

(LDL)

**

*

C E

(TAS)

(SOD)

:
- 1

(TBARS)

- 2

LDL

LDL

C E

LDL

TBARS

- 3

IN VITRO

C E

LDL

. IN VIVO

Effect of hypoalbuminemia on the susceptibility of low-density lipoprotein(LDL) to oxidation ; the protective role of antioxidants

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Abstract

Albumin has an important extra cellular antioxidant effect which prevents lipid peroxidation. This study was conducted to investigate the effect of low albumin level in patients with chronic moderate renal failure(CMRF) and nephritic syndrome(NS) on the susceptibility of LDL to oxidation, and the protective role of vitamins C and A in this process. The results of this study have shown that:

1- the levels of total antioxidants(TAS) and superoxide dismutase(SOD) decreased in plasma because they were consumed. This was noticed in the two conditions. Additionally, albumin level decreased, this was more evident in NS than in CMRF patients.

2- the degree of lipid per oxidation reactions increased as well as the level of thiobarbituric acid reactive substances(TBARS) in serum and in LDL particles. The levels increased further when oxidation was induced by the addition of copper ions to serum or incubating media, and this increase correlates with disorders in blood lipid levels.

3- the level of TBARS decreased in serum and in LDL after the addition of vitamins E and C to the incubating media, indicating a protective role of these vitamins against the negative consequences of low albumin level.

In conclusion, this study provides evidence of the increased susceptibility of LDL to oxidation when albumin level is low in CMRF and NS patients . The study also pointed to the potential role of vitamins E and C in the protection against the atherogenic effect of LDL oxidation.

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LpA-1

in vitro

(HDL)

)

[2·5]

(

(SOD) superoxide dismutase

[5·9·20]

[1·9]

(SH)

. [2·9]

()

()

LDL

Nephrotic syndrome

sacrificial antioxidant " "

. [9·11]

Chronic moderate renal failure

LDL

:
(-)E)
[9·22]()C .[4·6·13·18·26](

. [1·7·9·23])
(T.G
LDL
[15·16·21·23·25]HDL

LDL

. [7·8·14·17·19]

Total antioxidant status

E (TAS)
()C

(LDL)

: -1
HDL- و LDL-Ch و (T.Ch)
(T.G) Ch .
:

. BIOMERIEUX
-2 :
(TAS) -1
(SOD) .(n = 20)
-2
. RANDOX .(n = 13)
(n=9) -3
3 2

. / =

.(1)
-3

)

Thiobarbituric acid reactive (TBARS)substances
:

[9.22]

/ 3 EDTA (pH)

[10.24]

TBARS

P

P> 0.01

.P>0.001 LDL - 4
: 6000

[3] polyethylene glycol

LDL TBARS

(1)

(1)

LDL

: Cu++

- 1

-LDL

3 2 [5.10] / 5

E

(CMRF) %24+:(%100) 1/ 20

(CMRF) %51+ †(NS) %15+‡ 6 C

(CMRF) %72+ †(NS) %37+‡ 1/

(NS) %62+‡

	LDL (%35+و%50+)	- HDL	
C E	% 25+و%41 +	-(CMRF) %33 -:	
	.	%15- (NS)%28	
		-(NS)%24-(CMRF)	
		(NS)%33-(CMRF)%22	
		.	
(1-1)		TAS -2	
		3 2 SOD	
	(CMRF)	(CMRF)% 37 - :	
	(N.S)	(CMRF)%19- ؛(NS)%31-و	
		(NS)% 30 -و	
T.Ch		/TBARS -3	
،%51+ ،%24+ :T.G و Ch-LDL		3 2	
(CMRF) %72+		(%22+و%40+)	
في % 62+ ،%37+،%15+و		%63+	
	(N.S)		
-HDL		(%42+و	
في%28- (CMRF) % 33 -Ch		C و E	
	(N.S)	(%19+و%50 +)	
		.	
		TBARS - 4	
		3 2 LDL	
		(% 28+و% 36+)	
		E (%33+و%46+)	
		(%26+ و% 40 +) C و	

[9·13·17·22·23]

SOD

[4·15·18·25]

(2-1)

()

SOD

-

[1·9]

CMRF % 22

(7-1 6-1 5-1)

N.S % 33-

(5-1)

[4·6·13·18·19·26]

و 3 - 1)

TBARS

(4-1

CMRF %22+ و %40+

N.S

31-CMRF

%37-)

TAS

()

(N.S %

%63+

- CMRF

%19-)SOD

%42+

(N.S %30

(Cu++)

%19+ و %50+

)

(

C E

CMRF

N.S

LDL TBARS

(CMRF)%46+

-Ch T.G

)

(N.S)%33+

(HDL-Ch

LDL

LDL

%35+ و %50+

.... TAS SOD)

(

LDL

N.S CMRF

(1)

(LDLx)

LDL

6- 1)

LDL

(7-1 و

T.G

CMRF

LDL

N.S

TAS

(7-1)

LDL

E

C و

LDL

C E

LDL

LDL

E

HDL

LDL

C

[9•11•12•14•22]

C, E

()

(1-2)

(2)

LDL

LDL TBARS

[9•21•22]

LDL -Ch

LDL

LDL

T.G

HDL-Ch

1)

HDL

-

N.S %33-

(1

(CMRF %22

HDL

-

N.S %30-) SOD

LDL

(CMRF %19

(3-2) . SOD LDL
(2-2)
SOD
SOD SOD .LDL TBARS
LDL
() N.S CMRF
()
(4-2)
TBARS
) LDL (TBARS) CMRF
(LDL N.S
()
N.S CMRF :
(TAS) SOD HDL -Ch
T.G LDL-Ch
)
(LDL
TBARS
(5-2)
(TAS)

LDL TBARS

TAS

.CMRF

LDL

-

-

C & E

(SOD)

in vitro

(TAS)

LDL

-

-

.in vivo

- 1 – Adachi T , Nakamura M , et al . Quantitative and qualitative changes of extracellular superoxide dismutase in patients with various diseases . Clin. Chim. Acta . , 1994 Sep. ; 229 (1-2).
- 2 – Decossin C , Tailleux A , Fruchart J . C , et al . Protective of in vitro low – density lipoprotein oxidation by an albumin – containing LpA – 1 subfraction . Bioch. Biophys. Acta. 1995 , Mar 2 ; 1255 (1) .
- 3 – Demacker P N , Hijmans A G , Vos – Janssen , et al . A study of the use of polyethylene glycol in estimating cholesterol in high – density lipoprotein . Clin. Chem. 1980 ; 26 .
- 4 – Demant T , Mathes C , Gutlick K , et al . A simultaneous study of the metabolism of apolipoprotein B and albumin in nephrotic patients . Kidney Int. , 1998 Dec . 54 (6) .
- 5 – Dobrian A , Mora R , et al . In vitro formation of oxidatively – modified and reassembled human low – density lipoproteins : antioxidant effect of albumin . Biochim – Biophys – Acta . 1993 Jul. 21 , 1169 (1) .
- 6 – Durrington P N , Ishola M , et al . Influence of proteinuria on vascular disease , blood pressure , and lipoproteins in insulin dependent diabetes mellitus , Br. Med. (Clin. Res . Ed .) 1987 . Jun. 27 .
- 7 – Efe H , Deger D , Kirci D , et al . Decreased neutrophil antioxidative enzyme activities and increased lipid peroxidation in hyperlipoproteinemic human subjects . Clin. Chim. Acta . , 1999 Jan. ; 279 .
- 8 – Enas A , Rockford I . triglycerides and small , dense low – density lipoprotein . JAMA , Dec. 16 . 1998 , vol. 280 N° 23 .
- 9 – Halliwell B , Gutteridge J . M . C . Free radicals in biology and medicine . Oxford university press . 1999 .
- 10 – Jialal I , Scaccin C , et al . Laboratory assessment of lipoprotein oxidation . Aacc. Press , Washington , 1993 . 17 .

- 11 – Kazlov A V , Panasenko O M , et al . Antioxidant properties of albumin during the oxidation of linolenic acid and low - density lipoproteins in the presence of ferrous ions . *Biomed. Sci.* 1991 . 2 (5) .
- 12 – Krauss R M . Dense low density lipoproteins and coronary artery disease . *Am. Journ. Cardiol.* 1995 , feb. 23 ; 75 (6) .
- 13 – Luft F C . Renal disease as a risk factor for cardiovascular disease . *Basic Res. Cardiol.* 2000 ; 95 suppl. 1 : 172 – 6 .
- 14 – Morena M , Cristol J P , et al . Protective effects of hig - density lipoprotein against oxidative stress are impaired in haemodialysis patients . *Neph. Dial. Transplant.* 2000 Mar; 15 .
- 15 – Muntner P , Coresh J , Smith J C , et al . Plasma lipids and risk of developing renal dysfunction : the atherosclerosis risk in communities study . *Kidney Int.* 2000 , Jul. 58 .
- 16 – Noto D , Barbagallo C M , Cascio A L , et al . Lipoprotein (a) levels in relation to albumin concentration in childhood nephrotic syndrome . *Kidney Int.* 1999 Jun. 55 (6) .
- 17 – Ong – Aiyooth L , et al . Lipoproteins and lipid peroxidation abnormalities in patients with chronic renal disease . *J. Med. Assoc. Thai.* 1996 Aug. ; 79 (8) .
- 18 – Sechi L A , Zingaro L , Catena C , et al . Lipoprotein (a) and apolipoprotein (a) isoforms and proteinuria in patients with moderate renal failure . *Kidney Int.* 1999 Sep.; 56 .
- 19 – Shearer G C , Kaysen G A . Proteinuria and plasma compositional changes contribute to defective lipoprotein catabolism in the nephrotic syndrome by separate mechanisms . *Am. J. kidney Dis.* ; 2001 Jan. ; 37 (1) .
- 20 – Shimonoo M , Pinchuk I , et al . Susceptibility of serume lipids to copper – induced peroxidation correlates with the level of high – density lipoprotein cholesterol . *Lipids* , 1999 , Mar. ; 34 (3) .
- 21 – Skrzep – poloczek B , et al . Nephrotic origin hyperlipidemia , relative reduction of vitamin E level and subsequent oxidative stress may promote atherosclerosis . *Nephron* , 2001 Sep. ; 89 (1) .
- 22 – Wardle E N . Antioxidants in the prevention of renal disease . *Ren. Fail.* 1999 , Nov. ; 21 .
- 23 – Warwick G L , Waller H , Ferns G A . Antioxidant vitamin concentrations and LDL oxidation in nephrotic syndrome . *Ann. Clin. Biochem.* 2000 Jul. ; 37 (4) .
- 24 – Wasowicz W , Neve J , Peretz A . Optimized steps in fluorometric determination of thiobarbituric acid . *Clin. Chem.* 1993 . (39) .
- 25 – Wheeler D C . Lipid abnormalities in the nephrotic syndrome : the therapeutic role of statins . *J. Nephrol.* 2001 Nov. – Dec. ; 14 suppl. 4(4) .
- 26 – Zanetti M , et al . Plasma protein synthesis in patients with low – grade nephrotic proteinuria . *Am. J. Physiol. Endocrinol. Metab.* 2001 Apr. ; 28 (4) .

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.2003/8/12: