Lecithin:cholesterol acyltransferase (LCAT) Activity in Chronic Kidney Disease

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Background/Aims

The LCAT activities have been shown to decrease in ESRD, the corresponding plasma LCAT activities at the different CKD stages, however, are not known. The aim of this study was to evaluate whether LCAT activities also decrease in mild to moderate renal dysfunction groups.

Patients and Methods

The study included 186 patients whose plasma LCAT activitie measured by enzymetic method from 2011 to 2012 at a single Other parameters relate to lipid profile, including apolipoprot apolipoprotein B, and lipoprotein(a) were also evaluated observational cross-sectional study. We excluded the popula dailysis.

Results

Basic characteristics of the study subjects

	n=171
Age, yr	56 ± 19
male, n(%)	87 (50.9)
BMI, kg/m^2	23.8 ± 4.0
DM, n(%)	63 (36.8)
HBP, n(%)	94 (55.0)
smoker, n(%)	39 (22.8)
statin use, n (%)	32 (18.7)
fenofibrate use, n (%)	3 (1.8)
omega-3 use, n(%)	8 (4.7)
SBP, mmHg	132.4 ± 23.2
DBP,mmHg	78.6 ± 12.6
Hct, %	32.6 ± 7.7
BUN, mg/dl	41.4 ± 35.4
serum Creatinine, mg/dl	3.7 ± 4.3
eGFR, ml/min/1.73m^2	45.4 ± 38.3
serum albumine, g/dl	3.8 ± 0.9
Ca, mg/dl	8.6 ± 1.1
P, mg/dl	4.3 ± 1.4
iPTH, pg/ml	74.8 ± 85.7
Uric acid, mg/dl	7.7 ± 4.4
AST, IU/L	33 ± 98
ALT, IU/L	27 ± 67
hsCRP, mg/l	15.1 ± 38.5
HbA1C, %	5.9 ± 1.4
fT4, ng/dl	1.21 ± 0.29
TSH, mIU/l	3.6 ± 12.5
Proteinuria, g/day	1.83 ± 2.67
microalbuminuria, g/day	1.23 ± 1.84

The mean of plasma LCAT activities among all individuals was 70.45 ± 24.25 (U nmol/ml/hr/37'C). The LCAT activities of each CKD stage 1-5 were 83.2 ± 19.1, 83.9 ± 22.1, 65.1 ± 24.7, 67.1 ± 26.6, and 60.2 ± 20.2, respectively (U nmol/ml/hr/37'C). The present data showed that more advanced CKD stages tend to have the lower LCAT activities, correlated with lower the HDL cholesterol level, although it did not have statistical significance. In more advanced CKD stages, plasma apoA-I level significantly decreased, while apoB, and Lp(a) showed no differences.

Multivariable regression analysis demonstrated that plasma activities were associated positively with estimated GFR (β=0 p=0.001), and negatively with age (β=-0.182, p=0.002), as well as the interaction between LCAT activities and the amoun microalbuminuria (β=0.003, p=0.003), independent of diabetes, h and BMI.

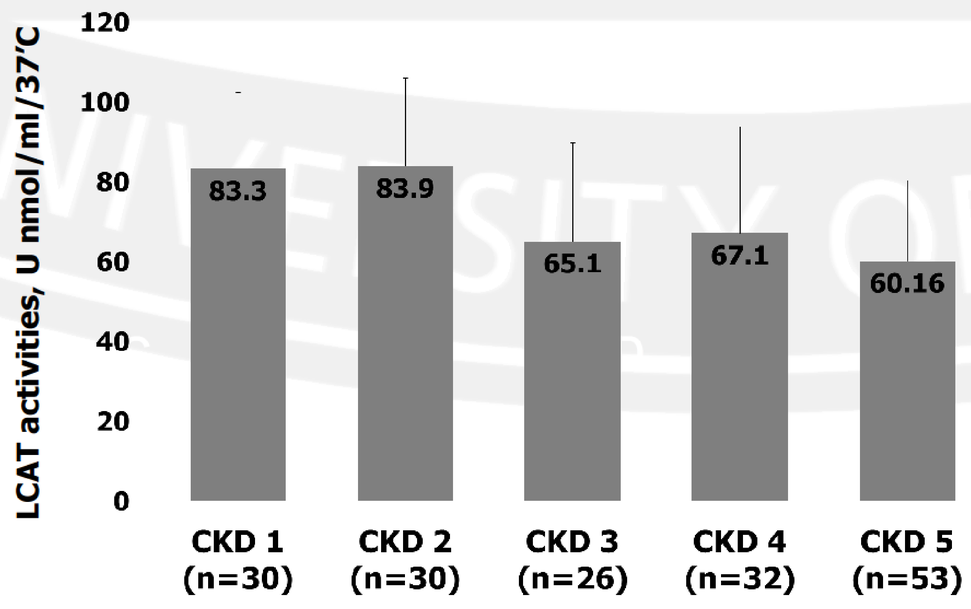

Fig. The LCAT activities at the different CKD stages
*CKD 5 subgroup exclude the patients on dialysis

The linear regression analysis between LCAT activities and variable parameters

parameters	Univariate		Multivariate	
	β coefficient	*p*	β coefficient	*p*
Sex	-6.639	0.073		
Age	-0.498	<0.001	-0.182	0.00
BMI	1.051	0.033	1.071	0.0
smoker	-3.966	0.371		
DM	-12.902	0.001	-12.437	0.00
HBP	2.707	0.469		
statin	-8.383	0.078		
SBP	-0.113	0.163		
DBP	0.046	0.757		
microalbuminuria	0.101	0.192	0.003	0.00
HbA1C	0.167	0.898		
hsCRP	-0.212	<0.001	-0.157	<0.00
uric acid	-0.733	0.085		
eGFR	0.24	<0.001	0.203	0.00

The lipid profile and other parameters relate to metabolism at the different CKD stages

	Total population (n=171)	CKD 1 (n=30)	CKD2 (n=30)	CKD3 (n=26)	CKD4 (n=32)	CKD5 (n=53)	p-value
TC, mg/dl	177 (166-188)	183 (149-217)	185 (150-220)	158 (141-175)	189 (155-189)	172 (155-189)	0.493
TG, mg/dl	152 (137-166)	127 (100-153)	173 (132-215)	142 (113-170)	185 (132-239)	139 (121-158)	0.077
HDL, mg/dl	41 (39-43)	51 (46-55)	46 (41-50)	39 (35-43)	40 (36-44)	34 (32-37)	<0.001
LDL, mg/dl	102 (95-108)	114 (90-138)	107 (96-118)	39 (35-43)	102 (89-116)	98 (85-111)	0.259
ApoA-I, mg/dl	122 (118-126)	141 (132-150)	130 (118-142)	123 (114-133)	119 (112-126)	109 (102-115)	<0.005
ApoB, mg/dl	92 (87-96)	94 (79-109)	89 (79-99)	86 (78-95)	98 (86-111)	90 (81-98)	0.599
Lp(a), mg/dl	27 (22-31)	18 (10-25)	18 (11-24)	20 (10-30)	32(20-45)	37 (27-46)	0.005
LCAT, U nmol/ml/37'C	70.4 (66.8-74.1)	83.3 (76.2-90.4)	83.9 (75.7-92.2)	65.1 (55.2-75.1)	67.1 (57.6-76.7)	60.16 (54.6-65.7)	<0.001

Conclusion

The plasma LCAT activities decreased at more advanced CKD stages, even after adjustment for other confounder factors. The present results s that plasma LCAT activity is as potential therapeutic target for dyslipidemia in CKD.