Effect of Magnesium Supplementation in Children with Uncontrolled Idiopathic Epilepsy

Thesis

Submitted for Partial Fulfillment of Master Degree
in Pediatrics

By

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M.B., B.Ch. (2009)

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2016

سورة البقرة الآية: ٣٢

Acknowledgement

First, great thanks to **ALLAH** *Who gave me the power to complete this work. Without his care nothing could be achieved.*

I would like to express sincere gratitude to **Prof. Sahar M. A. Hassanein,** *Professor of Pediatrics, Faculty of Medicine, Ain Shams University for her wise guidance, kind encouragement and instructive supervision; I have the honor to complete this work under her supervision.*

I am deeply thankful to **Prof. Neveen Tawakol Younis,** *Professor of Pediatrics, Faculty of Medicine, Ain Shams University, for his valuable supervision, guidance, understanding and kind advice throughout this work.*

Also I would like to express sincere gratitude to **Dr. Iman Ali Abd Elhamid,** *Assistant Professor of Pediatrics, Faculty of Medicine, Ain Shams University, every word and every step in this work has been kindly arranged by her effort, care and continuous encouragement.*

Last but not least, I would like to thank ***my patients****, who were the corner stone of this study.*

Finally my truthful affection and love to My Family, who were and will always be, by my side all my life.

Mohamed Ramadan

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List of Abbreviations

Abb.	Mean
5-HT	5hydroxy tryptamine
ACTH	Adrenocorticotropic hormone
ADHD	Attention deficit hyperactivity disorder
AEDs	Anti-epileptic drugs
AMPA	Amino-3 hydroxy-5-Methyl-isoxasole Propionic Acid
BECTS	Benign epilepsy with centrotemporal spikes
BFIS	Benign familial infantile seizures
BFNS	Benign familial neonatal seizures
BNFIS	Benign non familial infantile seizures
CAE	Childhood absence epilepsy
COE-G	Childhood occipital epilepsy of Gastaut
CT	Computed tomography
EEG	Electroencephalogram
EMA	Epilepsy with myoclonic absences
GABA	Gamma-Aminobutyric acid
GAD	Glutamic acid decarboxylase
GGE	Genetic generalized epilepsy
GGE	Genetic generalized epilepsy
GTCS	Generalized tonic-clonic seizure
H/A	Height/Age
IGE	Idiopathic generalized epilepsy

Abb.	Mean
ILAE	International League Against Epilepsy
IQ	Intelligence quotient
IS	Infantile spasms
JAE	Juvenile absence epilepsy
JME	Juvenile myoclonic epilepsy
MAE	Myoclonic astatic epilepsy
Mg	Magnesium
MgSO4	Magnesium sulfate
MRI	Magnetic resonance imaging
NMDA	N-methyl-D-aspartate
PTZ	Pentylenetetrazol
SPECT	Single-photon emission computed tomography
SW	Spike and wave
TA	Typical absence
VNS	Vagus nerve stimulation
WAIS	Wechsler Abbreviated Intelligence Scale
WISC-R	Wechsler Intelligence Scale for Children-Revised

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Effect of Magnesium Supplementation in Children with Uncontrolled Idiopathic Epilepsy

Abstract

Epilepsy is one of the most prevalent neurological conditions and it knows no age, racial, social class, geographic, or national boundaries. The magnesium has important role in many cellular functions as Over 300 enzyme systems are dependent on the presence of Mg. **Aim:** Study the effect of Magnesium as add on therapy on clinical seizure control in uncontrolled idiopathic epilepsy, effect of Magnesium therapy on cognition and effect Magnesium on electrographic control. **Subjects:** This is a clinical trial study which was conducted on 40 children aged less than 15 years. 40 children were suffering from uncontrolled idiopathic epilepsy and following up in pediatric neurology clinic, Ain shams university they were 20 males and 20 females. **Results:** In the current study there were no statistically significant difference between the epileptic patients and control group regarding age, sex distribution, social class and anthropometric measurements. **Conclusion:** Magnesium supplementation as add on therapy in children with uncontrolled idiopathic epilepsy was able to reduce the seizures frequency in those patients. Moreover both serum Mg level and verbal IQ level in epileptic patients were positively correlated, while the serum Mg level found to be negatively correlated to Chalfont score. **Recommendations:** Regular assessment of cognitive function in children with epilepsy. Magnesium supplementation for children with uncontrolled idiopathic epilepsy with consideration of it's possible side effects and contraindications.

Keywords: Epilepsy, Magnesium, anthropometric, idiopathic.

Introduction

Epilepsy is one of the most prevalent neurological conditions and it knows no age, racial, social class, geographic, or national boundaries ***(de Boer et al., 2008).*** The extraordinary burden of epilepsy on quality of life (QOL) is well known, as is the very high economic burden associated with the disease ***(Cardarelli and Smith, 2010)***. Epilepsy is strongly associated with social stigma and reduced quality of life for patients and their caregivers and, thus, may have a substantial socio-economic impact ***(Westphal-Guitti et al., 2007; van Andel et al., 2009).***

The magnesium has important role in many cellular functions as Over 300 enzyme systems are dependent on the presence of Mg ***(Fawcett et al., 1999).*** The transport of potassium and calcium across membranes is thought to be dependent on Mg; hence Mg is also important for nerve conduction ***(Rude, 1998).*** In brain, one major action of Mg2+ is modulating the voltage-dependent block of NMDA receptors (NMDAR), ***(Mayer et al., 1984; Nowak et al., 1984).*** Studies in animals in the 1920—1960s suggested that low blood Mg concentration is associated with seizures ***(Canelas et al., 1965)***.

Low Mg concentration in the perfusate is a common method of generating spontaneous epileptiform discharges from rat hippocampal slices ***(Tancredi et al., 1988)***, case

reports have described seizures due to hypomagnesemia in infants and adults ***(Fagan and Phelan, 2001; Weislederet al., 2002)***. In a study, serum ionized Mg was significantly lower in 49 people with epilepsy than in 32 racially matched controls ***(Sinert et al., 2007).***

In another study Mg supplementation was able to significantly decrease the amount of seizure days/month, with two patients reportedly becoming seizure-free ***(Abdelmalik et al., 2012).*** Also Magnesium sulfate was safely administered in 2 patients with febrile illness-related epilepsy syndrome, with seizure cessation in one ***(Tan et al., 2015).***

Gastrointestinal adverse effects of magnesium sulfate include nausea, vomiting, and diarrhea. Overdose of magnesium can cause thirst, hypotension, drowsiness, muscle weakness, respiratory depression, cardiac arrhythmia, coma and death. Because magnesium is cleared renally, patients with renal insufficiency may be at increased risk of heart block or hypomagnesaemia **(Martindale and Parfitt, 1999).**

Concomitant use of magnesium and urinary excretion-reducing drugs may increase serum magnesium levels **(Shils and Olson, 1994).** Concomitant oral intake of magnesium may influence the absorption of skeletal muscle relaxants **(McKevoy, 1998).**

Aim of the Study

The Aim of this work was to:

- Study the effect of Magnesium as add on therapy on clinical seizure control in uncontrolled idiopathic epilepsy.
- Effect of Magensium therapy on cognition.
- Effect Magensium on electrographic control.