor, et al. investigated the effects of socio-economic differences on the rate of cardiac malformations in their newborns. According to the study results, the socio-economic level affects Ebstein anomaly, L-transposition of large vessels, and aortic stenosis. The results revealed that the low socio-economic status in both black and white races causes an increase in the rate of transposition of the great arteries, aortic stenosis, and Ebstein anomaly (8). Li et al. conducted a study to investigate the effect of deprivation and CHD.

The results revealed that the rate of hospitalization due to CHD in the most deprived areas is 1.8 per 1000. However, in areas with high welfare, it was 2.2 per 1000 cases, and the rate of hospitalization due to cardiovascular disease increased with the increase in the socio-economic level of the place of residence in families with different socio-economic levels. Deprivation in this study was considered to be income level, place of residence, and parents' race (9). A survey by Olesen investigated the association p between the level of education and congenital anomalies. The results revealed that the risk of congenital anomalies was 3 times higher in infants of mothers whose education level was less than 10 years compared to mothers who had at least four years of post-graduate education (OR = 2.9). There was an association between the father's education level and family income and congenital heart disease, but the relationship was weaker than the maternal education level. This study had no statistically significant association between maternal health and congenital heart disease (10).

Janati et al. (2011) conducted a descriptive study entitled "Socioeconomic Status and Coronary Artery Disease" in Tabriz. The results revealed that people with low and moderate socio-economic levels are at a higher risk of heart disease (11). Over the last two decades, thanks to advancements in newborn screening methods, early diagnosis, treatment, and advanced surgical techniques, the life expectancy and quality of life of infants born with heart failure have increased. Given what was stated above and since SES has not yet been recognized as a definite risk factor and no such study has been conducted in Urmia province, this study aims to examine the demographic characteristics and socio-economic status of the parents of infants with congenital heart diseases referred to the Children's Heart Clinic and is admitted in the NICU and neonatal wards in Shahid Motahari Hospital from March 21, 2019, to March 21, 2020.

Methods

The present study was a descriptive study conducted on patients of CHD children. The study population included the parents of infants and children with congenital heart disease who were referred to the neonatal heart clinic and were admitted with the diagnosis of CHD in the NICU and pediatric wards from March 2019 to March 2020. The census sampling method was used from the parents of infants and children diagnosed with CHD and a history of hospitalization or outpatient visit to the neonatal heart clinic in Motahari Hospital. To collect data, a questionnaire form related to the socio-economic variables of the parents was prepared and submitted to a sufficient number in the NICU and neonatal wards, the neonatal cardiology wards, and the pediatric heart clinic. The researcher visited the pediatric heart clinic and carefully filled out the questionnaire by asking questions from the parents of children with congenital heart diseases. Also, the researcher referred to the pediatric and neonatal heart and NICU wards and carefully filled out the questionnaire related to infants hospitalized with congenital heart disease. The available information was analyzed with the help of a statistical consultant. Also, all the information was entered into the SPSS software and used for analysis and conclusions.

Results

The results revealed that 47.4% of patients were male, and 52.6% were male. Also, 39.8% lived in villages, and 60.2% lived in cities. Out of 133 examined patients, 102 (76.7%) had one congenital heart disease, and 31 (23.3%) had more than one congenital heart disease. Based on the results of table (1), the most common congenital heart disease was VSD, which was diagnosed in 43.6% of patients, followed by ASD in 24.81%.

Table 1: Frequency of congenital heart diseases

Row	Disease type	N	%
1	ASD	33	81.24
2	VSD	58	60.43
3	TOF	13	77.9
4	PDA	3	25.2
5	Single Ventricle	8	01.6
6	COA	1	75.0
7	Ebstein anomaly	4	3
8	Muscular VSD	2	5.1
9	Tricuspid atresia	1	75.0
10	DORV	3	25.2
11	Pulmonary atresia	3	25.2
12	PS	16	03.12

13	PFC	1	75.0
14	MR	1	75.0
15	TR	1	75.0
16	PH	1	75.0
17	BAV	3	25.2
18	TAPVC	4	3
19	AV canal defect	6	3
20	TGA	2	25.2
21	Hypoplastic left heart	1	75.0
22	AS	1	75.0

The mean age of the patients was 4.79 months. The maximum age was 4 years, and the minimum was one day. Out of 133 patients studied, 83 (62.4%) had no other comorbidities, but 50 (37.6%) had comorbidities. Down syndrome was the most common comorbidity in patients with CHD, with 11.3% (Table 2).

Table 2: Frequency of comorbidities

Row	Disease type	Frequency	Percentage of frequency
1	No disease	83	4.62
2	Down syndrome	15	3.11
3	Cleft palate	7	3.5
4	Urinary reflux	3	3.2
5	Polycystic kidney	3	3.2
6	Anus imperforate	3	3.2
7	Meningocele	2	5.1
8	Premature infants	2	5.1
9	Hirschsprung’s disease	1	8.0
10	Asthma	1	8.0
11	Convulsions	1	8.0
12	Spina Bifida	1	8.0
13	Tethered Cord	1	8.0

Out of 133 patients, only 3 patients (2.3%) had a history of congenital heart disease in other children. The mean age of fathers was 33.05 years, the minimum age was 20 years, and the maximum age was 56 years. The mean age of the mothers was 28.49 years, the minimum age was 15 years, and the maximum age was 43 years. The mean age of the mothers at the time of pregnancy was 27.54 years, the minimum age was 14 years, and the maximum age was 42 years. Seven mothers (5.3%) were aged under 17 years, 50 mothers 37.6%) were aged 18 to 25 years, 51 mothers (38.3%) were aged 26 to 35 years, and 25 patients (18.8%) were aged over 35 years.

Parents were divided into three groups according to their level of education. Accordingly, 33.8% of fathers and 44.4% of mothers were placed in group 1 (had primary or illiterate education), 43.6% of fathers and 42.8% of mothers were placed in group 2 (secondary up to diploma), and 22.6% of fathers and 12.8% of mothers were placed in group 3 (education higher than diploma). Parents' jobs were divided into three groups. Group 1 included unemployed farmers, ranchers, and workers, group 2 included service jobs such as driving, construction, sales, etc., and group 3 included government and professional jobs. Also, 31.6% of fathers and 94.7% of mothers were in group 1, 47.4% of fathers and 3.8% of mothers were in group 2, and 21.1% of fathers and 1.5% of mothers were in group 1. The level of family income (the total income of parents) through criteria such as the place of residence, the area of the city where they live, rented or personal house, job, physical condition, and the child's direct question about the level of monthly income was divided into three groups 1) low income 2) moderate-income 3) high income. In this regard, 75.2 percent of families had low income, 19.5 percent had moderate income, and 5.3 percent had a high income.

According to Table 3, a high percentage of fathers and mothers had no smoking history, and smoking in fathers is significantly more than among mothers.

Table 3: Smoking in parents of patients with CHF

	Father		Mother	
	N	%	N	%
History of smoking	44	1.33	2	5.1
No history of smoking	89	9.66	131	5.98

In this regard, 95.5% of fathers and 78.19% of mothers had no underlying diseases. The congenital disease was present only in 0.8% of fathers and 2.25% of mothers. The list of diseases is presented in Tables (4) and (5).

Table 4: Frequency of congenital and non-congenital disease in fathers of CHD patients

	Father's relatives		Mother's relatives		Relatives of both parents		No congenital heart disease in relatives of parents		Total	
	N	%	N	%	N	%	N	%	N	%
Congenital heart disease	10	5.7	17	8.12	2	5.1	104	2.78	133	100

List of diseases	N	%
No disease	127	5.95
Congenital (CHD)	1	8.0
Diabetes	2	5.1
Convulsion	1	8.0
Allergy	1	8.0
Depression	1	8.0

Table 5: Frequency of congenital and non-congenital disease in mothers of CHD patients

List of diseases	N	%
No disease	104	19.78
Congenital (CHD)	3	25.2
Hypothyroidism	9	76.6
Gestational Diabetes	4	3
Hypertension	4	3
Diabetes	2	5.1
Mitral valve diseases	2	5.1
Lupus	2	5.1
Asthma	2	5.1
Preeclampsia	1	8.0

According to Table 5, a significant percentage of marriages in the parents of CHD patients were non-consanguineous.

Table 6: The rate of consanguineous marriage in the parents of CHD patients

Marriage	N	%
Consanguineous	32	1.24
Non-consanguineous	101	9.75

According to Table 7, in 78.2 percent of patients, there was no congenital heart disease in the parents' relatives, and congenital heart disease was seen in 7.5 percent of the cases in the father's relatives, in 12.8 percent in the mother's relatives, and 1.5 percent of the relatives of both parents.

Table 7: Congenital heart disease in relatives of parents of CHD children

Discussion

The present study examines the socio-economic status of parents of infants and children with congenital heart disease born between 2018 and 2020. The results showed that 47.4% of the patients were male and 52.6% were female. In the study conducted by Agha et al., 51% of the patients were male, which is close to our research. Unlike the present study, the survey conducted by Bagher Nikyar et al. (12), the overall prevalence of CHD was 8.6 per 1000 births, and the prevalence of females and males was 7.34 and 9.96 per 1000 births, respectively, which is contrary to our study. The prevalence is higher in males. The results showed the prevalence of different congenital heart diseases among 133 patients diagnosed between 2018 and 2020, 102 patients (76.7%) had congenital heart disease, and 31 patients (23.3%) had more than one congenital heart disease.

The most common congenital heart disease was VSD, which was diagnosed in 43.6% of patients, followed by ASD in 24.81%. PS in 12.03%, ASD+VSD in 9%, single ventricle in 6.01%, Ebstein anomaly//TAPVC AV canal defect in 3% each, PDA/DORV/pulmonary atresia/BAV and TGA each in 2.25%, muscular VSD in 1.5%, tricuspid atresia/PFC/ MR/TR/PH/AS/COA and hypoplastic left ventricle were present in 0.75% of the subjects. However, in the study by Bagher Nikyar et al. (12), ASD was the most common finding with an incidence rate of 2.64 per 1000 births; ASD+VSD and PDA with 1.28 per 1000 births were the second most common findings. The results showed the prevalence of different congenital heart diseases among 133 patients who were diagnosed between 1997 and 2019, including 102 patients, equivalent to 76.7% of congenital heart disease, and 31 patients, equivalent to 23.3%, more than It was congenital heart disease. The most common congenital heart disease was

VSD, which was diagnosed in 43.6% of patients, followed by ASD in 24.81%. PS in 12.03%, ASD+VSD in 9%, single ventricle in 6.01%, Ebstein anomaly//TAPVC AV canal defect in 3% each, PDA/DORV/pulmonary atresia/BAV and TGA each in 2.25%, muscular VSD in 1.5%, tricuspid atresia/PFC/MR/TR/PH/AS/COA and hypoplastic left ventricle were present in 0.75% of the subjects. But in the study of Bagher Nikyar et al. (12), ASD was the most common finding with an incidence rate of 2.64 per 1000 births, ASD+VSD, and PDA with 1.28 per 1000 births were the second most common findings.

In the present study, out of 133 patients studied, 83 patients (62.4%) did not have any other comorbidity, but 50 patients (37.6%) had comorbidities. Down syndrome was the most common comorbidity among patients with CHD, with 11.3%. The study by M Vrijheid et al. (5) also showed that Down syndrome increases the incidence of CHD up to two times. In the present study, parents' jobs were divided into three groups. Group 1 included unemployed farmers, ranchers, and workers, Group 2 included service jobs such as driving, construction, sales, etc., and Group 3 had the government and professional jobs. Also, 31.6% of fathers and 94.7% of mothers were in Group 1, 47.4% of fathers and 3.8% of mothers were in Group 2, and 21.1% of fathers and 1.5% of mothers were in Group 3. Also, 75.2% of the families had low income, 19.5% had moderate income, and 5.3% had a high income. In the study conducted by Yang et al., there was a relationship between low income and an increased risk of severe congenital disease (4). In the study by M. Agha et al., a strong relationship was reported between low parental income and a high risk of severe CHD (3).

In the study by M. Agha et al., a strong relationship was reported between low parental income and a high risk of severe CHD (3). In the study by R. Kuciene et al., the incidence of CHD in the infants of housewives and workers was significantly higher than in the infants of working parents. In general, the incidence of CHD in infants of working mothers is lower than that of infants of housewife mothers (1). It may be justified by the fact that non-office jobs are more exposed to risks like chemical and physical stressors, ionizing radiation, trauma, infectious microorganisms, and stress. Unlike the results of our study, it was shown in the study conducted by Susan et al. (13) that the risk of TOF disease is reduced in low socio-economic status. Additionally, in this mentioned study, the risk of dTGA increases in families with low socio-economic status. According to this study, there is no or weak correlation between orofacial clefts and socio-economic status. In the present study, 33.0% of fathers and 44.4% of mothers had elementary or illiterate education, 43.6% of fathers and 42.8% of mothers had secondary to diploma education, and 22.6% of fathers and 12.8% of mothers had a diploma. In the study conducted by Kramer et al. (14), it was mentioned that parents' low education is one of the important risk factors in the occurrence of CHD. The study conducted by Yang et al. (4) also showed that the mother's low education is related to TGA. In the study conducted by M. Agha et al. (3), a strong relationship was reported between the low level of parental education and the high risk of CHD. In the study by R. Kuciene et al. (1), the mother's middle and low education of the mother was an important risk factor in the occurrence of CHD.

Although several studies did not find an association between the maternal level of education, job, and parents' income level and CHD, hence, it can be the reason that the higher education of the parents is associated with the level of access to medical and health centers, protective behaviors and caring for the child, and psychological mechanisms such as managing anxiety and having social support. In the present study, 33.1% of fathers and only 1.5% of mothers had a smoking history. Unlike our research results, the study by R. Kuciene et al. (1) showed that smoking during pregnancy increases the risk of CHD. Also, in the survey conducted by Malik et al. (15), it was reported that moderate and high cigarette consumption is related to septal defects, and more than 25 cigarettes per day are related to right-sided obstructive defects. Moreover, a case-control study in Lithuania showed that maternal smoking doubled the risk of CHD (16).

In the present study, the mean age of fathers was 33.05 years, the minimum age was 20 years, and the maximum age was 56 years. The mean age of the mothers was 28.49 years, the minimum age was 15 years, and the maximum age was 43 years. The mean age of mothers during pregnancy was 27.54 years, the minimum age was 14 years, and the maximum age was 42 years. In this study, we examined maternal age in four age groups. Seven mothers (5.3%) were aged under 17 years, 50 mothers (37.6%) were aged 18 to 25 years, 51 mothers (38.3%) of the patients were between 26 and 35 years old, and 25 patients (18.8%) were aged over 35 years.

In the study conducted by M. Agha et al. (3), a strong relationship was reported between high maternal age and high risk of non-severe CHD. In the study of R. Kuciene et al. (1), like our study, the maternal age was between 20 and 29 years, and the mean age of pregnancy was 28.6 years. In the study conducted by M. Agha et al. (3), the mean maternal age was 29.3 years. In the present study, 75.9% of marriages were non-consanguineous. However, in the survey by Bagher Nikyar et al. (12), 39.6% of parents had consanguineous marriages, and 38.6% were first-degree relatives. The results showed that 95.5% of fathers and 78.19% of mothers had no underlying disease. Congenital heart disease was present only in 0.8% of fathers and 2.25% of mothers. In the mothers, the most common non-congenital conditions were hypothyroidism and diabetes. In the study by M. Agha et al. (3), the history of

diabetes in the mother was strongly related to the congenital heart disease of the infants. However, in the study by Charlotte Olesen et al. (10), no relationship was found between maternal health status and congenital heart disease of the infant. In the present study, 39.8% of the parents lived in the village, and 60.2% lived in the city. In addition, 78.2% of patients had no congenital heart disease in their parents' relatives. Still, it was found in 7.5 % of the father's relatives, in 12.8% of the mother's relatives, and in 1.5% of cases, it was found in relatives of both parents.

Conclusion

The low socio-economic status of parents through factors such as unhealthy living environment, lack of necessary skills in making healthy and correct decisions, the level of mental health of the parent, and the physical health and nutritional status of the mother affect the level of children's health and is an important risk factor in the occurrence of CHD. Based on the study's results, the parents of patients with CHD had a low socio-economic status. The level of education and income level of most of the parents was low. According to the results, a higher percentage of patients were male, and most of the patients lived in the city. Congenital heart disease was present in a small percentage of parents, relatives of parents, and other family members.

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References

1. Kučienė R, Dulskienė V. Maternal socio-economic and lifestyle factors during pregnancy and the risk of congenital heart defects. Medicina. 2009;45(11):904.
2. Hoffman JI, Kaplan S. The incidence of congenital heart disease. J Am Coll Cardiol. 2002;39(12):1890-900.
3. Agha MM, Glazier RH, Moineddin R, Moore AM, Guttmann A. Socioeconomic status and prevalence of congenital heart defects: does universal access to health care system eliminate the gap Birth Defects Research Part A: Clin Molec Teratol. 2011;91(12):1011-8.
4. Yang J, Carmichael S, Canfield M, Song J, Shaw G, Study NBDP. Socio-economic status in relation to selected birth defects in a large multicentered US case-control study. Am J Epidemiol. 2008;167(2):145-54.
5. Vrijheid M, Dolk H, Stone D, Abramsky L, Alberman E, Scott J. Socioeconomic inequalities in risk of congenital anomaly. Arch Dis Child. 2000;82(5):349-52.
6. Carmichael SL, Nelson V, Shaw GM, Wasserman CR, Croen LA. Socio-economic status and risk of conotruncal heart defects and orofacial clefts. Paediat Perinat Epidemiol. 2003;17(3):264-71.
7. Morales-Suárez Varela MM, Nohr EA, Llopis-Gonzalez A, Andersen A-MN, Olsen J. Socio-occupational status, and congenital anomalies. Eur J Public Health. 2009;19(2):161-7.
8. Knowles RL, Ridout D, Crowe S, Bull C, Wray J, Tregay J, et al. Ethnic and socioeconomic variation in incidence of congenital heart defects. Arch Dis Child. 2017;102(6):496-502.
9. Li X, Sundquist J, Hamano T, Zöller B, Sundquist K. Neighbourhood deprivation, individual-level and familial-level socio-demographic factors and risk of congenital heart disease: A nationwide study from Sweden. Int J Behav Med. 2016;23(1):112-20.
10. Olesen C, Thrane N, Rønholt A-M, Olsen J, Henriksen TB. Association between social position and congenital anomalies: a population-based study among 19,874 Danish women. Scand J Public health. 2009;37(3):246-51.
11. Janati A, Matlabi H, Allahverdipour H, Gholizadeh M, Abdollahi L. Socioeconomic status and coronary heart disease. Health Promot Perspect. 2011;1(2):105.
12. Nikyar B, Sedehi M, Mirfazeli A, Qorbani M, Golalipour M-J. Prevalence and pattern of congenital heart disease among infants in Gorgan, Northern Iran (2007-2008). Iran J Pediatr. 2011;21(3):307.
13. Braveman P, Cubbin C, Marchi K, Egerter S, Chavez G. Measuring socio-economic status/position in studies of racial/ethnic disparities: maternal and infant health. Public Health Rep. 2001;116(5):449.
14. Kramer MS, Séguin L, Lydon J, Goulet L. Socio-economic disparities in pregnancy outcome: why do the poor fare so poorly? Paediat Perinat Epidemiol. 2000;14(3):194-210.
15. Malik S, Cleves MA, Honein MA, Romitti PA, Botto LD, Yang S, et al. Maternal smoking and congenital heart defects. Pediatrics. 2008;121(4):e810-e6.
16. Dulskienė V, Gražulevičienė R. Kenksmingi aplinkos veiksniai bei oro užterštumas formaldehidu ir įgimtos širdies anomalijos. Medicina (Kaunas). 2005;41(9):9.