

# Effect of Congenital Heart Diseases on the Physical Growth among Children

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## Abstract

Congenital heart diseases not only affected the growth of children but, causes developmental delay.

**Aim:** To assess the effect of congenital heart diseases on the physical growth among children.

**Research Design:** A descriptive research design was used in the current study. **Setting:** The study was conducted in pediatric cardiology outpatient clinics at Sohag university hospital. **Subjects:** A purposive sample included 100 children their age from 1 to 6 years with congenital heart disease confirmed by echo-cardiogram in the previous mentioned setting from March to December 2017.

**Tools** of data collection: one tool was used in the current study: Assessment questionnaire sheet.

**Results:** The results showed that both sex were approximately two thirds of children were male and one third of them were female. Seventeen percent of total children in acyanotic group were suffering from severe malnutrition where one ten percent of total children in cyanotic group suffering from severe malnutrition. Statistical significant difference was found between. Finally there was strongly relation between congenital heart diseases and the physical growth among children. **Conclusion:** It was concluded that congenital heart diseases affected the physical growth among children. There was strongly relation between congenital heart diseases and the physical growth among children. **Recommendation:** Raising awareness and education of the mothers about effect of congenital heart diseases on the physical growth among children. Educational programs must be established regularly to determine progress of nutritional status of the studied children.

**Keywords:** Congenital heart diseases, physical growth, children

## Introduction:

Congenital heart disease (CHD) is an important component of pediatric cardiovascular disease with an estimated prevalence of 4 to 5 per 1000 live births. There are rehabilitation differences and differences between adult and pediatric patients (Anton, 2016).

Although the mortality of patients who suffer from congenital heart disease has decreased significantly, the risks are still high when compared to other diseases. This is why it is necessary to decrease mortality in the vulnerable groups (Mandalenakis, et al. 2017).

Infants and children with congenital heart disease and congestive heart failure or cyanosis, their body has less oxygen than normal, tend to gain weight more slowly. Cardiac malformations are responsible for malnutrition, which may range from mild under nutrition to severe failure to thrive. Growth

failure has been associated with cellular hypoxia, hypermetabolism, reduction in nutrient ingestion', and intestinal malabsorption of nutrients. In addition, low serum IGF-I concentrations may result in growth delay in children with heart disease (Nasiruzzaman et al., 2011).

Acyanotic lesions tend to decrease weight gain rather than height, whereas cyanotic lesions tend to affect both height and weight. Anorexia and early satiety may be exacerbated by the drugs, such as diuretics, that are administered for the treatment of congestive heart failure may also lead to development of malnutrition (Shetty, et al., 2014). Not only the growth but also developmental delay occurred in congenital heart disease. Developmental milestones like sitting, crawling, standing and walking, may be delayed. Growth and development both are certainly influenced by clinical type of congenital heart disease and the degree of severity of the problem (Lin, & Nardocci, 2016). Most children with

congenital heart disease may have delays in development, learning disabilities. Primary care physician can also make recommendations for appropriate testing of child. Be proactive, ask questions, and work together with child and physicians to find the right solutions for child (Hay, et al., 2016).

Nurses play an important role in the protection, promotion, and optimization of health and abilities. In addition, it is the prevention of illness and injury, facilitation of healing, diagnosis and treatment, and advocacy in the care of individuals, families, groups, communities and populations (MILLER, 2015). Nurses should make a living system suitable for the patient's activity according to the patient's condition. In addition, they should take measures to prevent infection as well as to introduce self-protection information to children and parents. They should avoid contact with patients with infectious diseases. Therefore, the air in the ward needs to be kept fresh (Goldberg, 2013).

Once an infection occurs, it should be treated actively. From the perspective of nutrition, patients need to be given a high protein, high calorie and a high vitamin diet in order to enhance their physical fitness. In addition, the nurses should observe the patients' vital signs symptoms and signs as well as avoid the occurrence of complications (Murray & McKinney, 2014). Moreover, the psychological aspects are not something that the nurses can afford to ignore. As nurses, we should care for the patient, establish a good nurse - patient relationship, introduce the related information of the disease and make the diagnosis and treatment work smoothly (da Silveira et al., 2016).

#### Significance of the study:

Congenital heart diseases are responsible for causing malnutrition, which may range from mild under nutrition to severe failure to thrive. Growth failure has been associated with cellular hypoxia, hypermetabolism, reduction in nutrient ingestion, and intestinal malabsorption of nutrients. In addition, may result in growth delay in children with heart disease and Growth impairment of among children. Hence, the study aims to assess the effect of congenital heart diseases on the

physical growth among children (Hoffman and Kaplan, 2012).

#### Research questions

- 1- What is the nutritional status among children with congenital heart diseases?
- 2- Is there is a relationship between congenital heart diseases and the physical growth among children?

#### Aim of the study

To assess the effect of congenital heart diseases on the physical growth among children

#### Research design:

A descriptive research design was used in the current study.

#### Setting:

The study was conducted in pediatric cardiology outpatient clinics at Sohag university hospital.

#### Subjects & Method

##### Subjects:

The study subjects include A purposive sample included 100 children and their mothers their age from 1 to 6 years with congenital heart disease confirmed by echo-cardiogram in the previous mentioned setting from March to December 2017, either male or female.

##### Tools of the study

One tool was used for data collection as following:

**Tool I: Assessment questionnaire sheet** for children and their mothers and included 4 parts which are designed by the researchers as following:

**Part one:** General characters of children including, age and gender.

**Part two:** General characters of the mothers of children include the age, education, occupation, and residence.

**Part three:** Classification of congenital heart diseases (Ventricular septal defect, Patent ducts arterioles, Atrial septal defect, miscellaneous and family history

**Part four:** An anthropometric measurement:-It was used to assess the children growth parameters as weight and length.

**Methods:**

Official permission was obtained from the heads of Sohag university hospital to collect data from the previous selected setting and the permission was sent to these setting. Written informed consent from studied children and their mothers was obtained. The researcher began to collect data from March to December 2017. Pilot Study was carried out on 10% of the sample (10 children and their mothers) to test the clarity and applicability of the tool. Based on the results of pilot study, no modification in the tools was found.

Internal consistency of reliability was measured using alpha Cronbach test and R was 0.95 for the used tool. Content validity: The developed tools were tested for the content validity by selected juries of pediatric nursing professionals to assess the clarity, feasibility, and applicability of the tools. Content validity index (CVI) was 85% for the used tool.

The study followed common ethical principles in clinical research and no risk for study subjects during application of the research. Confidentiality and anonymity were assured. Studied children and their mothers had the right to refuse to participate or withdraw from the study without any giving any reason at any time.

Anthropometric measurements of the children included: - Weight which was measured by an appropriately sized balance scale by the researcher. Before the children were weighted, the scale was adjusted by setting it at zero and noting if the balance registered exactly in the middle of the mark. Children's heights were measured using plastic measuring tape in centimeters, and the scale records heights in centimeters. The growth curve formulated by Centre for Disease Control (CDC) was used to evaluate children's growth according to height and weight

**Statistical analysis**

The data were obtained reviewed, prepared for computer entry, coded, analyzed and tabulated and done using SPSS 17.0 statistical software package. Data were presented in the form of frequencies and

percentages for qualitative variables using descriptive statistics, and means for quantitative variables. Chi square used to determine significance of non-paretic's variables. Statistical significance difference was considered when P -value < 0.05.

**Results:**

**Table (1):** revealed that one hundred of children diagnosed with congenital heart diseases were included in the current study. The mean age of study patient was  $3.06 \pm 2.21$  years. Forty four (44%) of children were male and (56%) were female.

**Table (2):** Revealed that the mothers of children were mostly between  $18 < 23$  years (47%) and their mean age was  $(19.14 \pm 3.87)$  and (28%) of them had secondary education. more than two-thirds of mothers (71%) were housewives and (82%) were living in rural areas.

**Figure (1):** illustrated that among 100 children who diagnosed with congenital heart disease 58% of children had acyanotic and 42% of them had cyanotic variety of CHD.

**Table (3):** Clarified that the highest percentage of the studied children (34%) were diagnosed with ventricular septal defect followed by patent ductus arterioles (24%), atrial septal defect (15%), transposition of great arteries (10 %), pulmonary atresis (6%), tetralogy of fallot's ( 5%), coarctation of the aorta (3%), and truncus arteriosus was (3%).

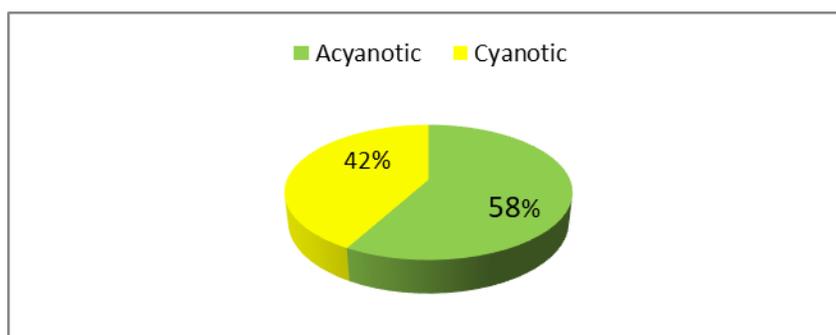
**Table (4):** Showed the relation between congenital heart diseases and the physical growth of the studied children with according to WHO classification, and mentioned that 34% of children from acyanotic group and, 18% of children from cyanotic group were suffering from severe malnutrition in height for age topic. On the other hand 20% of children from acyanotic group and 6% of children from cyanotic group were suffering from severe malnutrition in weight for height topic. There was strongly relation between congenital heart diseases and the physical growth among children.

**Table (1):** Frequency and percentage distribution of the studied children regarding their demographic data (n=100)

Demographic data	No.	%
<b>Age</b>		
- 1-3	35	35.0
- 3-6	65	65.0
<b>M±SD</b>	3.06+2.21	
<b>Gender :</b>		
- Male	44	44.0
- Female	56	56.0

**Table (2):** Percentage distribution of the studied mothers regarding their characteristics (n=100)

Characteristics	No.	%
<b>women ' age in years</b>		
- 18 < 23	47	47.0
- 23 < 28	22	22.0
- 28 < 33	23	23.0
- 33 < 35	8	8.0
<b>Mean ±Stander deviation</b>	19.14 ± 3.87	
<b>- women ' education</b>		
- Illiterate	23	23.0
-Read and write	20	20.0
-Primary education	24	24.0
-Secondary education	28	28.0
-University education	5	5.0
<b>Occupation</b>		
- Employee	29	29.0
- Housewife	71	71.0
<b>-Residence</b>		
-Rural	82	82.0
-Urban	18	18.0

**Figure (1):** Percentage distribution of the studied children regarding their type of congenital heart disease (n=100)**Table (3):** Frequency and percentage distribution of the studied children regarding their diagnosis (n=100)

Diagnosis	No	%
Ventricular Septal Defect	34	34%
patent ductus arterioles	24	24%
Atrial Septal Defect	15	15%
Transposition of Great arteries	10	10%
Pulmonary Atresis	6	6%
Tetralogy of Fallot's	5	5%
Coarctation of the Aorla	3	3%
Truncus Arteriosus	3	3%

**Table (4):** Relation between congenital heart diseases and the physical growth of the studied children with according to WHO classification (n=100).

Height for age					P- value
Studied children (n = 100)	Malnutrition				
	Mild	Moderate	Sever	Normal	X2 = 0.94 P=0.001
Acyanotic Heart Disease (58%)	3(3%)	10 (10%)	34(34%)	11 (11%)	
Cyanotic Heart Disease (42%)	8 (8%)	13(13%)	18(18%)	3(3%)	
Weight for height					P=0.004
Studied children (n = 100)	Malnutrition				
	Mild	Moderate	Sever	Normal	X2= 31.54 P=0.004
Acyanotic Heart Disease (58%)	13 (13%)	10 (10%)	20 (20%)	15 (15%)	
Cyanotic Heart Disease (42%)	9 (9%)	7 (7%)	6 (6%)	20(20%)	

## Discussion:

Congenital heart diseases are one from the most frequent congenital anomalies and responsible for children' morbidity, premature death, and mortality. Congenital heart defects have been increased risk for underweight so that, the aim of the present study was to assess the effect of congenital heart diseases on the physical growth among children

The results of current study revealed that, the mean age of study children was 3.06+2.21 years and near to half of children were male

and more than half of them were female. These results are in accordance with the results conducted by **Nasiruzzaman et al., (2011)** about "Growth and Developmental Status of Children with Congenital Heart Disease" in Bangladesh and found that the mean age of study patient was 3.04 (+2.01 SD) years and more than half of children were male

The results of current study revealed that, more than half of children had acyanotic variety of CHD. This result is supported by the study done by **Nasiruzzaman et al., (2011)** and detected the same between 50 children

with congenital heart disease. These results are also, supported by **Moghimi-Dehkordi, et al., (2013)** who mentioned in their study about "Overweight and obesity and related factors in urban Iranian population aged between 20 to 84 years" that a cyanotic heart disease is more frequent than others heart disease among children.

The results of current study clarified that, the highest percentage of the studied children were diagnosed with ventricular septal defect. This result is in the same line with **Nasiruzzaman et al., (2011)** who done prospective study of congenital heart disease in children and observed that the most common acyanotic heart disease is ventricular septal defect and was leading cause of the acyanotic congenital heart disease.

**Abed Kreem, Ayed & Hamed (2016)** found that ventricular septal defects were the most common type of congenital heart disease. This study was similar to the study conducted by **Ghaderian, et al., (2014)** who studied "prepregnancy Maternal Weight and Body Mass Index of Children with and without Congenital Heart Disease" and found that the most frequent congenital heart disease was ventricular septal defect.

The results of current study clarified that, the relation between congenital heart diseases and the physical growth of the studied children in accordance to WHO classification, and reflected that more than one third of children from acyanotic group and, near to one fifth of them from cyanotic group were suffering from severe malnutrition in relation to height for age topic and also, in cyanotic group were suffering from severe malnutrition in weight for height topic.

This is particularly true of children with cyanotic CHD and congestive heart failure. They expend more energy, need boosted nutrition, and sometimes have trouble absorbing the food they eat. This may result in children looking a bit younger than their age or looking a little less robust. The slower growth that may be seen in these children may be due to difficulty taking in enough food, either because of the condition itself or because of the high calorie requirements of children with a heart condition. Good nutrition (or the services

of a dietician to overcome any feeding issues) will be an integral part of child's care if they are not reaching their growth milestones. Getting enough calories is critical for children with CHD, since they need calories to support growth and energy needs. Some strategies may include energy boosting foods or organizing supplemental tube feedings **Mitchell, et al., (2013)**.

This result is in agreement with **Okoromah et al. (2011)** who studied Prevalence, profile and predictors of malnutrition in children with congenital heart defects and indicated that more than half of the children showed acyanotic CHD. Also, it was shown that malnutrition was highly prominent in children with CHD. On the same line, **Costello et al. (2015)** who studied Growth restriction in infants and young children with congenital heart disease and found that children with acyanotic heart disease were relatively higher than children with cyanotic heart disease. Costello also found that children showed restrained growth rate in terms of weight and height signifying that height was less affected than weight. On the other hand, in regard to wasting, **Okoromah et al. (2011)** indicated that wasting was highly observed in acyanotic CHD children.

**Nasiruzzaman et al., (2011)** also, in their cross sectional study showed that the children having congenital heart disease were more liable to developed delayed growth and development. This is attributed to loss of appetite that caused by congenital heart diseases.

### **Conclusion:**

The present study concluded that, Seventeen percent of total children in acyanotic group were suffering from severe malnutrition where one ten percent of total children in cyanotic group suffering from severe malnutrition. Children with congenital heart diseases are prone to delayed growth. There was strongly relation between congenital heart diseases and the physical growth among children and it affected growth negatively.

**Recommendations:**

Based on the results' of this study, we recommended that

- Raising awareness and education of the mothers about effect of congenital heart diseases on the physical growth among children.
- Educational programs must be established regularly to determine progress of nutritional status of the studied children. It is particularly important to promote a healthy lifestyle in this group

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