Peripheral Lymphocyte Count and Viral Clearance in COVID-19

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ABSTRACT

The objective of the study was to investigate whether the peripheral lymphocyte count was independently negative association with viral clearance time of SARS-CoV-2 in Chinese patients with COVID-19. Total 202 patients were chosen for the last data analysis. The patients' mean age was 41.39±12.47 years. Male was accounted for 48.51% and female was 51.49% respectively. The average viral clearance time was 19.40±9.03 days. Adjusted linear regression result showed peripheral lymphocyte count was associated with viral clearance time negatively after adjusting confounders (β, -2.79; 95% CI, -5.21 to -0.36). The trend of peripheral lymphocyte count treated as a categorical variable in linear regression was also consistent with the result when peripheral lymphocyte count was treated as a continuous variable. There was a negative association between peripheral lymphocyte count and viral clearance time of SARS-CoV-2 in Chinese patients with COVID-19.

Key Words: Peripheral lymphocyte count, Viral clearance, COVID-19.


The study was approved by the Research Ethics Commission of the First Affiliated Hospital of Xiamen University, China (M2021069). The study gathered a sum of 227 patients initially. The entry time and deadline for inclusion were September 12 to October 03, 2021, respectively. The entire clinical practice for every patient was conducted according to Chinese recommendations for the diagnosis and treatment of novel coronavirus (SARS-CoV-2) infection (Trial 8th version). Inclusion criteria were patient hospitalisation with confirmed COVID-19 by a positive result of RT-PCR analysis for SARS-CoV-2 in nasopharyngeal swabs. Exclusion criteria were age less than 14 years. After exclusion, 202 subjects remained for the final analysis.

According to published guidelines and research, the authors obtained the demographic, clinical, laboratory, therapy, and outcome data from the hospital information system. The demographic, clinical and laboratory data were gathered at the baseline (the time of admission). Disease severity definition: Mild was defined as mild symptoms without radiology-confirmed pneumonia; general was defined as fever or respiratory system symptoms with radiology-confirmed pneumonia; severe was defined as respiratory rate ≥30 per minute or peripheral oxygen saturation rate ≤93% or arterial oxygen pressure (PaO₂)/fraction of inspiration oxygen (FiO₂) ≤300mmHg (1mmHg = 0.133kPa) adjusted by altitude or radiology-confirmed pulmonary lesions progressing by more than 50% within 24-48 hours; critically severe was defined as respiratory failure requiring mechanical ventilation or shock or multiple organ failure requiring close monitoring in the intensive care unit. That the peripheral lymphocyte count less than 0.8×10⁹/L is defined as lymphocytopenia. Nasopharyngeal swab samples were taken
for analysis at baseline and then tested every 2-3 days until discharge or two weeks later. Then samples were taken for analysis every day after two weeks if not discharged. SARS-CoV-2 RNA was detected using the TaqMan probe targeting ORF1ab, and N gene by real-time RT-PCR assay and expressed in cycle threshold (Ct) (Shanghai ZJ Bio-Tech Co., Ltd. Shanghai JN Bio-Tech Co., Ltd. China). The viral clearance time of SARS-CoV-2 was defined as the time from illness onset to patients with two consecutive negative real-time RT-PCR results.

All the analyses were performed with the statistical software packages R (http://www.R-project.org, The R Foundation) and EmpowerStats (http://www.empowerstats.com, X&Y Solutions, Inc, Boston, MA). The authors expressed the continuous variable as mean ± standard (normal distribution), or as the median (quartile) (skewed distribution). Categorical variables were expressed in frequency or as a percentage. Generalised linear models were conducted to assess the relationship between the peripheral lymphocyte count and virus clearance time. Different models were built by adjusting various risk factors. Non-adjusted, mini-adjusted, and multivariable-adjusted models were listed. The peripheral lymphocyte count was transformed into a categorical variable and then calculated the trend for the purpose of sensitivity analysis. The two-sided p-value <0.05 were considered statistically significant.

A total of 202 patients were chosen for the last data analysis after checking by inclusion and exclusion criteria. The patients’ mean age was 41.39±12.47 years. Male was accounted for 48.51% and female was 51.49% respectively. The average viral clearance time was 19.40±9.03 days. The covariates adjusted were gender, age and comorbidities. The evidence suggests peripheral lymphocyte count results in an increase in viral clearance of SARS-CoV-2. A prospective study with a large sample size is necessary to further explore the association.

### Table I: Association of peripheral lymphocyte count with viral clearance time in different models.

<table>
<thead>
<tr>
<th>Exposure</th>
<th>Crude Model</th>
<th>Model I</th>
<th>Model II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peripheral lymphocyte count, x10^9/L</td>
<td>-3.49</td>
<td>(-5.69, -1.30)</td>
<td>(-5.67, -1.19)</td>
</tr>
<tr>
<td>Peripheral lymphocyte count in Tertile</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>-1.01</td>
<td>(-4.05, 2.02)</td>
<td>(-3.95, 2.15)</td>
</tr>
<tr>
<td>Middle</td>
<td>-0.90</td>
<td>(-3.33, 3.33)</td>
<td>(-3.11, 3.11)</td>
</tr>
<tr>
<td>High</td>
<td>-3.40</td>
<td>(-6.42, -0.37)</td>
<td>(-6.40, -0.25)</td>
</tr>
<tr>
<td>p for trend</td>
<td>0.028</td>
<td>0.035</td>
<td>0.046</td>
</tr>
</tbody>
</table>

### REFERENCES


