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FEVER STRESS AND ALPHA 1 ANTITRYPSIN

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Abstract. The behaviour of alpha 1 antitrypsin in fever stress condition had been investigated on a lot of 51 males and females subjects. 76.4% of them had adaptative reaction by increasing the alpha 1 antitrypsin; 23.5% with basal normal values had no significant reaction in the fever phase and only one subject was deficiently in both conditions. The significance of the non-reactive subjects supports discussion about their limited antielastatic capacity in important aggressions, in spite of the normal basal values.
Key words: alpha 1 antitrypsin, fever stress, antiproteasic marker

Rezumat. Pe un lot de 51 subiecți, neselecționați, s-a studiat comportamentul alfa 1 antitripsinei în condițiile stressului termic. 76,4% dintre subiecți au reacționat adaptativ prin creşterea alfa 1 antitripsinei, 23,5% cu valori bazale normale nu au reacționat semnificativ în faza febrilă, un singur subiect fiind deficitar în ambele condiții. Semnificația celor nonreactivi comportă discuții asupra capacității lor antielastazice limitate la agresiuni importante, în ciuda faptului că dispun de valori bazale normale.
Cuvinte cheie: alfa 1 antitripsina, stress termic

INTRODUCTION

The enzymatic theory of emphysema had been suggested by the observations of Laurell and Eriksson (1) who had correlated this disease with the deficit of alpha 1 antitrypsin. The experimental emphysema realized by Gross (2) using proteolytic enzymes (propaine) strengthen this theory which presumes an excessive proteolytic activity most of neutrophilic elastase, insufficiently inhibited in the context of alpha 1 antitrypsin deficit (3,4,5). The heterozigous deficit, characterized by a drastic decrease of the enzymatic activity is associated with severe early emphysema but it is a rare condition (6,7,8,9). More frequently the presence of an emphysema not correlated with alpha 1 antitrypsin deficiency is observed in clinical pathology explained by an excess of aggressions, alpha 1 antitrypsin activity been overwhelmed by the elastase (10), or by an inactivation of alpha 1 antitrypsin by the oxidative agents (10,11). We have been preoccupied by this relative deficit. So, the question was if the alpha 1 antitrypsin has an adaptative reaction by increasing the concentration or the activity following intense aggressions (12,13,14). The aim of this study was the assessment of the serum level of alpha 1 antitrypsin in the conditions of fever stress on a group of patients.

SUJECTS AND METHOD

The study protocol was formulated according to both Infectious Diseases Hospital and the Immunollogy Laboratory of Medical Clinic No. 1. 10 ml blood sample from 70 hospitalized patients with high fever (over 38°C during at least 72 hours), have been taken. Eight weeks following the hospital discharge, the patients have been invited at Occupational Diseases Hospital for a clinical examination and blood tests. Fifty one (72.8%) agreed to participate: 29 males and 22 females with age between 19 and 70 years (mean age 43.39 ± 14.96).

Hospital diagnoses included: upper respiratory tract viroses (29 subjects); acute viral pulmonary disorders (12 subjects); infections mononucleosis (6 cases) and pielonephritis (4 cases). Samples of 10 ml blood, were taken and similarly treated as former ones: serum from coagulated blood was frozen at –20°C.

The serum alpha 1 antitrypsin concentrations have been measured by the same laboratory team, without knowledge of sample's origin.

The alpha 1 antitrypsin level was carried out by radial immunodiffusion (Mancini) using specific antibodies (anti alpha 1 antitrypsin) prepared by "Cantacuzino" Institute from Bucuresti, on polystyrene immunoplaques, on each plaque were applied 12 serum samples. The covered plaques were incubated for 48 hours at 37°C. The diameter of precipitation ring was measured and compared to a curve of reference serum ring. The calculated quantitative value of alpha 1 antitrypsin was expressed in mg/dl.

RESULTS AND DISCUSSION

Blood samples of 51 healthy respondents show normal levels of alpha 1 antitrypsin (200 mg/dl) for 48 (94.11%) of them and lower ones for 3 subjects (5.9%) as fig. 1 indicates.

During the febrile period the alpha 1 antitrypsin levels increased significantly for 39 subjects (76.5%) as fig. 2 shows, and the increased levels of alpha 1 antitrypsin found is illustrated in fig. 3.

At 12 subjects (23.5%) the blood concentration of alpha 1 antitrypsin shown small variations, considered as a non significant reaction. The average value of alpha 1 antitrypsin was of 326.25 ± 104.66 mg/dl in normal condition and a decreased level of 274.58 ± 39.45 mg/dl in fever phase ($p>0.05$).

Different reactions were observed in the 3 cases with lower normal values. One case had a good reaction, alpha 1 antitrypsin increasing from 165 mg/dl to 465 mg/dl, another had a small increase from 125 mg/dl to 225 mg/dl and the third had deficient values in both phases with an insignificant increase from 115 to 150 mg/dl.

The observations of this study underlines that alpha 1 antitrypsin can not be regarded as an antiproteasic marker by a simple dosage. The behaviour of our cases shows that this antiprotease has adaptative changes and that fever stress is a non specific factor which stimulate the synthesis (liver release) of alpha 1 antitrypsin.

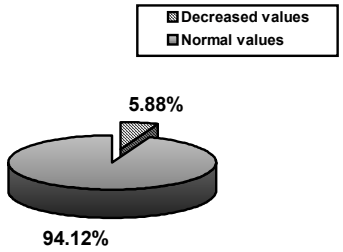

Fig.1 Study group alpha 1 antitrypsin values comparatively to normal values

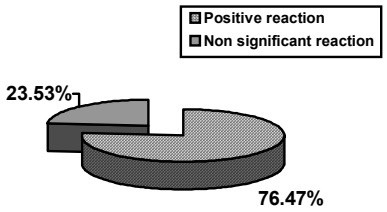

Fig.2 Alpha 1 antitrypsin reaction reported to fever phase

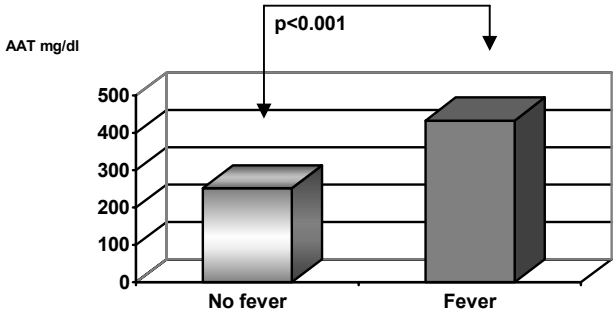

Fig.3. Average values of alpha 1 antitrypsin at reactive subjects

This study showed that 5.9% from subjects can be considered as alpha 1 antitrypsin deficient but the dynamic investigation revealed that after fever stress only one subject remains in the domain of deficit. Important is that 23.5% from the subjects were proved to be non-reactive for the alpha 1 antitrypsin mobilization by fever. The theoretical importance is the opening for discussion on the relative deficit meaning that the antiprotease, although in basal conditions appears as normal, has no adaptative increase in stress condition or exposure to respiratory irritants with toxic effects on PMN and even on macrophages (15,16). In this way, the elastase excess caused episodically (by infections, heavy exposure to irritants)

or continuously (smoking, occupational exposures) will not be enough annihilated by the antiprotease.

CONCLUSIONS

- Fever stress had shown to be stimulative for 76.5% of the subjects proved by a significantly increased of alpha 1 antitrypsin levels.
- Although in basal conditions the serum concentration was normal, 23.5% from the subjects had no significant reaction by increasing alpha 1 antitrypsin in fever phase.
- The significance of the non-reactive subjects may be discussed regarding the limited antielastatic capacity at important aggressions, in spite of their normal basal values.

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