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ORIGINAL ARTICLE

Effects of Levetiracetam Drug an Magnesium on Hematological Parameter and some Biochemical Parameters in White Rats

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ABSTRACT

Objective : The current study aimed to study the role of magnesium in reducing the effect of the Levetiracetam at a dose (25 mg/kg body weight) on hematological parameter and renal functions in White Rats.

Materials and Methods: Thirty two adult male rats of160 -170 grams weight were adopted. Rats randomly allocated in to four groups ;control ,Levetiracetam 25 mg ,Levetiracetam25 mg with magnesium(Mg+2)100mg and the four group Levetiracetam25 mg with magnesium(Mg+2)150mg .all groups were dosed daily for one month .

Results: the results revealed that levetiracetam causes significant decrease in hematological parameter(RBC, Hb , pcv)and significant elevations in WBC count ,and its causes significant elevations in renal urea and creatine comparing among the treatment groups with the control at (p≤0.05) .

The magnesium show demonstrated beneficial effects on hematological parameters renal functions in the present study.

Keywords: Levetiracetam ,magnesium, kidney, Rats.

INTRODUCTION

Levetiracetam (LEV) is one of newest antiepileptic drugs(AEDS), commonly used to treat epilepsy .it similar in structure with a piracetam[1], its work by decreasing up normal activity in The brain by used with other medicines to treat certain types of seizures in adults and children with epilepsy ,it's also used to treat the tonic-clonic seizures in people who are at last (6 years old)and myoclonic seizures in people who are at last (12 y old)[2].

it also used to treat some cases of autism, bipolardiorders ,anxiety and Alzheimer disease[3] . the metabolism of this drug is not dependent on the liver cytochrome P450 enzyme system [4] the mechanism of action of drug is unknown ,its bind to synaptic vesicle protein SV2A which is thought to prevent nerve conduction across synapses [5 ,6] The chemical structure (C8H14N2O2) and molecular Wight is 170.21[4]. the drug has a desirable pharmacokinetic formula because it is rapidly absorbed after oral administration[5].

The drug is completely absorbed after oral administration with peak plasma concentration reaching an hour after administration [7]. The drug is execrated by the kidneys at a rate of 60% by glomerular filtration and follows partial tubular [8] . the drug has adverse effect on central nervous system such as neuro behavioral (somnolence ,fatigue ,mood swing ,headache, memory loss ,confusion and increased suicide)[8].and its effects on thrombocytes of humans[9]and its effect on skin [10] it's also effects on cardiovascular system[11].

Magnesium is a very important mineral in the diet and has many roles in the body of human such as a catalyst in more than 300 enzymes reactions [12] and its necessary for regulating muscle contraction ,blood pressure, insulin metabolism, DNA synthesis [13,14]

And its has beneficial effects on lipid metabolism[15]. Mg deficiency due to decrease the level of GSH in erythrocytes[16, 17] and causes inhibit its biosynthesis[18]

MATERIALS AND METHODS

Animal of the study: The experiment was conducted in the animal house of the college of science /University of Al Qadisiyah,16 male rats that were purchased from the animal house of the college the ages ranged between (80-85) days ,and the weight ranged between (160-170mg) the experimental animal were placed in plastic cage, which were 50*35*15 cm in size, with a metal cap,4 rats in each cage in a room of 3*4 meters. All animal were exposed to same conditions, from a temperature range of 20-25c ,organized by an air conditioner and the lighting hours were 13 hour of light ,against 11hours of darkness.

Medication does were determined according to the pharmacopoeias according to body weight as the dose of drug (25 mg/kg/ day) was determined[19]and the dose of Mg+2[20] .

Experimental Design:

1 control group :Eight male rats were daily dosed orally with normal saline for one month .

2 Levetiracetam first treated group: Eight male rats were daily dosed orally with Levetiracetam 25 mg /kg for one month .

3 Levetiracetam second treated group: Eight male rats were daily dosed orally with Levetiracetam 25 mg /kg and mg+2 (100mg /kg)for one month .

4 Levetiracetam third treated group: Eight male rats were daily dosed orally with Levetiracetam 25 mg /kg and mg+2 (150mg /kg)for one month .

specimens collection: for the duration of the 30 day trial. After the end of the 30 day trial period and 24 hours after the last day, animal were anaesthetized by injection of ketamine and xylazine dissected and blood samples were obtained from abdominal vein in non-heparinized tube to perform the serological tests ()and heparinized tube to hematological parameter the sampling technique were applied respecting the recommendations of(21,22).

Statistical Analysis: ANOVA analysis and LSD test were used according to (SPSS version 18)to find the mean for all treatments at the (P≤ 0.05)(SPSS 2011).

RESULTS

The results revealed that levetiracetam causes significant decrease in hematological parameter with significant elevations in renal urea and creatine comparing among the treatment groups with the control at (p≤0.05) .

The magnesium show demonstrated beneficial effects on hematological parameters renal functions in the present study. (table 1)(table 2).

DISCUSSION

Our findings showed that LEV causes significant decrease in hematological parameter these results are in line with reference[23] and showed its causes significant elevation in WBC count these results are in line with reference[24,25] ,these effect of LEV might be due to the responsible of antiepileptic drugs on bone marrow suppression leading to blood problems like aplastic anemia via anti-folic activity [26] . and its effect on renal functions might be due to the effect of antiepileptic on renal glomerular filtration and glomerular[27].

Magnesium has beneficial effects on hematological parameter in this study agree, these results agree with reference [25]Magnesium has the power to protect blood from toxicity and stabilize damaged red blood cell membranes[26] and reduce erythrocyte dehydration [27].

Table 1: Effect of one mouth treatment with LEV and magnesium on hematological parameter in white rats

Hematological Parameters				
Group	P.C.V	HB	WBC	RBC
Control	41.797±0.591a	13.327±0.142b a	8.276±0.184a	6.6125±0.148a
LEV (25mg/kg)	21.218±0.620ab	6.935±0.2021ab	17.051±0.253abc	2.2075±0.136ab
LEV+Mg(100 mg/kg)	27.082±0.349 a	9.325±0.0756a	12.22±0.253a	4.17875±0.072 a
LEV+Mg(150 mg/kg)	37.17±0.4888 b	10.943±0.367b	9.205±0.15 b	5.72375±0.152b
LSD0.05	1.16	0.76	0.28	0.25

Numbers represent means ±standard deviation. Small letters to significant differences

Table 2: Effect of one mouth treatment with LEV and magnesium on kidney function tests in white rats

Group	kidney function tests	
	Creatinine(mg/Dl)	Urea(mg/Dl)
Control	0.635± 0.021 a	33.455 ± 0.235 a
LEV (25mg/kg)	1.838 ± 0.053 b	60.113 ± 0.850 ab
LEV+Mg(100mg/kg)	1.2110 ± 0.0321 abc	47.432 ± 0.894 a
LEV+Mg(150mg/kg)	0.798 ± 0.0304 cb	37.173 ± 0.7803 b
LSD0.05	0.03	0.065

Numbers represent means ±standard deviation. Small letters to significant differences

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