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ORIGINAL ARTICLE

Relationship of Parental Age with Congenital Heart Diseases in Children

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ABSTRACT

Objective: To find the relationship of parental ages with congenital heart disease in children

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Study Design: Case-control study

Place and Duration of Study: This study was conducted in Department of Child Health, Khyber Teaching Hospital Peshawar from October 2018 to January 2020

Material and Methods: From the total 346 children from birth to 15 years of age, 173 were with congenital heart disease (CHD) and 173 with no cardiac defect on echocardiography. Different parental age groups with and without congenital heart disease in their children were documented and analyzed by SPSS 23.

Results: These were 132 females and 214 male. Majority of the mothers i.e 77.2% were between 20-30 years of age and only 1.4% were above 40 years. Among the fathers none was less than 20 years and majority were between 20-30 years i.e 52.3% while 6% were more than 40 years. Our study showed no significant relationship of different maternal and paternal age groups with occurrence of congenital heart disease in children.

Conclusion: There is no significant relationship between parental age and the incidence of congenital heart disease in children.

Key Words: *Maternal age, paternal age, congenital heart disease, children*

INTRODUCTION:

Congenital heart disease (CHD) refers to the structural or functional heart disease which is present at birth. It is one of the major cause of death and morbidity in infancy.¹⁻³ Congenital cardiac defects one of the most commonly observed birth defects are which affect the newborn babies.^{4,5} Congenital cardiac defects are common and sometimes become a serious problem with substantial impact on well-being, mortality, and financial burden on children and

adults.⁶ These have a wide spectrum of presentations, from being symptomatic with varying degree of severity to being asymptomatic.⁷

With the global prevalence ranging from approximately 3.7 to 17.5 per 1.000 among newborns, CHD accounts for 30-45% of all birth defects.⁸ Differences in birth prevalence have been observed between different continents, from 6.9 per 1000 births in Europe to 9.3 per 1000 in Asia.⁶ Annually around 40,000 children are born

with a congenital heart defect in Pakistan.⁷ Incidence was found to be 8.2/1000 live births in a study in China.¹ The figures from Bangladesh were 25/1000 live births,⁹ and 8.1/1000 live births in Atlanta.¹⁰ Etiology of CHD is unknown in majority of cases but several environmental and genetic factors have a role in its pathogenesis including maternal smoking, tobacco use, maternal diabetes, infections, consanguinity among parents, family history of CHD and maternal age.¹¹ Begic et al reported that, more number of CHD cases (83.14%) were present in children whose mothers were 20-35 years old, while only 5.11% of mothers aged >35 year,¹² same result was found in another study as well.¹¹ In a study conducted by Ou et al in china found out that increased maternal age is statistically associated with different types of CHD¹³ which was also shown in previous study by Miller et al.¹⁴ In addition to maternal age and other environmental exposures, a study conducted by Fung et al found that increased paternal age also poses a significant risk of fetal CHD.¹⁵

The availability of data regarding the CHD and its relationship with parental age is very scanty in our region and that is why we wanted to conduct this study to find any significant relationship between the two if present or not.

MATERIAL AND METHODS

It was a case-control study conducted both at inpatient and outpatient setting of the department of child health, Khyber teaching hospital, which is one of the largest public sector tertiary care hospital of the KPK province, located in Peshawar city. This hospital provides health care services to pediatric patients most of whom belong to poor community and low socioeconomic class. In addition to local community, many of these patients come from far-flung areas of KPK and FATA. A total of 346 children from birth to 15 years of age who had undergone echocardiography due to congenital heart disease or suspicion of congenital heart disease on clinical examination were included in the study. Children with acquired heart disease due to any reason were not included. The children were divided into two equal groups after taking informed consent, the case group had 173 children with congenital heart disease and control group also had 173 children but with no congenital heart disease via consecutive non-probability sampling. Data was

collected on pre-designed proforma including name, age, sex, congenital heart disease status and parental age. Parental age was divided into 4 groups i.e less than 20 years, 20-30 years, 31-40 years, more than 40 years and was analyzed using SPSS v23. Frequency and percentage was calculated for categorical variables and logistic regression model was applied to the parental age groups to calculate the Odds Ratio (OR) and P-value to find its relationship with congenital heart disease in these children.

RESULTS

Out of 346 children from birth to 15 years of age, 173 had congenital heart disease and 173 had no cardiac defect. 132 (38.2%) were female while 214 (61.8%) were male. Majority of children were infants i.e. 0-1 yr making about 241 (71.1%) of the included children. 66 (19.1%) were between 1-5 years of age, 20 (5.8%) were between 5-10 years while just 14 (4%) were from 10-15 years of age. 28 (8.1%) of the mothers were less than 20 years of age, 267 (77.2%) were between 20-30 years of age which was the most among all groups, 46 (13.3%) were between 31-40 years and only 5 (1.4%) were above 40 years. Among the fathers none were less than 20 years and majority were between 20-30 years i.e. 181 (52.3%), 144 (41.6%) were between 31-40 years while only 21 (6%) were of more than 40 years of age. Binary logistic regression was applied to the data by taking last age group as reference category. Odds Ratio (OR) and p-value were calculated for each parental age group. Our study showed no significant relationship of different maternal and paternal age groups with occurrence of congenital heart defects in children with p-value >0.05 for all age groups as described in the tables 1-5 below.

TABLE 1: Gender

Gender	Frequency	Percentage
Male	214	61.8
Female	132	38.2
Total	346	100.0

TABLE 2: Children age groups

Age Groups (Years)	Frequency	Percentage
0-1	246	71.1
1-5	66	19.1
5-10	20	05.8
10-15	14	04.0
Total	346	100.0

TABLE 3: Maternal age groups

Age (Year)	Frequency	Percentage
<20	0	0
20-30	181	52.3
31-40	144	41.6
>40	21	06.1
Total	346	100.0

TABLE 4: Paternal age groups

Age Year)	Frequency	Percentage
<20	28	08.1
20-30	267	77.2
31-40	46	13.3
>40	5	01.4
Total	346	100.0

TABLE 5: Age groups and odd ratio

Age Groups	P-value	Odds Ratio (OR)	95% CI for OR
Maternal age			
<20 years	0.621	0.517	(0.038-7.101)
20-30 years	0.463	0.393	(0.032-4.756)
31-40 years	0.343	0.313	(0.028-3.465)
>40 years	0.647		
Paternal Age			
20-30 years	0.248	0.484	(0.141-1.657)
31-40 years	0.762	0.836	(0.263-2.656)
>40 years	0.080		

DISCUSSION

Our study did not find any significant association between advancing maternal or paternal age with increasing incidence of congenital heart diseases in children. This is almost the same finding of a study by Zaid from Saudi Arabia in 2010 where he found no association between the two. The father's age >40 years was associated with decreased incidence of congenital heart disease compared to 20-39 years age group (OR 0.38;95 CI[0.20-0.72].¹⁶

In another study by Olshan and colleagues, father's age <20 years was associated with higher incidence of some congenital heart diseases more compared to other age groups but this was not the case in our study.¹⁷

A study by Miller et al. showed increased prevalence for different types of congenital heart disease with maternal age of 35 years or older including, conotruncal defects (aPR¼1.30; CI 1.03–1.65), laterality defects (aPR¼2.06; CI 1.22–3.48), coarctation of the aorta (aPR¼1.54; CI 1.10–2.16), dextro-transposition of the great arteries (aPR¼1.65; CI 1.10–2.48), ventricular septal defects (aPR¼1.20; CI 1.06–1.36) and atrial septal defects (aPR¼1.36; CI 1.05–1.77). They also examined the association of CHD and paternal age and found no difference in specific associations compared to the analysis of CHD and maternal age.¹⁴

In another study in China by Ou et al. maternal age more than 40 years was associated with statistically significant increase in the incidence of congenital heart diseases in children with OR 1.94 [95% CI (1.12-3.34), while no significant association was found in lower maternal age groups.¹³ Gill et al. in their case-control study in the United States, found that maternal age <20 years and more than 40 years was associated with increased incidence of congenital cardiac defects in children.¹⁸ Another study in China by Pei and colleagues also showed that maternal age more than 30 years was related with increased incidence of congenital heart diseases in children.¹⁹ That was not the case with our study where no association was documented with any maternal age group.

In another study on the effects of parental age on congenital heart disease in children, Zhan and colleagues observed that maternal age had no significant association with congenital heart disease in children while father's age less than 25 years had increased incidence of congenital heart disease in children while no effect of increasing paternal age.²⁰ This is in contrast to some other studies which do not show such results. While most of this data of this study correlates with our results except the younger paternal age group.

CONCLUSION

Our study show no statistically significant relation between maternal and paternal age with congenital heart disease in children. Many studies show that there is increased incidence of congenital heart disease in children and increasing maternal age while a few point towards younger paternal age with increased incidence of congenital heart disease. Further work is needed in this regards on large scale to establish these findings in our country so that effective policy can be made and better parental counselling can be done antenatally.

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