GROWTH PATTERN IN CARDIAC PATIENTS IN RELATION TO SOMATOMEDIN AND GROWTH HORMONE LEVELS

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By

[redacted] YEHIA HUSSEIN

Under the supervision of

Professor
Saadia Abdel Fattah
Professor of Pediatrics

Professor
Sawsan El Sokkary
Professor of Pediatrics

Professor
Hussein El Damasy
Professor of Medicine

Professor
Amal Ayoub
Professor of Cardiology

FACULTY OF MEDICINE
AIN-SHAMS UNIVERSITY

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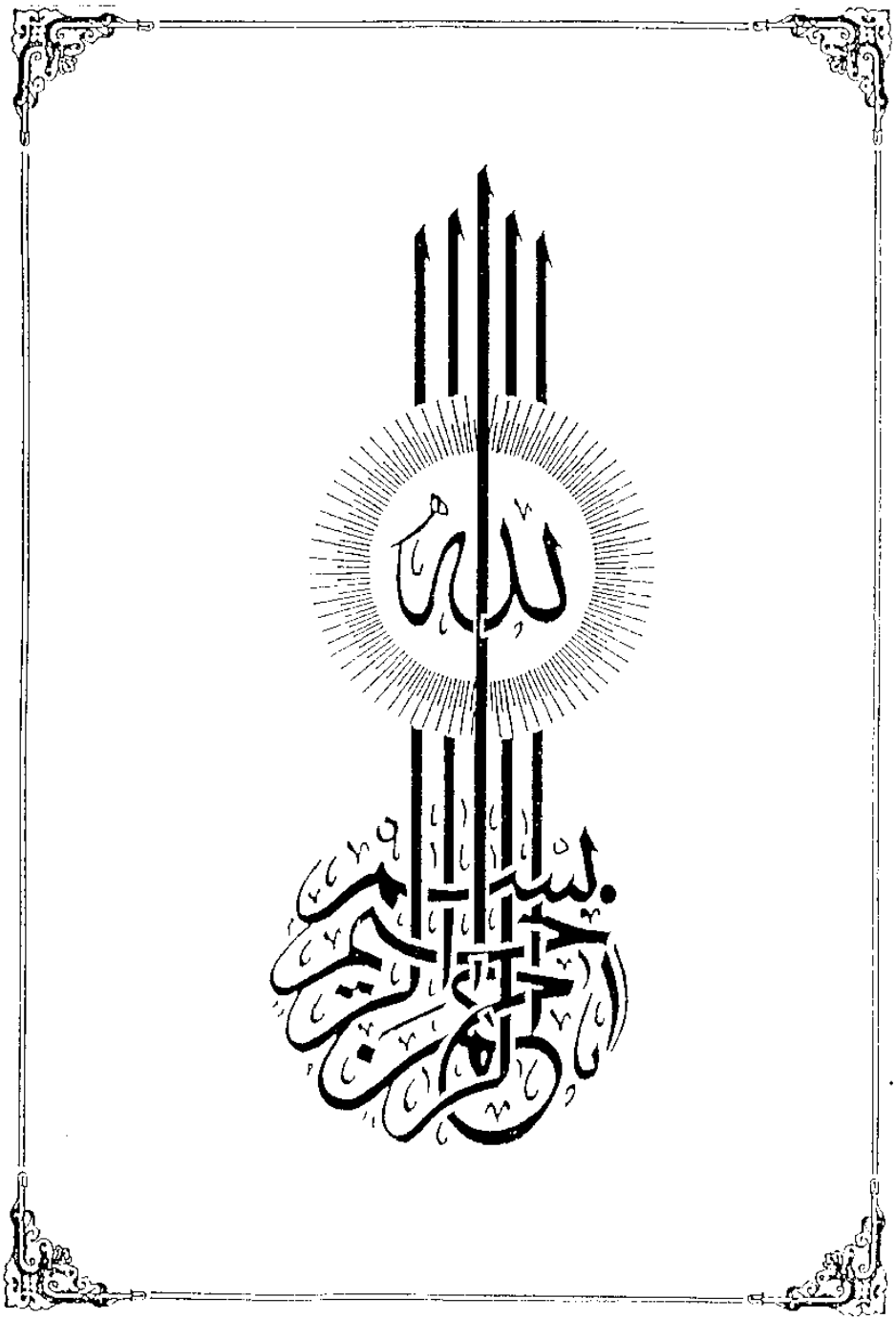

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CONTENTS

Abbreviations

- CHD = Congenital heart disease.
- VSD = Ventricular septal defect.
- PDA = Patent ductus arteriosis.
- PEM = Protein-energy malnutrition.
- NGF = Nerve growth factor.
- GH = Growth hormone.
- Sms = Somatomedins.
- Sm-C = Somatomedin-C.
- hGH = human growth hormone.
- hCS = human chorionic somatotropin.
- GHRH = Growth hormone releasing hormone.
- GHIH = Growth hormone inhibitory hormone.
- TSH = Thyroid stimulating hormone.
- c-AMP = cyclic adenosine monophosphate.
- GABA = Gamma amino buteric acid.
- Ca^{++} = Calcium ions.
- RIAs = Radioimmunoassays.
- IGFI = Insulin-like growth factor I.
- IGFII = " " " " II.
- CSF = Cerebrospinal fluid.
- RNA = Ribonucleic acid.
- Na^{+} = Sodium ions.
- K^{+} = Potassium ions.
- NSILA = Non suppressible insulin like activity.
- Sm-A = Somatomedin-A.
- Sm-B = Somatomedin-B.
- MSA = Multiplication stimulating activity.
- RRA = Radioreceptor assay.
- PS = Pulmonary stenosis.
- AS = Aortic stenosis.
- NCHS = National Centre for Health Statistics.
- RHD = Rheumatic heart disease.

INTRODUCTION

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Cardiac diseases whether congenital or acquired are a nuisance to human performance. In infants and children, various degrees of growth retardation are commonly found among patients with cardiac diseases particularly those of the congenital type (Linde et al, 1967).

Growth retardation is multifactorial, the cardiac lesion itself may be directly responsible (Abdin et al, 1973), also growth retardation may simply be associated with other factors such as heredity, undernutrition parasitism, liver and kidney diseases. Endocrinopathies might be a contributing factor in these patients (Kerpel-Fronius et al, 1977).

Although growth hormone has impressive growth promoting actions when administered in vivo, it has little or no direct effect on growth of skeletal tissues. Since sulfation factor, later termed somatomedin was first described by Salmon and Daughaday in 1957, considerable speculation has arisen as to the role of this group of growth hormone dependent peptides in various disorders of growth. Since the somatomedins stimulate the in vitro growth of cartilage, and of a variety of cells derived from the extraskeletal tissues, it has been proposed that the growth promoting actions of growth hormone are mediated through this family of peptides (Underwood et al, 1980).

AIM OF THE WORK

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The aim of this work is to study the growth pattern of children with cardiac diseases whether congenital or rheumatic.

The work also aims at the detection of the possible role of growth hormone and somatomedin in the development of growth retardation due to cardiac diseases.

REVIEW OF LITERATURE

Congenital Heart Disease

Congenital malformations of the heart occur in about eight of every 1000 livebirths, and they represent about 10 percent of all congenital malformations. However, it is difficult to obtain precise incidence data for all congenital heart disease, since signs and symptoms of heart disease may be absent at birth and not be evident until years or decades later (Freed, 1984).

The incidence of congenital heart disease among Egyptian children has been estimated to be 0.6% (Hamed, 1976).

The New England Regional Infant Cardiac Program provides valuable information on the incidence of specific lesions. This is listed in the following table.

Diagnostic Frequencies Among Neonates with Congenital Heart Disease

Diagnosis	%
Ventricular septal defect	15.7
D-Transposition of great arteries	9.9
Tetralogy of Fallot	8.9
Coarctation of aorta	7.5
Hypoplastic left heart syndrome	7.4
Patent ductus arteriosus	6.1
Endocardial cushion defect	5.0
Heteroaxis	4.0
Pulmonary stenosis	3.3
Pulmonary atresia with intact ventricular septum	3.1
Atrial septal defect secundum	2.9
Total anomalous pulmonary venous return	2.6
Myocardial disease	2.6
Tricuspid atresia	2.6
Single ventricle	2.4
Aortic stenosis	1.9
Double outlet right ventricle	1.5
Truncus arteriosus	1.4
L-Transposition of great arteries	0.7
Other heart disease	4.9
Primary pulmonary disease	4.5

Adapted from Fyler, 1980.

Aetiology:

The aetiology of congenital heart disease remains uncertain in most cases. Approximately 8% of congenital heart patients have an aetiologic basis attributable to genetic factors with very little contribution from environment. Also, about 2% have environmental aetiology with little, if any genetic contribution, but the great majority of patients (approximately 90%) are best explained by genetic-environmental interaction (Nora, 1983).

1- Primary genetic factors:

a. Chromosomal causes:

Gross chromosomal anomalies exist in about 5% of patients with C.H.D. (Nora, 1968). For example, patients with Down's syndrome have a high incidence of C.H.D. (about 50%). The most frequent cardiac anomalies in Down's syndrome are endocardial cushion defect, ventricular septal defect, patent ductus arteriosus and atrial septal defect (Spicer, 1984). On the other hand, 99% of patients with trisomy 18 have C.H.D. in the form of VSD, P.D.A. and pulmonary stenosis (Nora, 1983).

The role of the X chromosome in the development of PDA has been studied by many workers, since the frequency of this defect in females is twice that in males. Also, patients with Turner's syndrome (Xo) have often the male

associated coarctation of the aorta, whereas the (XXXXY) patients have the female associated disorder P.D.A. (Nora, 1983).

Some rare autosomal dominant syndromes are associated with C.H.D. For example, in Marfan's syndrome prolapsed mitral valve and aortic aneurysm are often present (Scott, 1985).

b. Single mutant gene causes:

It is essential to recognize families in which the congenital heart defects are transmitted by Mendilian inheritance, since they are at a higher risk. It is typical that a congenital heart anomaly caused by a single mutant gene will have a 25% recurrence risk if the gene is recessive, and 50% recurrence risk if the gene is dominant (Nora, 1983).

2. Primary environmental factors:

The discovery that Ebstein's malformation is rather frequent among the offspring of mothers exposed to lithium during pregnancy is a new observation worth remembering (Nadas, 1984). The rate of cardiovascular defects in cases of exposure to oral contraceptives in early pregnancy was found to be 21.5/1000 (Heinonen et al, 1977). Fredrick et al (1971), have found a significant increase in septal defects in infants of mothers who smoked during pregnancy. It has been now established that pregnant women who contract