

Effect of Chronic Rheumatic Heart Disease on Intellectual Function in School-Age Children

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A Case control design conducted at the cardiology clinic of the new children hospital Cairo University of one hundred children with chronic rheumatic heart lesion and another 50 normal children divided into 2 groups as control (A) with the same socioeconomic status while control (B) had higher social class. Their ages ranged from 6 to 12 years and both sexes were included in this study to evaluate the effect of this disease to the psychosocial, intellectual and behavioral development of the children. Both patients and controls were subjected to a designed questionnaire sheet including the clinical data on anthropometric measurements as well as the intellectual functions assessed by the intelligence test. This study revealed that the patients height, weight, and B.M.I were significantly lowered with general delayed growth as regard the other anthropometric measurements for this group of cases compared to normal control. All patients showed significantly low intellectual function and abnormal behavior compared to normal control (1) and more lower than control (B). This current study concluded that children with chronic rheumatic heart disease have growth retardation, intellectual decline and abnormal behavior, so psychosocial supportive care is necessary to manage these patients..

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INTRODUCTION

Long term illness in childhood is one of the most agonizing problems for both the child and his family members. In Egypt epidemiological surveys show that rheumatic heart disease (CRHD) is the most common serious cardiac condition as it is estimated by the ministry of health to be present in about 1.5% of school children, as well as 0.5% have recurrent rheumatic activity despite the long acting penicillin administration (El-Said et al, 1995). Rheumatic heart disease is a chronic illness affecting children and young adults limiting their efficiency and crippling them at an age

where they are expected to be most contributing and productive in their community (Abdel Aal et al, 1995).

Information are numerous regarding the impact of CRHD on children delaying their developmental skills as well as cognitive and intellectual abilities. Many children with this condition exhibited a wide range of emotional disturbance as extreme shyness, aggressiveness, anxiety, and depression (Abdel Mageed, 1989).

Previous research estimates that children with raumatic heart disease showed the higher percent of behavioral disorder in 46.5% (El-Naggar et al, 1990).

AIM OF THE WORK

This work was designed to evaluate

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the effect of chronic rheumatic heart disease on the intellectual function and behavior as well as the impact of socioeconomic status.

SUBJECTS AND METHODS

A Case control study was conducted over one hundred school age children with chronic rheumatic heart disease. The patient group was recruited from the cardiology clinic of Cairo University. Their ages ranged from 6 to 12 years old from both sexes. The cases selected were free from any congenital lesion or other chronic disease that can affect their growth.

Fifty age and sex matched asymptomatic children were taken as control, which are subdivided into two groups, control (A) consists of 25 children recruited from the asymptomatic relatives attending the outpatient clinic to match the same socioeconomic standard. The 2nd control (B) consists of 25 children who from higher socioeconomic standard

METHODS

The following steps were followed for all children included in the present study

1- Medical Assessment:

a) Full medical history.

b) Cardiovascular examination.

d) Investigations (including ECG and Echocardiogram).

2- Socio-economic and Environment Assessment

3- Anthropometric Assessment. Including weight, height, arm circumference and skin fold thicknesses

4- Intellectual Assessment. Included tests to assess intellectual level:

a) Colored Progressive Matrices (Raven, 1977), (Visual memory)

b) Digit span forward and backward (Wechsler, 1974) (Immediate memory).

c) Vocabulary test (Wechsler, 1974). (General verbal ability)

Before performing the test, the interviewer had a full training course for eve-

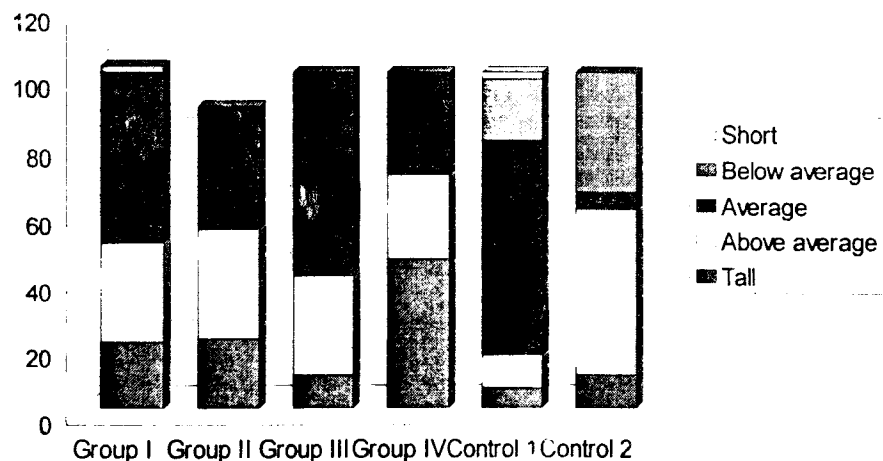


Fig (I): Evaluation of growth of different studied groups

Table 1
The Classification of Children According to Valve Lesion

Variable	Heart lesion
Group I No = 25	Chronic rheumatic heart disease, single valve lesion with compensated heart
Group II No = 25	Chronic rheumatic heart disease, multiple valve lesion with compensated heart
Group III No = 25	Chronic rheumatic heart disease, single valve lesion with heart failure.
Group IV No = 25	Chronic rheumatic heart disease, multiple valve lesion with heart failure
Control A No = 25	Heart free with the same socioeconomic status
Control B No = 25	Heart free with the higher socioeconomic status

Table 2
The Distribution of Social Level of the Total Number of Cases and the Control Groups

Social level	Control A No = 25		Control B No = 25	
	No.	%	No.	%
Very low	20	80		
Range (12-20)		12-16.5		
Low	2	8		
Range (21-29)		24-26		
Below middle	3	12		
Range (30-42)		30-33		
High			9	36
Range (72-84)				74.1 - 79.4
Very high			16	64
Range (85-97)				86.2 - 97
Total no & percent	25	100	25	100

Social level according to Abdel Ghaffar and Kaskoush (1990)

Table 3
The Height/age, Weight/age, Weight/Height and B.M.I of the Cases and the Control groups In relation to NCHS growth Standards (1977)

Variable	Control A No = 25	Control B No = 25
Height/age:		
Mean $\pm$ S.D.	-0.3 $\pm$ 1.0	0.5 $\pm$ 1.0
Range	-2.11 - (1.68)	-1.57-(2.34)
P - Value	0.0001	0.0001
Weight/Age:		
Mean $\pm$ S.D.	0.5 $\pm$ 0.9	0.5 + 1.0
Range	-1.91 - (1.60)	-2.05- (2.34)
P - Value	0.0001	0.0001
Weight/Height		
Mean $\pm$ S.D.	4.6 $\pm$ 5.3	6.0 $\pm$ 5.1
Range	-2.14 - (9.99)	-1.92 - (9.99)
P - Value	N.S.	N.S.
B.M.I.:		
Mean $\pm$ S.D.	16.2 $\pm$ 2.5	18.4 $\pm$ 3.4
Range	13.0 - 23.7	31.1 - 26.4
P - Value	0.05	0.0001

Table 4
The Skin Fold: Triceps, Biceps, Subscapular, Suprailiac
(MM) Between the Cases and the Control groups

Variable	Control A No = 25	Control B No = 25
Arm Circumference (cm):		
Mean±S.D.	19.3±2.7	22.1±3.7
Range	16 - 27	15 - 28
P - Value	0.01	0.0001
Skin Fold Triceps (mm):		
Mean±S.D.	10.3±4.3	13±5.0
Range	4.9 - 21.8	5.2 - 23.2
P - Value	0.0003	0.0001
Biceps (mm)		
Mean±S.D.	5.8±2.3	7.1±3.1
Range	3 - 21.4	3.2 - 14
P - Value	0.0001	0.0001
Subscapular (mm):		
Mean±S.D.	8.1±3.9	9.3±4.2
Range	3.8±19.3	4.2±15.5
P - Value	0.0003	0.0001
Suprailiac (mm):		
Mean±S.D.	6.9±3.7	9.7±4.7
Range	2.7 - 17.5	3.4 - 15.2
P - Value	0.002	0.0001

Table 5
Comparison Between Cases and Control

Variable tests	Control A (25)	Control B (25)
Verbal scaled:		
Mean±S.D.	13±5.5	19.8±0.6
Range	4 - 20	17 - 20
P - Value	0.001	0.0001
Digit Span Scaled		
Mean±S.D.	9.4±3.3	12.4±2.4
Range	4 - 16	8 - 17
P - Value	0.0006	0.0001
Biceps (mm)		
Mean±S.D.	19.0±17.6	77.8±21.7
Range	5 - 75	50 - 95
P - Value	0.07	0.0001
Subscapular (mm):		
Mean±S.D.	82.97±10.4	115.8±12.6
Range	72.75 - 111	88.96±127.10
P - Value	0.02	0.0001

Table 6
Frequency and Percent Distribution of IQ Level in the
Different Studied Groups

Variable IQ Level	Control IV		Control A		Control B	
	No	%	No	%	No	%
Variable	18	72	14	56	0	0
Range (70 - 79)						
Low average	5	20	8	32	1	4
Range (80 - 89)	2	8	2	8	6	24
Average						
Range (90 - 109)						
Height average	0	0	1	4	4	16
Range (110 - 119)						
Superior	0	0	0	0	14	56
Range (120 - 129)						
Total no & percent	25	100	25	100	25	100

Table 7
The Distribution of Abnormal Behavior of Children
of the Different Studied Groups

Variable IQ Level	Control IV		Control A		Control B	
	No	%	No	%	No	%
Normal	15	60	20	80	23	92
Abnormal	10	40	5	20	2	8
Nocturnal	6	24	3	12	2	8
Enuresis						
Others	4	16	2	6	0	0
Total no & percent	25	100	25	100	25	100

Table 8
Stepwise Regression YI : Raven IQ 14 x Variables
Variable in Equation

Variable	Stderr	Std. Coeff:	F.to remove
Intercept	0.0	0.666	115.858
Social score	4		
Years of education	9	0.179	7.964
	0.5	0.197	12.001
Ht / age	06		

Variable Not in Equation		
Variable	Partial Corr.	F. to enter:
Weight	0.026	0.096
Height	0.077	0.0869
Family size	0.039	0.217
Birth order	0.089	10163
Arm Cir.	-- 0.032	0.152
Triceps	0.068	0.678
B.M.I	0.014	0.027
C.I.	0.012	2.121
Wt./Ht.	0.021	0.066
Wt. / Age	0.013	0.026
Age	0.109	1.751

ry test in the child health department (N.R.C).

5- Behavioral Assessment. (EL Shemnowy 1995).

6- Statistical management of data.

RESULTS

Our sample consisted of 40% males and 60% females, their ages ranged from 6 to 15 years old with a mean of 10.5 ± 2 . The case group were classified into four subgroups according to valve lesion, each group consisted of 25 children.

DISCUSSION

Rheumatic heart disease is a chronic debilitating disorder affecting the school age children. In our study we have found that there were predominance of female sex affection compared to male sex in all patients groups. This was mentioned before in various studies carried out by Kassan et al, (1992) and Soliman (1994) who interpreted this finding by negligence of female children in the strata of the society as they consider the male child as the whale stone of the family.

Growth status of chronic rheumatic disorder: for evaluation of growth status we used different anthropometric measures using the NCHS standard anthropogram. Our results demonstrated that there is growth failure for those children with CRHD evidenced by the statistical significance of $Ht/A.$, Wt/A and $B.M.I$ compared to both control groups A and B. Further data obtained revealed that patient groups were statistically significant as regard the measures of arm circumference, skin fold in triceps, biceps and suprailiac muscles compared to control (A) and more significantly different from control (B) from this result we can conclude that the energy stores and the

amount of protein content in skeletal muscle were lower in patients with CRHD. Social impact on the energy storage variables indicating the influence of nutritional status on growth of the children.

Intellectual function and social impact in this study, the intellectual test included the verbal scale, digit span scale, raven colored Progressive Matrices (Raven) showed statistically significance between cases and control. The mean IQ of cases was 77.9 for cases and 83 for control (A) and 115.8 for control (B). So the group of patients fall in the low average intelligence (control 1) and high average (control B). These result agree with those of El-sNaggar et al, (1990) who found that there were a significant affection of intelligence in almost all children with rheumatic heart disease especially in cases 92% of with single valve lesion with heart failure had less 80 than i.e. low average category of intelligence which may be attributed to other social qualification since we found the highest percentage of illiteracy among parents of those children. More analysis of data revealed that a great difference in intelligence was shown between patients and control (A) and more significant for control (B). Apparently, the highest impact on intellectual functions was from the social status of the individual so this means that the social level contributes by about 64.5% of the IQ of the child as well as years of education of the child which contribution by about 19% of the IQ of the child.

Behavioral and Emotional and CRHD:

Emotional and behavioral disorders has high prevalence rate among children with serious illness EL Shemnowy (1995). In the present study behavioral disorders were generally higher among cardiac cases in group III (52%), group IV (40%) group I (32%) and less in

group II (28%) while in control (A) was 20% and only 8% in the control (B). Nocturnal enuresis, nightmares and terrors were the most frequent behavior symptoms present in cases with CRHD which is almost resolved automatically after surgery (Ratzman 1991).

Intellectual function and environmental variables:

In this study, using the stepwise regression analysis aiming to develop an equation indicating the IQ from certain variables within a certain environment that contribute in intellectual function of the children.

Results of all 14 variables for each child (social score, years of education H/Age, Weight / Age weight, height, family size, birth order, arm triceps, BMI, Wt/Ht) were included in the program as independent variables and Raven IQ was included as the dependent variable. The following prediction equation was developed from this study.

$$IQ = 43.435 + 0.432 B1 + 1.353 B2 + 1.525 B3.$$
 Where B1 = Social score, B2 = Years of education and B3 is H/Age.

The significance of this equation is that for any child in a similar environment to this study if the social score, years of education and Ht/Age Values are estimated, IQ value could be roughly estimated without going through the rest of the measurements therefore we offer this equation from this study to predict the IQ easily before going through further details.

Further application of this equation should be first tested on large scale of children on the same age group.

The findings of this study could be interpreted by social, psychological, psychosocial and biological explanations. However, by any means children with CRHD should receive adequate neuropsychological and behavioural assessment in order to have an integrated biopsychosocial integrated management

therapeutic plan. Liaison psychiatrist should develop programs and skills to outreach for these children.

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تأثير مرض روماتزم القلب المزمّن على الوظائف الفكرية للأطفال في سن الدراسة

تم البحث بطريقة العينة الضابطة بعيادة أمراض القلب بمستشفى جامعة القاهرة الجديد للأطفال وتمت عينة الدراسة على ١٠٠ طفل مصابين بمرض روماتزم القلب وعينة ضابطة مقدارها ٢٠ طفل، مقسمة إلى مجموعتين، مجموعة مماثلة من الناحية الاقتصادية والاجتماعية والمجموعة الأخرى بمرتبة اقتصادية واجتماعية أعلى ويتراوح أعمارهم بين السادسة والثانية عشر وتشمل ذكراً وإناثاً وقد تم تقييم تأثير المرض من الناحية الاجتماعية والفكرية والسلوكية للأطفال. وقد تم عمل مجموعة أسئلة للمجموعات المختلفة تشمل المعلومات الإكلينيكية شاملة الطول والوزن والمقدرة الفكرية بواسطة اختبارات الذكاء وقد أظهرت هذه الدراسة أن الطول والوزن في المجموعة المرضية من مجموعة الضابطة وقد وجد أنه هناك نقص في المقدرات الفكرية واضطراب في السلوك إذا قرنت بالمجموعة الضابطة وقد أثارت هذه الدراسة بأن المصابين بمرض روماتزم القلب المزمّن لديهم ضعف في النموقة في المقدرة العقلية واتباع سلوك غير طبيعي ولذلك ننصح برعاية هؤلاء المرضى اجتماعياً ونفسياً لتحسن أحوالهم.