Effect of renal dialysis on some haematological, electrolytes and biochemical parameters in hepatitis patients.

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ABSTRACT

The present study was designed to finding the influence of renal dialysis in some haematological, electrolytes and biochemical parameters in kidney failure and kidney failure with hepatitis patients (C and B) virus. The experiment was designed from ten normal healthy patients as control group and sixty male human patients were selected from hospital campus of the Zagazig University conducting adialysis three time a week and classified according to dialysis into two major groups, the first group: patients with less than one year of dialysis. The second group: patients with more than one year of dialysis. Each group are divided into three sub groups are renal failure, renal failure with hepatitis c virus (HCV) and renal failure with hepatitis B virus (HB), a significant decrease was recorded in RBCs count, Hb, HCt and platelets count, also a significant decrease was showed in serum sodium and calcium levels, while a significant increase was demonstrated in WBCs count, serum potassium, phosphorus levels and transaminases (ASAT and ALAT) enzymes activities in patients with renal failure and renal failure with hepatitis (C and B) virus.

Keywords: Renal failure, Hemodialysis, Hepatitis, Electrolytes, Kidney function and Liver function.

INTRODUCTION

Renal function as indicated by glomerular filtration rate (GFR) is associated with an increased mortality risk in patients with end stage renal disease (ESRD) on dialysis. Preventing or delaying the full loss of (GFR) can improve survival in dialysis patients. This supports the importance that is given to the effect of treatment options for patients with (ESRD) on the rate of decline of the residual renal function. (Willem et al., 2011).

Mhawech and Saleen (2000) reported that platelet dysfunction is often observed with chronic renal failure or liver disease in patients experiencing a variety of myeloproliferative and lymphoproliferative disorders.

Anaemia is the most common haematological Abnormalities in chronic renal failure. Also anaemia is recognized relatively early in the course of kidney dysfunction (Asort et al., 2002). Renal anaemia causes high sympathetic nerve activity and linked to cardiovascular complications, such as increased blood pressure and left ventricular hypertrophy. (Ayus et al., 2005).

Carru et al., (2005) found a decrease in white blood cells count during hemolysis and it was investigation as function of different dialysis membranes.

Sankara et al. (2005) showed that the control of serum phosphaetse levels on patients with hemodialysis requires the restriction of dietary (po4) intake. The dose of (po4) binder ideal should be proportional to the amount of phosphorus ingested with each meal. While, Segal et al. (2008) found that hyperphosphatemia is among the most common metabolic
complications of the end stage renal dialysis.

Both hypokalemia and hyperkalemia are life threatening to hemodialysis patients. Hypokalemia haemodialysis patients with lower serum albumin, pre albumin showed amalnutrition and inflammatory status and caused increased mortality rate (Tyh et al., 2011).

Lemos et al. (2008) found that HCV infected patients had significantly higher serum ALT levels. While, Azevedo et al. (2007) reported that HCV infected patients with chronic renal failure (CRF) submitted for hemodialysis (HD) have lower serum ALT levels.

Dina et al. (2010) found that patients under going chronic hemodialysis, as well as hemodialysis staff members increase risk of infection with HBV, that may be transmitted in the dialysis setting through blood transfusions.

MATERIALS AND METHODS

Experimental design:
The normal healthy control group ten subjects (human) and sixty male human patients are selected from the hospital campus of the Zagazig University conducting adialysis three times aweek and classified according to dialysis into two major groups:
The first group: Patients less than one year of dialysis.
The second group: Patients more than one year of dialysis.

Each group including 30 patients and divided into three subgroups, the first renal failure (20) patients, renal failure with HCV virus (20) patients and renal failure with HB virus (20) patients.

Blood samples were taken after the dialysis process for aperiod of three months from the beginning of analysis, Samples were taken every two weeks for each patients taking the average of their results. Blood samples were taken with anticoagulant for haematological measurements. Also blood samples were taken without anticoagulant and centrifuge for 20 minutes at 3000 rpm to obtained serum which separated for biochemical analysis.

Biochemical analysis:

Serum electrolytes were estimated according to the method of (Teitz, 1986). Using Chiron diagnostics kits.

Serum aspartate transaminase (ASAT) and alanine transaminase (ALAT) enzymes activities were estimated according to the method of (Reitman and Frankel, 1957) using biomereux kits.

Statistical analysis

Statistical analysis of the obtained data was done according to (Armitage, 1974) using T - test value.

RESULTS

Obtained data in table (1) showed a significant decrease (P<0.05) and (P<0.01) in RBCs count, Hb concentration, HCt values and platelets count in patients infected with renal failure and renal failure with hepatitis (C and B) virus at the two different periods less and more than one year of dialysis. On the other hand a significant increase (P<0.01) in white blood cells count in patients infected with renal failure and renal failure with hepatitis (C and B) virus at the two different periods less and more than one year of dialysis incomparision with the healthy patients.

Data in table (2) exhibited a significant decrease (P<0.05) and (P<0.01) in serum sodium and calcium levels in patients infected with renal failure and renal failure with hepatitis (C and B) virus at the two different periods less and more than one year of dialysis, except group infected with renal failure in period less than one year of dialysis showed insignificant decrease in serum sodium level when compared with the control group. Also insignificant decrease in serum calcium level was
Effect of renal dialysis on some haematological, electrolytes and biochemical recorded in patients infected with renal failure more than one year of dialysis.

Serum potassium and phosphorus levels observed a significant increase (P<0.01) in all groups at two different periods less and more than one year of dialysis when compared with the healthy group.

Table 1: Means level of some haematological measurements in renal failure patients and renal failure infected with hepatitis (C and B) virus at two different dialysis periods.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Groups</th>
<th>Control</th>
<th>Renal failure</th>
<th>Renal failure with HCV</th>
<th>Renal failure with HB</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>RBCs x 10^6, Cell/mm³</td>
<td>Mean ± S.D.</td>
<td>4.72 ± 0.35</td>
<td>3.76 ± 0.83</td>
<td>4.02 ± 0.63</td>
<td>3.60 ± 0.76</td>
<td>3.68 ± 0.77</td>
</tr>
<tr>
<td></td>
<td>N. S.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.89 ± 0.63</td>
</tr>
<tr>
<td>WBCs x 10^3, Cell/mm³</td>
<td>Mean ± S.D.</td>
<td>7.23 ± 1.70</td>
<td>9.71 ± 0.63</td>
<td>10.01 ± 0.78</td>
<td>10.33 ± 0.75</td>
<td>10.57 ± 0.83</td>
</tr>
<tr>
<td></td>
<td>N. S.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>11.09 ± 0.69</td>
</tr>
<tr>
<td>Hb, g/dl</td>
<td>Mean ± S.D.</td>
<td>4.11 ± 3.97</td>
<td>35.7 ± 5.65</td>
<td>35.9 ± 5.33</td>
<td>31.8 ± 6.30</td>
<td>28.8 ± 3.17</td>
</tr>
<tr>
<td></td>
<td>N. S.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>29.06 ± 3.26</td>
</tr>
<tr>
<td>Platelets x 10^3, /mm³</td>
<td>Mean ± S.D.</td>
<td>307.4 ± 40.92</td>
<td>186.5 ± 66.89</td>
<td>169.8 ± 71.10</td>
<td>190.60 ± 30.80</td>
<td>118.00 ± 29.41</td>
</tr>
<tr>
<td></td>
<td>N. S.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>177.90 ± 70.93</td>
</tr>
</tbody>
</table>

Table 2: Means level of some serum electrolytes in renal failure patients and renal failure infected with hepatitis (C and B) virus at two different dialysis periods.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Groups</th>
<th>Control</th>
<th>Renal failure</th>
<th>Renal failure with HCV</th>
<th>Renal failure with HB</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sodium, mEq/L</td>
<td>Mean ± S.D.</td>
<td>140.8 ± 4.05</td>
<td>137.7 ± 6.48</td>
<td>135.8 ± 4.78</td>
<td>133.3 ± 6.12</td>
<td>132.2 ± 3.85</td>
</tr>
<tr>
<td></td>
<td>N. S.</td>
<td></td>
<td>N. S.</td>
<td>4.05 ± 0.05</td>
<td>4.78 ± 0.04</td>
<td>6.12 ± 0.01</td>
</tr>
<tr>
<td>Potassium, mEq/L</td>
<td>Mean ± S.D.</td>
<td>4.10 ± 0.14</td>
<td>5.12 ± 0.50</td>
<td>5.74 ± 0.84</td>
<td>5.13 ± 0.11</td>
<td>5.34 ± 0.30</td>
</tr>
<tr>
<td></td>
<td>N. S.</td>
<td></td>
<td>N. S.</td>
<td>0.14 ± 0.05</td>
<td>0.84 ± 0.04</td>
<td>0.11 ± 0.01</td>
</tr>
<tr>
<td>Calcium, mg/dl</td>
<td>Mean ± S.D.</td>
<td>9.51 ± 0.61</td>
<td>8.57 ± 0.61</td>
<td>8.35 ± 0.52</td>
<td>8.55 ± 0.76</td>
<td>8.85 ± 0.85</td>
</tr>
<tr>
<td></td>
<td>N. S.</td>
<td></td>
<td>N. S.</td>
<td>0.61 ± 0.05</td>
<td>0.52 ± 0.04</td>
<td>0.76 ± 0.01</td>
</tr>
<tr>
<td>Phosphorus, mg/dl</td>
<td>Mean ± S.D.</td>
<td>3.99 ± 0.41</td>
<td>7.29 ± 0.98</td>
<td>7.82 ± 0.83</td>
<td>7.77 ± 0.87</td>
<td>7.00 ± 0.56</td>
</tr>
<tr>
<td></td>
<td>N. S.</td>
<td></td>
<td>N. S.</td>
<td>0.41 ± 0.05</td>
<td>0.83 ± 0.04</td>
<td>0.87 ± 0.01</td>
</tr>
</tbody>
</table>

A significant increase (P<0.01) in serum transaminases (ASAT and ALAT) enzymes activities in patients infected with renal failure and renal failure with hepatitis (C and B) virus throughout the experimental periods less and more than one year of dialysis in comparison with the control group (Table 3).
Table 3: Means level of serum transaminases enzymes activities in renal failure patients and renal failure infected with hepatitis (C and B) virus at two different dialysis periods.

<table>
<thead>
<tr>
<th>Parameters</th>
<th>Groups</th>
<th>Duration of dialysis less than one year</th>
<th>Duration of dialysis more than one year</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control</td>
<td>Renal failure</td>
<td>Renal failure with HCV</td>
</tr>
<tr>
<td>ASAT, u/L</td>
<td>Mean ± S.D</td>
<td>22.9 ± 7.26</td>
<td>32.8 ± 2.89</td>
</tr>
<tr>
<td></td>
<td>Prob.</td>
<td>P&lt;0.01</td>
<td>P&lt;0.01</td>
</tr>
<tr>
<td>ALAT, u/L</td>
<td>Mean ± S.D</td>
<td>21.7 ± 3.26</td>
<td>52.6 ± 4.27</td>
</tr>
<tr>
<td></td>
<td>Prob.</td>
<td>P&lt;0.01</td>
<td>P&lt;0.01</td>
</tr>
</tbody>
</table>

Prob. = Probability  
N.S. = Non significant  
P. < 0.01 = Highly significant (**)

DISCUSSION

Haematological measurements

In patients with end stage renal failure, serum erythropoietin (EPO) may increase after hepatitis C and B infection, resulting in an improvement of red cells status.

Radovic et al., 1999. Anaemia is the most common haematological abnormality in chronic renal failure (Asort et al., 2002).

Obtained results refer to decrease in red blood cells (RBCs) count, haemoglobin (Hb) concentration, haematocrit (Hct) values and platelets count in patient infected with renal failure and renal failure infected with hepatitis (C and B) virus these decrease maybe due to decrease dose of erythropoiesis stimulating agents with adequacy of dialysis or anaemia due to chronic kidney disease (Katzarski et al., 1999)

Electrolytes

In the present study the obtained results of serum sodium level recorded as significant decrease, this decrease may be due to impaired renal capacity to excrete solute free water. This results are in agreement with (Agrawal et al., 2008) found that hyponatremia and hypernatremia represented disorders of water balance, or due to impaired renal water excretion and antidiuretic hormones (ADH) play an important role in hyponatremia.

Serum potassium level revealed as significant increase in patients infected with renal failure and renal failure with hepatitis, these increase may be due to arise from true excess or imbalance in the distribution between potassium inside and outside of cells. Data found in the presented study showed as significant decrease in serum calcium level, these decrease may be due to decrease renal tubular reabsorption of calcium causing decrease in calcium ion level these results are in agreement with (Kinder and Stewart., 2002) found that hypocalcemia and decrease glomerular filtration rate lead to reduction in filtered calcium and increase in proximal tubular reabsorption of sodium and calcium these results are dis agreement with (Bilezikan et al., 2002). Hypophosphatemia as an independent risk factor for cardiovascular disease and mortality on dialysis or due to progressive deterioration in kidney function (Nagano et al., 2003).

Transaminases

Serum transaminases enzymes (ASAT and ALAT) revealed as significant increase activities in patients infected with renal failure and renal failure with hepatitis (C and B) virus, these increase due to liver disease on long term dialysis. These results are in agreement with Hung
et al. (1997) found that AST and ALT levels were higher in the positive HBV marker group.

Mohamed and Atta (2010) reported that hepatitis C infection is known to have a higher prevalence of some components of metabolic syndrome and to be associated with chronic renal disease and disagreement with Azevedo et al. (2007) showed that HCV infected patients with chronic renal failure submitted with haemodialysis have lower ALT levels.

REFERENCES


**ARABIC SUMMERY**

تأثير الغسيل الكلوي على بعض المعايير الدموية وبعض الأملاح المعدنية والقياسات البيوكيميائية في مرضى التهاب الكبد

البحث فضلاً إبراهيم الظواهري 1 ، محمود محمد سالم 1 ، هشام جمال عبد الرحيم 1، محمد وفيف علي 2، جليل محمد شريف 3، علي وفيف محمد 1، سالم جابر 2، علي عبد الرشيد هشام 2، جلال محمد شريف 1، السيد شحاتطلعت 1

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3 كلية طب – جامعة الزقازيق

الدراسة الحالية توضح تأثير الغسيل الكلوي على بعض المعايير الدموية وبعض الأملاح المعدنية والقياسات البيوكيميائية في مرضى الفشل الكلوي. وقد صممت التجربة من عشرة المرضى الذين اصيبوا بمرضي الغسيل الكلوي بمستشفي الزقازيق الجامعي. وتم تقسيمهم إلى مجموعتين مثابرتين. مجموعتهما الأولى نظام الغسيل بالمرتين، لفترات زمنية أطول من 60 يومًا. في حين أن مجموعتهما الثانية، في حالة الغسيل المتكافل، وظف في مجموعات فرعية، تم تقسيمها إلى مجموعتين مثابرتين، في المجموعتين الأولى، مرضى مصابون بالفشل الكلوي مصابون بمرضي الفشل الكلوي، في المجموعتين الثانية، مرضى مصابون بالفشل الكلوي مصابون بمرضي الفشل الكلوي، وقد أظهرت النتائج نفس معنى في عدد كريات الدم الحمراء، وعديد الهيموغلوبين، والبيليروبين، وعدد الصفائح الدموية. كلاً وأظهرت النتائج نفس معنى في عدد كريات الدم البيضاء، ومستوي البوتاسيوم والفسفور، في كل منهما، وكذلك لم نلاحظ زيادة معنوية في مجموعات الفشل الكلوي، في الفئات المريضة، والفئات الصحية، في مجموعات الفشل الكلوي.