

## The effect of carbamazepine monotherapy on full blood count in epileptic patients

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### ABSTRACT

**Objectives:** To assess the effect of carbamazepine on full blood count in epileptic patients.

**Patients and Methods:** This study was done in the Outpatient department of Ibn-Sina Hospital in Mosul, during the period from October 2004 to September 2005. Epileptic patients under oral carbamazepine therapy (200-1200 mg/day) were included in this study. The patients were 44 males and 26 females. The duration of treatment was between 1-30 years. The control subjects included 41 males and 35 females. They were apparently healthy subjects. Blood samples were taken from patients and controls and analyzed for full blood count including hemoglobin (Hb), mean corpuscular volume (MCV), mean corpuscular Hb concentration (MCHC), mean corpuscular Hb (MCH), red cell distribution width (RDW), red blood cell count (RBC count), hematocrit % (PCV), white blood cell count (WBC count) and platelets.

**Results:** In both male and female patients, Hb was significantly lower than that in the control group, respectively. The other measurements of full blood count, there were no significant differences compared with the control group in both male and female, respectively.

**Conclusion:** Chronic use of carbamazepine in epileptic patients is relatively safe on full blood count. Periodical examination of full blood count is necessary for epileptic patients under carbamazepine therapy.

### الخلاصة

**أهداف البحث:** دراسة تأثير عقار كاربامازيبين على أعداد الدم الكاملة.

**المرضى وطرق العمل:** تمت الدراسة في العيادة الخارجية في مستشفى بن سينا العام في الموصل، خلال الفترة من تشرين الأول 2004 ولغاية أيلول 2005،

**طرائق العمل:** شملت هذه الدراسة مرضى مصابين بالصرع وتحت علاج كاربامازيبين (200-1200 ملغم/اليوم) وكان عدد المرضى هو 44 من الذكور و 26 من الإناث. وكانت فترة العلاج تتراوح بين 1-30 سنة. أما مجموعة السيطرة فشملت 41 من الذكور و 35 من الإناث وكانوا من الأشخاص الأصحاء ظاهرياً. وأخذت عينة الدم من مجموعة المرضى ومجموعة السيطرة. وتم تحليل الدم وحساب العدد الكلي للدم والذي شمل خضاب الدم ومعدل حجم الكريات الدموية ومعدل تركيز خضاب الكريات الدموية ومعدل خضاب الكريات الدموية وتوزيع سمك الكريات الحمراء وعدد كريات الدم الحمراء و هيماتوكريت الدم وعدد كريات الدم البيضاء والصفائح الدموية.

**النتائج:** كان خضاب الدم في ذكور وإناث المرضى تحت علاج عقار كاربامازيبين اقل معنوياً وعلى التوالي منه في مجموعة السيطرة، ولم تتغير معنوياً بقية القياسات للعدد الكامل للدم للمرضى مقارنة بمجموعة السيطرة.

**الاستنتاج:** ان الاستعمال المزمن لعقار كاربامازيبين في مرضى الصرع أمين نسبياً في تأثيره على العدد الكامل للدم. ويعتبر الفحص الدوري للعدد الكامل للدم ضرورة لمرضى الصرع تحت علاج كاربامازيبين.

The wide spread and chronic use of carbamazepine in multiple neurological disorders makes a drug whose most frequent side effects are well known and controlled.<sup>1</sup> Most of the side effects associated with carbamazepine are mild, transient and reversible with an adjustment of dosage.<sup>2,3</sup> However, serious blood disorder as thrombocytopenia<sup>4,5</sup> and aplastic anemia<sup>3,6,7</sup> are rare in patients with carbamazepine therapy.

In Iraq, carbamazepine therapy is not pharmacologically monitored. Therefore, this study was conducted to evaluate the effect of chronic use of carbamazepine on full blood count in epileptic patients.

#### Patients and methods

The study was carried out in the Neurology Outpatient Department in Ibn-Sina Hospital under supervision of neurologist, during the period from October 2004 to September 2005.

Seventy six epileptic patients were included in this study. The patients were received carbamazepine monotherapy for at least one year. Those patients comprised 50 males, their ages ranged between 16-47 years (mean±SD: 30.5 ± 9.4 years) and 26 females, their ages ranged between 16-40 years (31.37±9.8 years). The duration of treatment was between 1-30 years (8.93±8.11 years), with daily dose between 200-1200 mg. Any other diseases or medications were excluded.

The control group comprised 76 apparently healthy subjects, none of them were taken any medications. They were 41 males their ages ranged between 16-50 years (31.8 ± 9.3) and 35 females their ages ranged between 17-50 years (29.5±9.5 years).

Blood samples (3ml) were taken from both groups and transferred to EDTA tubes. The haematological parameters were measured by

haematology auto analyzer (Bergmann Coulter Counter, Germany) at Ibn-Sina haematology laboratory.

Data are presented as mean±SD. Unpaired t-test was used to compare between patients and control parameters.

#### Results

RBCs indices including, mean corpuscular volume (MCV), mean corpuscular Hb (MCH), mean corpuscular Hb concentration (MCHV), red cell distribution width (RDW), red blood cell count (RBC count), hematocrit % (PCV), in addition to white blood cell count (WBC) were not significantly different in carbamazepine patients as compared to control group for both males and females. Only Hb decreased significantly in males and females patients compared with the control group, respectively (Table 1). Platelet count showed a decline but not significant in both male and female patients compared with controls

#### Discussion

In this study, there is no significant decline in RBC indices (except for Hb level) in both males and females patients compared with the control group. This result is in agreement with previous studies.<sup>3,11</sup> Hb level decreased significantly for both male and females in patients group as compared to the control group, this result is in agreement with other result.<sup>11</sup> Tagawa<sup>12</sup> observed that low Hb levels of the patients had been raised to the normal levels within 1 weeks after discontinuation of carbamazepine therapy. Shah et al.<sup>13</sup> observed that low Hb level might be result of decreased total serum iron concentration by the effect of carbamazepine as enzyme inducer that led to depletion of iron stores.

Table 1. Complete blood picture of epileptic patients treated with carbamazepine and controls.

Hematological parameters	Males		Females	
	Controls n=41	Patients n=50	controls n=30	Patients n=26
Mean corpuscular volume (MCV) ( $10^{-15}$ L)	89.20±0.0	90.8±10.8	89.6±0.9	88.6±12.4
Mean corpuscular Hb (MCH) (pg)	28.71±2.06	29.37±3.8	28.08±2.60	27.21±4.30
Mean corpuscular Hb concentration (MCHC) (g/L)	319.816.0	322.3±18.4	311.2±12.3	300.2±16.3
Red cell distribution width (RDW) ( $10^{-15}$ L)	9.09±1.01	8.70±1.83	9.19±1.37	9.13±2.08
Hemoglobin Hb (g/L)	14.0±1.6	13.7±1.3*	12.3±19.08	11.7±12.7*
RBCs count $10^{12}/L$	4.81±0.39	4.03±0.41	4.30±0.20	4.26±0.30
Hematocrit (%)	42.72±3.77	41.02±3.64	39.39±3.17	38.19±3.18
WBCs count ( $10^9/mL$ )	7.6±1.67	7.39±2.14	7.24±1.04	7.07±2.28
Platelet count ( $10^9/L$ )	280±0.7	200±70.1	209±74.0	264±84.7

\*p value < 0.05

WBCs and platelet counts did not significantly decline in patients group as compared to control group. Evans et al.<sup>4</sup> and Halikas et al.<sup>5</sup> did not notice any significant changes in WBCs and platelet counts. Therefore, frequent blood testing is not necessary in asymptomatic patients<sup>1</sup>. On the other hand, WBCs and RBCs counts decreased after 2 months of

carbamazepine therapy and remained at lower level for 6 years<sup>1</sup>.

Rare but serious aplastic anemia was reported in patients treated with carbamazepine.<sup>6,7</sup> The rapid onset of aplastic anemia and thrombocytopenia occurred by carbamazepine, while leucopenia developed more slowly within 3 months, therefore; daily laboratory checks in the first few months of carbamazepine therapy

would be necessary to monitor these serious hematological reactions.<sup>14</sup> These serious hematological reactions were not observed in the studied patients, since the measurements were done for those patients with chronic use of carbamazepine.

In conclusion, carbamazepine decreased HB but not the other full blood count. Chronic use of carbamazepine is relatively safe. Periodical examination of carbamazepine patients for full blood count is necessary.

### Acknowledgments

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