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*LETTER TO THE EDITOR*

# RELEVANCE OF SERUM ALKALINE PHOSPHATASE AS A DIAGNOSTIC AID IN LUNG PATHOLOGY

Sir,

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Alkaline phosphatase (ALP, 3.1.3.1) is a dimeric glycoprotein present in humans that catalyses the hydrolysis of orthophosphoric monoesters at alkaline $P_H$ (1). It has been reported to occur in abundance in human bile canaliculi, bone, intestine, placenta and kidney (1). Hence serum ALP levels has been extensively used as a diagnostic tool for hepatobilliary disorders particularly in patients with extrahepatic cholestasis (2). It has also been suggested to be useful in the diagnosis of malignancies and diseases affecting the liver (3,4), bone (5) and kidney (6). However, in the last few years a number of workers have reported serum ALP as a useful diagnostic parameter in certain types of lung disorders (7–9). In the light of this information available in scientific literature the aim of the present work was to evaluate and confirm the extent of utility of serum ALP as a diagnostic marker for various lung pathology.

Serum was separated from 5 ml of venous blood collected in aseptic syringe without anticoagulants from patients with different types of lung diseases admitted to Wenlock Government Hospital and Attavar Cancer Hospital located in Mangalore, Karnataka. The diagnosis of these patients were confirmed by the physicians of respective hospitals with the aid of results of various tests such as sputum and blood analysis, chest X-ray, ultrasound and CT scan. Samples were taken only from patients with confirmed diagnosis admitted to the respective hospitals who were yet to be put on regular treatment regimen. Normal controls constituted adults who were students and staff of the department. Serum was analysed on the day of collection without storage. ALP was measured as reported (10) using disodium phenylphosphate as the substrate. The phenol liberated by ALP action was estimated using 4–amino antipyrine and the colour developed analysed at 520 mm and calculation done using appropriate phenol standard. All chemicals used were of reagent grade. Statistical analysis was done based on students 't' test (11) and values expressed as mean ± standard deviation (SD).

The average mean serum ALP values when calculated separately for each of the lung disease showed values higher than that obtained for normal controls (Table I). However, serum ALP values were statistically significant when compared to controls only in adenocarcinoma, adenosquamous carcinoma and pulmonary tuberculosis (Table I). Moreover, when each

TABLE I: Serum ALP level in healthy normal controls and patients with different lung pathology.

| | No. of cases | Mean ± SD |
|---|---|---|
| | | King Armstrong units/100 ml |
| Normal controls | 15 | 10.2±1.6 |
| Chronic obstructive pulmonary disease | 20 | 11.5±8.8 |
| Squamous carcinoma | 25 | 12.2±4.5 |
| Adenocarcinoma | 15 | 28.1±17.8* |
| Adenosquamous carcinoma | 10 | 13.4±13.8** |
| Pulmonary tuberculosis | 20 | 19.4±9.3** |
| Bronchial asthma | 20 | 11.6±2.1 |

*P≤0.001; **P≤0.01

patients ALP values was segregated and categorised individually based on range of different serum ALP activity it was observed that some patients had enzyme values in the normal control range (Table II). This observation casts doubt on the utility of serum ALP as a marker for diagnosis of lung diseases.

Our study indicates that in some patients with confirmed lung pathology serum ALP values can still be found in the normal control range. The reason for this observation can be explained on the basis of information published that ALP in the lung is only found in plasma membrane and lemellar bodies of Type II alveolar epithelial cells (12, 13). Based on this information it would be logical to assume that an increase in serum ALP values above the normal control value could occur only in cases where these cells are involved in the disease process in the lung. Consequently it follows that if the lung pathology originates and develops in some other area of the lung devoid of Type II alveolar cells, there is no reason to expect perturbation in serum ALP level.

Further, we observed that the mean serum ALP values was higher in patients with lung disease when compared to mean normal control values. This observation was similar to that reported by others for status asthmaticus (14), adenocarcinoma of the lung

TABLE II: Segregation and categorization of patients on the basis of their individual serum ALP values.

| Range of ALP in KA units/% | 0–12 | 13–24 | 25–36 | 37–48 | 49–60 |
|---|---|---|---|---|---|
| | Percentage of cases | | | | |
| Chronic obstructive pulmonary disease | 70 | 30 | – | – | – |
| Squamous carcinoma | 64 | 32 | 4 | – | – |
| Adenocarcinoma | 20 | 20 | 26.7 | 26.7 | 6.6 |
| Adenosquamous carcinoma | 40 | 60 | – | – | – |
| Pulmonary tuberculosis | 25 | 55 | 15 | 5 | – |
| Bronchial asthma | 70 | 30 | – | – | – |

KA units = King Armstrong units

(15) and active tuberculosis (16). However, the above observation does not in anyway authenticate the validity of serum ALP as a diagnostic marker for lung disease in the light of what we have discussed earlier. Moreover, it was also observed that in certain cases of active lung disease when there was elevation of serum ALP, these values returned to normal levels consequent to complete cure of the lung pathology (data not shown). This observation validates the suggestion that serum ALP levels in lung diseases has more prognostic relevance than any diagnostic utility.

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