Effect of the Congenital Heart Disease on Growth and Nutritional State of Children

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Abstract

Background: This study will show the most likely congenital heart disease that affect on growth parameters which re- arrange our information for rapid referring of such patient to solving their problems and maintains the life of child and decrease burden on salary of family.

Objective: To assess nutritional status and factors that predicts nutritional changes in children with congenital heart disease.

Patients and Methods: Cross-sectional study, of 110 patients with congenital heart diseases, performed in Al-Hilla and Baghdad cities in Iraq. Children were divided into three groups according to the age. Cardiac diagnosis was made on basis of clinical history, examination, electrocardiography and echocardiography. acute malnutrition assessed by weight/length ratio, chronic malnutrition assessed by length/age ratio, while poor nutritional status and acute deterioration of health status assessed by weight/age ratio.

Results: 110 patient; Wasted or severely wasted (60.9%) according to weight/length, and Stunted or severely stunted (61.8%) according to length for age measure; and wasted or severely wasted was (42.7%) according to BMI . There was significant association between acute malnutrition and child age, p value <0.002. Acute malnutrition (Wasted or severely wasted) more with left side volume overload (62.7%) and (60.2%) those with chronic malnutrition (Stunted or severely stunted) have complex heart disease. There was significant association between malnutrition assessed by weight for height and presence of mild, moderate and Severe PHT, absence or presence of treatment, type of feeding and syndromatic type of CHD. There was significant association between chronic malnutrition assessed by height for age and cyanosis, pulmonary hypertension and type of feeding. There was significant association between acute malnutrition assessed by BMI for age and pulmonary hypertension, absence or presence of treatment and type of feeding. There was significant association between malnutrition assessed by Weight for height and history of abortion.

Conclusion: Congenital heart disease can affect the growth of children so need resolve these problems by correcting the cardiac abnormality whether by cardiac catheterization of surgical intervention.

Key words: Congenital heart disease, Acute, Chronic malnutrition.

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Introduction

One of the most common congenital anomaly is congenital heart disease, affecting about 8 in 1000 children [1]. Regardless of the nature of the cardiac defect and the presence or not of cyanosis, malnutrition is a common feature among children with congenital heart disease [2].Those Children are susceptible to malnutrition for different reasons including low energy intake, greater energy requirements, or both[3].

The growth is the most important functional index of nutritional status in children. Weight, length and weight/length ration are very important in assessment of adequate nutrition. Precise assessment may necessitate other measurements such as mid-upper arm circumference. Growth failure is more significant in cases with congestive heart failure (CHF), pulmonary hypertension, and cyanotic congenital heart disease [4].

Accompanying hypoxia in patient with cyanosis, increased pulmonary blood flow and pulmonary hypertension worse the condition[5]. Patients with cyanotic CHD and those with congestive HF are associated with more than percent of Acute or chronic malnutrition, while the less percent of the malnutrition patients are without these two conditions[6].The hypoxemia which result from the right-to-left shunting of blood flow at the ventricular level in congenital heart disease with Cyanotic defects are often producing disturbances in both weight gain and attainment of stature. On the other hand, the left-to-right shunting of blood at the atrial or ventricular level in acyanotic congenital heart disease affects weight rather than stature[7]. This study shows the most likely congenital heart disease which effect on growth parameters which re- arrange our information for rapid referring of such patient to solving their problems and maintains the life of child and decrease burden on salary of family.

The aim of this study is to assess nutritional status and factors that predict nutritional changes in children with congenital heart disease.

Patients and Methods

Study design

This cross-sectional study, 110 patients (66males and 44 females) aged between 2months to 12 years admitted to Babylon Gynecology and Pediatrics Teaching Hospital, Al-Hilla and Iraqi-center for cardiac disease, Baghdad. For the period from January 2015 to June 2015.

Children were grouped into three groups according to the age. The first group below one year, the second group one to two years old, third group more than two years old. Patients with other medical diseases that affect anthropometric measurement were excluded these include; generalized oedema, persistent diarrhea or vomiting, dehydration, chronic renal failure and neurological disability. Cardiac diagnosis was made on basis of clinical history, examination, electrocardiography and echocardiography.

Information on socio-demographic aspect was taken about (age, Gender, family member, and child order in the family) also history taken for birth weight of patient, type of feeding, frequency of admission to the hospital and medical treatment. Maternal histories include age of mother at time of pregnancy, number of abortions and maternal risk factors during pregnancy were taken.

Anthropometric measurement (weight, length, head, and mid upper-arm circumference were carried for all patients. The body weight was taken when the child undressed by scale according to their age (The weight of infants, and those > 2 years but unable to stand was taken with a Wunder beam balance table top weighing scale which measures to the close to 100gm to a maximum of 13 kg, while for those above 2 years who could stand, it was taken with the Wunder beam balance floor top weighing scale).

The child length was taken using scientific anthropometre when patient was lying in supine position flat or rigid surface, while the height was measured for those above the age of 2 years with Wunder scale stadiometer. , Measurement of head circumference and mid-upper arm circumference was taken by numbered soft tape measure.

The anthropometric analysis was achieved by calculation of percentiles and Z score with the support of the Anthro 2007© software, Head and mid-arm circumference were in percentile. Z score was calculated for the following rate (length /age, weight/age, Weight/ length, and body mass index). The cut-off points for the Z values: normal values; 0,+1,+2 and +3. Values;-1,-2,-3 and -4 units of standard deviation constituted the zone of risk. In all cases, a Z score of less than -2 was considered as the cut-off point for malnutrition. And below -3 considered severe malnutrition[8]. The type of malnutrition was classified according to the value of calculation of Z score, acute malnutrition assessed by weight/length ratio, chronic malnutrition assessed by length/age ratio, while poor nutritional status and acute deterioration of health status assessed by weight/age ratio.

Statistical analysis

Statistical analysis was carried out using SPSS version 17. Pearson's chi square (X2) and fisher-exact test were used to find the association between categorical variables. A p-value of $\leq$ 0.05 was considered as significant.

Results

We have 110 patients, all admitted with congenital heart disease. Predominant were male (60%) and majority their age below one year (54.5%). And usually child order in family was 2nd or third one (27%, 28 %). Figure (1) shows the distribution of patients with CHD according to type. 46.4% of them presented with isolated left side volume overload. (61.8%) their birth weight was acceptable 2.5-3 kg. With no pulmonary hypertension, absent cyanosis , asyndromatic and on treatment were (60.0%, 53.6%, 81.2%, and 52.7%) respectively Table(2).

Regarding maternal age, (80%) their ages less than 35 year, absent maternal risk factors in (84.5%) and there is no history of abortion in (74.5).Table 3. from 110 patient ;Wasted or severely wasted (60.9%), and Stunted or severely stunted (61.8%); and wasted or severely wasted was (42.7%) according to BMI Table (4).

Table (5) shows the relation between acute malnutrition assessed by weight for length and variables including age, gender, number of family and order of child within family (socio-demographic). There was significant relation between acute malnutrition and child age, while there was no significant relation between malnutrition and gender, number of family members, child order in family variables.

Table (6) shows the association between chronic malnutrition assessed by length for age and gender, age, number of family and order of child within family (socio-demographic variables). There was significant association between chronic malnutrition assessed by length for age and child age, child order within family, while there was no significant relation between chronic malnutrition and gender and number of family. Acute malnutrition (Wasted or severely wasted) more in with isolated left side volume overload (62.7%) Table(7). (41/68) (60.2%) those with chronic malnutrition (Stunted or severely stunted) have complex heart disease. table 8. Table 9: shows the association between malnutrition assessed by Weight for height and study variables including (Birth weight, pulmonary hypertension, cyanosis, presence of syndrome, treatment, type of feeding and frequency of hospital admissions). There was significant association between malnutrition assessed by weight for height and presence of mild, moderate and Severe PHT, treatment, type of feeding and syndromatic type of CHD, while there was no significant association between malnutrition assessed by weight for height and other study variables.

Table (10) shows the association between chronic malnutrition assessed by height for age and study variables including (Birth weight, pulmonary hypertension, cyanosis, presence of syndrome, treatment, type of feeding and frequency of hospital admissions). There was significant association between chronic malnutrition assessed by height for age and cyanosis, pulmonary hypertension and type of feeding, while there was no significant association between chronic malnutrition assessed by height for age and other study variables.

Table (11) shows the association between acute malnutrition assessed by BMI for age and study variables including (Birth weight, pulmonary hypertension, cyanosis, presence of syndrome, treatment, type of feeding and frequency of hospital admissions). There was significant association between acute malnutrition assessed by BMI for age and pulmonary hypertension, treatment and type of feeding, while there was no significant association between acute malnutrition assessed by BMI for age and other study variables.

Table (12) shows the association between malnutrition assessed by Weight for height and maternal factors including (maternal age, maternal risk factors and number of abortions).There was significant association between malnutrition assessed by Weight for height and history of abortion, while there was no significant association between malnutrition assessed by Weight for height and other maternal factors.

Table (13) shows the association between chronic malnutrition assessed by height for age and maternal factors including (maternal age, maternal risk factors and number of abortions).There was no significant association between chronic malnutrition assessed by height for age and maternal factors.

Table (14) shows the association between upper mid arm and occipto-frontal circumferences and type of CHD. There was no significant association between these growth parameter and type of CHD.

Table (1): Distribution of patients according to socio-demographic variables.

Socio-demographic variables	Number	%
Age (years)		
< 1year	60	54.5%
(1-2) years	18	16.4%
≥ 2 years	32	29.1%
Total	110	100.0%
Gender		
Male	66	60.0%
Female	44	40.0%
Total	110	100.0%
No of family members		
< 3	57	51.8%
(4-6)	38	34.6%
(7-10)	15	13.6%
Total	110	100.0%
Child order		
First	11	10.0%
Scecond	30	27.3%
Third	31	28.2%

Fourth	14	12.7%
Fifth	8	7.3%
Sixth or more	16	14.5%
Total	110	100.0%

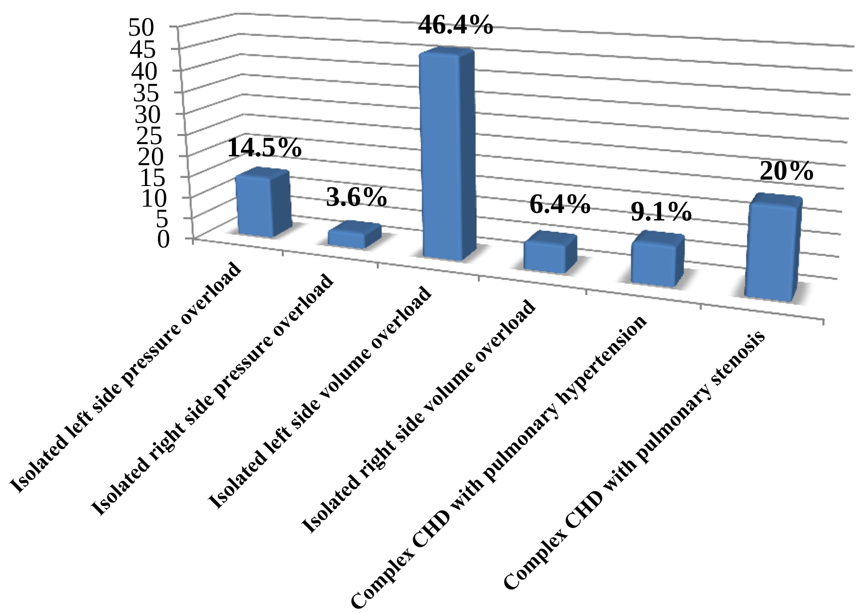

Figure (1): Distribution of patients according to type of CHD.

Table (2): Distribution of patients according to study variables.

Study variables	Number	%
Birth weight		
(1-2.5) kg	28	25.5%
(2.5-3) kg	68	61.8%
≥ 3 Kg	14	12.7%
Total	110	100.0%
Pulmonary hypertension		
No pulmonary HT	66	60.0%
Mild pulmonary HT	16	14.5%

Moderate pulmonary HT	10	9.1%
Severe pulmonary HT	18	16.4%
Total	110	100.0%
Cyanosis		
Present	51	46.4%
Absent	59	53.6%
Total	110	100.0%
Syndrome		
Syndromatic	20	18.2%
A sydromatic	90	81.8%
Total	110	100.0%
Treatment		
Present	58	52.7%
Absent	52	47.3%
Total	110	100.0%
Type of feeding		
Breast feeding	25	22.7%
Bottle feeding	43	39.1%
High calories feeding	1	0.9%
Usual family feeding	41	37.3%
Total	110	100.0%
Frequency of hospital admissions		
Less than 3 admissions	75	68.2%
(4-6)admissions	20	18.2%
(7-10) admissions	15	13.6%
Total	110	100.0%

Table (3): Distribution of patients according to study variables (maternal age, maternal risk factors and number of abortions).

Study variables	Number	%
Age of mother		
(15-25) years	40	36.4%
(26-35) years	48	43.6%
(36-45) years	22	20.0%
Total	110	100.0%
Maternal risk factors		
Present	17	15.5%
Absent	93	84.5%
Total	110	100.0%
Number of abortions		
No history of abortion	82	74.6%
History of (1-2)abortions	23	20.9%
History of (3or more) abortions	5	4.5%
Total	110	100.0%

Table (4): Distribution of patients according to growth indicators.

Growth indicators	Number	%
Weight for height		
Normal	36	32.7%
Wasted or severely wasted	67	60.9%
Overweight or obese	7	6.4%
Total	110	100.0%
Height for age		
Normal	42	38.2%
Stunted or severely stunted	68	61.8%
Total	110	100.0%

BMI for age		
Normal	41	37.3%
Wasted or severely wasted	47	42.7%
Overweight or obese	22	20.0%
Total	110	100.0%

Table (5): Relation of malnutrition to age, gender, number of family and order in family.

Socio-demographic characteristics	Weight for height			P-value
	Wasted or severely wasted	Normal	Overweight or obese	
Age < 1 year (1-2) years ≥ 2 years	 46 (68.7) 9 (13.4) 12 (17.9)	 12 (33.4) 7 (19.4) 17(47.2)	 2 (28.6) 2 (28.6) 3 (42.8)	0.002*
Gender Male Female	 39 (58.2) 28 (41.8)	 24 (66.7) 12 (33.3)	 3 (42.9) 4 (57.1)	0.459
Number of family < 3 (4-6) (7-10)	 35 (52.2) 25 (37.3) 7 (10.5)	 18 (50.0) 11 (30.6) 7 (19.4)	 4 (57.1) 2 (28.6) 1 (14.3)	0.732
Child order in family First Second Third Fourth Fifth or more	 7(10.4) 14 (20.9) 21 (31.4) 10 (14.9) 15 (22.4)	 3 (8.3) 14 (38.9) 9 (25.0) 2 (5.6) 8 (22.2)	 1 (14.3) 2 (28.6) 1 (14.3) 2 (28.6) 1 (14.3)	0.451

*p value ≤ 0.05 was significant

Table (6): Association between malnutrition and type of CHD.

Study variable	Weight for height			P-value
	Wasted or severely wasted	Normal	Overweight or obese	
Type of CHD Isolated pressure overload (left or right) Isolated volume overload (left or right) Complex CHD Total	 8 (11.9) 42 (62.7) 17 (25.4) 67 (100.0)	 11 (30.6) 13 (36.1) 12(33.3) 36 (100.0)	 1 (14.2) 3 (42.9) 3(42.9) 7 (100.0)	0.05* [f]

*p value ≤ 0.05 was significant

Table (7): Relation of chronic malnutrition to age, gender, number of family and order of child in family.

Socio-demographic characteristics	Height for age		χ^2	P-value
	Stunted or severely stunted	Normal		
Age < 1 year (1-2) years ≥ 2 years	 17 (40.5) 11 (16.2) 20 (62.5)	 43 (63.2) 7 (16.7) 12(37.5)	6.895	0.032
Gender Male Female	 38 (55.9) 30 (44.1)	 28 (66.7) 14 (33.3)	1.258	0.262
Number of family members < 3 (4-6) (7-10)	 30 (44.1) 26 (38.3) 12 (17.6)	 27 (64.3) 12 (28.6) 3 (7.1)	4.841	0.089
Child order in family First Second Third Fourth Fifth or more	 4 (5.9) 19 (27.9) 19 (27.9) 6 (8.8) 20 (29.5)	 7 (16.7) 11 (26.2) 12 (28.6) 8 (19.0) 4 (9.5)	9.892	0.042*

*p value ≤ 0.05 was significant

Table (8): Association between chronic malnutrition and type of CHD.

Study variable	Height for age		P-value
	Stunted or severely stunted	Normal	
Type of CHD Isolated pressure overload (left or right) Isolated volume overload (left or right) Complex CHD Total	 10 (14.7) 17 (25.0) 41 (60.2) 68 (100.0)	 12 (28.5) 18 (42.8) 12 (28.6) 42 (100.0)	0.05*f

*p value ≤ 0.05 was significant

Table (9): Association between malnutrition and study variables.

Study variables	Weight for height			χ^2	P-value
	Wasted or severely wasted	Normal	Overweight or obese		
Birth weight (1-2 Kg) (2.1-3 Kg) (> 3 Kg)	 17 (25.4) 41 (61.2) 9 (13.4)	 8 (22.2) 23 (63.9) 5 (13.9)	 3 (42.9) 4 (57.1) 0 (0.0)		0.829f
PHT Mild, moderate, and Severe PHT absent	40 (60.0) 27(40.0)	4 (9.09) 39(90.7)	0 (0.0) 7(100.0)	4.843	0.004

Cyanosis Present Absent	 35 (52.2) 32 (47.8)	 14 (38.9) 22 (61.1)	 2 (28.6) 5 (71.4)		0.285 [f]
Syndrome Syndromatic Asyndromatic	 17 (25.37) 50 (74.63)	 3 (8,33) 33 (91.7)	 0 (0.0) 7 (7.77)	6.232	0.044
Treatment Present Absent	 22 (32.83) 45 (67.16)	 29(80.5) 7 (19.5)	 7(100.0) 0 (0.0)		<0.001 [f]
Frequency of hospital admissions < 3 (4-6) (7-10)	 44 (65.7) 13 (19.4) 10 (14.9)	 26 (72.2) 6 (16.7) 4 (11.1)	 5 (71.4) 1 (14.3) 1 (14.3)		0.977 [f]
Type of feeding Bottle feeding Breast feeding Usual family food	 34 (50.7) 18 (26.9) 15 (22.4)	 7 (19.44) 6(16.7) 23 (63.9)	 2 (4.65) 1(14.3) 4 (57.1)		<0.001 [f]

*p value ≤ 0.05 was significant

Table (10): Association between chronic malnutrition and study variables.

Study variables	Height for age		χ^2	P-value
	Stunted or severely stunted	Normal		
Birth weight (1-2 Kg) (2.1-3 Kg) (> 3 Kg)	 20 (29.4) 40 (58.8) 8 (11.8)	 8 (19.0) 28 (66.7) 6 (14.3)	1.484	0.476
PHT mild , moderate Severe PHT absent	 38 (55.88) 30(44.11)	 6 (14.3) 36(85.70)	0.214	0.04
Cyanosis Present Absent	 49(72.05) 19(27.94)	 2 (4,76) 40 (95.23)	0.947	0.033
Syndrome Syndromatic Asyndromatic	 14 (20.6) 54 (79.4)	 6 (14.3) 36 (85.7)	0.693	0.405
Treatment Present Absent	 39 (57.4) 29 (42.6)	 19 (45.2) 23(54.8)	1.529	0.216
Frequency of hospital admissions < 3 (4-6) (7-10)	 47 (69.1) 13 (19.1) 8 (11.8)	 28 (66.6) 7 (16.7) 7 (16.7)	0.566	0.753
Type of feeding Bottle feeding Breast feeding Usual family food	 29 (42.7) 19 (27.9) 33 (48.50)	 14 (33.3) 6(14.3) 9 (21.42)	6.294	0.043

*p value ≤ 0.05 was significant

Table (11): Association between acute malnutrition and study variables.

Study variables	BMI for age			χ^2	P-value
	Wasted or severely wasted	Normal	Overweight or obese		
Birth weight (1-2 Kg) (2.1-3 Kg) (>3Kg)	 12 (25.5) 26 (55.3) 9 (19.2)	 10 (24.4) 28(68.3) 3 (7.3)	 6 (27.3) 14 (63.6) 2 (9.1)	3.352	0.501
PHT Severe PHT Mild, moderate or absent	 13 (27.7) 34(72.3)	 4 (9.8) 37(90.2)	 1 (4.5) 21(95.5)	7.935	0.019
Cyanosis Present Absent	 11 (23.4) 36 (76.6)	 7 (17.1) 34 (82.9)	 2 (9.1) 20 (90.9)	2.118	0.347
Syndrome Syndromatic Asyndromatic	 25 (53.2) 22 (46.8)	 19 (46.3) 22 (53.7)	 7 (31.8) 15 (68.2)	2.753	0.252
Treatment Present Absent	 34 (72.3) 13 (27.7)	 19 (46.3) 22(53.7)	 5 (22.7) 17(77.3)	15.868	<0.001
Frequency of hospital admissions < 3 (4-6) (7-10)	 29 (61.7) 11 (23.4) 7 (14.9)	 29 (70.8) 6 (14.6) 6 (14.6)	 17(77.3) 3 (13.6) 2 (9.1)		0.756 f
Type of feeding Bottle feeding Breast feeding Usual family food	 27 (57.4) 10 (21.3) 10 (21.3)	 7 (17.1) 10(24.4) 24 (58.5)	 9 (40.9) 5(22.7) 8 (36.4)	17.234	0.002

*p value ≤ 0.05 was significant

Table (12): Association between acute malnutrition and maternal factors.

Study variables	Weight for height			χ^2	P-value
	Wasted or severely wasted	Normal	Obese or overweight		
Maternal age (15-25) years (26-35) years (36-45) years	 22 (32.8) 30 (44.8) 15 (22.4)	 16 (44.4) 16(44.4) 4 (11.2)	 2 (28.6) 2 (28.6) 3 (42.8)		0.30 f
Maternal risk Present Absent	 9 (13.4) 58(86.6)	 6 (16.7) 30(83.3)	 2 (28.6) 5(71.4)	1.172	0.557
History of abortion Present Absent	 21 (31.3) 46 (68.7)	 4 (11.1) 32(88.9)	 3 (42.9) 4(57.1)	6.245	0.044

*p value ≤ 0.05 was significant

Table (13): Association between chronic malnutrition and maternal factors.

Study variables	Height for age		χ^2	P-value
	Stunted or severely stunted	Normal		
Maternal age (15-25) years (26-35) years (36-45) years	 23 (33.9) 29 (42.6) 16 (23.5)	 17 (40.5) 19(45.2) 6 (14.3)	1.465	0.481
Maternal risk Present Absent	 12 (17.6) 56(82.4)	 5 (11.9) 37(88.1)	0.655	0.418
History of abortion Present Absent	 16 (23.5) 52 (76.5)	 12 (28.6) 30(71.4)	0.348	0.555

*p value ≤ 0.05 was significant.

Table (14)

Study variables	Type of CHD			χ^2	P-value
	Isolated pressure overload	Isolated volume overload	Complex with PS or PHT		
Mid upper arm circumference Failure to thrive Normal growth	 10 (50.0) 10 (50.0)	 37 (63.8) 21(36.2)	 18 (56.2) 14 (43.8)	1.321	0.517
Occpito-frontal circumference Failure to thrive Normal growth	 9 (45.0) 11 (55.0)	 38 (65.5) 20 (34.5)	 17 (53.1) 15 (46.9)	3.047	0.218

*p value ≤ 0.05 was significant

Discussion

There is several studies of growth patterns in children with congenital heart disease (cyanotic and acyanotic), revealed the incidence of malnutrition and failure of growth in CHD to be fairly high [9].

In our study; there was significant association between malnutrition and child age, acute malnutrition (wasted or severely wasted)occur mostly in those below one year(68.7%), and chronic malnutrition assessed by height for age, stunted or severely stunted (62.5%) in those more than 2year age, in R. Baaker et al study, they found that acute malnutrition was more obvious in infants (31.7%), while in 2nd year of age was (13%), but severe chronic malnutrition was (19.6%) for patients in first year of age and (34.7%) in patients in second year of age (10). While in other study by Daymont et al. show 80% of infants had acute malnutrition and 18% of patients of other ages (P < .001) (11). Our local result differed from results found in developed study by Venugopalon [12] who found that older children were less affected than infants; this may be attributed to delay in surgical intervention of our patient in compares to their heart disease patients whom underwent early surgical intervention.

In Birgül Varan, et al, study showed chronic malnutrition, which disturbs both weight and length, is significant problem in congenital heart disease, 65% of the children were below the 5th centile for weight and 41% were below the 5th centile for both weight and height and (63%) were underweight for their length[14].

In our study there was significant association between acute malnutrition assessed by weight for height and presence of mild, moderate and Severe PHT(60%),absent of treatment(67.16%), type of feeding:(50%) were bottle feeding, and (91%) of Asyndromatic type of CHD have no malnutrition and 25% of syndromatic have acute malnutrition.

There was significant association between chronic malnutrition assessed by height for age and cyanosis (72.05%), pulmonary hypertension(55.88%) and (85%) of those of normal height have no pulmonary hypertention.(48.50%). In R. Baaker *et al* study,acute malnutrition was more in patients with an acyanotic congenital heart disease without heart failure or pulmonary hypertension (39.2%), while chronic malnutrition was more in patients with HF (25%) and (26.3%) for patients with PHT than other groups. and for severe chronic malnutrition was found more in patients with PHT (52.6%) and patients with HF (37.5%)[10].Also De staebel study shows that patients with heart failure, cyanosis or both highly associated with chronic malnutrition[15].

In M.Dalili et al study, there is statistically a major difference was found in mean weight between cyanotic and acyanotic patients (p value = 0.035), cyanotic patients had lower body weight than those were acyanotic. Borderline negative association was observed between height and cyanosis (P= 0.062)[9]. H. Al-Asy1 study show that the cyanotic children had a more marked reduction in both weight and length than in the acyanotic children, and this reduction was more marked in those having evidences with heart failure[16].

Also we found that, (61.8%) their birth weight was acceptable 2-3 kg. that was explained by study of F.Monteiro, *et al* which show that the intrauterine growth are not affected by congenital heart disease even the more complex forms of heart disease don't usually bring signs of dysfunction during the intra-uterine period, and in early neonatal life we cannot expect cardiac distress in the immediate neonatal period (13). The Steltzer M, et al study mention that the occurrence of malnutrition in patients with congenital heart disease influenced by the type and severity of the disease (17). We found that acute malnutrition (Wasted or severely wasted) more in those with isolated left side volume overload (62.7%) while (60.2%) those with chronic malnutrition (Stunted or severely stunted) have complex heart disease.

In Daymont study they found that half of children with left sided heart obstruction had chronic malnutrition while 11% showed acute malnutrition. M.Dalili et al study found that cyanosis, intracardiac left to right shunts, and pulmonary hypertension, can affect body weight and stature in different degrees[9]. We found there was decrement in occipto-frontal circumferences in those with volume overload (65.5%).

Conclusion

1-Congenital heart disease can affect the growth of children so need to resolve these problems by correcting the cardiac abnormality whether by cardiac catheterization or surgical intervention.

2- Any patient with failure to thrive and poor weight gain or unexplained recurrent respiratory tract infection should be sent for Echocardiography to exclude congenital heart diseases that cause failure to thrive or detect heart failure that caused by elements deficiency from malnutrition like Carnitine, Selenium, and Copper .

3- Improving the way of feeding in CHD child is one of the most important things in treatment of CHD.

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