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Original Research

Evaluation of adipokines and endothelial dysfunctionin CKD patients

[1]Johar Iqbal, [2]Poonum Tyagi

[1]Associate Professor, [2]Assistant Professor, Department of Biochemistry, Venkateshwara Institute of Medical Sciences, Gajraula, Uttar Pradesh, India

ABSTRACT:

Background: Due to its increasing incidence and prevalence, chronic kidney disease (CKD) is becoming a more significant global public health concern. The present study evaluated the concentration changes of adipokines and ED level in CKD patients. **Materials & Methods:** 60 CKD patients of both genders were divided into three groups according to glomerular filtration rate (GFR). Patients in Group I (n=40) had GFRs ranging from 60 to 119 ml/ min/1.73m2 (stage I, II), group II (n=40) had 15-59 ml/min/1.73m2 Group III (n=40) had <15 ml/min/1.73m2 (stage III, IV), and V). Adiponectin level was estimated by ELISA. High sensitivity C-reactive protein (hsCRP) was estimated by immunoturbidimetry. **Results:** In group I, group II and group III, M:F ration was 9:12, 10:10 and 11:9, BMI (kg/m2) was 25.2, 23.1 and 21.8, urea (mg/dL) was 30.5, 55.2 and 112.7, creatinine (mg/dL) was 0.96, 2.3and 6.1 and eGFR (ml/ min) was 95.2, 32.6 and 12.4 respectively. The difference was significant (P< 0.05). In group I, group II and group III, mean adiponectin (ng/mL) was 4532.6, 20123.4 and 31267.3 respectively. Leptin (pg/mL) was 7682.1, 12435.7 and 30945.2, IL-6 (pg/mL) was 22.7, 26.2 and 184.2, IL-10 (pg/mL) was 3.8, 2.1 and 1.9 and hsCRP (mg/dL) was 0.46, 0.91 and 0.48 respectively. The difference was significant (P< 0.05). **Conclusion:** Because renal function deteriorates with chronic kidney disease (CKD), adipokine concentrations vary abnormally. The concentration changes were more noticeable at later stages of CKD than at earlier stages of CKD.

Keywords: chronic kidney disease, endothelial dysfunction, interleukin

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Corresponding author: Poonum Tyagi, Assistant Professor, Department of Biochemistry, Venkateshwara Institute of Medical Sciences, Gajraula, Uttar Pradesh, India

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INTRODUCTION

Due to its increasing incidence and prevalence, chronic kidney disease (CKD) is becoming a more significant global public health concern.[1] There is growing evidence that people with chronic kidney disease (CKD) have a higher risk of dying from cardiovascular disease (CVD) than from renal failure. Atherosclerosis is the primary cause of a large portion of the vascular disease observed in CKD.[2] The endothelium is identified as a major contributor to the development of atherosclerosis under the "response to injury hypothesis." A significant factor in linking renal illness to endothelial dysfunction (ED) and cardiovascular (CV) events is decreased nitric oxide (NO) bioavailability. In addition, inflammation is a common symptom of CKD and is linked to endothelium damage.[3]

Furthermore, the emergence of adipose tissue factors (adipokines such adiponectin, leptin, interleukin-6 (IL-6), interleukin-10 (IL-10), and tumor necrosis in CKD has added components to this problem.4Factor-α (TNF-α) that may be able to cause ED through inflammation. According to recent research, uremic cachexia may be significantly influenced by adiponectin, leptin, IL-6, IL-10, and TNF-α.[5] The levels of these adipokines and cytokines may be altered in renal failure and these altered levels in CKD are involved in progression of inflammation and ED.6The present study evaluated the concentration changes of adipokinesand ED in CKD patients.

MATERIALS & METHODS

The study was carried out on 60 CKD patients of both genders. All gave their written consent to participate in the study.

Data such as name, age, gender etc. was recorded. All were divided into three groups according to glomerular filtration rate (GFR). Patients in Group I (n=40) had GFRs ranging from 60 to 119 ml/min/1.73m2 (stage I, II), group II (n=40) had 15-

59 ml/min/1.73m2 Group III (n=40) had <15 ml/min/1.73m2 (stage III, IV), and V). Adiponectin level was estimated by ELISA. High sensitivity C-reactive protein (hsCRP) was estimated by immunoturbidimetry. Results thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Baseline characteristics

Parameters	Group I	Group II	Group III	P value
M:F	9:12	10:10	11:9	0.57
BMI (kg/m2)	25.2	23.1	21.8	0.74
Urea (mg/dL)	30.5	55.2	112.7	0.01
Creatinine (mg/dL)	0.96	2.3	6.1	0.03
eGFR (ml/ min)	95.2	32.6	12.4	0.02

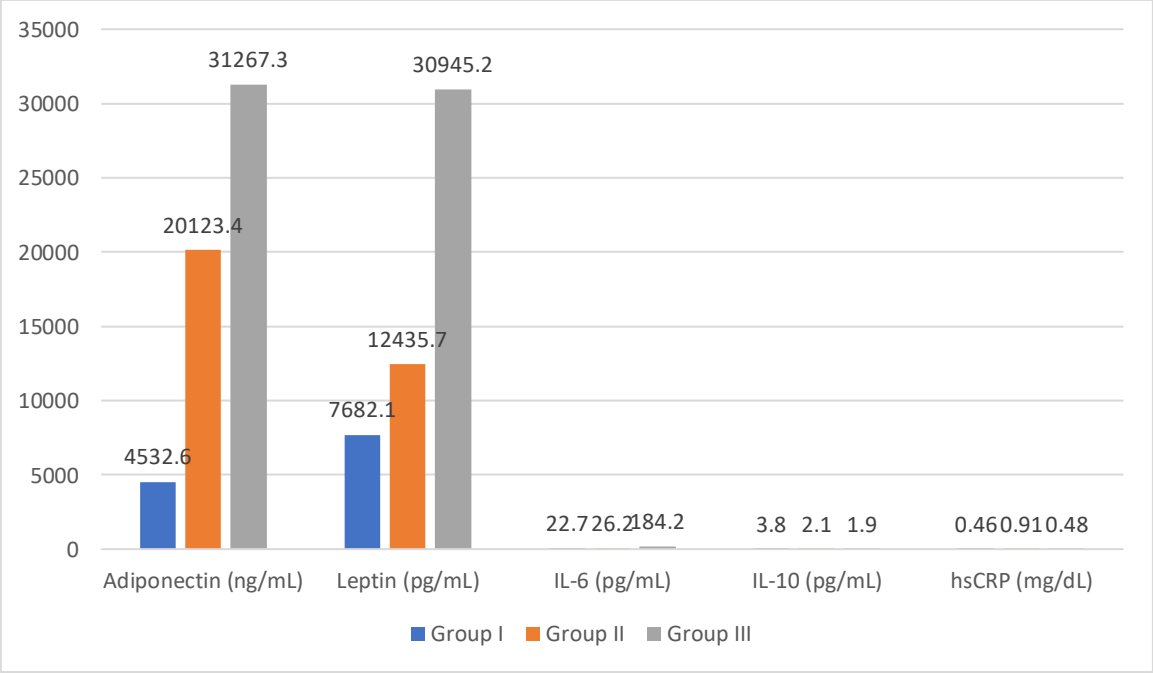
Table I shows that in group I, group II and group III, M:F ration was 9:12, 10:10 and 11:9, BMI (kg/m2) was 25.2, 23.1 and 21.8, urea (mg/dL) was 30.5, 55.2 and 112.7, creatinine (mg/dL) was 0.96, 2.3 and 6.1 and eGFR (ml/ min) was 95.2, 32.6 and 12.4 respectively. The difference was significant (P< 0.05).

Table II Comparison of adipokines inflammatory and endothelial dysfunction markers

Parameters	Group I	Group II	Group III	P value
Adiponectin(ng/mL)	4532.6	20123.4	31267.3	0.57
Leptin (pg/mL)	7682.1	12435.7	30945.2	0.74
IL-6 (pg/mL)	22.7	26.2	184.2	0.01
IL-10 (pg/mL)	3.8	2.1	1.9	0.03
hsCRP (mg/dL)	0.46	0.91	0.48	0.02

Table II, graph I shows that in group I, group II and group III, mean adiponectin (ng/mL) was 4532.6, 20123.4 and 31267.3 respectively. Leptin (pg/mL) was 7682.1, 12435.7 and 30945.2, IL-6 (pg/mL) was 22.7, 26.2 and 184.2, IL-10 (pg/mL) was 3.8, 2.1 and 1.9 and hsCRP (mg/dL) was 0.46, 0.91 and 0.48 respectively. The difference was significant (P< 0.05).

Graph I Comparison of adipokines inflammatory and endothelial dysfunction markers



DISCUSSION

These adipokines are involved directly or indirectly in ED by augmenting inflammation and reducing bioavailability of NO in CKD.[7] Accordingly, the evidence that is currently available points to adipokines as a potential missing link between ED and inflammation in CKD. However, there are sparse and conflicting data on the concentration changes of adipokines in CKD.[8] The studies that were available concentrated on stage V (end stage renal disease, or ESRD) CKD patients, but not included all the stages especially, earlier stages of CKD.[9,10] Thus, studies on concentration changes of adipokines in earlier stages of CKD and their connection with inflammation and

ED are restricted.[11] The present study evaluated the concentration changes of adipokines and ED in CKD patients.

We found that in group I, group II and group III, M:F ration was 9:12, 10:10 and 11:9, BMI (kg/m2) was 25.2, 23.1 and 21.8, urea (mg/dL) was 30.5, 55.2 and 112.7, creatinine (mg/dL) was 0.96, 2.3 and 6.1 and eGFR (ml/ min) was 95.2, 32.6 and 12.4 respectively. Ambarkar et al[12]assessed the associationsbetween adipokines, inflammation and ED in CKD patients.A total of 120 CKD patients wereincluded and classified into 3 groups based on Glomerular filtrationrate (GFR). Group I (n=40) patients had a GFR between 60-119 ml/min/1.73m2(stage I, II), group II (n=40) had 15-59 ml/min/1.73m2(stage III, IV) and group III (n=40) had <15 ml/min/1.73m2 (stageV). Forty healthy subjects served as controls. Adiponectin, Leptin,Interleukin-10 (IL-10), Interleukin-6 (IL-6), tumour necrosis factor-α(TNF-α) were estimated by ELISA. High sensitivity C-reactiveprotein (hsCRP) was estimated by immunoturbidimetry and NOby Griess method.A significant increase in leptin, IL-6, TNF-α, IL-6/IL10 ratio, hsCRP and decrease in adiponectin, IL-10, NO wasobserved in CKD patients compared to controls ($p<0.05$). In CKDpatients, adiponectin, leptin, IL-6, IL-6/IL-10 ratio, TNF-α weresignificantly increased and IL-10 levels were decreased fromgroup I to group III ($p<0.05$). In group III CKD patients IL-6 showeda significant negative correlation with NO ($r=-0.557$; $p=0.005$). Inlinear regression analysis also, IL-6 showed a significant negativeassociation with NO ($B\pm SE=-0.038\pm0.11$; $p=0.002$) in CKDpatients

We observed that in group I, group II and group III, mean adiponectin (ng/mL) was 4532.6, 20123.4 and 31267.3 respectively. Leptin (pg/mL) was 7682.1, 12435.7 and 30945.2, IL-6 (pg/mL) was 22.7, 26.2 and 184.2, IL-10 (pg/mL) was 3.8, 2.1 and 1.9 and hsCRP (mg/dL) was 0.46, 0.91 and 0.48 respectively. Kir et al[13]measured the serum levels of hs-CRP, adiponectin, and TNF-alpha in 37 patients with CKD on conservative treatment, 34 patients maintained on CAPD, 35 HD patients, and 25 healthy volunteers. The mean TNF-alpha levels were found to be significantly higher in patients in the predialysis, CAPD, and the HD groups, than in the control group (17.24 +/- 9.22, 31.57 +/- 10.56, 24.34 +/- 5.32, 7.64 +/- 4.12 pg/mL, respectively, $p < 0.001$). The mean TNF-alpha levels in the predialysis group were significantly lower than in both the CAPD and the HD group ($p < 0.001$). The mean TNF-alpha levels in the CAPD group were significantly higher than in the HD group ($p = 0.001$). The mean adiponectin levels in the control group were significantly lower than in the predialysis, CAPD, and HD groups (2.54 +/- 2.30, 4.10 +/- 3.12, 7.69 +/- 8.35, 5.97 +/- 6.20 ng/mL, respectively, $p < 0.05$). Furthermore, the mean adiponectin levels in the predialysis groups were significantly lower than in the CAPD group ($p < 0.05$). The mean hs-CRP levels were found to be significantly higher in patients in the predialysis, CAPD, and HD groups than in the control group (0.65 +/- 0.57, 0.82 +/- 0.71, 1.14 +/- 1.45, 0.30 +/- 0.19 mg/dL, respectively, $p < 0.05$).

The shortcoming of the study is small sample size.

CONCLUSION

Authors found that because renal function deteriorates with chronic kidney disease (CKD), adipokine concentrations vary abnormally. The concentration changes were more noticeable at later stages of CKD than at earlier stages of CKD.

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