

THE HYPOGLYCEMIC EFFECT OF ASCORBIC ACID IN A JUVENILE-ONSET DIABETIC

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Medical Biochemistry and Metabolic Disorders

Diabetes mellitus
(73-3) 30-11-1

Endocrine System

Islets of Langerhans
(73-3) 15-10-1

Pharmacology V

Insulin preparations and vitamins
(73-3) 10-19-1

For reprints please quote
(73-3) 10-19-1

Paper received: 1st January, 1973.

Ascorbic acid (vitamin C) appears to be associated with carbohydrate metabolism in humans since subjects with low circulating levels of ascorbic acid exhibit diabetic-like glucose tolerance curves which return to normal when the ascorbic acid deficiency is alleviated (1). Furthermore, it has been reported that excess ascorbic acid reduces the blood sugar level of both normal (2) and diabetic (3) subjects. Other work, however, indicates that vitamin C does not affect the blood sugar of diabetics (4). Here we report that orally administered ascorbic acid markedly reduced the insulin requirement of a juvenile-onset diabetic.

The principal author (Dice), in whom diabetes was diagnosed at 15, was the experimental subject. At the time of the experiment the subject was 20 years old and did not respond to oral hypoglycemic agents. His insulin requirement had been constant for four years (32 units of NPH U80 administered in a single morning injection).

In order to examine the hypoglycemic effect of ascorbic acid, progressively increasing amounts of ascorbic acid were ingested hourly from 7:00 AM to 1:00 AM. Control of the diabetes was maintained by reducing the daily insulin dosage in response to hypoglycemic reactions, and by increasing ascorbic acid consumption when glycosuria developed. In this manner a portion of the daily insulin dosage was gradually substituted by ascorbic acid.

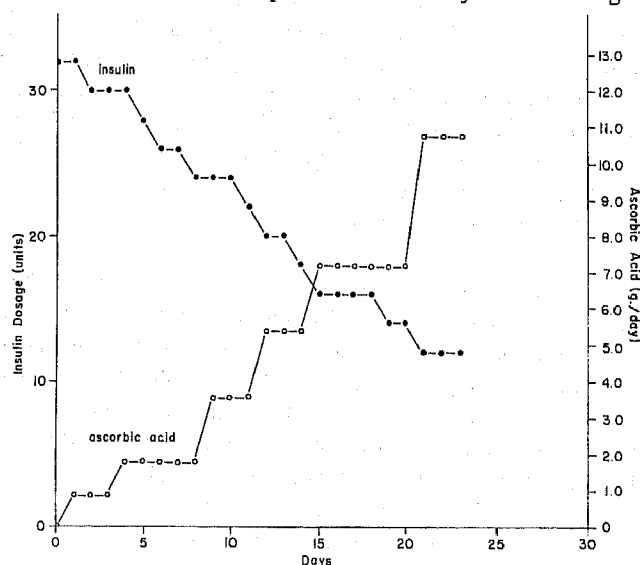


Figure 1. The relationship between decreasing daily insulin dosage (●—●) and increasing daily consumption of ascorbic acid (o—o), while maintaining control of the diabetes.

We conclude that ascorbic acid exhibits marked hypoglycemic activity in this particular diabetic subject. The results of this pilot study suggest the need of well-controlled, large scale tests to determine whether this observation is true for other diabetics.

1. Secher K., Acta Med. Scand., 1942, 60, 255.
2. Sylvest O., Acta Med. Scand., 1942, 60, 183.
3. Banerjee, S. and Ghosh N., Indian J. Physiol. Allied Sci., 1950, 4, 129.
4. Owens L., Wright J., Brown, E., Am. J. Med. Sci. 1941, 201, 636.

Secondary Classification: Diabetes, vitamin C

Figure 1 illustrates one of two identical experiments in which a substantial insulin dosage reduction was made possible by progressively increasing ascorbic acid intake. On the 23rd day the insulin was entirely withheld and a total of 15 grams of vitamin C was ingested. Glycosuria and hyperglycemia occurred, and the next day the experiment was terminated. In contrast to the marked insulin reduction possible with concomitant vitamin C ingestion, when the insulin dosage was reduced from 32 units to 26 units without vitamin C, severe glycosuria developed.

The subject's diet was carefully noted both prior to and during these experiments to rule out dietary changes other than the vitamin C ingestion which might lead to a reduction in insulin requirement. Control of hyperglycemia was monitored carefully both prior to and during the experiments. Four daily urine sugar readings (7 AM, 12 N, 6 PM, 12 M) were made and weekly blood glucose determinations were conducted. Hyperglycemia was controlled at least as well during the experiments as during the period of normal insulin dosage.