The 1st International Pharmacy Conference on Research and Practice

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THE EFFECTIVITY OF PIRACETAM AND CITICOLIN AMONG INPATIENT HEAD INJURY WITH BARTHÉL INDEX AT PKU MUHAMMADIYAH YOGYAKARTA HOSPITAL

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Abstract

The use of nootropic agent to regulate cerebral function and to improve cognition impairment in patient with head injury is still controversial. The other fact, piracetam and citicoline as nootropic agent in patient with head injury at RS PKU Muhammadiyah Yogyakarta is used in a great numbers. Aimed of this research were to know the profile use and to evaluate the effectiveness of piracetam and citicoline as a single agent or combination among head injury inpatient at RS PKU Muhammadiyah Yogyakarta. Research conduct with cross sectional analytical study and data were collected prospectively, then are patient outcome or clinical response patient qualitatively. The clinical outcome of head injury was measured by Barthel Index (BI). From 59 head injury patients inclusive, 37,9% given piracetam, 49,2% was given citicoline, 5,1% was given combination, and 5,8% given nothing. All of the head injury patients who was given piracetam and citicoline single agent or combination and who was not given piracetam and citicoline showed improvement of Barthel Index Scale, which means an increase in the ability of patients to perform daily activities. Based on statistical test, the different mean between the treatment and the last treatment on the group of piracetam and the group of citicoline showed statistical significantly difference.

Key words: piracetam, citicoline, head injury, Barthel Index

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Introduction

Nootropic agent was first introduced by GE. Guirgen at 1972. This drug has been used in many countries and claimed to regulate cerebral function by improving cognitive impairment in the brain decreased (Keil, U., et al., 2006). Piracetam is a nootropic agent was first discovered and has been used as therapy in stroke and cognitive impairment (Balaraman, R., 2002). Piracetam work at neuronal and vascular level. At the neuronal level, piracetam can improve the fluidity of cell membranes, neurotransmission, and stimulate adenylyl cyclase which catalyzes the conversion of GTP to ATP. At the vascular level, piracetam can increase deformability of erythrocytes so that increase cerebral blood flow, decrease platelet hyperaggregation and improve vascular microcirculation.

The effectiveness of piracetam in various pathological conditions such as brain injury (head injury), stroke, dementia, myoclonus epilepsy, vertigo is controversial. Piracetam known have effect on cerebral blood flow by decreasing the adhesion, aggregation, erythrocyte deformability, thus improving brain blood perfusion (Mahapatra, A. K., et al., 2008). RCT studies on post-trauma patients showed low doses piracetam can increase cerebral blood flow and restore perfusion to the brain abnormalities (Agrawal, D., et al., 2007).

Besides piracetam, the other nootropik agent are often used is citicoline. Citicolin (cytidine-5'-diphosphocholine) works at neuronal and vascular level. The primary mechanisms in neuronal level is increases the formation of choline and inhibit destruction phosphatidylcholine (inhibiting phosphatase). At the vascular level, citicolin can increase blood flow to the brain, increases oxygen consumption, and lower vascular resistance. The use of citicolin among head injury patients is still controversial. RCTs study in patients with head injuries, showed that citicolin cannot decrease patients working days lost, and can not improve the quality of life of patients. At another trial double-blind trials, citicolin can improve cognitive skills, coordination skills, and shorten length of stay in patients with head injury (Aniruddha, et al., 2009).

Based on several studies of piracetam and citicolin on head injuries is still controversial, it is necessary to evaluate the effectiveness of its use. The use of piracetam and citicolin in PKU Muhammadiyah Hospital based on data from the last three months is quite a lot, while the price is quite expensive. Piracetam total usage is 1401 (oral dosage), 1178 (injectable preparations), and 932 (intravenous preparation). While the amount of use is citicolin 999 (oral dosage), 3811 (injectable preparation). This fact become one of the reasons why the research was conducted.

Methodology

The research was conducted with a cross sectional analytic study design, by intake data prospectively and then analyzed patients outcome (clinical response) that occurs after administration piracetam and citicolin. The clinical outcome in patients with head injury was measured by BI (Barthel Index).

Results and Discussion

From the result of this study, there are 59 cases of head injury patients in PKU Muhammadiyah Yogyakarta Hospital. In this study, effectiveness of piracetam and citicolin among head injury patients is measured by BI (Barthel Index). The initial measurements was first measured at the time of hospital admission. The measurement is limited to patients who admitted to the hospital for 24 hours after the patient is hospitalized. The characteristics of patients who received piracetam and citicolin therapy at the time of hospital admission was showed at Table 1.

Clinical manifestation of head injury that often occurs is the change of consciousness, which is measured using the GCS (Glasgow Coma Scale). The other problem that often occurs in head injury patients is physical disabilities. Patients get a problem to do the Activity Daily Living (ADL), that evaluated with Barthel Index (BI). The evaluation of activity daily living with Barthel Index (BI) scale have 5 categories, independent, mild dependent, moderate dependent, severe dependent, and total dependent. The percentage of each category of Barthel Index in patient with head injury at the time of initial hospitalization and discharge hospital may indirectly indicate the patients BI development (Metheny, et al., 1995)

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Table 1. Baseline Characteristics of Piracetam and Citicoline among Head Injury Inpatients at PKU Muhammadiyah Yogyakarta Hospital

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Non piracetam</th>
<th>Piracetam</th>
<th>Citicoline</th>
<th>Piracetam + citicoline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total of Patients (n)</td>
<td>5</td>
<td>22</td>
<td>29</td>
<td>3</td>
</tr>
<tr>
<td>Age</td>
<td>24.8±19.8</td>
<td>35.0±18.9</td>
<td>33.8±16.1</td>
<td>35.3±31.8</td>
</tr>
<tr>
<td>Length of Stay (days)</td>
<td>5.6±2.3</td>
<td>10.6±8.5</td>
<td>7.9±5.6</td>
<td>9.3±3.1</td>
</tr>
<tr>
<td>Sex (% men)</td>
<td>60.0</td>
<td>63.6</td>
<td>55.2</td>
<td>33.3</td>
</tr>
</tbody>
</table>

Baseline Barthe Index

| Average | 5.4±2.4 | 5.7±1.7 | 7.2±2.4 | 9.0±6.9 |
| 12-19 (%) | 0.0 | 0.0 | 3.4 | 33.3 |
| 9-11 (%) | 0.0 | 4.5 | 20.7 | 0.0 |
| 5-8 (%) | 60.0 | 59.1 | 62.1 | 66.7 |
| 0-4 (%) | 40.0 | 36.4 | 13.8 | 0.0 |

Picture 1 presented that all head injury patients are given piracetam and citicoline as a single agent or combination and who was not given piracetam and citicoline showed the improvement of Activity Daily Living (ADL). Statistical analysis paired T-Test of each groups. Based on statistical test, the different mean between the first treatment and the last treatment on the group of piracetam and the group of citicoline was showed statistical significantly difference.

Picture 1. The Average of BI (Barthe Index) among Inpatient Head Injury at the Time of Initial Hospitalization and Hospital Discharge at PKU Muhammadiyah Yogyakarta Hospital
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Picture 2 showed the development of BI in each group of drugs among inpatient at PKU Muhammadiyah Hospital at the time of initial hospitalization and at hospital discharge. In the group of piracetam and group of citicoline, the percentage of mild dependent and moderate dependent are increase when the patient discharge from the hospital. In the group non piracetam + non citicoline, the increase value only happened in moderate dependent. While in combination group, the increase value happened in mild dependent category. Independent category when patient discharge from the hospital only happened in the group of piracetam. It needs a long time to get the independent condition when the patient discharge from the hospital. This condition is different of each patients, depend on the condition of initial hospitalization and the severity condition of the patient.

![Graphs showing BI development](image)

**Picture 2.** Percentage Category of Barthel Index (BI) Scale in Each Group of Drugs among Inpatient PKU Muhammadiyah Yogyakarta Hospital at the Time of Initial Hospitalization and at Hospital Discharge
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Table 2 showed the development condition of improved activity daily living. The patient have improved conditions if the BI scale shows an increase score, and the patient have worsening conditions if the BI scale shows decrease score.

Table 2. Percentage of Barthel Index (BI) Scale Changes at the Time of Hospital Discharge among Inpatient Head Injury at PKU Muhammadiyah Yogyakarta Hospital

<table>
<thead>
<tr>
<th>Drugs</th>
<th>Initial Condition (Total of Patient)</th>
<th>Total</th>
<th>Last Condition [Percentage (%)]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mild Mode Rate Severe Total Independent</td>
<td>Improvement Condition</td>
<td>No Improvement</td>
</tr>
<tr>
<td>Piracetam</td>
<td>0 1 13 8 0 22</td>
<td>95.5 4.5 0.0</td>
<td></td>
</tr>
<tr>
<td>Citicolin</td>
<td>1 6 18 4 0 29</td>
<td>93.1 6.9 0.0</td>
<td></td>
</tr>
<tr>
<td>Piracetam and</td>
<td>1 0 2 0 0 3</td>
<td>100 0 0</td>
<td></td>
</tr>
<tr>
<td>Citicolin</td>
<td>Non Pracetam + Non Citicolin</td>
<td>80.0 20.0 0.0</td>
<td></td>
</tr>
</tbody>
</table>

Conclusion
From 59 head injury patients inclusive, 37.3% was given piracetam, 49.2% was given citicolin, 5.1% was given combination, and 8.5% was given nothing. All of the head injury patients who were given piracetam and citicolin as a single agent or combination and who was not given piracetam and citicolin showed the improvement of consciousness. Based on statistical test, the different mean between the first treatment and the last treatment on the group of piracetam and the group of citicolin was showed statistical significantly difference.

Reference