The Role of Decreased Levels of Antimicrobial Peptides in Progression of Chronic Renal Insufficiency

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Abstract: Antimicrobial peptides (AMPs) are gaining popularity as better substitute to antibiotics. These peptides are shown to be active against several bacteria, fungi, viruses, protozoa and cancerous cells. Understanding the role of primary structure of AMPs in their specificity and activity is essential for their rational design as drugs. The aim of present study was to estimate the level of defensines in peripheral blood of patients with chronic and progression of renal insufficiency.

Keywords: Innate immunity, defensines, antimicrobial peptides

Introduction:
Defensins are antimicrobial peptides, and as the integral component of the innate immune system, demonstrate potent activity toward pathogens. Decreased levels of these peptides have been noted for patients with atopic dermatitis and Kostmann's syndrome, a congenital neutropenia. In addition to important antimicrobial properties, growing evidence indicates that AMPs alter the host immune response through receptor-dependent interactions [1, 2, 3]. The aim of present study was to estimate the level of defensines in peripheral blood of patients with chronic and progression of renal insufficiency (RI).

Material And Methods:
Patient characteristics: We observed 54 patients with chronic renal insufficiency and they were classified in two groups. 30 patients with chronic RI were studied as 1st group, 24 patients with the progression of chronic RI were included in 2nd group. Mean age of patients in study groups was 56.4±3.2 and 54.6±2.7 respectively. The all patients provided written consent for participation in this study after receiving complete information on the study’s scope and purpose. The study exclusion criteria for both groups included diabetes mellitus, acute infectious diseases, excessive drug addiction.

Blood collection. Venous blood was collected and blood samples were collected into tubes with EDTA. After 15-20 minute centrifugation, plasma samples were frozen at -70°C. Grossly hemolysed samples were not used for study.

Measurement of the concentrations of defensines in the peripheral blood by ELISA. Samples from all patients were assayed in duplicate for each test. ET-1 was detected with commercial kit according to standard enzyme immunoassay procedure. All results in which performed dilution of plasma samples were multiplied by dilution factor. The levels of defensines are expressed in ng/mg of total protein in the sample.

Statistical analysis. The Student t-test and the Mann-Whitney test were used for comparison of parametric and non-parametric parameters. Non parametrical data are presented as means ± SD and medians (ranges). Categorical data were analyzed by the Fischer exact test. In all instances, significance was established at p< 0.05.

Results:
The patient characteristics are shown in table 1. We observed more frequent infectious complications
Ibrahimova S.Sh., Mammadova N.T., Goyushova R.R. The role of decreased levels of antimicrobial peptides in progression of chronic renal insufficiency during progression of RI. The mean concentrations of antimicrobial peptides were presented in figure 1. It was determined significantly lower concentrations of defensines in blood serum of patients with progression of RI compared with parameters in chronic RI (59,64±3,4 ng/ml vs 67,89±2,9 ng/ml, p<0.05).

<table>
<thead>
<tr>
<th>Patient characteristics</th>
<th>1st group</th>
<th>2nd group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>56,4±3,2</td>
<td>54,6±2,7</td>
</tr>
<tr>
<td>Male/Female</td>
<td>14/16</td>
<td>12/12</td>
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<tr>
<td>Frequent respiratory infections, N (%)</td>
<td>8 (26,6)</td>
<td>12 (50)</td>
</tr>
<tr>
<td>Renal and urinary tract infections</td>
<td>6 (20)</td>
<td>8 (33,3)</td>
</tr>
<tr>
<td>Dialysis</td>
<td>4 (13,3)</td>
<td>4 (16,6)</td>
</tr>
</tbody>
</table>

Table 1. Patient characteristics of study groups

![Figure 1. The level of antimicrobial peptides in patients with RI](image)

Discussion:

Evidence for the significant role of antimicrobial peptides in the host defense of mammals is also accumulating. In addition to their action on microbes, some antimicrobial peptides can function as regulatory molecules in the host. For example, in vitro studies suggest that defensins can attract phagocytes and lymphocytes to sites of infection, inhibit the release of cortisol from adrenal cells, induce the proliferation of fibroblasts and modify ionic fluxes in epithelial cells [4, 5]. In a rare human disease, specific granule deficiency, the content of defensins (and probably several other antimicrobial peptides and proteins as well) in neutrophil granulocytes is severely decreased. The patients develop recurrent and severe bacterial infections. However, the interpretation and attribution of this defect is made complex by the multiple proteins affected [6, 7].

Unlike acute renal failure, chronic renal failure most often results gradual destruction of
Ibrahimova S.Sh, Mammadova N.T., Goyushova R.R. The role of decreased levels of antimicrobian peptides in progression of chronic renal insufficiency. The kidneys and can range from mild dysfunction to severe kidney failure; progression may be associated with decreasing levels of antimicrobian peptides. Thus, interference with synthesis and posttranslational processing of antimicrobial peptides weakens host resistance to infections.

Reference:


