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Identifying Congenital Heart Defects in Children and Evaluating Health Outcomes

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Abstract: This paper aims to Determining the extent of the prevalence of congenital heart different hospitals in Iraq, and knowing the extent of the relationship between the prevalence of congenital heart diseases and the quality of life of children where Demographic information and data were collected for 115 patients aged from 1 to 5 years, with 35 girls and 80 boys and This study was designed according to Microsoft Excel 2013, which is the statistical analysis program SPSS 22 Soft, where the prevalence of congenital heart diseases among Iraqi pediatric patients was analyzed and a simulation was conducted based on the results of our study to determine the strength of the correlation on the quality of life of patients. Patients diagnosed with congenital heart diseases were collected, and the most common diseases in this study were ASD for 30 patients with 26.1%, SPDA for 26 patients with 22.6%, and VSD for 25 patients with 21.7. %, AVSD for 10 patients with 8.7%, TGA for 9 patients with 7.8%, TA for 8 patients with 7%, as shown in Table 3. Quality of life was assessed according to a distributed questionnaire. The paper mentions that the prevalence of types of congenital heart disease can vary depending on the population being studied and the specific criteria used to define the types. While some types of congenital heart defects may have a higher prevalence in males than females (such as ventricular septal defect), others may have a slightly higher prevalence in females than males (such as atrial septal defect). However, the paper does provide information on any significant differences observed between boys and girls with respect to the prevalence or severity of congenital heart defects in the study conducted.

Keywords: Identifying Congenital Heart Defects, Patients, and Children.

INTRODUCTION

Congenital heart diseases of the newborn (CHD) refer to heart anatomy abnormalities that arise during fetal development, especially early in pregnancy [Eser, E. *et al*., 2004]. Cardiac abnormalities have various types and can be classified differently [Eser, E. *et al*., 2004], and the mode and time of presentation differ depending on the type of defect, which may result in asymptomatic new-borns in the first few weeks or months of life while others may experience severe symptoms that are incompatible with life after birth an urgent diagnostic protocol should be initiated in case of encountering a new-born with suspected CHD, due to the potential severity of the disease [Culbert, E. L. *et al*., 2003; Teixeira, F. M. *et al*., 2011; Uzark, K. *et al*., 2008; Mellion, K. *et al*., 2014].

The papers consistently report that ventricular septal defect (VSD) is the most common congenital heart defect in children. Namuyonga 2020 found that isolated VSD was the most common CHD seen in their study, while Miyague 2003[Huber, J. *et al*., 2010; Spijkerboer, A. W. *et al*., 2006] reported that VSD was the most frequent acyanotic anomaly. Atrial septal defects (ASD) and patent ductus arteriosus (PDA) were also commonly reported in the papers. Tetralogy of Fallot (TOF) was the most common cyanotic heart defect in Namuyonga 2020 and Miyague 2003, while Adebayo 2016 found that Fallot's Tetralogy was more common than isolated PDA or ASD. [Landolt, M. A. *et al*., 2008; Janiec, I. *et al*., 2011; Van Der Linde, D. *et al*., 2011]

Among chronic non-communicable diseases, heart diseases are those with the highest incidence since the mid-twentieth century, 3.4 have a frequency of 8 per 1,000 live births (NV) worldwide with a slight male predominance, ranging from 4 to 12 per 1,000 live births [Latal, B. *et al*., 2009; Freitas, I. R. *et al*., 2013] differences that may depend on the moment of study, the population studied, [Tahirović, E. *et al*., 2010] and methods of diagnosis, being higher in stillbirths, miscarriages, and preterm infants [Areias, M. E. *et al*., 2013]

So far, 15% of major heart defects are diagnosed in the prenatal stage, and according to the American Heart Association, each year, nearly 35,000 babies are born with some type of congenital heart defect [Aydemir, Ö. *et al*., 1997]. CHD is responsible for more deaths in the first year of life than any other birth defect [Zigmond, A. S. *et al*., 1983].

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Among children with congenital anomalies, there is a wide range of severity. Approximately 2 or 3 in every 1,000 newborns present with symptoms of congenital heart disease in the first year of life. Generally, the diagnosis is obtained within the first week of life at 40-50. % of patients during the first month in 50-60 %, and the aim of the research is to detect and know the Prevalence of congenital heart disease [Öner. *et al*., 1994, N; Le Comple, G. *et al*., 1978].

that there are both genetic and environmental risk factors associated with congenital heart defects in children where that congenital heart malformations occur due to genetic and environmental factors during the embryonic morphogenesis period of the heart.

Selected environmental risk factors, including maternal illnesses and lifestyle factors that may increase the risk of congenital heart defects and those genetic or chromosomal abnormalities, excessive alcohol consumption during pregnancy, use of medications, and maternal viral infection, are risk factors for congenital heart disease in children.

specifically identifies anemia, chronic fetoplacental insufficiency, the threat of termination of pregnancy, toxicosis of the first half of pregnancy, and acute viral infection in the early stages of pregnancy as leading risk factors for congenital heart disease in children.

That several environmental and lifestyle factors may be associated with congenital heart defects, where the literature and identifies maternal illnesses and lifestyle factors such as alcohol use and smoking as potential risk factors.

that socioeconomic factors may also influence the incidence of congenital heart disease, where reports on two cases of infants with congenital heart defects born from mothers with rheumatic heart disease highlighting the potential role of maternal health conditions and the role of social determinants of health, including environmental exposure and nutrition, in the aetiology of congenital heart disease and the provision and outcomes of care.

MATERIAL AND METHOD

This study collected demographic information and data from various different hospitals in Iraq, where A cross-sectional study was conducted on 115 Iraqi children.

The children's ages varied between 1 and 5 years, with 35 girls and 80 boys represented in the sample.

Written consent was obtained from patients for the purpose of conducting medical analyses and publishing the study. The study was conducted over a 6-month period from January to August 2021.

A bibliographic review was conducted on a systematic review, classification, ethology, clinical features, epidemiology, and prognosis of congenital heart disease. Reports related to the reviewed topic were obtained by consulting electronic databases in MEDLINE and the WHO/PAHO bibliographic group.

This research is valuable in establishing the prevalence of congenital heart disease in children, and the findings may be useful to other researchers who wish to carry out similar studies.

New measures were utilized in the study to assess the quality of life of diseased children and to evaluate the reliability of the relationship, and the study utilized the SPSS IBM SOFT 22 statistical analysis program to identify all variables, including the true value, standard regression, and frequency, to determine the prevalence of congenital heart disease and the level of statistical relationship among patients.

RESULTS

The table below shows the mean value and standard division to the average age of patients who underwent participation in this study. MEAN STD was 3.1±1.43, and the ages ranged from 1 to 5 years.

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Table 1: Results of patients according to Statistics age (Unit mo)

Statistics			
		Age of children	**Age of mother**
N	Valid	115	115
	Missing	0	0
Mean		3.1	27.5500
Std. Error of Mean		.234	.40536
Median		4.3	28.0000
Mode		3.3a	24.00[a]
Std. Deviation		1.43	4.05362
Variance		3.98	16.432
Skewness		0.98	.121
Std. Error of Skewness		0.111	.241
Kurtosis		1.98	-.766
Std. Error of Kurtosis		0.545	.478
Range		3	16.00
Minimum		1	20.00
Maximum		5	36.00
a. Multiple modes exist. The smallest value is shown			

Fig 1 is a graphical representation of the distribution of patients based on their sex, and the term "distribution" refers to the way in which the patients are spread out or divided among the two categories of sex, which are female and male.

The table shows the number of patients in each sex category, with 35 patients being female and 80 patients being male.

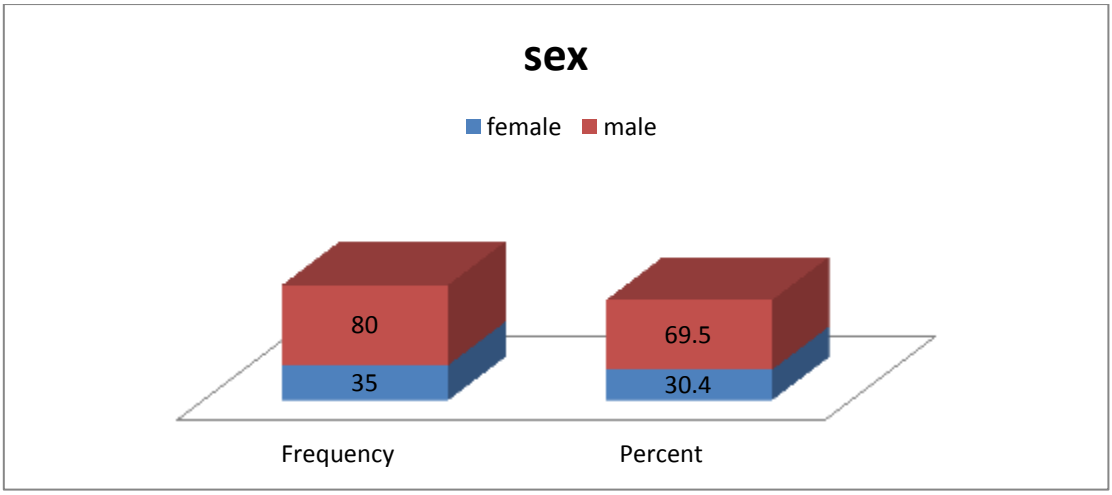

Fig 1: Distribution of patients according to sex

Table 2: Characteristics of patients according to Clinical Features of congenital heart disease cases

Clinical Features					
		f	**%**	**VP**	**CP**
Valid	Hypoxia/ Murmur	22	19.1	19.1	19.1
	Cyanosis	8	7.0	7.0	26.1
	Dysmorphia	19	16.5	16.5	42.6
	Fatigue	4	3.5	3.5	46.1
	Hypoxia	10	8.7	8.7	54.8
	Murmur	18	15.7	15.7	70.4
	Tachypnea	34	29.6	29.6	100.0
	Total	115	100.0	100.0	

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The prevalence of types of congenital heart disease can vary depending on the population being studied and the specific criteria used to define the types. However, there are certain patterns regarding the prevalence of congenital heart disease based on sex.

Overall, congenital heart disease affects both males and females, but some types may have a higher prevalence in one sex compared to the other. Here are a few examples:

1. Ventricular septal defect (VSD) is one of the most common types of congenital heart defects. It occurs more frequently in males than females.
2. Atrial septal defect (ASD): ASD is another common type of congenital heart defect. It usually has a slightly higher prevalence in females than males.

Table 3: Prevalence of Types of congenital heart disease

VAR00001					
		Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Valid	Atrial Septal Defect	30	26.1	26.1	26.1
	An atrioventricular septal defect	10	8.7	8.7	34.8
	Solitary Patent Ductus Arteriosus	26	22.6	22.6	57.4
	Tetralogy of Fallot	7	6.1	6.1	63.5
	Transposition of Great Arteries	9	7.8	7.8	71.3
	Tricuspid Atresia	8	7.0	7.0	78.3
	Ventricular septal defect	25	21.7	21.7	100.0
	Total	115	100.0	100.0	

Table 4: An estimate of patients' QOL according to a questionnaire distributed to patients

Descriptives					
	VAR00001			**Statistic**	**Std. Error**
VAR00003	Atrial Septal Defect	Mean		57.0667	1.93333
		95% Confidence Interval for Mean	Lower Bound	53.1126	
			Upper Bound	61.0208	
		Std. Deviation		10.58930	
	An atrioventricular septal defect	Mean		44.4000	3.60309
		95% Confidence Interval for Mean	Lower Bound	36.2493	
			Upper Bound	52.5507	
		Std. Deviation		11.39396	
	Solitary Patent Ductus Arteriosus	Mean		54.3846	2.41220
		95% Confidence Interval for Mean	Lower Bound	49.4166	
			Upper Bound	59.3526	
		Std. Deviation		12.29984	
	Tetralogy of Fallot	Mean		47.1429	6.21606
		95% Confidence Interval for Mean	Lower Bound	31.9327	
			Upper Bound	62.3530	
		Std. Deviation		16.44616	
	Transposition of Great Arteries	Mean		47.2222	4.29721
		95% Confidence Interval for Mean	Lower Bound	37.3128	

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			Upper Bound	57.1316	
		Std. Deviation		12.89164	
	Tricuspid Atresia	Mean		50.1250	5.40647
		95% Confidence Interval for Mean	Lower Bound	37.3407	
			Upper Bound	62.9093	
		Std. Deviation		15.29180	
	Ventricular septal defect	Mean		53.0400	1.80876
		95% Confidence Interval for Mean	Lower Bound	49.3069	
			Upper Bound	56.7731	
		Std. Deviation		9.04378	

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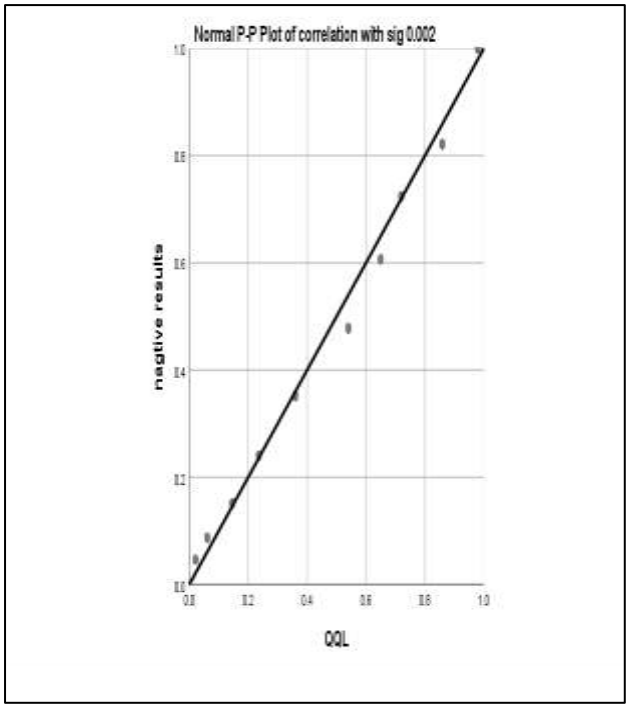

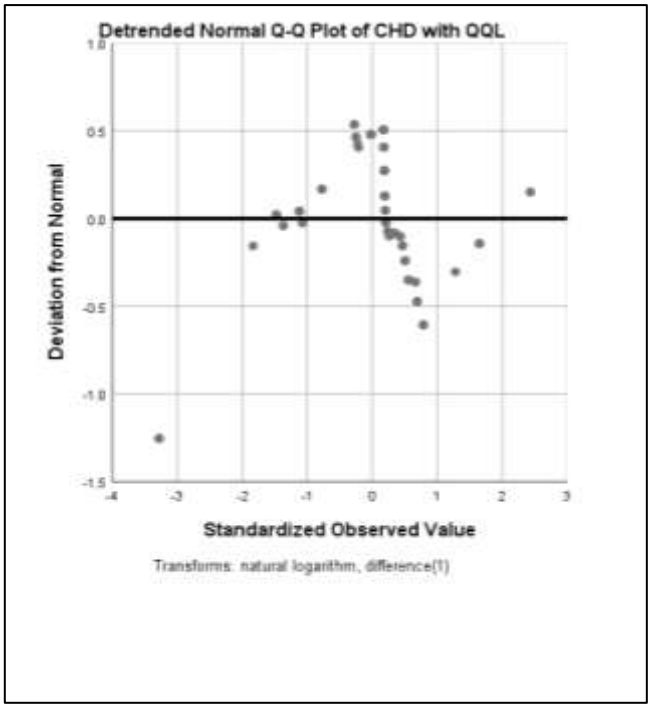

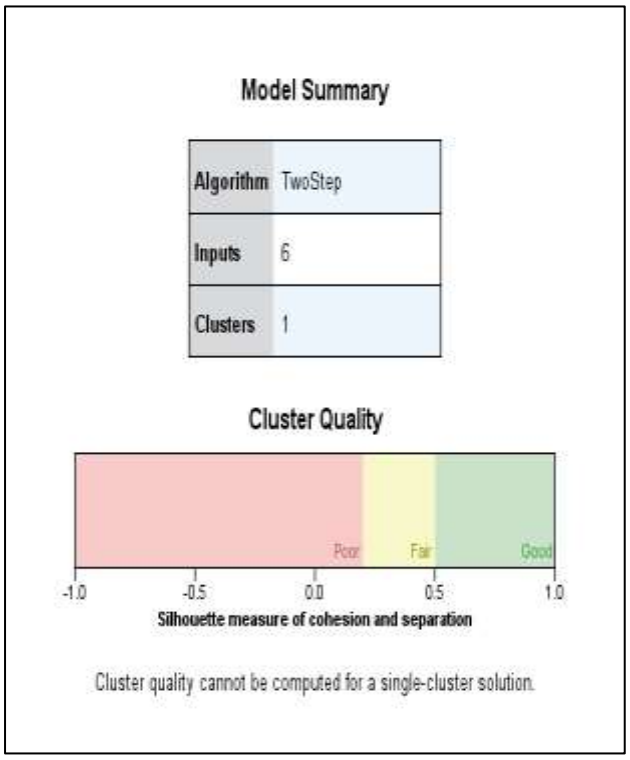

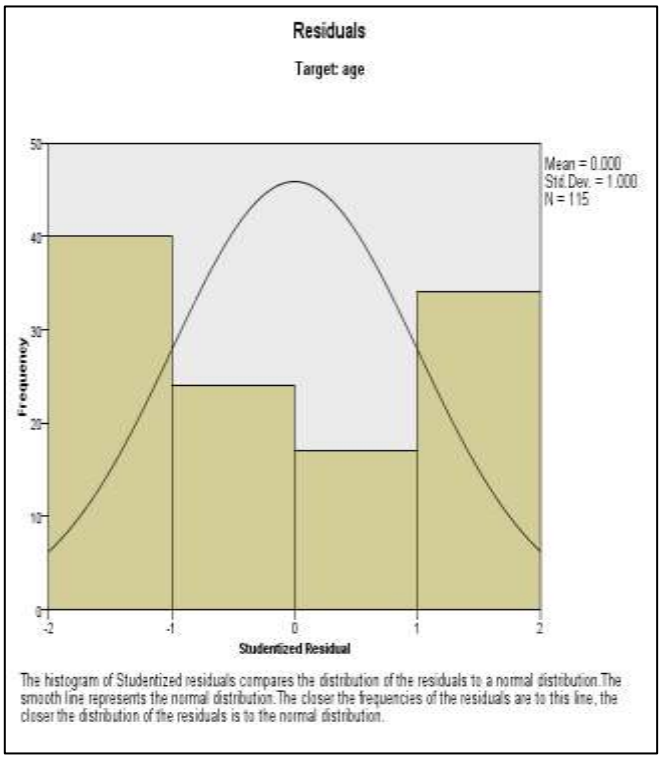

The figures above provide mixed findings on the accuracy of QQL in identifying congenital heart defects in children. Where found that is there a direct relatioship with high sensitivity and specificity between QQL and CHD with various types, but it also noted that errors in analysis could have surgical importance and Quality of Life Inventory 3.0 Cardiac Module had acceptable internal consistency and can be a useful tool in clinical practice and research for assessing health-related quality of life in children with congenital heart defects.

According to SPSS, we anlayzed results and found that patients and quality of life were impaired in this population, highlighting the relevance of assessing quality of life in children with CHD.

In the above figure, it was evaluated the Correlation between congenital heart disease and QOL, where two variables were added (Negative

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result, congenital heart disease). It was found with negative outcomes and a deterioration in the children's quality of life.

In the table below, logistical investigation of risk factors associated with paediatric health and QOL on the following aspects: Cardiac prognostic severity, Physical functioning, Psychosocial functioning, and the most influential factor in this study was Cardiac Prognostic Severity Where the effect of (Est) was negative with P-value 0.00245.

Table 5: Logistic investigation of risk factors associated with pediatric health and QOL

	Est.	**SE**	**P-value**
Age	-2.11	1.1	0.012
Cardiac Prognostic Severity			
Curative	-0.23	1.1	0.01
Corrective	-0.55	2.0	0.00245
Palliative	-0.66	2.8	<0.001
Physical functioning	Est.	SE	P-value
	-0.01	0.88	0.05
Psychosocial functioning	-0.77	0.61	0.01

Table 6: Mortality assessment of Iraqi paediatric patients inside Dhi Qar Hospital

Count				
		VAR00004		**Total**
		alive	**dead**	
VAR00001	Atrial Septal Defect	28	2	30
	An atrioventricular septal defect	10	0	10
	Solitary Patent Ductus Arteriosus	23	3	26
	Tetralogy of Fallot	6	1	7
	Transposition of Great Arteries	8	1	9
	Tricuspid Atresia	7	1	8
	Ventricular septal defect	24	1	25
Total		106	9	115

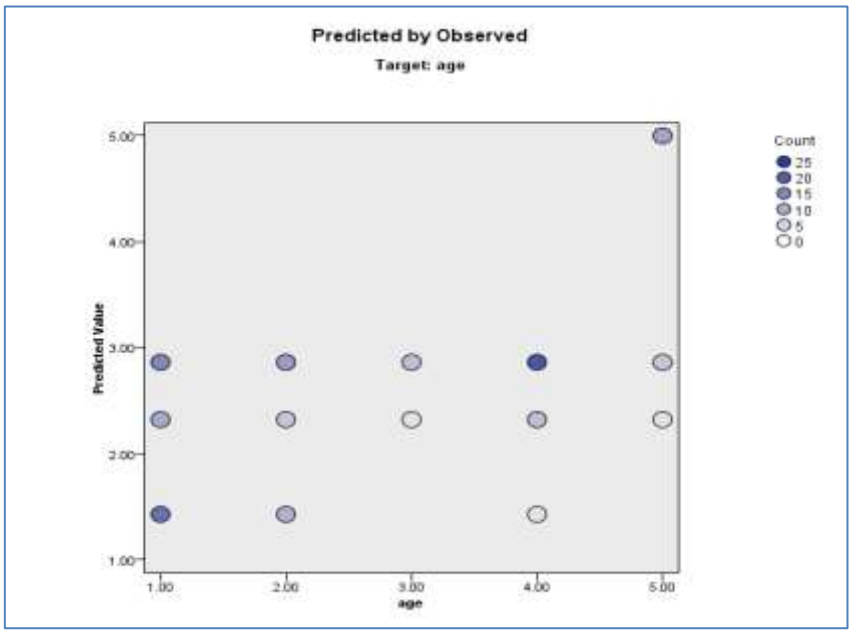

Fig 3: Predicted by observed of Iraqi children N=115

According to the Predictive value of age at greatest risk of congenital heart disease, The prevalence of congenital heart disease varies across different age groups where the most children with heart disease were diagnosed between 1-5 years of age, with acyanotic heart disease presenting at a mean age of 11.5 months and In the figure above, which shows the predictive value, it was found that children

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aged 2 and 3 years will suffer in the future with predictive value 2.8596 and statical p value >0.0.

DISCUSSION

A cross-sectional study was undertaken at different hospitals in Iraq, where a group of 115 unwell children aged from 1 to 5 years were enrolled. The study identified the true value and the arithmetic mean of average patient age, which was 3.1 ± 1.43, as presented in Table 1.

In the present study (see Figure 1), patient distribution by gender revealed a higher prevalence of male patients (80 patients with 69.5% males) in comparison to females (35 patients with 30.4%).

Table 2 details the characteristics of patients sorted by clinical features of congenital heart disease cases.

The most frequent symptom in our study was Tachypnea, found in 34 patients with 29.6% of cases, followed by hypoxia/murmur in 22 patients (19.1%) and dysmorphia in 19 patients (16.5%).

The study focused on patients diagnosed with congenital heart disease. The most commonly diagnosed conditions were ASD in 30 patients (26.1%), SPDA in 26 patients (22.6%), and VSD in 25 patients (21.7%). AVSD was observed in 10 patients, accounting for 8.7%, while TGA was found in 9 patients, representing 7.8%, and TA was identified in 8 patients, equivalent to 7%. Table 3 provides a detailed account of these findings. Quality of life was evaluated using a distributed questionnaire, indicating a reduction in quality of life. The diagnosed ASD patients had a mean value of 57.06 ± 10.5.

The paper's results demonstrate that during the study period, 115 out of 1000 neonates admitted to the hospital exhibited congenital heart disease, resulting in a hospitalisation rate of 11.5%.

The demographic data was analyzed based on calculating frequencies, mean values, and standard regression to the results. The statistical data showed a direct positive statistical relationship between the results of the study and the level of quality of life for children.

The main objective of the cross-sectional study conducted in different hospitals in Iraq, was to identify congenital heart defects in children and evaluate health outcomes. The study aimed to find out the prevalence of congenital heart disease in children and analyse the demographic data based on calculating frequencies, true values, and standard regression to the results. The study also aimed to assess the mortality rate of Iraqi paediatric patients inside Dhi Qar Hospital and determine the relationship between the results of the study and the level of quality of life for children.

Our study was somewhat consistent with Ken Lau's study in Shanghai 2012, where the most common symptoms in his study were blue skin, a constant feeling of fatigue, shortness of breath, and rapid breathing, in addition to heart rhythm disorders.

Figure 2 refers to Patients' QOL was estimated according to a questionnaire distributed to patients, and quality of life was evaluated according to Quality of life, which is a comprehensive approach aimed at assessing the level of individual performance.

The quality of life assessment is characterized by multidimensional aspects and focuses on subjective experiences with well-being and happiness. The assessment process depends on mental health, heart symptoms, adherence treatment, treatment of anxiety, cognitive status, and communication skills.

Congenital heart disease (CHD) significantly impacts the quality of life (QOL) in individuals, with studies showing lower QOL compared to those without the condition. Factors affecting QOL include the severity of the heart defect, associated health problems, treatment interventions, and individual resilience. Physical, emotional, and psychosocial challenges, such as fatigue, difficulty performing activities, anxiety, depression, body image concerns, and social isolation, also contribute to lower QOL. However, QOL outcomes can be influenced by individual coping strategies, social support, healthcare access, and medical interventions. Advancements in medical treatments have improved long-term outcomes.

It is recommended that individuals with CHD work closely with a healthcare team to manage their condition and optimize their QOL. Psychosocial support, counseling, and participation in support groups can also be beneficial in improving overall well-being and QOL for individuals with CHD.

The vast majority of congenital heart diseases have a multifactorial cause, which is currently unknown, and very rarely are cases associated with

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a specific genetic mutation. The chance of passing the infection on to offspring or of recurring another birth defect in a child is generally low and ranges between 3% and 5%, although it can vary greatly depending on the specific type of heart disease. [Yalın, Ş. *et al*., 2013; Goodman, R, 1997]

The most effective method of diagnosis is echocardiography. Diagnosis of critical forms in the perinatal period improves if diagnosed during the prenatal period, and as a strategy of the Ministry of Public Health, prenatal diagnosis of deformities is performed through ultrasound imaging, which has led to a decrease in the number of births that show some of these defects [Üneri, Ö. *et al*., 2007].

The concept of congenital heart disease has a broader meaning, which is that congenital heart disease can be defined as an anatomical malformation of the heart or large vessels that develops in the womb, regardless of when it was discovered and currently, congenital heart disease occupies a leading position in terms of the prevalence of other malformations in children and remains the cause Moreover, a further increase in the prevalence of coronary artery disease is expected.

In the study of P. Khairy *et al*. Comparison of mortality rates in children with congenital heart disease showed that the total mortality rate decreased by 31% and amounted to 0.69 per 100 thousand population by 2002-2005. Moreover, the largest decrease in mortality rates was observed in the newborn group and by the period 2018-2020. It was 0.23% per 100,000 population. Similar results have been obtained in other studies. Thus, according to the results of a multicenter study conducted in the United States in the period from 1999 to 2006 and published in 2010, due to the improvement of diagnostic methods and tactics of helping children with congenital heart disease, the death rate decreased by a large proportion in general Similarly, in different studies, the most representative congenital anatomical alteration in children with Down syndrome is a periventricular septal defect, which accounts for 15 to 20% of all congenital heart diseases, with an incidence of 6 - 10 per 1,000 or 20-30 per 10,000 births, followed by the atrioventricular canal, atrial septal defect, and tetralogy of Fallot And in contrast to other studies in Spain that showed atrioventricular septal defect to be the most common heart disease, with a prevalence of 36.3% and 89%, respectively [Üneri, Ö. *et al*., 2007].

In the analyzed medical records, it was found that the female sex, with 52 patients, dominated the male population, 47 patients and that the mean age in months at diagnosis was 23 days (0-40 months). Similarly, delays in diagnosing congenital heart disease were also demonstrated, according to a study conducted in Brazil in a maternal and child care unit at a local reference center, where it was documented that only 74% of cases were detected within the first six months of age seven years.

Literature study consistently report that ventricular septal defect (VSD) is the most common congenital heart defect in children. Namuyonga 2020 found that isolated VSD was the most common CHD seen in their study, while Miyague 2003 reported that VSD was the most frequent acyanotic anomaly. Atrial septal defects (ASD) and patent ductus arteriosus (PDA) were also commonly reported in the papers. Tetralogy of Fallot (TOF) was the most common cyanotic heart defect in Namuyonga 2020 and Miyague 2003.

CONCLUSION

We conclude from this cross-sectional study on the prevalence of congenital heart disease at ages ranging from 1 to 5 years. The most common age in this study was between 2 to 3 years, and the most common congenital heart disease was Atrial Septal Defect for 30 patients with 26.1%. It was also found There is a positive statistical relationship with CHD, where a decrease in quality of life was found, with a statistically significant relationship at p-value <0.05

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