

TISSUE SULPHYDRYL GROUPS AND ASCORBIC ACID IN VITILIGO

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Summary

Tissue sulphhydryl groups and total ascorbic acid content were estimated in the normally pigmented and vitiliginous skin. Vitiliginous patches compared to contralateral normally pigmented skin showed a higher sulphhydryl content in 5 out of 6 patients and lower ascorbic acid content in all the 4 patients studied. The role of tissue sulphhydryl groups in the pathogenesis of vitiligo is discussed.

Melanin synthesis is an oxidative process mediated chiefly through the oxidative action of tyrosinase on tyrosine. Sulphhydryl groups and ascorbic acid are perhaps the most important inhibitors of tyrosinase activity. Van Scott et al¹ hypothesized that tyrosinase is inhibited by the sulphhydryl groups and is able to act on the substrate only if this inhibitory factor is eliminated. Again, ascorbic acid because of its reducing action retards the oxidation of dopa to dopa-quinone and thereby inhibits the melanin formation². It may thus be argued that the sulphhydryl groups and/or ascorbic acid content of the skin may be playing some role in the pathogenesis of vitiligo. The contradictory results with regard to sulphhydryl groups obtained by Van-Scott et al¹ and Lajmanovich and Magnin³ and the absence of studies pertaining to ascorbic acid content of the vitiliginous skin prompted us to undertake the present study.

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Materials and methods

The tissue sulphhydryl groups and the total ascorbic acid content (reduced ascorbic acid and dehydro ascorbic acid) of normal and contralateral vitiliginous skin in patients with vitiligo were estimated in skin biopsies. Skin biopsies from vitiliginous patches and contralateral normally pigmented skin were obtained and blotted free of blood. The tissue sulphhydryl groups were determined in 6 patients using the method of Ellman⁴ and the total ascorbic acid content in 4 patients by employing the method of Roscoe & Kingsley⁵.

Results

Table 1 gives the values of sulphhydryl (-SH) groups obtained from the vitiliginous and normal skin. It was observed that the values for sulphhydryl groups in 5 out of 6 cases of vitiligo were higher in the vitiliginous patches compared to the contralateral normally pigmented skin. The results were statistically significant ($p < .05$)

In all the four cases, total tissue ascorbic acid content in the vitiliginous patches was found to be significantly

TABLE 1

Content of sulphhydryl groups in vitiliginous skin and normal skin from vitiligo patients.

| Sulphhydryl groups expressed as nm/mg wet weight of tissue | | | |
|--|-------------|-------------------|-------|
| S. No. | Normal skin | Vitiliginous skin | |
| 1. | 0.45 | 0.98 | |
| 2. | 1.55 | 0.68 | |
| 3. | 0.83 | 1.04 | |
| 4. | 1.83 | 2.23 | |
| 5. | 1.55 | 2.36 | |
| 6. | 2.40 | 2.54 | |
| Mean | 1.435 | Mean | 1.638 |
| SD | 0.7 | SD | 0.82 |
| SEM | 0.285 | SEM | 0.376 |
| $t_{10} = 2.766$ | | | |
| $p < .05$ | | | |

decreased compared to the normally pigmented contralateral skin ($P < 0.01$). The results are shown in Table 2.

TABLE 2

Ascorbic acid content of vitiliginous skin and normal skin from vitiligo patients.

| Ascorbic acid expressed in mg/100 mg of wet weight of tissue | | | |
|--|-------------|-------------------|---------|
| S. No. | Normal skin | Vitiliginous skin | |
| 1. | 0.021 | 0.013 | |
| 2. | 0.069 | 0.0063 | |
| 3. | 0.021 | 0.0074 | |
| 4. | 0.013 | 0.0095 | |
| Mean | 0.03075 | Mean | 0.00905 |
| SD | 0.007 | SD | 0.0064 |
| SEM | 0.0035 | SEM | 0.0032 |
| $t_6 = 4.617$ | | | |
| $p < .01$ | | | |

Comments

The results of the present study demonstrated a statistically significant increase of tissue sulphhydryl content and decreased ascorbic acid content in vitiliginous skin compared to the contralateral normally pigmented skin. The total (soluble and protein bound) sulphhydryl groups were estimated, because of the wide divergence of views as to the reactive value of the two

fractions. In relation to tyrosinase activity, Van-Scott et al¹, for instance, estimated the water soluble fraction of sulphhydryl groups of the skin and found this to be raised in the vitiliginous skin. On the other hand, Lajmanovich and Magnin³ estimated the total sulphhydryl groups and found no significant difference. The ratio of immediate (soluble) fraction to the denatured sulphhydryl groups (protein bound) has been estimated approximately to be 1:1.5⁶. The present study showed a significantly elevated levels of total sulphhydryl groups in the vitiliginous skin compared to normal. Even though the results are not strictly comparable (Van Scott and associates estimated only the soluble fractions), the observations would lend support to the findings of Van Scott et al¹ that the sulphhydryl groups are elevated in the vitiliginous patches. The low ascorbic acid content of vitiliginous patches will support the findings of Cornbleet⁷ who found the ascorbic acid concentration to be directly proportional to the degree of pigment present.

The interpretation of these results in the present stage of our knowledge must be speculative. Ascorbic acid depletion may be a primary event caused by its being used up in interfering with the synthesis of melanin i.e. preventing the conversion of dopa to dopaquinone and high sulphhydryl content may be secondary to a complete cessation of melanin function. This may explain the disparity in the concentration of the two important reducing agents.

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— *Managing Editor*