HORMONAL AND LIPID PROFILE CHANGES IN MEN WITH CHRONIC RENAL FAILURE


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ABSTRACT

**Background:** Chronic kidney disease (CKD) naturally progresses with metabolic and hormonal disorders. **Aim:** This study was conducted to determine occurrence and prevalence hormonal changes in patients with CKD. **Materials and methods:** We conducted a cross sectional study for a sample composed of 70 patients with CRF, admitted to the Baqubah teaching hospital, dialysis unit, their ages between (20 – 60) years, and a control group consists of 40 subjects of comparable age, selected from medical staff who were apparently normal healthy adults without any major illness. The levels of hormones assay (LH, FSH, prolactin and testosterone) were measured by VIDS automated technical. The levels of blood urea, serum creatinine, blood glucose, total protein and serum albumin as well as serum triglycerides(TG), total cholesterol( TC), low density lipoprotein cholesterol( LDL-C), very low density lipoprotein cholesterol(VLDL-C) and high density lipoprotein cholesterol(HDL) were measured by colorimetric method. TC/HDL-C and LDL-C/HDL-C ratios were calculated. **Results:** The levels of serum LH, FSH and prolactin were significantly increased and serum TG, VLDL-C and blood glucose were significantly increased and HDL-C, TC, LDL-C, total protein and serum albumin was significantly decreased in cases when compared to controls. **Conclusion:** Patients with CKD are prone to hormonal and metabolic changes with health impact that need continuous follow up.

**KEYWORDS:** Chronic renal failure; Hormonal change; Sex Hormones Disorder; Erectile Dysfunction.
INTRODUCTION
Chronic kidney disease (CKD), end-stage renal disease (ESRD) and kidney transplantation all affect the endocrine system, encompassing a wide variety of syndromes and clinical disorders. The kidney is a potent endocrine organ, a key modulator of endocrine function and an important target for hormonal action. Thus, alterations in signal-feedback mechanisms and in production, transport, metabolism, elimination and protein binding of hormones rather commonly occur in these diseases. As a direct consequence, the uremic state is associated with abnormalities in the synthesis or action of many hormones, including the hypothalamic-pituitary-gonadal (HPG) axis. Hyper gonadotropic hypogonadism is a well-described hormonal derangement associated with CKD, which has also been termed *uremic hypogonadism*. \[^{3}\]

The serum concentration of luteinizing hormone (LH) is elevated in uremic men; this is due to diminished testosterone feedback. Follicle stimulating hormone (FSH) secretion is also elevated, although to a more variable degree. Elevated FSH levels are probably the result of decreased testosterone and inhibin, a Sertoli cell product. The plasma FSH concentration tends to be highest in those uremic patients with the most severe damage to seminiferous tubules and presumably the lowest levels of inhibin. It has been suggested that increased FSH levels may portend a poor prognosis for recovery of spermatogenic function after renal transplantation. The gonadotropin reserve is generally intact, since the plasma level of both gonadotropins increased appropriately following administration of gonadotropin-releasing hormone (GnRH). \[^{4}\]

The basal levels of serum prolactin are elevated in the majority of uremic patients, and the response to thyrotropin-releasing hormone (TRH) is reduced and delayed. The mechanisms for the hyperprolactinemia in chronic renal failure are not well defined. Increased autonomous production rate of prolactin is a major mechanism for the hyperprolactinemia but decreased metabolic clearance rate may also play a role. The demonstration of resistance to stimulation or suppression of prolactin in CRF is consistent with increased autonomous production. The state of secondary hyperparathyroidism of CRF may contribute to the increased production rate of prolactin, because PTH stimulates prolactin secretion. \[^{4}\]

Erectile dysfunction can be seen in up to 40–80% of hemodialysis patients. Although psychological factor plays an important role, effective renal replacement therapy improves fitness, libido, and potency. Erectile dysfunction in CKD is multifactorial and includes
decreased arterial blood flow, venous leakage due to shunts, altered penile smooth muscle function, hormonal disturbances, side effect of medications, and neurogenic dysfunction.\[5\]

MATERIALS AND METHODS

A case control study of serum LH, FSH, Prolactin and Testosterone hormones as well as serum lipid profile and fasting blood sugar in chronic renal failure (CRF) patients were carried out from January 2015 to April 2015. The cases of CRF were selected from dialysis unit in Bacoba Teaching Hospital, in Baqubah City of Diyala Governorate. A total number of 70 patients were included in the study, they were clinically diagnosed by nephrologist as chronic renal failure, based on their history, clinical examination and renal function tests, their ages range between (20 – 60) years with age mean (48.28).

Control group consists of 40 subjects of comparable age, their age means (40.4), and selected from medical staff who were apparently normal healthy adults, without any major illness.

The main source of data was obtained directly from the CRF patients and control subjects by interviewing them, reading patients records and using prepared questionnaire which was prepared to record detailed information about each patient and each control subject. It included: name, age (years), diet, BP (mmHg), weight (kg), smoking history, disease (CRF) history, family history, duration of illness, type of treatment, duration of treatment, dialysis history, duration of dialysis, renal transplantation history, other renal disease history, vascular diseases and diabetes mellitus (DM) history, erectile dysfunction (ED) history and other chronic diseases history.

Five mls of venous blood sample were drawn from each fasting patient (8-12 hours fasting). Slow aspiration of the venous blood sample using disposable needles and syringes to prevent hemolysis. All the samples with fine hemolysis were neglected. The samples were dropped into clean disposable plane tubes, left at room temperature for 30 minutes for clotting and then centrifuged for 15-20 minutes at 3000 run per minute (rpm). The serum was separated and transported into a new disposable plane tube, which is used for measuring LH, FSH, Prolactin and Testosterone as well as lipid profile, fasting blood sugar, total protein and serum albumin. Samples from the control subjects were collected and processed in the same way.
RESULTS

Table (1): Mean Serum Hormones in Renal Failure Patients and Control Group.

<table>
<thead>
<tr>
<th>Serum Hormones</th>
<th>Mean ± SD</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Patient</td>
<td>Control</td>
</tr>
<tr>
<td>S.LH (m.IU./ml)</td>
<td>26.3 ± 10.6</td>
<td>6.95 ± 2.06</td>
</tr>
<tr>
<td>S.FSH (m.IU./ml)</td>
<td>21.17 ± 9.24</td>
<td>7.97 ± 2.24</td>
</tr>
<tr>
<td>S. Prolactin (ng/ml)</td>
<td>45.8 ± 41.0</td>
<td>6.47 ± 1.71</td>
</tr>
<tr>
<td>S. Testosterone (ng/ml)</td>
<td>2.74 ± 1.37</td>
<td>6.15 ± 1.70</td>
</tr>
</tbody>
</table>

P <0.001 – Highly Significant.

Table (2): Mean Value of Blood Urea, Serum Creatinine and Total Protein, Serum Albumin in CRF Patients and Control Group.

<table>
<thead>
<tr>
<th>Biochemical marker</th>
<th>Mean ± SD</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Patient</td>
<td>Control</td>
</tr>
<tr>
<td>B. Urea (mg/dl)</td>
<td>124.0±40.2</td>
<td>32.8±5.67</td>
</tr>
<tr>
<td>Creatinine (mg/dl)</td>
<td>7.18±2.75</td>
<td>0.72±0.07</td>
</tr>
<tr>
<td>Protein (g/l)</td>
<td>58.96±6.09</td>
<td>73.50±2.86</td>
</tr>
<tr>
<td>Albumin (g/l)</td>
<td>32.14±4.39</td>
<td>44.77±2.79</td>
</tr>
</tbody>
</table>

P <0.001 – Highly Significant

Table (3): Mean Value of Serum Lipid Profile in Renal Failure Patients and Control Group.

<table>
<thead>
<tr>
<th>Serum lipid profile</th>
<th>Mean ± SD</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Patient</td>
<td>Control</td>
</tr>
<tr>
<td>S.TotalCholesterol (mg/dl)</td>
<td>149.9 ± 25.1</td>
<td>164.9 ± 12.2</td>
</tr>
<tr>
<td>S.Triglyceride (mg/dl)</td>
<td>181.1 ± 73.9</td>
<td>126.3 ± 20.0</td>
</tr>
<tr>
<td>S.HDL-C (mg/dl)</td>
<td>33.14 ± 4.56</td>
<td>47.58 ± 6.96</td>
</tr>
<tr>
<td>S.VLDL-C (mg/dl)</td>
<td>35.9 ± 14.6</td>
<td>25.26 ± 4.14</td>
</tr>
<tr>
<td>S.LDL-C (mg/dl)</td>
<td>81.3 ± 26.8</td>
<td>92.0 ± 15.2</td>
</tr>
</tbody>
</table>

P <0.001 – Highly Significant.

The result demonstrated significant (P < 0.001) higher mean serum value of LH, FSH, Prolactin, while mean serum total Testosterone concentration was significantly lower (P< 0.001) in renal failure patients when compared with those of the control group, Table (1).

The result demonstrated significant (P< 0.001) elevation in mean value of blood urea and serum creatinine; while total protein and serum albumin was significantly lower (P< 0.001) in renal failure patients when compared with those of the control group, Table (2).
The result demonstrated significant ($P < 0.001$) elevation in mean value of serum Triglyceride and VLDL concentration, while, serum total Cholesterol, LDL-cholesterol and HDL-cholesterol was significantly lower ($P < 0.001$) in renal failure patients when compared with those of the control group, Table (3).

DISCUSSION

In this study, the mean value of serum gonadotrophins (LH and FSH) Levelis significantly increase in CRF patients when compared to control. This result is compatible with some studies were performed by studies of other researchers in other countries.$^{[3,4,5]}$ In view of prolonged half-life of LH in uremia, there is significant decrease in pulsatile secretion of LH.$^{[6]}$ This leads to low levels of testosterone in uremic patients while the serum estradiol and total estrogens levels are usually elevated.$^{[7, 8]}$

In the present study, the mean value of total serum testosterone is significantly decreased in CRF patients when compared to control. This result is compatible with some studies were performed by studies of other researchers in other countries.$^{[3,4,5]}$

In this study, the mean value of serum prolactin Levelis significantly increased in CRF patients when compared to control. This result is compatible with some studies were performed by studies of other researchers in other countries.$^{[1,3,4,5]}$ Serum prolactin level as well as its biological activity is increased in CKD.$^{[9]}$

In this study, the mean value of total protein and serum albumin is significantly decreased in CRF patients when compared to control. This result is compatible with some studies were performed by Bonanni et al.$^{[10]}$, Kaysen et al.$^{[11]}$, Dashtil et al.$^{[12]}$ in other countries, and by Weam in Iraq.$^{[14]}$ Total protein and serum albumin is a well-known marker of nutrition in ESRD patients. There was a linear increase in death rate with declining total protein and serum albumin levels in the dialysis patients.$^{[13]}$

The mean value of total cholesterol (TC) is significantly decreased in CRF patients when compared to control as this study indicated. This is in accordance with the study done by Satpathy et al.$^{[18]}$, observed decreased levels of TC in CRF patients. Studies of other researchers in other countries,$^{[15,16,21]}$observed increase levels of TC in CRF patients. The reason for this decrease may be due to reduced food intake.
The data of this study showed significantly elevation in serum triglyceride for patients when compared to control. This result is compatible with some studies were carried out in other geographical areas of other western and eastern countries\[15, 16, 19, 20\], and also compatible with another study performed in southern areas of Iraq\[14\]. Hypertriglyceridemia is a common feature of CRF\[21\].

The present study shows that the mean value of HDL-C is significantly decreased in CRF patients when compared to control. Many studies carried out in other regions of world observed the same results\[16, 17, 21, and 22\]. This study is also in accordance to the study done in Karbala city of Iraq\[23\]. The data of this study showed significantly elevation in serum VLDL-C for patients when compared to control. This result is compatible with studies of Patel et al\[16\], Tsimihodimos et al\[17\], Boekholdt et al\[20\], Sumathi et al\[21\], and Weam\[14\]. Elevation of plasma triglycerides in ESRD patients is accompanied by increased plasma concentration and impaired clearance of VLDL.

In this study, the mean value of serum LDL-C is significantly decreased in CRF patients when compared to controls. In accordance with the study done by Satpathy et al\[18\], observed decreased levels of LDL-C in CRF patients. This result disagreement with the studies done in other countries\[15, 16, 21\], and in Iraq\[14\].

CONCLUSION

Our study demonstrated that Endocrine abnormalities or hormonal change are common feature of chronic renal failure (CRF) patient. Dysregulation of sex hormones metabolism in CRF can contribute to libido in men CRF patients. Elevated gonadotrophin LH (luteinizing hormones) and FSH (follicle-stimulating hormones) in most CKD patients and plasma testosterone level are decrease or in the low normal range in men patients of CKD, as well as, Hyperprolactinemia (high level of prolactin) is common feature of CKF patients.

REFERENCES


