Study of Some Biochemical Parameters in Epileptic Patients

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Abstract

Epilepsy is a worldwide disease characterized by huge changes in several biochemical parameters due to seizure the main symptoms of the disease. The aim of this study was to assess some biochemical parameters in epileptic patient. This study involves 31 patients with 31 healthy as a control group for each one of both groups, the following parameters were assessed: {8-hydroxydeoxy guanosine(8-OHdG), Malondialdehyde (MDA), Prolactin, Lactate dehydrogenase (LDH), Albumin, Total bilirubin (TSB), Alkaline phosphatase (ALP), Aspartate aminotransferase (AST), Alanine-aminotransferase (ALT) and Creatine phospho kinase (CPK)} in serum of them. 8-OHdG concentration was increase significant ($P< 0.05$) in epileptic patients in compare to control group while MDA was nonsignificant, the seizure was characterized by increasing of oxidative stress situation according to its naturalistic effect mainly on nucleic acid (generate 8-OHdG) in cells more than lipid (generate MDA), due to generating oxidants inside the cell. TSB was significantly decreased ($P< 0.05$) may be due to its function as endogenous antioxidant. Albumin did not show any significant difference. CPK has significant increasing ($P< 0.05$) which be due to its seizure nature that need high energy production which stimulate the reactions of energy production which lead to upregulate that enzyme. LDH failed to show any significant difference may be due to fast remediation. [DOI: 10.22401/ANJS.22.4.02]

Keywords: Epilepsy, 8-hydroxydeoxy guanosine, Malondialdehyde, Creatine phospho kinase, oxidative stress.

Introduction

Epilepsy is one of the most common neurologic problems worldwide. Approximately 1% to 2% of the population suffers from epilepsy, making it the second most common neurologic disorder (after stroke), affecting more than 2 million persons in the United States [1]. It has been estimated that about 7%–8% of the population experiences at least 1 epileptic seizure during their lifetimes [2]. A seizure is a clinical appearance, producing from a short episode of abnormal undue or concurrent neuronal activity in the brain. The tendency to have recurrent unprovoked seizures is called 'Epilepsy'. Two unprovoked seizures were demands by epilepsy definition, separated by major than 24 hours [3]. To function normally, an ongoing equilibrium between excitation and inhibition was achieved in the brain, to still responsive to the surroundings without continuous unrestrained spontaneous action. It is possible that many seizures produce from an inequality between this excitation and inhibition [4]. Oxidative stress and mitochondrial dysfunction happened as a production of long-time epileptic seizure and the seizure-induced brain damage may provide. After all, the epileptogenic is the acute differences in seizure-induced free radical construction and mitochondrial dysfunction [5]. The end product of hydroxylation of guanine is a 8-OHdG. Once formed, its level will raise in the place of DNA injury and freed to be create in the plasma and the urine, raised oxidative stress effected by seizure action raises the occurrence of oxidative DNA damage in all brain domains, containing hippocampal neurons [6]. Epilepsy effects on MDA level which stimulating of Glutamate for the N-methyl-D-aspartate (NMDA) receptors, leading to raised excitotoxicity and cerebral hypoxia, that produces from raised inflow of calcium by way of voltage-gated and NMDA-dependent ion channels leading to raise in ROS and oxidative stress [6]. Epilepsy effected on Liver function tests (AST, ALT & ALP) by significant elevation of their serum levels in epileptic patients [7] [8]. The molecules have

the ability to balance oxidants and deny cells damage is defined antioxidants, Antioxidant can be categorized in two groups: exogenous and endogenous Antioxidant [9] [10]. Endogenous Antioxidant such as Total bilirubin, and Albumin. Albumin view as bigger antioxidant in plasma [11]. that has actions related to ligand-binding capacities [12]. Total bilirubin is an effective antioxidant that could prevent lipid oxidation and other kinds of oxidation [11]. and effected by epilepsy disease. [13] [14]. The Serum albumin can do as an effective pro-synaptogenic signaling molecule, proposing that control of Blood Brain Barrier integrity may promote regulated synaptogenesis in damaged tissue. [15]. The epilepsy has a effective role with CPK serum level which the cellular constituent may be a target for free radical injury, the restriction of some target such as Na+, K+-ATPase may cat as a serious function in the epilepsy that caused hyperexcitability Na+, K+-ATPase that is a membrane bound enzyme well-known to cat as a serious function in cellular ionic gradient support and particularly delicate to reactive species [14]. LDH enzyme has extracellular activity raises under the action of oxidative stress [16]. Increasing of sex hormone prolactin, Disturbance of central and/or peripheral control of hypothalamic-pituitary-gonadal axis and alteration of central neurotransmitters (GABA, glutamate and serotonin) by epileptic discharges. The release of neurotransmitters including γ-aminobutyric acid (GABA), glutamate, opioids and serotonin also contribute to the release of hypothalamic and pituitary hormones and intact sexual function [17].

Materials and Methods

This study involved 31 patients where they have epilepsy disease (20 males 11 females), age between (15-64) years. The samples were collected from privet clinic in the period from September 2017 to March 2018, all patients were diagnosed by Consultant Physician in Neurology. Thirty-one volunteers were also included in this study as a control group (19 males and 12 females), age between (15-53) years. The parameters used in this study were; Serum MDA (kit supplied by SHANGHAI YEHUA Biological Technology), Serum Albumin (kit supplied by BIOLABO), Serum total Bilirubin (kit supplied by BIOLABO), serum 8-OHdG (kit supplied by SHANGHAI YEHUA Biological Technology), serum Prolactin (kit supplied by Monobind Inc.), serum AST (kit supplied by BIOLABO), serum ALT (kit supplied by BIOLABO), serum ALP (kit supplied by BIOLABO), serum LDH (kit supplied by HUMAN) and serum CPK (kit supplied by HUMAN).

Statistics analysis

In this study all statistical analysis used SPSS program version 20. To descriptive analysis was used to show the mean and standard error mean (SEM) by using Student's T-test. The figures were done by used Microsoft Excel program. Difference consider significantly at ($p<0.05$).

Results and Discussion

Number and percentage (according to gender) of subjects who's involved in this study were given in Table (1).

Table (1)
Distribution of subjects according to the healthy status and gender.

Study group		Healthy control		Epileptic patients	
		N	%	N	%
Gender	Male	19	61%	20	65%
	Female	12	39%	11	35%
Total		31	100%	31	100%
BMI (kg/m^2) (Mean ± SEM)		24.84±0.92		26.44±1.57	
Age in year		15 – 53		15 - 64	
Duration		–		From birth to 64 years	

Two notes relate to the results of this study must be taken in considering; first, the difference of sample numbers that involved and which stated in the results came from that several samples failed to give us the measurements and so no results obtained from it. The second one and based on the above, the total numbers of cases in results were acted for male and female collectively.

The mean (±SEM) values of serum 8-HdG levels in addition to size number and P-Value in control and epileptic patients were in Table (2) and Fig.(2).

Table (2)
Serum 8-HdG concentration (ng/ml) in epileptic patients compared with the control group.

Epileptic patient & control	N	Mean ± SEM (ng/ml)	P-Value
Patient	20	18.0±4.3	0.024*
Control	31	7.16±1.2	

*High significant with P<0.05

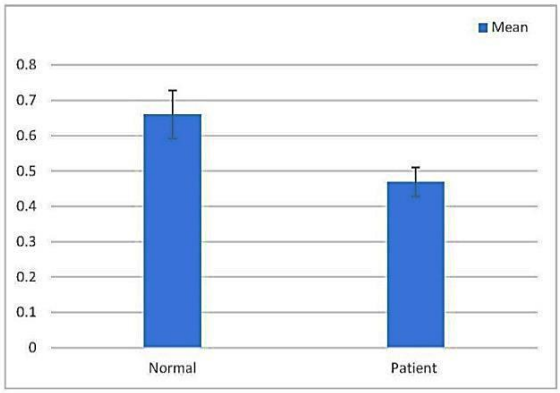

Fig.(1): Serum 8-HdG concentration (ng/ml) in epileptic patients compared with the control group.

The data in Table (2) showed 8-HdG concentration in the serum of epileptic patients group (18.0 ±4.3 ng/ml) was significant higher than the control group (7.16±1.2ng/ml). The significant difference may be due to oxidative the nucleic acids in mitochondria or in other places in the cell. [6]. The results obtained from the study is agreed with study of Figen Öngöz et al [18]. the seizure was characterized by increasing of oxidative stress situation according to its naturalistic effect mainly on nucleic acid (generate 8-OHdG) in cells more than lipid (generate MDA), because oxidant generate inside the cell.

The mean (±SEM) values of serum Bilirubin levels in addition to size number and P-Value in control and epileptic patients were in Table (3) and Fig.(2).

Table (3)
Serum Bilirubin in epileptic patients compared with the control group.

Epileptic patient & control	N	Mean±SEM (mg/dl)	P-Value
Patient	28	0.469±0.041	0.020*
Control	30	0.660±0.068	

*High significant with P<0.05

The data in Table (3) showed Bilirubin concentration in the serum of epileptic patients group (0.469±0.041) was significantly lower than the control group (0.660±0.068) mg/dl. The decreasing in bilirubin concentration may be due to its function as antioxidant. [19]. This result disagreed with the study of Mathew George, Lincy Joseph, Preethi Christina Jose that show the bilirubin level increase to 6.1 mg/dL [14].

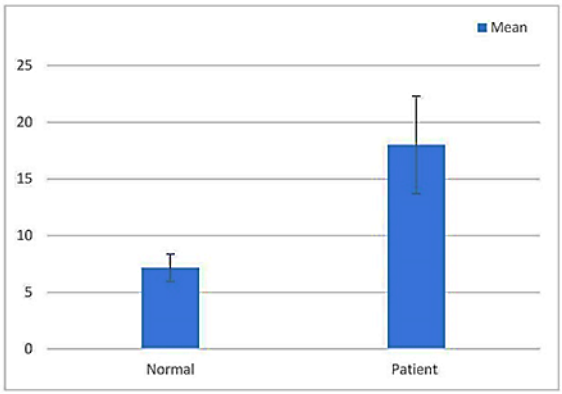

Fig.(2): Serum Bilirubin in epileptic patients compared with the control group.

The mean (±SEM) values of serum CPK levels in addition to size number and P-Value in control and epileptic patients were in Table (4) and Fig.(3).

Table (4)
Serum CPK in epileptic patients compared with the control group.

Epileptic patient & control	N	Mean±SEM (U/l)	P-Value
Patient	20	58.8±9.2	0.012*
Control	18	32.5±3.1	

*High significant with P<0.05

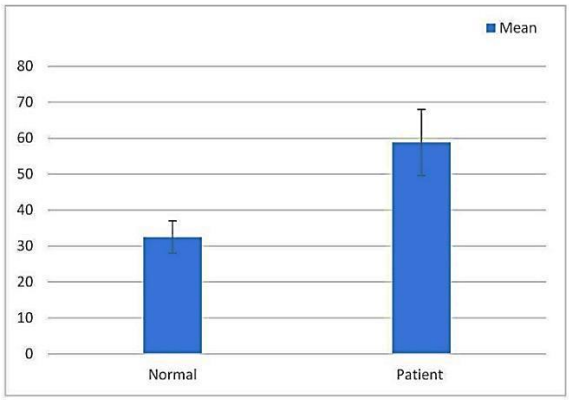

Fig.(3): Serum CPK in epileptic patients compared with the control group.

The data in Table (4) showed CPK concentration in the serum of epileptic patients group (58.8±9.2) was significant higher than the control group (32.5±4.5). The significant increase in activity of this enzyme raise may be from its rule in energy generation in muscle (which involve in seizure nature).

With respect to Albumin, AST (GOT), ALT (GPT), ALK, CPK, LDH and Prolactin; all these biochemical parameters, show non-significant difference in comparison its levels in patients group with control group.

Conclusion

Epileptic disease has oxidative stress effects concentrated on nucleic acids CPK may be upregulate as response to seizure. Liver function biochemical parameters does not change.

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