VITAMIN A AND E IN EPILEPTIC PATIENTS

Thesis

Submitted for Partial Fulfillment of Master Degree in Pediatric

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2010

Dedication

To my sweet family

My lovely wife

My little daughter

This work would have never come true without your support, generosity and encouragement.

Acknowledgment

First, thanks are all to ***ALLAH*** for blessing this work until it has reached its end.

I wish to express my deep gratitude to ***Prof. Dr/ Nancy Abd El-Aziz Soliman***, Professor of Pediatrics, Ain Shams University, for her kind guidance and great help.

I am greatly indebted to ***Dr/ Rania Hamed Shatla***, Lecturer of Pediatrics, Ain Shams University, who assisted me in assembling the finest details of this work and gave me from her time, knowledge, continuous support and sincere encouragement.

I would like also to express my sincere gratitude to ***Dr/ Hala Abdel Al Ahmed***, Lecturer of Clinical and chemical Pathology, Ain Shams University, for the great help she gave me, and the great effort she has done. Last but not least, I am very grateful to the patients and their parents for their cooperation and I deeply hope better health for them.

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List of Abbreviations

ADHD	Attention-deficit/ hyperactivity disorder
AED	Antiepileptic Drugs.
BECTS	Benign childhood Epilepsy with Centro Temporal Spikes.
CBZ	Carbamazepine.
CHD	Chronic Heart Diseases
CNS	Central Nervous System
CPS	Complex Partial Seizures.
CSF	Cerebro-Spinal Fluid.
CT	Computerized Tomography.
CVD	Cardio Vascular Diseases
EEG	Electro-Encephalo Graphy.
EPI	Expanded Program on Immunization.
FDA	Food and Drug Administration.
FNB	Food and Nutrition Board
GABA	Gama Amino Butyric Acid.
GTC	Generalized Tonic-Clonic.
HDL	High-Density Lipoprotein.
HPLC	High Performance Liquid Chromatography
IBE	International Bureau for Epilepsy.
IGE	Idiopathic Generalized Epilepsy.
ILAE	The International League Against Epilepsy.
IU	International Units.

K+	Potassium.
KD	Ketogenic Diet.
LDL	Low-Density Lipoprotein.
LOAEL	Lowest Observed Adverse Effect Level.
LPO	Lipid Per Oxidation.
LTG	Lamotrigine.
MMA	Methyl Malonic Acid.
MRI	Magnetic Resonance Imaging.
MRS	Magnetic Resonance Spectroscopy.
Na	Sodium.
NOAEL	No-Observed-Adverse-Effect Level.
PB	Phenobarbitone
PET	Positron Emission Tomography.
PTZ	Pentylenetetrazole.
RA	Retinoic Acid.
RAE	Retinol Activity Equivalents.
RDA	Recommended Dietary Allowance.
ROS	Reactive Oxygen species.
RSV	Respiratory Syncytial Virus.
SE	Status Epilepticus.
SMR	Standarised Mortality Ratio.
SPECT	Single Photon Emission Computerized Tomography.
T3	Tocotrientol
TCS	Tonic Clonic Seizure.

TNS	Trigeminal nerve stimulation.
TOC	Tocopherol
UL	Tolerable Upper Levels.
VAD	Vitamin A Deficiency.
VNS	Vagus Nerve Stimulation.
VPA	Valproate.
WHO	World Health Organization.

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Introduction

An epileptic seizure is a transient occurrence of signs and/or symptoms due to abnormal excessive or synchronous neuronal activity in the brain. Epilepsy is a disorder of the brain characterized by an enduring predisposition to generate epileptic seizures and by the neurobiologic, cognitive, psychological, and social consequences of this condition. The definition of epilepsy requires the occurrence of at least one epileptic seizure **(Fisher et al., 2005)**.

Epilepsy is usually controlled by the administration of antiepileptic drugs; the type of seizure and the specific epileptic syndrome play the major role in the selection of anticonvulsants, probably because of the different pathophysiologic mechanisms **(Kaindl et al., 2006)**.

Increased excitatory amino acid transmission and decreased GABAergic inhibitory responses seem to be important mechanisms in the genesis of convulsions, where reactive oxygen species (ROS) have recently been suggested to play a critical role. Therefore, administration of antioxidants may be potentially beneficial for the treatment of convulsive states **(Rebeiro et al., 2005)**.

The brains of people with epilepsy are under considerable oxidative stress from free radicals. Studies

have shown that epileptics are low in many antioxidants, including vitamin A and vitamin E (Sudha et al., 2001).

The role of vitamin A and its derivatives, the retinoids, in the function of the mature central nervous system has recently been described (Malik et al., 2000; Lane and Bailey, 2005).

Vitamin E prevents the damaging effects of oxidation in brain tissues; it is a natural nutrient that works to stabilize the membranes of cell (Ayyildiz et al., 2005).

Vitamin E prevents the increase of lipid peroxides and neuronal death in hippocampus and reduces the seizure-induced neurodegeneration in cultured hippocampal cells (Artemowicz, 2005).

Decrease vitamin E levels have been reported in epileptic children receiving antiepileptic drugs (Kataoka et al., 1990), and this depletion is significant when combined with studies showing the power of vitamin E to help the body control epileptic seizure activity (Ogunmekan et al., 1979a).

Epileptic patients who are on valproic acid therapy have reduced plasma concentrations of antioxidant vitamins and these reductions are reversible after VPA withdrawal (Verrotti et al., 2008).