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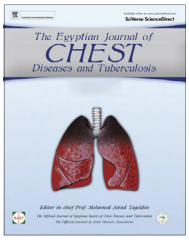

ORIGINAL ARTICLE

Evaluation of B-type natriuretic peptide in patients with community acquired pneumonia

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KEYWORDS

B-type natriuretic peptide
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C-reactive protein
Erythrocyte sedimentation rate
The area under the curve

Abstract *Background:* Community acquired pneumonia (CAP) is a widespread disease, brain natriuretic peptide (BNP) shown to be elevated in patients with congestive heart failure, acute myocardial infarction and massive pulmonary embolism, BNP levels have been found to be significantly elevated in CAP with a positive correlation to CRP and also low levels of BNP predict treatment success.

Objective: The aim of this study was to evaluate the utility of cardiac stress marker B-type natriuretic peptide in patients with CAP without sepsis or shock.

Patients and methods: 26 patients with CAP were eligible for study in addition to 10 healthy control cases, cardiac stress marker BNP and inflammation marker (CRP, white blood cell count, ESR) were measured in patients with CAP.

Results: The mean serum level of initial BNP level was significantly higher (86.75 ± 25.91 pg/ml) in patients with CAP than the control group (30.70 ± 6.77 pg/ml) with p-value <0.001 and also

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significantly lower after treatment (40.15 ± 9.60) with p-value < 0.001, BNP significantly positively correlated with (CRP) in patients before treatment ($r = 0.709$, $p < 0.001$) and also positively correlated with CRP after treatment ($r = 0.490$, $p = 0.011$), there was significant negative correlation between initial BNP level and partial arterial oxygen pressure ($r = -0.409$, $p = 0.038$). The optimal cut-off for BNP was 47.0 pg/ml at admission vs 39.5 pg/ml after treatment.

Conclusion: In this study BNP levels show a transient rise in patients with community acquired pneumonia and correlate well with CRP, low levels of BNP adequately identify patients with an uncomplicated disease course.

Introduction

Community-acquired pneumonia (CAP) is a common and leading infectious cause of death throughout the world. Although the mortality rate in CAP patients has decreased with widespread use of antibiotic therapy, the mortality rate for hospitalised CAP patients ranges between 10% and 15% [1,2].

Brain natriuretic peptide (BNP) is a neurohormone secreted by the heart in response to myocardial stretch caused by volume overload. It has been demonstrated to be a neurohumoral marker for left ventricular dysfunction and a potent prognostic marker in congestive heart failure patients [3].

BNP regulates a wide array of physiological effects including natriuresis, diuresis and vasodilatation, the main stimulus for the secretion of BNP is cardiac stress reflected by myocardial stretch and pressure or volume overload [4].

Recently pro-inflammatory cytokines and the activation of the sympathetic nervous system have been identified as additional triggers inducing BNP secretion [5].

They have been studied for the diagnosis and prognosis of patients with congestive heart failure, myocardial infarction, pulmonary embolism and sepsis [6,7].

Consequently, BNP levels may reflect the severity of pneumonia, displayed by pulmonary hypertension, right ventricular pressure overload and the inflammatory cytokine response, as well as the presence of disease-relevant co-morbidities, namely heart failure and renal dysfunction. In a pilot study we found promising results for the ability of BNP to predict death in selected patients with CAP [8].

In patients affected by an infectious disease but without sepsis or shock, study results are still controversial [9,10].

It has been shown that increased BNP levels in patients with acute phase pf Kawasaki disease significantly decrease after treatment [11].

The aim of this study was to evaluate the utility of BNP in CAP without sepsis or shock.

Patients and methods

The case control study was conducted on 26 cases with the diagnosis of community acquired pneumonia (CAP) and healthy control cases, both patients and control were cross matched for age and sex.

CAP was defined by the presence of one or several of the following recently acquired respiratory signs or symptoms, cough, sputum production, dyspnoea, core body temperature > 38.0 °C, auscultatory findings of abnormal breath sounds and rales, white blood cell count >10 or $< 4 \times 10^9$ cells L^{-1} and an infiltrate on chest radiograph [12].

Exclusion criteria

Exclusion criteria were history of heart failure, clinical, radiological, or echocardiographic evidence of heart failure, history of renal failure, chronic obstructive pulmonary disease, cirrhosis of liver, hypertensive heart disease, pregnancy, pulmonary hypertension, pulmonary embolism, cystic fibrosis, active pulmonary tuberculosis, hospital-acquired pneumonia, immunodepression.

All patients underwent laboratory tests at admission and at 15th day of the treatment which include white blood cell count, erythrocyte sedimentation rate, C-reactive protein, arterial blood gas (ABG), and BNP level.

CRP was analysed with a Ray Bio-Human CRP ELISA (Enzyme-linked immunosorbent Assay) KIT (Ray Biotech, Inc, USA), BNP assay was performed by the use of microplate-based immunoassay (Abbot laboratories, Abott park, IL).

Statistical analysis

Data were analysed using SPSS (Statistical Package for Social Sciences) version 15. Qualitative data are presented as number and percent. Comparison between groups was done by Chi-Square test. Data were presented as mean ± SD. Paired t-test was used for comparison within groups. Student t-test was used to compare between two groups. Pearson's correlation coefficient was used to test correlation between variables. $P < 0.05$ was considered to be statistically significant.

Results

This study was conducted on 26 cases with the diagnosis of community acquired pneumonia (CAP) and 10 healthy control cases, both patients and control were cross matched for age and sex.

Table 1 Demographic and BNP (initial) data of the case control study population.

	Cases ($n = 26$)	Control ($n = 10$)	P Value
Age (years)	48.54 ± 5.46	45.40 ± 4.90	0.122
Sex			0.763
Male	17 (65.4%)	6 (60%)	
Female	9 (34.6%)	4 (40%)	
BNP (pg/ml)	86.73 ± 25.91	30.70 ± 6.77	< 0.001

Data are represented as mean ± SD.