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Study the relationship between hs-CRP level and urinary albumin creatinine ratio (UACR) levels

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Abstract
Background: *C-reactive protein (CRP), an acute phase reactant, is a highly sensitive marker of inflammation. Its level rises dramatically during an inflammatory process. CRP has a long half life, affordability of estimation and stability of its levels with no circadian variation and therefore is one of the best markers of vascular inflammation.*
Methods: *Hospital based cross-sectional Study was conducted at Department of Medicine, S.P. Medical College, Bikaner on Type 2 diabetes patients reporting to OPD & IPD of Medicine Department.*
Results: *Mean hs-CRP in UACR group <30 µg/mg was 1.76±1.37 mg/l and in ≥30 µg/mg it was 6.12±3.36 mg/l and this difference was found statistically highly significant (p<0.001).*
Conclusion: *We found hs-CRP is high in microalbuminuria group compared to normoalbuminuria group. It was also found in our study that diabetic nephropathy is associated with hs-CRP level.*
Keywords: *C-reactive protein (CRP), Inflammation, Urinary albumin creatinine ratio (UACR).*

Introduction

Diabetic nephropathy is the single most common cause of chronic renal failure, accounting for 45% of patients receiving renal replacement therapy, and is a rapidly growing problem worldwide.

Recent evidence suggest that chronic subclinical inflammation may play a key role in the initiation and progression of diabetic nephropathy and finally leads to the development of glomerulosclerosis and tubulointerstitial fibrosis[1]. Recent studies suggest that proinflammatory cytokines such as interleukin (IL)-1, IL-6, IL-8, and tumor necrosis factor play a role in the pathogenesis of diabetic nephropathy[2]

C-reactive protein (CRP), an acute phase reactant, is a highly sensitive marker of inflammation. Its level rises dramatically during an inflammatory process. CRP has a long half life, affordability of estimation and stability of its levels with no circadian variation and therefore is one of the best markers of vascular inflammation[1]. CRP has been found to be associated with disorders like diabetes mellitus (DM), cardiovascular disorders, metabolic syndrome, renal failure, etc[3]. Serum high sensitivity CRP (hs-CRP) level is higher in patients with type 2 diabetes mellitus than in normal subjects and plays an important role in the

development and progression of type 2 diabetes mellitus[4].

Materials and Methods

Study Design: Hospital based cross-sectional Study

Study Place: Department of Medicine, S.P. Medical College, Bikaner

Study population: Type 2 diabetes patients reporting to OPD & IPD of Medicine Department.

Sampling Method: Random Sampling

a. Inclusion criteria
   i. Type 2 Diabetes Mellitus (according to WHO diagnostic criteria) patient receiving either oral hypoglycemic agents or insulin or both
   ii. Willing to participate
   iii. Type 2 Diabetes Mellitus patients having Normoal-buminuria or Microalbuminuria [urinary albumin creatinine ratio <300 µg/mg]

Diagnostic criteria for diabetes mellitus:

1. Fasting blood sugar > 7.0mmol/L(126mg/dl) or
2. HbA_{1C} > 6.5%
3. Two hour plasma glucose > 11.1mmol/L (200mg/dL) during an oral glucose tolerance test
4. Symptoms of diabetes plus random blood glucose concentration > 11.1mmol/L (200mg/dL)

b. Exclusion criteria:
   i. Patients with type 1 diabetes mellitus.
   ii. Not willing to participate
   iii. Have suffered from any acute illness in past 1 week
   iv. Patient with macroalbuminuria (UACR >300µgm/mg)
   v. Patient with pre-existing renal disease eg polycystic kidney disease,
   vi. Type 2 DM patients having cardiovascular disease.

Observations

In present study, overall mean age in females was 57.53± 8.23 and in males it was 58.95±8.23 years. Mean age of onset in females was 49.39±6.30 and in males it was 49.73±5.45 years while mean duration of diabetes in females was 8.14±4.92 years and in males it was 9.23±5.70 years and these differences were found statistically insignificant (p>0.05).

Table 1 Distribution of Cases according to UACR in relation to hs-CRP Group

hs-CRP Group(mg/l)	UACR Group (µg/mg)				Total
	<30		≥30		
	No.	%	No.	%	No.
<3	63	71.6	25	28.4	88
3-6	8	16.0	42	84.0	50
>6-9	2	4.9	39	95.1	41
>9	0	-	22	100	22
Total	73	36.3	128	63.7	201
Mean	1.76		6.12		
SD	1.37		3.36		
T	10.576				
P	<0.001				

According to above table, out of total 201 cases, 88 patients had their hs-CRP level <3 mg/l and out of them 63(71.6%) and 25(28.4%) cases belonged to initial UACR group <30 µg/mg and ≥30 µg/mg respectively. In hs-CRP group 3-6 mg/l, total 50 patients were found and out of them 8(16%), 42(84%) patients had their initial UACR <30 and ≥30 µg/mg respectively, 41 patients had their hs-CRP level >6-9 mg/l and out of them 2(4.9%) and 39(95.1%) cases belonged to initial UACR group <30 and ≥30 µg/mg respectively while 22 patients had their hs-CRP level >9 mg/l

and they all belonged to initial UACR group ≥30 µg/mg.

Mean hs-CRP in UACR group <30 was 1.76±1.37 mg/l and in ≥30 it was 6.12±3.36 mg/l and this difference was found statistically highly significant (p<0.001).

Discussion

In our study, overall mean age in females was 57.53± 8.23 years and in males it was 58.95±8.23 years. Mean age of onset in females was 49.39±6.30 years and in males it was 49.73±5.45 years while mean duration of diabetes in females was 8.14±4.92 years and in males it was 9.23±5.70 years and these differences were found statistically insignificant (p>0.05).

In present study, mean hs-CRP in UACR group <30 (normoalbuminuria) was 1.76±1.37 mg/l and in ≥30 (microalbuminuria) it was 6.12±3.36 mg/l and the difference was found statistically highly significant (p<0.001).

Similar observed made by Navarro et al[5] they studied patients with type 2 diabetes and revealed that CRP levels were high in patients with microalbuminuria or mild proteinuria compared with those with normoalbuminuria. Saraheimo et al[6] evaluated the association between CRP levels and diabetic nephropathy in 194 patients with type 1 diabetes and found that CRP was higher in patients with micro- and macroalbuminuria compared with those without[6].

Conclusion

Recent evidence suggests that chronic subclinical inflammation may play a key role in the initiation and progression of diabetic nephropathy. C-reactive protein (CRP), an acute phase reactant, is a highly sensitive marker of inflammation. We found hs-CRP is high in microalbuminuria group compared to normoalbuminuria group. It was also found in our study that diabetic nephropathy is associated with hs-CRP level.

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