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 ٢٠٠٤ to September ٢٠٠٥. Epileptic patients under oral carbamazepine therapy (٢٠٠-١٢٠٠ mg/day) were included in this study. The patients were ٤٤ males and ٤٤ females. The duration of treatment was between ١-٣ ٠ years. The control subjects included ٤٤ males and ٤٤ 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.
The widespread and chronic use of carbamazepine in multiple neurological disorders makes a drug whose most frequent side effects are well known and controlled.¹ Most of the side effects associated with carbamazepine are mild, transient and reversible with an adjustment of dosage.¹²⁻¹⁷ However, serious blood disorder as thrombocytopenia²⁶⁻²⁷ and aplastic anemia²⁵⁻²⁶ 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 ٤٠٠٢ to September ٥٠٠٢.

Seventy six epileptic patients were included in this study. The patients were received carbamazepine monotherapy for at least one year. Those patients comprised ٢٥ males, their ages ranged between ٦١⁻٧٤ years (mean±SD: ٦٤.٥±٩.٤ years) and ٤١ females, their ages ranged between ٦١⁻٨٥ years (٦٣.٣±٩.٨ years). The duration of treatment was between ٦⁻٧.٨ years (٦.٨±٧.٨ years), with daily dose between ٠٠٢⁻٦٠٢ mg. Any other diseases or medications were excluded.

The control group comprised ٧١ apparently healthy subjects, none of them were taken any medications. They were ٣٤ males their ages ranged between ٦١⁻٧٤ years (٦٤.٨±٩.٧ years) and ٣٧ females their ages ranged between ٦١⁻٨٥ years (٦٣.٥±٩.٨ years).

Blood samples (٣ml) 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 ١). 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.⁹⁻­¹¹ Hb level decreased significantly in males and females patients compared with the control group, respectively. Tagawa²¹ observed that low Hb levels of the patients had been raised to normal levels within ١ weeks after discontinuation of carbamazepine therapy. Shah et al.¹⁶ 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.

<table>
<thead>
<tr>
<th>Hematological parameters</th>
<th>Males Controls n=41</th>
<th>Patients Males n=40</th>
<th>Females Controls n=30</th>
<th>Patients Females n=27</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean corpuscular volume (MCV) (*10^12/L)</td>
<td>8.9±0.6</td>
<td>9.4±0.8</td>
<td>8.9±0.9</td>
<td>8.8±1.2</td>
</tr>
<tr>
<td>Mean corpuscular Hb (MCH) (pg)</td>
<td>28.7±2.7</td>
<td>29.3±3.4</td>
<td>28.4±2.6</td>
<td>27.1±4.3</td>
</tr>
<tr>
<td>Mean corpuscular Hb concentration (MCHC) (g/L)</td>
<td>319±17.9</td>
<td>332±18.7</td>
<td>311±17.3</td>
<td>300±17.3</td>
</tr>
<tr>
<td>Red cell distribution width (RDW) (*10^12/L)</td>
<td>9.9±1.0</td>
<td>8.4±1.4</td>
<td>9.1±1.3</td>
<td>9.3±2.0</td>
</tr>
<tr>
<td>Hemoglobin Hb (g/L)</td>
<td>14.0±1.3</td>
<td>13.1±1.3</td>
<td>14.5±1.9</td>
<td>11.7±1.7</td>
</tr>
<tr>
<td>RBCs count *10^12/L</td>
<td>4.8±0.3</td>
<td>4.3±0.1</td>
<td>4.3±0.2</td>
<td>4.2±0.3</td>
</tr>
<tr>
<td>Hematocrit (%)</td>
<td>47.8±4.7</td>
<td>41.2±4.3</td>
<td>49.4±4.7</td>
<td>48.1±4.8</td>
</tr>
<tr>
<td>WBCs count *10^7/mL</td>
<td>7.7±1.7</td>
<td>7.4±1.4</td>
<td>7.6±1.5</td>
<td>7.5±2.4</td>
</tr>
<tr>
<td>Platelet count *10^3/L</td>
<td>240±100</td>
<td>200±100</td>
<td>209±140</td>
<td>260±240</td>
</tr>
</tbody>
</table>

*p value < 0.05

WBCs and platelet counts did not significantly decline in patients group as compared to control group. Evans et al. and Halikas et al. did not notice any significant changes in WBCs and platelet counts. Therefore, frequent blood testing is not necessary in asymptomatic patients. On the other hand, WBCs and RBCs counts decreased after 3 months of carbamazepine therapy and remained at lower level for 6 years.

Rare but serious aplastic anemia was reported in patients treated with carbamazepine. 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. 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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References
