Serum Lysozyme in Crohn's Disease and Ulcerative Colitis

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SUMMARY
Serum lysozyme (muramidase) concentrations were determined in 55 patients with inflammatory bowel disease, 6 with miscellaneous bowel disease, 40 with pulmonary tuberculosis, and in 20 normal subjects. The mean (± SE) lysozyme concentration for each group was as follows: controls 6.95 ± 0.36 μg/ml; ulcerative colitis 9.61 ± 1.02 μg/ml; inactive Crohn's disease 7.61 ± 0.53 μg/ml; active Crohn's disease 20.77 ± 2.17 μg/ml; sputum-negative tuberculosis 13.05 ± 1.06 μg/ml; and sputum-positive tuberculosis 20.35 ± 2.08 μg/ml. The mean enzyme levels were significantly higher in patients with Crohn's disease than in those with ulcerative colitis (P<0.05) or in normal controls (P<0.01). Our findings suggest that serum lysozyme levels may be useful in differentiating active Crohn's disease from ulcerative colitis, but the results overlap somewhat. However, the enzyme level may be a useful index of disease activity in following up patients with Crohn's disease. As tuberculosis is endemic in this country it must first be excluded, because patients with pulmonary tuberculosis have similarly high levels of serum lysozyme.


Recent studies suggest that serum lysozyme concentrations may be useful in differentiating ulcerative colitis from Crohn's disease and also as an index of disease activity in patients with Crohn's disease. However, some workers have failed to find this clear-cut differentiation between Crohn's disease and ulcerative colitis in spite of higher mean enzyme levels in patients with Crohn's disease.

This study was undertaken to examine the diagnostic value of serum lysozyme concentrations in patients suffering from these diseases, and to compare the results with those in patients suffering from one of the endemic inflammatory diseases, namely tuberculosis.

PATIENTS AND METHODS
Investigations were performed on 35 patients with Crohn's disease, 20 with ulcerative colitis, 40 with pulmonary tuberculosis and 6 with miscellaneous bowel disease.

Twenty healthy volunteers without a history of gastrointestinal disease or tuberculosis were studied. These included 11 women and 9 men ranging in age from 20 to 68 years (mean 39 years).

Crohn's Disease
The diagnosis of Crohn's disease was assessed by clinical, radiological, endoscopic and histopathological criteria. This group included 17 women and 18 men ranging in age from 18 to 72 years (mean 38 years), the duration of their disease ranging from 6 months to 22 years. In 27 patients the histological picture was that of classic Crohn's disease. In 14 patients the disease was confined to the ileum, in 8 the disease was limited to the colon and in 13 there was ileocolic involvement. According to the criteria of De Dombal et al., the disease was graded as inactive or active, the patients with active disease all having moderate or severe disease activity. There were 17 cases of active and 18 of inactive disease. In 4 patients with active disease serum lysozyme levels were determined during periods of both exacerbation and remission.

Ulcerative Colitis
This group consisted of 12 women and 8 men ranging in age from 18 to 65 years (mean 41 years), with a disease history of 1 week - 12 years. In 12 patients the disease was confined to the rectum and sigmoid colon, while 8 had total colitis. The activity of the colitis was assessed by established criteria; 16 had mild or moderate disease and 4 severe disease. In all patients the diagnosis was confirmed histologically; also, the patients all had the classic clinical and radiological features associated with the disease. Sixteen patients were receiving corticosteroid therapy, either systemic or local, while all were receiving sulphasalazine (Salazopyrin).

Pulmonary Tuberculosis
Twenty women and 20 men ranging in age from 18 to 78 years (mean 41 years) were studied. Twenty had tubercle bacilli in their sputum at the time, and 20 had been sputum-negative for at least 1 month after therapy.

Miscellaneous Bowel Disease
There were 3 patients with coeliac disease, 2 with eosinophilic gastro-enteritis, and 1 with α-chain disease and lymphoma. All the diseases were histologically and biochemically proven.

Serum Lysozyme Determination
At least 1 serum sample was obtained from each subject and patient and stored at -20°C until the assay was...
performed. The serum lysozyme activity was determined by the lysoplate method, with standard solutions of egg white lysozyme (Boehringer). All subjects and patients had normal blood urea and creatinine levels.

Statistical comparisons were carried out by the unpaired Student t test.

**RESULTS**

The serum lysozyme concentration for each subject and patient is shown in Fig. 1. The mean lysozyme concentration (± SE) for each group was as follows: controls 6.95 ± 0.36 μg/ml; ulcerative colitis 9.61 ± 1.02 μg/ml; inactive Crohn's disease 7.61 ± 0.53 μg/ml; active Crohn's disease 20.77 ± 2.17 μg/ml; sputum-negative tuberculosis 13.05 ± 1.06 μg/ml; and sputum-positive tuberculosis 20.35 ± 2.08 μg/ml. The mean enzyme level for patients with active Crohn's disease was significantly higher than that for controls (P<0.01), for patients with ulcerative colitis (P<0.05) and for patients with inactive Crohn's disease (P<0.01).

In 4 patients with active Crohn's disease, serial measurements were made during the course of 1 year. Serum lysozyme levels were found to increase with exacerbation of the disease and to decrease during improvement. Fig. 2 depicts the serum lysozyme levels in a patient with typical Crohn's ileitis. The serum level was initially increased during an attack, fell during remission while the patient was on steroids and azathioprine, increased again during exacerbation of symptoms, and fell during relapse and returned to normal after surgical removal of the terminal ileum and caecum.

Of interest were the 2 patients with eosinophilic gastroenteritis who had very high levels of serum lysozyme (37.1 and 19.9 μg/ml); 1 patient with α-chain disease had a level of 13.5 μg/ml. The 3 patients with coeliac disease had normal levels.

**DISCUSSION**

In this study, serum lysozyme levels tended to be higher in patients with active Crohn's disease than in those with ulcerative colitis, and in patients with both of these diseases than in normal controls. However, the individual results overlapped considerably, and therefore serum lysozyme levels alone could not be used to differentiate Crohn's disease from ulcerative colitis as suggested by Falchuk et al. On the other hand the serum concentration of lysozyme appeared to be a useful index of disease activity as suggested by Falchuk et al. more recently, and may be useful in monitoring therapeutic response.

High lysozyme levels have also been detected in patients with granulomatous diseases such as sarcoidosis and tuberculosis, but the distribution of values also overlapped with that of controls. It seems likely that the raised serum lysozyme levels found in most of the patients with active Crohn's disease or other granulomatous diseases are derived from tissue macrophages, epithelial cells and Paneth's cells in the inflammatory region. In a country with a high incidence of tuberculosis it is important to exclude active tuberculosis before ascribing an elevated serum lysozyme level to activity of the bowel disease alone. Even the presence of inactive tuberculosis would seem to interfere with the clinical usefulness of this test.

We conclude that an increased level of serum lysozyme is not a good differentiating factor between Crohn's disease and ulcerative colitis, but that it may be a useful index of disease activity in patients with Crohn's disease.
We have, for the first time, also documented elevated levels of serum lysozyme in 2 patients with eosinophilic gastro-enteritis. It is difficult to explain these findings, as eosinophils do not contain lysozyme.

REFERENCES

### Skinfold Thickness Measurements in Assessment of Nutritional Status of Indian and White Schoolchildren

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#### SUMMARY

A statistical comparison is presented between height, weight, and subscapular and triceps skinfold thickness for age of Indian and White schoolchildren. It was found that (i) although a high degree of correlation existed between height and weight for age of White children, this was not true for Indian children; (ii) for both White and Indian children of both sexes inconsistent variations occurred between both height and weight and skinfold thickness; (iii) despite extremely low heights and weights observed for Indian children, which could be interpreted as depicting chronic undernutrition, the skinfold thicknesses of the latter children were close to normal as judged by conventional standards; the subscapular skinfold thicknesses in Indian girls actually exceeded the conventionally accepted normal standard values. It is concluded that in the indirect assessment of nutritional status of Indian subjects, anthropometric variables should be used with caution. Finally, it is proposed that further anthropometric and individual energy balance studies be conducted on a cross-section of various socio-economic, age and sex groups of the Indian population in an attempt to establish the basis for the described anomalies.

The measurement of skinfold thickness for the assessment of nutritional status has become common practice. The thickness of the subscapular and triceps skinfolds, has often been used for this purpose. In fact, it has become common to regard genetic determinants of anthropometry in young children from different populations or ethnic groups as of small importance compared with the effect of environmental determinants such as nutritional pattern and status.1,2

It has been reported, however, that in contrast to the other population groups in South Africa, young children of Indian descent have 'normal' skinfold thicknesses despite being grossly underweight and of small stature for age.4,5 It has been postulated that this anomaly could be ascribed to genetic determinants.3

In the present study a statistical comparison is made of some anthropometric variables in Indian and White junior school children, in an attempt to establish the extent and significance of observed differences between the two groups.

#### METHODS

The composition of the two groups of children in this study, as well as the procedure followed in the measure-