Detection and clinical significance of immune function, inflammatory factors, Hcy, SF and $\beta_2$-MG in elderly patients with chronic renal failure

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ABSTRACT

Objective: To explore the detection and clinical significance of immune function, inflammatory factors, Hcy, SF and $\beta_2$-MG in elderly patients with chronic renal failure. Methods: We selected 95 elderly patients with chronic renal failure treated in our hospital from March 2016 to December 2017 as the observation group, and 100 healthy elderly patients were selected as the control group during the same period. The levels of immune parameters, inflammatory factors, Hcy, SF and $\beta_2$-MG levels were compared and analyzed. Results: The levels of IgA in the observation group was significantly higher than that in the control group, while IgG, IgM, C3, and C4 were significantly lower than those in the control group. The levels of hs-CRP and IL-6 in the observation group were significantly higher than those in the control group, and the difference was statistically significant. the levels of Hcy, SF and $\beta_2$-MG in Observation group were significantly higher than that of in the control group, the difference was statistically significant. Conclusions: Elderly patients with CRF have low immune function, high inflammation level, high expression of Hcy, SF and $\beta_2$-MG. The diagnosis of these indicators is of great significance for the early diagnosis, prevention and prognosis of elderly CRF patients.

1. Introduction

Chronic renal failure (CRF) is a urinary system disease that is common in elderly patients. The pathological factors may be a large number of extracellular matrices caused by a variety of virulence factors, leading to glomerular sclerosis and renal interstitial fibrosis, resulting in glomerular filtration dysfunction[1–3]. Some studies have concluded that[4] patients with CRF have spleen and kidney deficiency, and one of the main manifestations of deficiency syndrome is lower immune function. Some studies have also found that[5] the severity of CRF patients is closely related to the microinflammation state, in which pro-inflammatory factors are involved in the production of microinflammation. Hcy-cysteine (Hcy) is involved in the occurrence of microvascular disease in nephropathy. High expression of Hcy in serum can cause abnormal oxidative stress and endothelial function, affecting the renal function of patients[6]. Whereas ferritin (SF) is closely related to the common indicators of renal function such as creatinine and urea nitrogen metabolism[7]. Serum $\beta_2$-microglobulin ($\beta_2$-MG) is a protein that can respond to early impaired renal function and is a sensitive indicator of renal failure[8]. This study explored the specific mechanisms of immune, inflammatory, Hcy, SF and $\beta_2$-MG markers in elderly patients with CRF, as reported below.

2. Materials and methods

2.1 General data

A total of 95 cases of elderly CRF patients admitted to our hospital from March 2016 to December 2017 were selected as observation group. Among them, 50 males and 45 females, aged 25-72 years.
old, mean age (50.82±19.95) years old, all patients have been diagnosed as chronic renal disease. CRF is diagnosed according to the relevant criteria of Internal Medicine[9], including 39 cases of chronic glomerulonephritis, 15 cases of chronic glomerulonephritis, 17 cases of diabetic nephropathy, and 13 cases of lupus nephritis, 11 cases of hypertensive nephropathy, with a course of 3 to 6 years and an average disease duration of (4.52±1.06) years. In the same period, 100 healthy elderly people in our hospital were selected as the control group, including 51 males and 49 females, aged 23-73 years old, with an average age of (50.25±18.97) years. The difference in gender, age and duration of the two groups was not statistically significant (P>0.05) and was comparable. Exclusion criteria: pregnant or lactating women; combined with cardio-cerebrovascular, liver, lung and other important organ dysfunction; abnormal mental existence. All subjects and their families signed informed consent.

2.2 Methods

5 mL of venous blood of all subjects were collected at the time of admission. Immunological indicators: Immunoglobulin A (IgA), immunoglobulin M (IgM), Immunoglobulin G (IgG) and complement (C3, C4) were tested using a fully automated specialty protein analyzer (inspected by Beckman Coulter, USA). Inflammatory factors: High-sensitivity C-reactive protein (hs-CRP) and interleukin-6 (IL-6) were detected by ELISA (purchased in Shanghai Jimian Industrial Co., Ltd.); automatic biochemical analyzer was used (purchased from Nanjing Lanlanbei Biotechnology Co., Ltd.) to detect homocysteine (Hcy) and serum β₂-microglobulin (β₂-MG); the detection of ferritin (SF) by chemiluminescence detector.

2.3 Statistical analysis

The data of this study were analyzed by SPSS 19.0. The count data were tested by chi-square. The indexes of immunoglobulin, complement, inflammation index, Hcy, SF and β₂-MG were expressed by (Mean ± SD), and t test was used to comparison of both groups. P<0.05 indicated difference was statistically significant.

3. Results

3.1 Changes in immune indicators level in the two groups

The IgA in the observation group was significantly higher than that of the control group, and the difference was statistically significant (P<0.05). The IgG, IgM, C3 and C4 were significantly lower than the control group, and the difference was statistically significant (P<0.05). See Table 1.

3.2 Changes in inflammatory markers levels in the two groups

The hs-CRP and IL-6 in the observation group were significantly higher than the control group, and the difference was statistically significant (P<0.05). See Table 2.

3.3 Change in Hcy, SF and β₂-MG levels in the two groups

The levels of Hcy, SF and β₂-MG in the observation group were significantly higher than those in the control group, and the difference was statistically significant (P<0.05). See Table 3.

4. Discussion

The incidence of chronic renal disease increases significantly with age. In the United States, the prevalence of chronic kidney disease is as high as 93% in the 70-year-old population. Early, reasonable and effective intervention and prevention of senile kidney disease is the current huge challenge of kidney disease research. At the same time, the incidence of CRF in China is increasing year by year, especially in elderly patients. Its pathogenesis is more complex, and the pathological mechanism is more variable. Chinese medicine believes that the combination of wetness, heat and blood stasis can trigger CRF. When the condition of CRF is more serious, the treatment effect is not satisfactory and the mortality rate is significantly increased. The clinical symptoms of elderly CRF patients are mainly weakened body resistance and pathogenic excess. Among them, the main clinical manifestations of weakened body resistance are

Table 1. Changes in immune indicators level in the two groups.

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>IgA (g/L)</th>
<th>IgG (g/L)</th>
<th>IgM (g/L)</th>
<th>C3</th>
<th>C4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation group</td>
<td>95</td>
<td>1.95±0.61</td>
<td>8.39±1.93</td>
<td>1.08±0.25</td>
<td>0.65±0.18</td>
<td>0.26±0.05</td>
</tr>
<tr>
<td>Control group</td>
<td>100</td>
<td>1.67±0.49</td>
<td>11.82±2.77</td>
<td>1.50±0.36</td>
<td>1.29±0.41</td>
<td>0.37±0.10</td>
</tr>
</tbody>
</table>

Note: compared with the control group, *P<0.05.

Table 2. Changes in inflammation indicators levels in the two groups.

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>hs-CRP (mg/L)</th>
<th>IL-6 (pg/mL)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation group</td>
<td>95</td>
<td>15.86±2.91</td>
<td>51.78±6.29</td>
</tr>
<tr>
<td>Control group</td>
<td>100</td>
<td>6.72±1.28</td>
<td>23.97±3.60</td>
</tr>
</tbody>
</table>

Note: compared with the control group, *P<0.05.
Note: compared with the control group, \(^* p<0.05\).

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Hcy (mmol/L)</th>
<th>SF (ng/mL)</th>
<th>(\beta_2)-MG (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Observation group</td>
<td>95</td>
<td>28.66±5.75</td>
<td>176.32±15.33</td>
<td>35.85±5.29</td>
</tr>
<tr>
<td>Control group</td>
<td>100</td>
<td>8.73±1.69</td>
<td>65.69±8.05</td>
<td>2.70±0.41</td>
</tr>
</tbody>
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</tr>
</tbody>
</table>

Studies have found that the disease.

increased. The results of this study showed that IgA in the body's defense capacity is decreased, and the possibility of infection is greatly increased. The results of this study showed that IgA in the observation group was significantly higher than that in the control group, while IgG, IgM, C3 and C4 were significantly lower than the observation group was significantly higher than that in the control group, suggesting that the immune function of elderly CRF patients was significantly lower than that of normal people, and the probability of various infections increased significantly. The cause of this result may be related to the accumulation of toxic substances, metabolic acidosis and secondary anemia in the patients. Therefore, clinical treatment needs to pay attention to the patient's immune status, and if necessary, immune support treatment can be given.

Elderly patients with CRF due to abnormal body metabolism, toxin accumulation and low immunity, easy to concomitant infection, leading to death of end-stage renal failure\(^{[15–17]}\). The level of inflammatory factors is a marker of infection in the body. Therefore, it is necessary to detect inflammatory factors in patients with CRF. Kang Ligen et al\(^{[18]}\) found that the detection of hs-CRP in serum can be used as a reliable reference for the diagnosis and evaluation of prognosis of renal failure. Schömig et al\(^{[19]}\) believed that patients with early renal failure will have a tendency to inflammation, and proinflammatory factors such as CRP and IL-6 will be highly expressed in the body. The results of this study showed that the hs-CRP and IL-6 levels in the observation group were significantly higher than those in the control group, suggesting that there is a strong inflammatory response in the elderly CRF patients, that is, there are different degrees of infection, and the reason for this result may be the patient's immunity is low, and it is easy to be infected by the outside world. Therefore, in clinical treatment, the level of inflammatory factors in elderly CRF patients should be strengthened to reduce the risk of infection.

Hcy is a metabolite of the methionine cycle in the body. When the level of Hcy increases, it can activate oxidative stress and damage the vascular endothelium, leading to the occurrence of nephrotic microangiopathy. SF is the main form of iron stored in the human body. If the SF increase indicates that the iron content available in the body is reduced, when the kidney is abnormal, the erythropoietin deficiency may be caused, and the hematoipoietic function and iron utilization disorder in the body may cause anemia. \(\beta_2\)-MG can pass through the glomerular filtration membrane freely, is absorbed and degraded in the proximal renal tubule, and is highly sensitive to renal function detection. In this study, the levels of serum Hcy, SF and \(\beta_2\)-MG in elderly patients with CRF were detected. The results showed that the levels of Hcy, SF and \(\beta_2\)-MG in the observation group were significantly higher than those in the control group. It is suggested that patients with CRF have different degrees of nephropathy and iron utilization disorders. The reason for this result may be related to renal dysfunction in CRF patients, microinflammation in the body, decreased hemoglobin synthesis, and effect of metabolites such as urea nitrogen and creatinine on iron metabolism, as well as low immune function\(^{[20]}\). Therefore, it is of great significance to diagnose, prevent and control the patient's condition by detecting the levels of Hcy, SF and \(\beta_2\)-MG in patients.

In summary, elderly CRF patients have low immune function, high levels of inflammation, high expression of Hcy, SF and \(\beta_2\)-MG. By regulating the levels of immune, inflammation, Hcy, SF and \(\beta_2\)-MG, they can be of great significance in early diagnosis, prevention and prognosis of CRF patients.

References

\[1\] Ma Xu, Zhu Qing, Shao Fengmin. Effects of Danshen Ligustrazine Injection on serum growth factor and transforming growth factor-\(\beta_1\) in serum connective group of elderly patients with chronic renal failure. Chin J Gerontol 2015; 35(16): 4640-4641.


\[3\] Tian Zhengxiang, Li Quanqing, Zhang Li. Clinical study on the treatment of chronic kidney disease complicated with hyperuricemia with


