Arch Dermatol Res (1989) 280:499–501

Dermatological Research

Decreased levels of vitamin A in serum of patients with psoriasis

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Key words: Serum retinol level – Psoriasis

The retinoids, including natural vitamin A (retinol), have positive effects with regard to the prevention and therapy of various dermatologic and neoplastic disorders [6]. Early studies on the relationship between vitamin A-deficient diet and disturbances in epidermal growth and differentiation suggest the importance of this compound for the maintenance of epidermal homeostasis (for review see [3]).

In addition, it is possible that changes in the retinol level could lead to the appearance of various benign or malignant disorders [2, 5, 7, 18]. Recent studies, however, have failed to confirm an inverse relationship between serum retinol level and overall cancer incidence [11, 19]. Our previous studies on the Polish population of patients with colorectal cancer also suggest that decreased retinol level is secondary and results from the cancer burden [9]. This finding might not apply, however, to other forms of cancer, since our more recent studies have revealed decreased retinol level in patients with uterine cervical tumors, irrespective of the size of the lesion, as well as in those who have been observed during the follow-up disease-free period [4]. Therefore, hypovitaminosis A could be considered as one of the risk factors in the development of this tumor.

Psoriasis is a common skin disorder in which epidermal hyperproliferation and abnormal differentiation are the most important features, which could be related, in part, to the abnormalities in the vitamin A metabolism. There are reports of a dramatically elevated level of cellular retinoic acid binding protein (CRABP) in psoriatic plaques [14], of altered expression of receptors for retinol-binding protein (RBP) on psoriatic keratinocytes [12], and of an increased level of dehydroretinol (vitamin A2) in psoriatic lesions, irrespective of the severity of the disease [13]. However, serum concentrations of vitamin A and RBP were found to be within normal range in patients with psoriasis of unspecified activity [1, 8], and decreased only in cases of widespread plaque lesions or in pustular erythrodermic variety [13].

The aim of the present study was to test serum levels of vitamin A in patients with psoriasis of various activity and extent of skin lesions, as well as in relation with the duration of the disease and duration of the last relapse. The study was performed in 54 patients with psoriasis (36 males and 18 females) ranging in age from 16 to 81 years (mean 37.8 years). The group included 51 patients with common psoriasis, two with arthropatic psoriasis, and one patient with generalized pustular psoriasis of the von Zumbusch type. The cases of psoriasis vulgaris were classified into various groups according to the activity of the disease and the extent of skin lesions. The grade of disease activity was defined as follows: A0, when the skin lesions remained stationary for longer than 4 months; A1 peripherally spreading plaques with a few small guttate skin lesions; A2, acute disseminated pinpoint and guttate lesions with the duration of the last relapse not exceeding 1 month. The patients had not received any systemic therapy (except the neutral ointment) for at least 1 week prior to the study. The control group consisted of 52 healthy volunteer precisely matched according to age and sex. They had no symptoms of liver disease or other pathological conditions known to influence serum retinol level. They had been informed of the reasons for the study. The women who were included in the study had not been taking oral contraceptives for at least 6 months before the blood sample collection. Sera were prepared under normal indoor light and were kept frozen at $-20°C$ in the

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Table 1. Serum retinol levels (μg/100 ml) in patients with common psoriasis as related to disease activity and the extent of skin lesions

	Level of retinol (mean ± SD)
Disease activity	
A2	35.55± 9.85 (n = 13)[a]
A1	36.16± 9.05 (n = 15)[a]
A0	40.18±18.58 (n = 16)[b]
Remission	43.45± 8.49 (n = 7)[b]
Extent of skin lesions	
1%–10%	41.97±17.41 (n = 17)[b]
10%–25%	33.96±11.15 (n = 11)[a]
25%–50%	40.38±10.29 (n = 11)[b]
>50%	34.99± 6.96 (n = 5)[a]
Common psoriasis (total)	38.74±13.26 (n = 51)[a]
Healthy controls	57.40±11.30 (n = 52)

Statistically significant difference from control at [a] $p < 0.001$ or [b] $p < 0.05$, using Student's t-test. The numbers of patients are given in parentheses

dark until used (no longer than for 6 months). The retinol level was determined following the original procedure of Thompson et al. [15], which includes caroten quenching and also standardization. The measurements were done in triplicate. All methodological procedures were performed in moderate yellow light.

The results are presented in Table 1. Mean serum retinol level was found to be significantly decreased in patients with common psoriasis as compared with the values from sex- and age-matched healthy controls.

The lowest values of serum retinol level were found in patients with active (A1 and A2) form of psoriasis, and less pronounced, although still significantly lower, in patients with inactive disease (A0), and in clinical remission, i.e., in patients without any skin lesions. There was no correlation between serum retinol level and the extent of skin lesions (Table 1), and other clinical parameters, e.g., duration of the disease and duration of the last relapse (data not shown). Serum retinol levels were found to be significantly decreased also in two patients with arthropatic psoriasis (31.5 and 41.2 μg/100 ml) and in one patient with generalized pustular psoriasis of the von Zumbusch type (23.5 μg/100 ml).

Since it is known that moderate and severe inflammatory reaction lead to a decrease in the blood retinol content [9, 10, 16, 17], the low retinol level in the most active psoriasis might be explained by its inflammatory character. A study by Rollman and Vahlquist [13] showed that serum level of RBP is lowered in psoriasis with extensive but not with limited skin lesions. The results of those authors are in good agreement with our results, except for the findings in patients with inactive skin lesions and during remission. It is difficult to explain the difference between the two studies. One possibility is that serum storage time may influence the determination of retinol level. In our study sera were kept for no longer than 6 months.

It is of interest that patients with uterine cervical cancer, in contrast to those with colorectal cancer [10], did not develop normal retinol level during the disease-free follow-up [4].

Since a careful examination of patients did not reveal any concomitant disorder, which could induce a decrease in retinol blood level, and since decreased retinol levels were found also in patients with inactive skin lesions or during remissions, it is conceivable that hypovitaminosis A not only reflects the inflammatory process of psoriasis but might be one of the factors contributing to the development of the disease.

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Received June 27, 1988