*Brit. J. Psychiat.* (1971), 118, 227–8

# Ascorbic Acid and Chronic Schizophrenia

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## Introduction

Milner (1963), using urinary saturation tests to determine ascorbic acid levels in a group of male chronic schizophrenics, reported that far higher doses of ascorbic acid were required to achieve saturation in that group than in normal subjects. Briggs (1962) observed hypovitaminosis C in schizophrenics, and postulated a disturbance of ascorbic acid metabolism which could be relevant to the biochemical basis of schizophrenia.

The present study compares ascorbic acid levels in schizophrenics and controls measured by a more direct and accurate method than has been used heretofore, namely by 'buffy layer' estimations (Denson and Bowers, 1961).

The method consists essentially of a colorimetric estimation of total ascorbic acid (i.e. ascorbic acid and dehydroascorbic acid) in leucocytes and platelets ('buffy layer') isolated from a small sample of venous blood. Results are expressed as microgrammes total ascorbic acid per $10^8$ leucocytes.

## The Problem

This study was carried out at Claybury Hospital, where previously Leitner and Church (1956) had found the patients in a poor state of vitamin C nutrition as judged by urinary saturation tests.

Most of the hospital's chronic patients are schizophrenics. There was therefore difficulty in finding sufficient controls, i.e. patients on the same wards, receiving the same diet, but not suffering from schizophrenia. In the wards for the elderly, though, there are a substantial proportion of demented as well as schizophrenic patients. It was decided, therefore, to compare ascorbic acid levels in elderly chronic schizophrenics with those in demented patients on the same wards.

Criteria for the schizophrenic group were that on their admission they had shown one or more of the following: paranoid or grandiose delusions, thought disorder, hallucinations in clear consciousness, bizarre behaviour, e.g. posturing, stereotypies, mutism; that they had not been confused, subnormal, manic or depressed; and that currently some schizophrenic features persisted, with no confusion.

Criteria for the control group were that they had been admitted in a state of confusion (i.e. disorientation and loss of recent memory) which persisted, and that there was no previous history of schizophrenic symptoms.

## Method

From three female and one male wards for the elderly 32 schizophrenics were selected and compared with 24 (demented) control subjects from the same wards, matched as far as possible for age. (An attempt also to match for height and weight proved impracticable.)

'Buffy layer' ascorbic acid levels of every subject (Denson and Bowers, 1961) were estimated in duplicate over a period of ten weeks, samples of blood from subjects on the same ward being taken at the same time.

## Results

Subjects in both groups were evenly distributed over the four wards. The ages of the two groups did not differ significantly. Schizophrenics ate rather more readily than controls, but the difference was not significant. Significantly more schizophrenics were on phenothiazines than controls ($0{\cdot}05>p>0{\cdot}02$).

Mean *ascorbic acid levels*, expressed as mcg./$10^8$ w.b.c., were 29·42 (S.E. 1·9) in schizophrenics, 23·69 (S.E. 1·7) in controls. This difference is significant—$t = 2{\cdot}1998$, $0{\cdot}05>p>0{\cdot}02$. The levels in the controls are similar to those found in elderly patients in other institutions; those of the schizophrenics are appreciably higher.



https://doi.org/10.1192/bjp.118.543.227 Published online by Cambridge University Press

There was no significant correlation of ascorbic acid levels with age, eating habits or the administration of phenothiazines.

### Saturation Test

In view of the unexpected finding that ascorbic acid levels in schizophrenics were significantly higher than in controls, a loading test was carried out on 12 patients from each group chosen at random from those who ate normally. A comparison was made of the effect on 'buffy layer' ascorbic acid levels of an oral dose of 500 mg. ascorbic acid b.d. for 14 days. Estimations were made just before and on the 8th, 15th and 29th days after starting the course.

Neither before, during or after the course were the levels of the schizophrenics significantly different from those of the controls. (The random selection from the control group happened to include 3 patients with uncharacteristically high initial ascorbic acid levels, whereas the selection of schizophrenics was more representative of the whole group.)

### Summary

The purpose of the study was to investigate the findings of Milner and others that schizophrenic patients showed evidence of ascorbic acid depletion.

The work was done in two parts. First, 'buffy layer' ascorbic acid levels were measured in a group of 32 schizophrenic patients, and 24 patients on the same wards suffering from dementia (referred to as the 'control group'). In fact, far from showing evidence of ascorbic acid depletion, the mean level in the schizophrenic group was significantly higher than that of the control group. This finding was not accounted for by differences in age, eating habits, wards or drug administration.

The second part of the study involved sampling two sub-groups of 12 patients each from the schizophrenic and control groups, matched for eating habits, feeding them 500 mg. ascorbic acid twice daily for 14 days and estimating 'buffy layer' levels before, during and after the course. No significant difference in ascorbic acid levels was detected between these smaller groups at any stage, nor was there any trend towards higher levels in the schizophrenics.

In only one patient was the 'buffy layer' ascorbic acid level low enough to suggest the possibility of sub-clinical scurvy.

### Acknowledgements

We wish to thank the Consultant staff of Claybury Hospital, and the nurses on the wards involved in this study for their co-operation. Mr. P. J. Farmer, Pathology Technician at Claybury, collected the blood samples and prepared them for analysis by Mr. W. Johnson, Research Biochemist, Roche Products Ltd.; we thank them both for their assistance. The ascorbic acid for the second part of the study was supplied by Roche Products Ltd.

### References

Briggs, M. D. (1962). 'Possible relations of ascorbic acid, ceruloplasmin and toxic aromatic metabolites in schizophrenia.' *New Zealand Medical Journal*, **61**, 229.

Denson, K. W., and Bowers, E. F. (1961). 'The determination of ascorbic acid in white blood cells. A comparison of white blood cells, ascorbic acid and phenolic acid excretion in elderly patients.' *Clinical Science*, **21**, 157.

Leitner, Z. A., and Church, I. E. (1956). 'Nutritional studies in a mental hospital.' *Lancet*, **i**, 565.

Milner, G. (1963). 'Ascorbic acid in chronic psychiatric patients—a controlled trial.' *British Journal of Psychiatry*, **109**, 294.

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(*Received 13 March 1970*)

https://doi.org/10.1192/bjp.118.543.227 Published online by Cambridge University Press