PREDOMINANCE OF RIGHT HEMISPHERE IN POST-ISCHEMIC STROKE IMMUNITY MODULATION

Noer Rachma
Department of Medical Rehabilitation
Faculty of Medicine, Sebelas Maret University
Dr. Moewardi Hospital Surakarta

ABSTRACT

Post-ischaemic stroke infectious complications are commonly found. However, the post-stroke reduction of immunity modulation has never been clearly disclosed. This study, which was aimed to disclose immunomodulation mechanism of post-ischaemic stroke, was undertaken using cross-sectional observational method to patients aged 50-60 years with ischaemic stroke in left and right cerebral hemispheres, who were compared with healthy individuals. Analysis unit was blood from cubital veins taken 7 days after the first stroke attack. Immunity status observation was carried out by measuring total lymphocytes, monocytes, IL-10, IFN-\(\gamma\), and TNF-\(\beta_1\). The analysis of immunity status in those three groups was done using multivariate approach. Results of Manova analysis revealed that immunity status in those groups had significant difference (Wilk’s Lambda, \(p < 0.05\)). Furthermore, discriminant analysis performed to obtain variable that had predominant contribution to immune response revealed the following results: (1) in group with ischaemic stroke in right hemisphere, a number of discriminant variable were monocytes, IL-10, IFN-\(\gamma\), and TNF-\(\beta_1\), (2) in group with ischaemic stroke in left hemisphere, the discriminant variable were monocytes and IFN-\(\gamma\). In conclusion, (1) ischaemic stroke, either in left and right hemispheres, induces different immunity modulation, (2) ischaemic stroke modulation in right hemisphere is contributed particularly by the role of monocytes IL-10, IFN-\(\gamma\), and TNF-\(\beta_1\), while that in left hemisphere by only the role of monocytes and IFN-\(\gamma\). The role of IFN-\(\gamma\), IL-10 on the cell immunocompetence (monocyte) is psychoneuroimmunological approach. Based on those findings, it can be seen that the function of left hemisphere may be more predominant in complementary mechanism to maintain immunological defense of the body.

Keywords: ischaemic stroke, right hemisphere, left hemisphere, immunity

Correspondence: Noer Rachma, Department of Medical Rehabilitation, Faculty of Medicine, Sebelas Maret University, Dr. Moewardi Hospital Surakarta

INTRODUCTION

Management of ischemic stroke often bring complications, among others, pneumonia, urinary tract infection and decubital ulcer (Lamsudin 1998). Ischemic stroke associated with infection has been examined in two perspectives. First, the complications of infection can occur in post-ischemic stroke. Second, infectious complications of ischemic stroke are seen as the cause of repeated attacks of ischemic stroke (Grau 1995, Bova 1996, Paganini 2003). Impaired Central Nervous System (CNS) causes immune modulation. It is known that disturbances in neuron, astrocyte, and microgla can cause immune modulation. Some research indicates that post-acute attack may lead to ischemic neurons. In acute attacks the body's immune decline (Tarkowski 1995). The mechanism of immune modulation involves various mediators cytokines, hormones, and polypeptide (Stemberg 1997). The results showed that IL-1\(\beta\), IL10, and IL-8 have proven to be a predictor in the modulation of immunity due to hypoxia (Suroto 2001, Hartanto 2003). Fluctuation of IL-1\(\beta\), IL10, and IL-8 on the condition of brain tissue hypoxia will be used as a basis for the observation of immune modulation by psychoneuroimmunological approach.

MATERIALS AND METHODS

The design of this study was observational-sectional. The population was all patients with ischemic stroke that hospitalized at Dr. Moewardi Surakarta in May-July 2003. The sample was part of the population of ischemic stroke patients with the following sample criteria: age 50-60 years, the first stroke, the CT scan showed an ischemic stroke both left and right hemispheres, erythrocytes and hemoglobin within normal limits, random blood sugar within normal limits, liver function within normal limits, renal function within normal limits. All patients who meet the criteria of the sample followed for 7 days post-stroke.
Total lymphocytes and monocytes examined by means of cell dyn 3300. IL-10, IFN-γ, TGF-β1 were measured by using enzyme-linked immunosorbent assay (ELISA). The data were analyzed with statistical tests at significance level 0.05. Homogeneity test conducted on moderator variables to see the physical condition and health of the sample in the same condition. To test IIDN dependent variable (Identically Independence and normality) to see the variety and independence of the data of each group. Manova test performed on different immunity between the stroke right or left to control. Discriminant analysis is used to help get a response as distinguishing variables that have a strong contribution to the biological process of immune modulation.

RESULTS

Samples that can be used to support the existence of an ischemic stroke includes ischemic area (SIH left = 0.61 ± 0.10, SIH right = 0.63 ± 0.08) and cholesterol control = 2008 ± 8.7, left = 206 SIH , 3 ± 8.4, SIH right = 206.7 ± 8.3 by t test there is no difference, while the systolic pressure in all groups of 115-140 mmHg and diastolic 70-85 mmHg. All variables obtained homogeneous (p> 0.05) and within normal limits.

Manova test results between groups differences between the control group, the left hemisphere and right hemisphere difference found between groups (Wilk's Lambda, p <0.05), so the immune status of the three groups showed differences. The result of discriminant analysis right hemisphere ischemic stroke group with the control variables obtained differentiating monocytes, IL-10, IFN-γ, TGF-β1. The result of discriminant analysis of the left hemisphere ischemic stroke group with the control variables obtained differentiating monocytes and IFN-γ.

Table 1 Mean and Standard Deviation

<table>
<thead>
<tr>
<th>Groups</th>
<th>Lymphocytes (10^3/µL)</th>
<th>Monocytes (10^3/µL)</th>
<th>IFN-γ (pg/ml)</th>
<th>IL-10 (pg/ml)</th>
<th>TGF-β1 (pg/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>2.4115 ±0.5153</td>
<td>0.52290 ±0.16803</td>
<td>0.8440 ±1.9826</td>
<td>0.7710 ±0.9911</td>
<td>59.8375 ±18.2044</td>
</tr>
<tr>
<td>Right hemisphere</td>
<td>2.1244 ±0.8829</td>
<td>0.70589 ±0.18822</td>
<td>4.7300 ±3.6273</td>
<td>3.9489 ±1.8403</td>
<td>36.3756 ±10.6810</td>
</tr>
<tr>
<td>Left hemisphere</td>
<td>2.0400 ±0.5731</td>
<td>0.73800 ±0.18900</td>
<td>5.3500 ±4.6495</td>
<td>2.3170 ±1.9360</td>
<td>42.8890 ±22.9741</td>
</tr>
</tbody>
</table>

Figure 1. Immunity pattern of right SIH and control.
DISCUSSION

All three groups showed differences in immunity and all three showed modulation of immunity. Based on the average of the dependent variables showed that in ischemic stroke shows (1) the number of peripheral lymphocytes and TGF-β. There is a decrease and (2) the number of peripheral blood monocytes, IFN-γ, and IL-10 increases. On the basis of the results of measurements above the mean of these variables, the ischemic condition can cause inflammation, especially the marked increase in IFN-γ. Increased levels of IFN-γ in modulation of the amount of possible blood monocyte phagocytic blood as a candidate on the network. Tarkowski (1995) have obtained a decrease of lymphocytes in the condition of stroke. Impairment of TGF-β1 reflects Th3 negative role in the modulation of inflammation (Suroto 2001). Rabin (1989) and Owens-Babcock (2002) states that the central nervous system and immune system has a modulation in both directions. Stress conditions in both systems will mutually affect the activities of various cells in the system. Tarkowski (1995) found that ischemic stroke can cause modulation lateralization of the delayed-type hypersensitivity (DTH) or DTH responses obtained are asymmetric between the right hemisphere ischemic stroke and left hemisphere.

CONCLUSION

Post-ischemic right hemisphere stroke and left hemisphere obtained different immune modulation. Immune modulation after ischemic stroke is more...
dominant right hemisphere (monocytes, IL-10, IFN-γ, and TGF-β1) compared with left hemisphere ischemic stroke (monocytes and IFN-γ). This is possibly due to complementation left brain function in maintaining immune homeostasis in ischemic stroke right hemisphere is more dominant.

REFERENCES
