Anti-Toxoplasma IgM-IgG Titer in Malignancy Patients Receiving Chemotherapy at Dr. H Abdul Moeloek General Hospital of Lampung Province

Jhons Fatriyadi, Noviany, Juspeni, Betta, Hanna

1 Department of Microbiology and Parasitologi, Faculty of Medicine, University of Lampung, Bandar Lampung, Indonesia
2 Department of Chemistry, Faculty of Mathematics and Natural Sciences, University of Lampung, Bandar Lampung, Indonesia
3 Department of Internal Medicine, Faculty of Medicine, University of Lampung / Dr. H Abdul Moeloek General Hospital of Lampung Province, Bandar Lampung, Indonesia
4 Department of Parasitology, Faculty of Medicine, University of Indonesia, Jakarta, Indonesia

Abstract.
Transmission of toxoplasmosis is influenced by interacting disease agents, hosts and environmental conditions. Nutritional status is a host factor that cannot be ignored. Some studies suggest that high body mass index has a strong association with Toxoplasmosis. This study aims to analyze anti-toxoplasmosis IgM and IgG titers based on nutritional status in patients with malignancies who receive chemotherapy at the Lampung Provincial General Hospital, Indonesia. The design of this study was cross-sectional. The population of this study were malignancy patients who received chemotherapy with or without symptoms of infection at Lampung Provincial Hospital. Blood samples were examined for Toxoplasmosis serology to measure IgG and IgM titers. Examination with CMIA technique. Data analysis was done descriptively followed by Anova or Kruskal Wallis test. The results of this study showed that there were no differences in mean age, IgM and IgG titers in the three nutritional status groups.

1 Introduction
Parasitic infections in people who have a good immune system are generally asymptomatic or mild but can develop into chronic conditions. Different things happen in conditions of decreased immune response (immunodeficiency) so that parasitic infections can be symptomatic and become severe, called opportunistic infections. Parasites that cause opportunistic parasitic infections include protozoa such as Giardia lamblia, Cryptosporidium sp., Entamoeba histolitica, Isospora sp., Cyclospora sp., Blastocystis sp., and Toxoplasma gondii.[1–8] These infections are often detected late and become neglected, so patients will seek treatment when their condition is already severe. This immunodeficiency condition itself can be found in HIV/AIDS patients, patients with risk factors for the use of
immunosuppressive drugs and chemotherapy.[9] In Indonesia, cases of malignancies that receive chemotherapy continue to increase. This condition will certainly increase the possibility of opportunistic infections, including those caused by parasites. Several studies explain that opportunistic infections in HIV/AIDS patients range from 26.4% - 85.0%[5,6,10] and about 5% in organ transplant recipients.[3]

Based on various theories, it appears that an infection can occur due to various factors, such as the availability of disease agents, suitable hosts and favorable environmental conditions. The three factors will interact with each other.[11,12] Nutritional status is a host factor that cannot be ignored. In previous studies, it was reported that there was an association between high body mass index and toxoplasmosis seroprevalence [13,14]. However, there were also studies that said there was no association between anthropometric measurements and toxoplasmosis seroprevalence.[15] Other studies have also shown that the socioeconomic conditions of the community and the location where people live affect the onset of an infectious disease.[16] Rural and urban environments also have an influence on the transmission of infectious diseases. Previous studies have shown that intestinal parasitic infections are more common in rural areas compared to urban areas.[8]

Dr. H Abdul Moeloek General Hospital of Lampung Province (RSUDAM Lampung Province) is a Lampung Provincal Referral Hospital that serves people from all regions of Lampung Province. In Lampung Province, there has never been reported research on the seroprevalence of toxoplasmosis found in malignancy patients who received chemotherapy and its relationship with nutritional status. This study aims to analyze the average differences in anti-toxoplasma IgM and IgG titers based on nutritional status in patients with malignancies who receive chemotherapy at the Lampung Provincial General Hospital, Indonesia.

2 Methods

This research design was a cross-sectional study conducted at RSUDAM Lampung Province. The sample population consisted of malignancy patients who received chemotherapy with or without symptoms of infection at RSUDAM Lampung Province from October to December 2022. Toxoplasmosis serology examination to measure IgG and IgM titers was performed using CMIA (Chemiluminescent Microparticle Immunoassay) technique with ARCHITECT Toxo Reagent Kit. The test result was positive if the IgG or IgM titer was above the laboratory reference limit value (IgM Positive > 0.9 IU/mL, IgG Positive > 8 IU/mL).

Data analysis was done descriptively by looking at the mean, median, and range. The analysis was continued with ANOVA and Kruskal Wallis tests to determine differences in mean age, IgG, and IgM titers based on nutritional status. This study was approved by the Health Research Ethics Committee of the Faculty of Medicine, University of Lampung with number 2059/UN26.18/PP/05.02.00/2022.

3 Results

The research subjects who were successfully examined amounted to 80 people. The results of the study of 80 research subjects showed that the average BMI of the research subjects was 21.15 which means that it is still in the normal BMI range. However, when grouped based on low BMI (<18.5) there were 46.3%, normal BMI (18.5-22.9) there were 26.3%, and high BMI (>23) there were 27.5%. Based on the results of the toxoplasmosis seroprevalence examination, 58 (72.5%) research subjects had IgG titers above normal values (positive), while for IgM only 2 (2.5%) research subjects. The mean and median age, IgG, and IgM titers are shown in Table 1.
Table 1. Mean, Median, and Range of Data Variable (n = 80)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Median</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>52.54</td>
<td>53.12</td>
<td>21 – 80</td>
</tr>
<tr>
<td>Titer IgM (IU/mL)</td>
<td>0.10</td>
<td>0.06</td>
<td>0.02 – 0.91</td>
</tr>
<tr>
<td>Titer IgG (IU/mL)</td>
<td>104.61</td>
<td>49.00</td>
<td>0 – 1200</td>
</tr>
</tbody>
</table>

Table 2 shows the mean age, IgM, and IgG titers in each BMI group. It appears that the average age in each group is not significantly different. In IgM titer, there was no statistically significant difference in average titer between groups (p > 0.05), although in the high BMI group, IgM titer was lower than in other groups. The same thing was also found in IgG titer, where based on statistical tests there was no significant difference (p > 0.05), although, the group with high BMI showed a higher IgG titer (136.86 IU/mL) compared to the other 2 groups. Detailed statistical test results are shown in Table 2.

Table 2. The Average of Age, IgG, and IgM Titer in Each Group Based on Nutritional Status.

<table>
<thead>
<tr>
<th>Variable</th>
<th>BMI</th>
<th>p-Value</th>
<th>Test</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Low (n = 37)</td>
<td>Normal (n = 21)</td>
<td>High (n = 22)</td>
</tr>
<tr>
<td>Age (years)</td>
<td>53.64</td>
<td>53.30</td>
<td>50.21</td>
</tr>
<tr>
<td>Titer IgM (IU/mL)</td>
<td>0.11</td>
<td>0.12</td>
<td>0.08</td>
</tr>
<tr>
<td>Titer IgG (IU/mL)</td>
<td>82.91</td>
<td>97.76</td>
<td>136.86</td>
</tr>
</tbody>
</table>

4 Discussion

The results of this study are in line with studies previously reported that there is no relationship between human body size including BMI and latent toxoplasmosis infection.[15] Although, another study stated that there was a strong relationship between higher BMI and poor diet to the incidence of toxoplasmosis, especially in women, but no strong relationship was found in the male group.[14] However, another study found a strong association between BMI and toxoplasmosis in men who kept cats.[13] The age variable is also in line with previous studies that did not show a significant association with the incidence of toxoplasmosis found in previous studies both in at-risk groups such as slaughterhouse workers and HIV/AIDS patients.[7,8]

Toxoplasmosis is an intracellular protozoan parasitic infection caused by Toxoplasma gondii. The mechanism of transmission of this parasite can be through various ways including eating undercooked animal meat, contamination of cat feces in the environment or food ingredients such as vegetables, contact when processing animal products, blood transfusions, congenital from mother to fetus, and many other risk factors.[13] Toxoplasmosis in people who have a good immune system can be asymptomatic, but in immunosuppressed conditions such as patients with malignancies, this infection can be symptomatic or even severe.[8,19]

This study is incomplete to reveal all factors associated with toxoplasmosis infection and this is a limitation of this study. Factors such as healthy living behavior, eating behavior, preventing cat feces contamination, and using personal protective equipment when doing activities on the ground (gardening) are important factors in the transmission of toxoplasmosis. This infection can affect all people, all genders, and all age groups, especially in at-risk populations.
5 Conclusion

Based on the results of the analysis, it can be concluded that there are no significant differences in the average age, IgM, and IgG anti-toxoplasmosis titers in each nutritional status group in malignancy patients who receive chemotherapy at RSUDAM Lampung Province, Indonesia. The authors would like to thank Project HETI for providing a research grant to complete the first phase of this study. The authors would also like to thank the Dean of the Faculty of Medicine, University of Lampung, and the Director of RSUDAM Lampung Province for giving permission for data collection and analysis of research data, to the various partner laboratories that have been willing to help with the necessary examinations and to the research subjects who have been willing to participate in this study.

References


15. Berrett AN, Gale SD, Erickson LD, Brown BL, Hedges DW. No association between latent toxoplasmosis and multiple body measures in U.S. adults. Folia Parasitol (Praha) [Internet]. 63:1–6 [2016].


