CEREBRAL CHANGES IN CHRONIC LIVER DISEASES

THESIS

SUBMITTED FOR THE PARTIAL FULFILMENT OF

M.Sc. Degree

(Paediatrics)

Presented by

MOHAMED NASR EL DIN IBRAHIM EL BARBARY

M.B., B.Ch.

Under the Supervision of

Prof. Dr. ABD EL KHALEK KHATTAB
Professor of Paediatrics - Ain Shams University

Prof. Dr. SAIDIA ABD EL FATTAH
Professor of Paediatrics - Ain Shams University

Dr. MONA ABD EL HAMID RAAFAT
Lecturer of ~~Paediatrics~~ Neurology - Ain Shams University

Faculty of Medicine

Ain Shams University

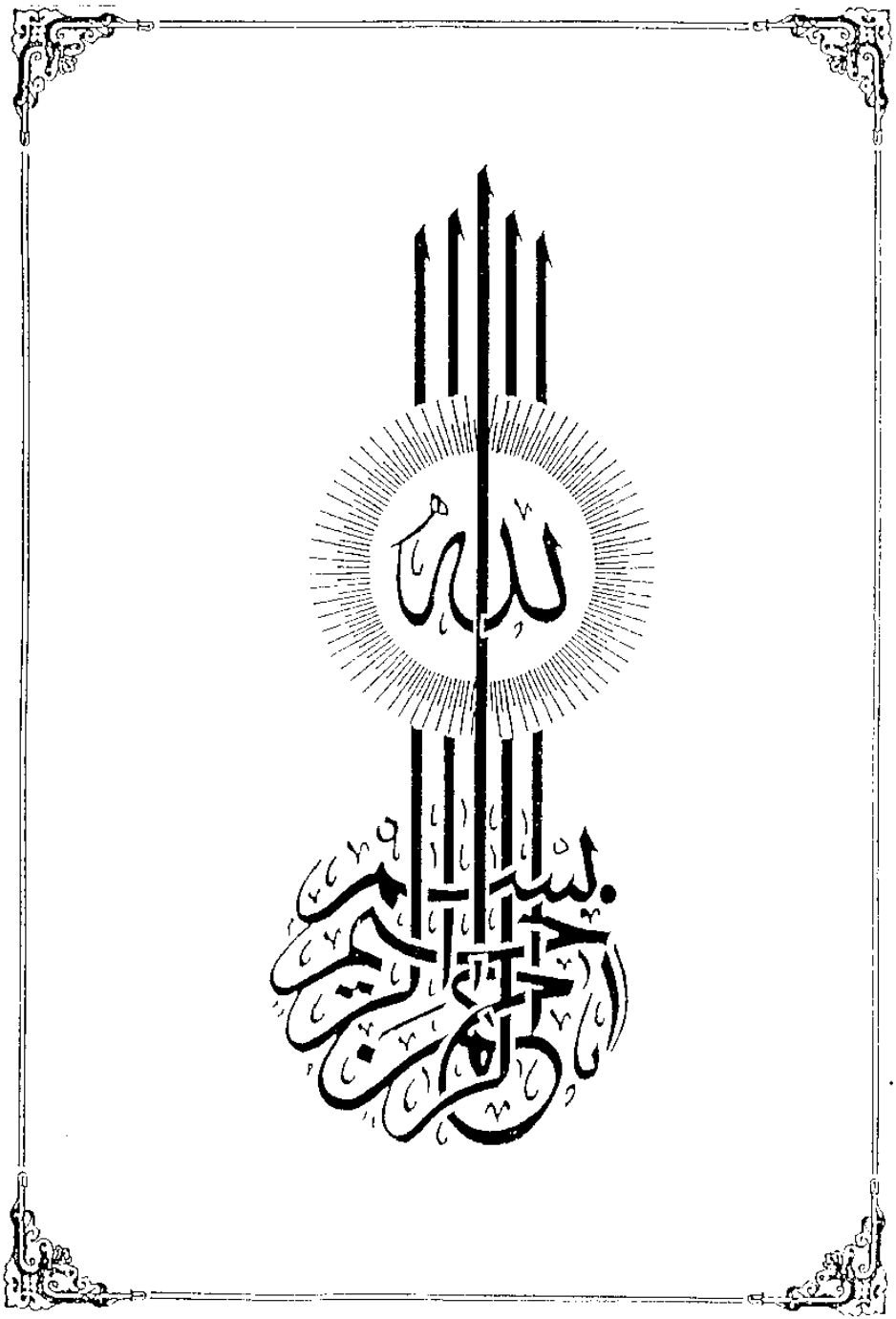
1986

Dedicated to

my parents...

my wife...

my daughter...



ACKNOWLEDGEMENT

Words cannot express my deep thanks and gratitude to my Professor Dr. Abd El Khalek Khattab, Professor of Paediatrics, Faculty of Medicine, Ain Shams University, for giving me the privilege of working under his supervision, for his continuous encouragement, his patience and kind guidance throughout the whole work and always.

I am also indebted to Professor Dr. Saidia Abd El Fattah, Professor of Paediatrics, Ain Shams University, who was kind enough to devote me much of her time and valuable advice and experience in this branch.

I am also grateful to Dr. Mona Raafat, Lecturer of Neurology, Ain Shams University, for her great help and co-operation in revising this work.

To everyone who has participated in one way or another in making this work come to its actual picture, I convey my thanks and my gratitude.

C O N T E N T S

INTRODUCTION AND AIM OF THE WORK

INTRODUCTION

Chronic liver diseases are one of the common incapacitating problems in paediatric practice.

Among the common causes of chronic liver diseases in Egypt are chronic hepatitis with its two types (persistent, active), liver cirrhosis, chronic passive congestion (cardiac cirrhosis), chronic cholestatic syndromes and fibropolycystic diseases of the liver.

Liver cirrhosis can be classified according to the morphologic appearance or best according to the aetiology. As regards to the clinical stage, cirrhosis may be also divided into compensated and decompensated stages. In the decompensated stage, these are some clinico-pathological features attributed to hepatocellular failure up to the stage of chronic hepatic encephalopathy with neurological and psychiatric changes.

However, there are no definite neurological complications accompanying each liver disease, but despite the aetiology, the neurological picture suggested a common pattern but differs in degree, duration and extent.

One of the most common neurological changes accompanying chronic hepatic encephalopathy is the electroencepha-

lographic (EEG) changes which have been extensively investigated and documented since many years ago.

Striking psychiatric changes may be also seen in patients with chronic liver diseases. The manifestations are extremely variable, depending on the premorbid personality. The disturbances may persist for many years, sometimes with complete remissions for long periods of time, or the condition may become chronic and constant.

AIM OF THE ESSAY

Chronic liver diseases are considered among the major illnesses met with in paediatrics.

Neuropsychiatric changes are one of the most omnius signs in chronic liver diseases. These changes may precede other manifestations of hepatic cell failure.

It is the aim of this essay to find a correlation between chronic liver diseases and the neuropsychiatric manifestations based on clinical and electroencephalographic data.

Review of Literature

ANATOMY OF THE LIVER

Gross anatomy:

The liver is situated in the upper right quadrant of the abdomen, below the diaphragm, largely protected by the rib cage and suspended by peritoneal folds. The falciform ligament is attached to the anterior and superior surfaces. Two main areas are found, the right and left lobes; the right lobe is superficially delineated by the attachment of falciform ligament and by fissure for ligamentum teres in the inferior surface. Two other small portions are called the quadate and quadrate lobes. The peritoneum, which forms the capsule of the liver, is tightly stretched over the organ, imparting to it a smooth surface. At the porta hepatis in the undersurface of the liver, the peritoneum folds in and is carried into the deeper hepatic parenchyma along with the vessels and ducts that enter or leave the organ. The gall bladder, a pear-shaped sac, is situated on the undersurface of the organ in a fossa extending from the middle of the inferior border to the right end of the porta hepatis (Elias, 1963).

Surface anatomy

The upper border is at the level of the fifth or sixth rib in the right mid-clavicular line, at about the seventh intercostal space in the mid-axillary line, and the ninth rib posteriorly. The lower edge may be palpable up to two centimeters below the costal margin in the first four months of life. In older children, it is rarely more than one centimeter below the costal margin. It may be normally palpable in the mid-line three or four centimeters below the base of the xiphisternum. The left lobe extends from the mid-line out as far as the left mid-clavicular line. A Reidel's lobe is a downward tongue-like projection from the right lobe of the liver. It may extend as far as the right iliac crest (Petrelli and Scheuer, 1967).

CONGENITAL ANOMALIES

The liver, like any organ in the body, has got some developmental anomalies which develop in the intra-uterine life. Some of these congenital anomalies are permanent, others could be surgically corrected later on. In asplenia, the lower margin of the liver may be horizontal instead of oblique. The draining bile ducts may show stenosis or atresia in their extra or intrahepatic course, or may be

involved in a variety of anomalies as regards their number pattern, location or site of joining the upper gut (Du Bois, 1963).

In situs inversus, the liver is situated in the left hypochondrium. The two lobes may vary in size and shape or the organ may lie in an ectopic position in the thorax secondary to diaphragmatic hernia (Elias, 1955).

HISTOLOGY OF THE LIVER

Kiernan (1833) introduced the concept of hepatic lobules as the basic architecture of the liver. He described circumscribed pyramidal lobules consisting of a central tributary of the hepatic vein and at the periphery, a portal tract containing bile duct, portal vein radicle and hepatic artery branches. Columns of liver cells and blood-containing sinusoids extended between these two systems which are surrounded by a limiting plate of liver cells (Ross and Reith, 1985).

The liver cells (hepatocytes) comprise about sixty percent of the liver. They are polygonal and approximately thirty micrometers (um) in diameter. The nucleus is single or, less often, multiple and divides by mitosis. The life

span of hepatocytes is about one hundred and fifty days in experimental animals (Becker, 1970).

The hepatocytes have three surfaces with no basement membrane. The walls of the sinusoids consist of endothelial and phagocytic cells of the reticulo-endothelial system. The flat cell components are known as Kuppffer cells. The excretory system of the liver begins with the bile canaliculi. These have no walls but are simply grooves on the contact surfaces of the liver cells. Their surfaces are covered by microvilli. The intra-lobular canalicular networks drain into thin-walled terminal bile ducts (ductules) and these terminate in larger bile ducts in the portal canals (Ma and Biempica, 1971).

The liver has a double blood supply; the portal vein supplies almost two thirds of the hepatic circulation, the remainder being provided by the hepatic artery (Rappaport, 1963).

PHYSIOLOGY OF THE LIVER

The liver occupies a central place in human metabolism It plays a major role in many biochemical conversions and synthesis in the body, and has a regulating function for others.

1) Carbohydrate metabolism:

Monosaccharides such as glucose, galactose and fructose absorbed from the gastro-intestinal tract are taken by the liver, where they may be utilized for immediately required energy, being incorporated in the citric acid cycle, or may be used to form glycogen (glycogen synthesis). On the other hand, the release of glucose by hepatocytes is by glycogen degradation. The major pathway is through the phosphorylase system while the minor pathway is by the acid malatase (Ryman and Whelan, 1971).

2) Protein synthesis:

Amino acids absorbed from the intestine are rapidly taken by the liver. There, they are deaminated, transaminated or utilized in protein synthesis. Ammonia produced by the deamination of amino acids is rapidly converted to urea. Most of the plasma proteins, other than immunoglobulins, are synthetized by the ribosomes in the hepatocytes. Quantitatively, albumin is the most important of these, but haptoglobulin, transferrin, ceruloplasmin, C-reactive protein, alpha-1-antitrypsin, alpha-2-globulin and alpha and beta lipoproteins are also formed in the liver (Feldman et al., 1972).