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Interaction between Metabolic syndrome and oxidative stress in hypertensive patients

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BACKGROUND

Oxidative stress, obesity and metabolic syndrome are implicated in the physiopathology of hypertension. Visceral adipose tissue is a regulating tissue of lipid metabolism, but it plays a major endocrine role by the secretion of adipocytokines, and controls insulin sensitivity.

OBJECTIVES

The aim of this work is the determination of oxidized LDL and antioxidant vitamins (A/E) levels in hypertensive patients, and correlate to the studied metabolic parameters Iinsulin resistance and Metabolic syndrome (MS)

METHODS

It is a prospective descriptive study, performed in 245 Algerian hypertensive patients, mean age: 57 (8,49) years, 118 women and 42 men. A fasting metabolic assessment was performed (glycemia, renal status, a complete lipid profile: total cholesterol, triglycerides, HDLc, LDLc, CRPus and insulinemia), these parameters were determined by methods certified on Cobas 6000. Insulin resistance was estimated by the HOMA-IR, coupled with anthropometric measurements (weight, BMI and waist circumference). Leptin, adiponectin and oxidized LDL were determined by ELISA, antioxidant vitamins (A/E) were measured by HPLC.

RESULTS AND DISCUSSION

In our study, hypertensive women predominate with 89.42%, compared to men (20.58%).
The age group [50-59 [years represents 42.85%, followed by hypertensives over than 60 years (30.35%).
HTA was diagnosed <5 years for the 40,81% of patients, followed by those with hypertension ≥10 years (24.5%). 88% of them are followed and treated for their hypertension.
The most prescribed antihypertensive in our patients are ARAII (48.83%), diuretics (33.02%) and calcium channel blockers (25.11%). The prevalence of metabolic syndrome, as defined by NCEP-ATPIII in our series is 47,35%, we observed that 45% of patients are sedentary, 47% are overweight and 36.25% of them are obese.
The prevalence of insulin resistance evaluated by the HOMA index is 45%. Leptinemia results in patients show that the concentration is 38.22(24.31) ng / ml in HTA with MS, and 33.34(19.62) HTA without MS. It is higher in obese hypertensive patients.
For adiponectin, there is a statistically significant difference (p = 0.046), with a mean low concentration for the MS + group 6.92 (3.18) ng / ml, whereas for HTA without MS the mean concentration is higher 8.74(5.02) ng / ml.
For oxidized LDL, 4.58 (3.74) µg / ml MS + and 2.16 (1.41) µg / ml were found for the group without MS, with p <10-5.
For the HOMA-IR, there is a significant difference between the two groups (p = 0.002), the patients with MS have a marked IR compared to the HTA without MS.
Statistical analysis reveals in HTAs with MS that there is a positive and significant correlation between leptin and anthropometric parameters (TT, BMI, weight) and with HDLc. A negative correlation with TG.
Our preliminary results implicated an increased oxidative stress in hypertensive patients with MetS and a decreased antioxidative defence (vitamin E: p=0,002/ alpha-tocopherol: $p<10^{-6}$,that correlated with serum leptin and anthropometric biomarkers (BMI, waist circumference).
In patients with stage 1 and 2, there is a significant difference between the 2 groups according the MS in vitamin A (p=0,005), vitamin E ($p<10^{-7}$), oxLDL (p=0,003),CRP (p=0,01), UA (p=0,05), leptine (p=0,007) and adiponectine(p=0,02).

Adipocytokines and oxidative stress in HTA patients according to MS

	HTA(with MS) (N=115)	HTA(without MS) (N=130)	p
Leptine (ng/ml)	38,22 (24,31)	33,34 (19,62)	**0.10**
Adiponectine (ng/ml)	6,92 (3,18)	8,74 (5,02)	**0.046**
Oxidized LDL (µg/ml)	4,58 (3,74)	2,16 (1,41)	**$<10^{-5}$**
HOMA-IR	2.95 (1.61)	2.07 (1.38)	**0,002**
GPx (U/gHb)	71,66 (25,67)	72,76 (29,21)	0.82
SOD (U/grHb)	879,76 (369,85)	861,65 (383,31)	0.74
Vitamine A (µmol/l)	1,89 (0,48)	2,03 (0,69)	**0.06**
Vitamine E (µmol/l)	23,09 (8,10)	25,28 (6,73)	**0.002**
Index alpha tocopherol	3.53 (1.29)	4.30 (1.28)	**$<10^{-6}$**

conclusion

In our series, the preliminary results suggest that there is an important metabolic role of adipocytokines and oxLDL, they interact directly with the insulin signal transmission pathways, their measurement with the antioxidant vitamins allows to complete the metabolic balance especially in hypertensive patients with metabolic syndrome.

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oxydative and cardiometabolic parameters in patients stage 1 and 2

HTA stage 1 and 2	HTA with MS (n=43)	HTA without MS (n=46)	P
PAS (mmHg)	147 (12,61)	146 (10,08)	0.68
PAD (mmHg)	92,14 (7,17)	84,64 (10,82)	**0.0003**
HOMA-IR	2,56 (1,22)	2,24 (0,96)	0.18
LDL ox (µg/ml)	2,79 (2,45)	1,575 (0,87)	**0.003**
GPx (U/gHb)	75,55 (25,78)	75,12 (35,34)	0.95
SOD(U/gHb)	835,48 (313,03)	732,79 (234,46)	**0.09**
CRP(mg/l)	6,96 (6,24)	3,74 (5,9)	**0.01**
Ac urique (mg/l)	46,23 (13,84)	41,21 (11,49)	**0.05**
Leptine (ng/ml)	39,19 (20,33)	27,08 (19,63)	**0.007**
Adiponectine (ng/ml)	8,85 (4,01)	7,01 (3,09)	**0.02**
vitamine A (µmol/l)	1,68 (0,57)	2,18 (0,72)	**0.005**
vitamine E (µmol/l)	17,74 (11,12)	34,33 (12,18)	**$<10^{-7}$**
Index tocophérol	2,82 (1,86)	5,84 (1,99)	**$<10^{-7}$**