Corticoid Excretion in the Nephrotic Syndrome

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Since the reports by Farnsworth [4], Barnett et al. [1] and Riley [9], it has been known that in nephrotic patients diuresis can be induced by administration of ACTH. In some cases proteinuria ceases and recovery is permanent; in others, proteinuria persists and oedema reappears. Subsequently McCall and Singer [8], Farnsworth [5] further Galán et al. [6] observed that the probability of ACTH administration being followed by diuresis was directly related to the amount of corticosteroids excreted by the patients during ACTH-treatment. The increase in corticosteroid excretion was least pronounced in severely oedematous patients. Such patients had to undergo repeated treatment with ACTH for diuresis to set in [8].

These observations have induced us to investigate into the corticoid excretion of nephrotic patients. The present paper deals with the excretion in untreated patients.

Material and Methods

Eight children displaying the nephrotic syndrome with pitting oedema and subjected to no treatment were examined. A group of 23 endocrinologically healthy children served as a control.

In 7 of the 8 nephrotic children blood pressure and the value for non protein nitrogen were normal. In the urinary sediment there were at most 3 to 5 erythrocytes and a few leucocytes. In the 8th patient NPN varied between 24 and 30 mg per 100 ml but the endogenous creatinine clearance (36.2 ml/min/1.73 m^2) pointed to diminished glomerular filtration. Thus, 7 of the 8 patients suffered from so-called pure lipoid nephrosis at the time of examination.

From the 8 patients 23 samples of 24 hour urine were collected and after acid hydrolysis at pH 1.0 the corticoid content was assayed and compared to the corticoid excretion in the urine of the 23 control children. The reducing steroids were determined according to Heard, Sobel and Venning [7], and expressed per 1 m^2 body surface according to the Du Bois nomogram [2] so as to facilitate comparison. The ideal weight corresponding to body height was determined from Stuart and Stevenson's data [3].

Results

Fig. 1 shows that in the control group the mean 24 hour corticoid excretion was 1.28 ± 0,48 mg per m² body surface, with 0.53 and 2.07 mg as extreme values. In the nephrotic patients corticoid excretion was considerably less, 0.45 ± 0.23 mg per m² body surface, with 0.13 and 1.07 mg as extreme values.

The difference between the two groups, in spite of the wide scattering, was statistically significant ($p < 0.001$).

Considering the oedematous state of the nephrotic patients the question arose whether the low figures for corticoid excretion were reliable.

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The presence of oedema may mean an increase of some 10 to 20 per cent of the body weight and at the same time a certain increase in body surface. These cause a reduction of the relative value of corticoid excretion. Led by this consideration, we computed the value of corticoid excretion also with reference to the body surface corresponding to the lowest weight on 10 occasions when a considerable diminution in body weight

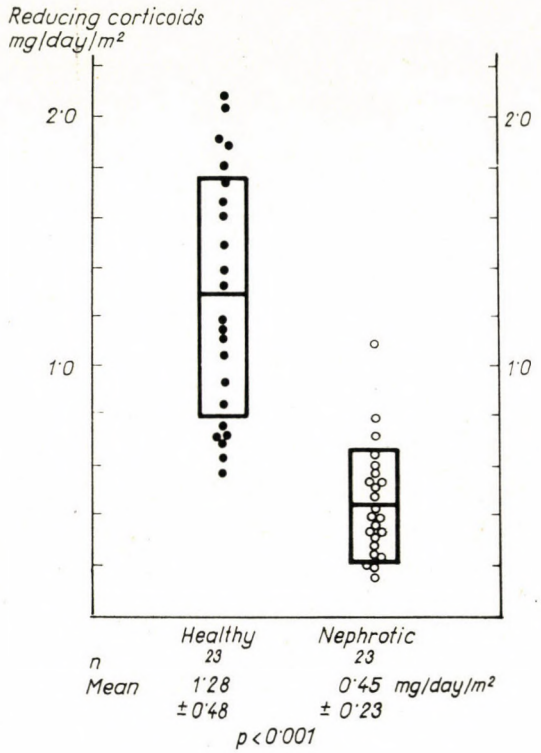

Fig. 1

(3 to 9 kg) was brought about by diuresis. For the same reason the ideal weight corresponding to body weight was determined, again on the basis of STUART and STEVENSON's data [3], and corticoid excretion was then computed also according to the body surface resulting from these values. The results are illustrated in Fig. 2.

It is obvious from Fig. 2 that neither the mean values nor the scattering for corticoid excretion as determined by the formaldehydrogen method, lies within the normal range [5, 6, 9]. The supposition that our lower values were due to a difference in the method applied was invalidated by the fact that the mean value for our control group was hardly different from the results obtained by GALÁN et al. (1.28 ± 0.48 and 1.42 ± 0.23, respectively). We could not compare our figures with those reported by FARNS-

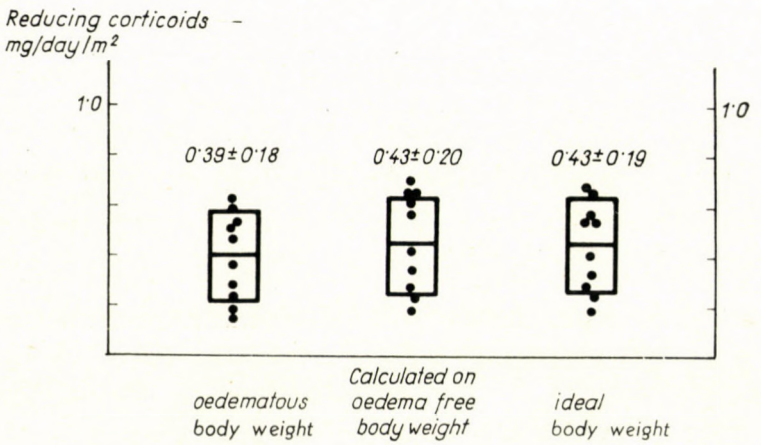

FIG. 2

were significantly influenced by the surplus weight due to oedema. The value of corticoid excretion per "oedematous body surface" was 0.39 ± 0.18 mg, per "non-oedematous body surface" 0.43 ± 0.20 mg, and per the "ideal body surface" (i. e. the one corresponding to height) 0.43 ± 0.19 mg.

DISCUSSION

According to the literature, in untreated nephrotic patients the value

WORTH [5] and RILEY [9] since their values indicate daily amounts and have not been reduced to body surface.

Another question was whether renal or adrenal changes were responsible for the diminished corticoid excretion. This could have been a consequence of reduced diuresis, considering that in nephrotic patients GALÁN et al. [6] found corticoid excretion to be proportionate with the amount of urine excreted while they observed no such parallelism in healthy individuals.

However, in their diagrams no difference having been made between the values determined before and those determined during ACTH treatment, they do not permit of definite conclusions. A similar connection between corticoid excretion and diuresis was not observed in our experiments.

The second alternative would be a reduction in glomerular filtration. As has been noted, this was the case in only one of our 8 nephrotic patients. Creatinine clearance was 25 to 35 ml/min/1.73 m^2, in every one of the 5 patients examined by GALÁN et al. [6]. In spite of this, corticoid excretion in their patients was hardly different from the normal. The low corticoid excretion cannot, therefore, be attributed to insufficient filtration.

The third possibility is a diminished production of steroids by the adrenal cortex. GALÁN et al. [6] determined in a few cases the serum corticoid level and found it to be normal.

Our present experimental results are therefore not conclusive, and settlement of the problem requires further investigations.

SUMMARY

The amount of corticoids excreted in the urine of untreated nephrotic patients has been determined. The daily amount of excreted steroids was found to be one third of the normal although out of 8 patients it was only in a single case that glomerular filtration rate was reduced so that all the other patients belonged to the category of so-called pure lipoid nephrosis.

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