

A STUDY OF SERUM AND SKIN ZINC IN LEPROSY

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Summary

Serum and skin zinc values were determined in 50 cases of leprosy and 50 normal healthy controls; (25 males, and 25 females) of various age groups. "Dithizone extraction" method of Vallee and Gibson¹ (1948), as modified by Vallee and Hock (1949), was followed in this study.

The mean value of serum zinc in healthy individuals was 105.78 μ g with S. D. 7.47 (range 88-123). The mean value of serum zinc in leprosy patients was 91.20 μ g, with range 79-104 μ g. Serum zinc is significantly reduced in all types of leprosy as compared to healthy controls.

The mean value of skin zinc in healthy individuals was 83.24 μ g with range 68.93 μ g. The mean value of skin zinc in leprosy patients was 84.90 μ g range being 72-97 μ g. No significant difference was found in skin zinc in leprosy patients and in healthy controls.

Presence or absence of trophic skin ulcerations did not affect serum and skin zinc levels.

There is no significant change in values of serum/skin zinc after 90 days of initial therapy in leprosy patients.

Introduction

Zinc is an essential trace element, required for nutrition of plants and lower animals. It is a vital component of at least 20 enzymes, concerned with the fundamental process of R.N.A. and D.N.A., protein synthesis, metabolism in plants, micro-organisms and higher animals. It is also necessary for normal keratinization of skin in animals like chicks² and its deficiency gives rise to parakeratotic skin lesions which disappear after correction of deficiency

state. There is close association between chronic skin ulcerations and lowered serum or plasma zinc concentrations. Dietary zinc may promote healing of ulcers in patients with low plasma or serum zinc concentration^{3,4}. Trophic skin ulceration is a common cause of disability in leprosy. Present study was therefore undertaken to investigate serum and skin zinc in patients of leprosy with and without trophic skin ulcerations.

Material and Method

50 patients with leprosy and 50 normal healthy controls comprised the clinical material for study. Cases were selected from those attending out-patient department and those who were admitted in infectious disease hospital of J. A.

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Group of Hospitals, Gwalior. Leprosy cases comprised of 20 lepromatous 20 tuberculoid and 10 dimorphous forms. Lepromatous patients were sub-divided into a group with trophic ulcers and a group without these.

Usual features of leprosy were looked for and diagnosis of leprosy was confirmed in every case either by demonstration of Hansen's bacilli in nasal smear and/or skin scraping or by nerve biopsy. Cases were grouped according to International classification of leprosy⁵. All diseases like diabetes, myocardial infarction, liver diseases etc in which zinc metabolism is altered, were carefully excluded. Estimation of zinc in serum and skin was done before starting dapsone therapy and after 90 days of therapy. Therapy was started with 25 mgm. of dapsone once a week and continued with a weekly increment of 25 mgm. till maximum dose of 50 mgm. daily was reached.

Determination of zinc in serum and skin was done by "dithizone extraction" technique of Vallee and Gibson¹ as modified by Vallee and Hock. Serum zinc values were determined by drawing 10 ml. of blood in the morning from antecubital vein in a dried syringe and centrifuged twice for 10-15 mts. Serum was separated and transferred into another centrifuge tube. For estimation in skin, six 4 mm. punch biopsy specimens were taken from upper and outer part of thigh. Digest of these specimens was prepared by method of Harrison⁶ et al. Method of estimation of zinc in serum and skin digest was the same.

A. Serum Zinc

Serum zinc was significantly diminished in all types of leprosy, when compared with healthy individuals.

The mean value of serum zinc in different types of leprosy did not reveal any significant difference.

Results and Observations

TABLE 1

The results are tabulated in the following Tables

	No. of cases	Serum Zinc			Skin Zinc		
		Mean ug/100cc	S. D.	Range	Mean ug/Gm	S. D.	Range
Normal	50	105.78	7.47	88-123	83.24	6.46	68-97
Lepromatous leprosy	20						
Before treatment		88.94	6.546	79-103	84.50	6.225	72-97
After treatment		90.90	6.000	80-104	84.75	5.790	73-98
Tuberculoid Leprosy	20						
Before treatment		91.00	5.895	79-104	84.20	6.000	72-96
After treatment		93.80	6.732	80-104	84.50	6.125	72-97
Dimorphous leprosy	10						
Before treatment		91.20	6.200	81-103	93.90	6.100	72-94
After treatment		92.60	5.900	82-104	84.80	6.640	72-95

TABLE 2

	No. of cases	Serum Zinc			Skin Zinc		
		Mean ug/100cc	S. D.	Range	Mean ug/Gm	S. D.	Range
Leprosy with trophic ulcer	16	95.00	6.000	80-103	85.75	5.763	72-97
Leprosy without trophic ulcer	34	91.941	5.763	79-103	94.352	5.180	72-94

There was no significant difference in the mean value of serum zinc before and after 90 days of therapy.

There was no significant difference in serum zinc in cases of leprosy with trophic ulceration or without trophic ulcerations.

B. Skin Zinc

There was no significant difference in skin zinc in 50 cases of leprosy, when compared with healthy individuals.

There was no significant difference in skin zinc in different types of leprosy.

There was no significant difference in the mean value of skin zinc in 50 cases of leprosy, before and after 90 days of initial therapy.

There was no significant difference in skin zinc in cases of leprosy with trophic skin ulcerations and without trophic skin ulceration.

Molokhia⁷ has shown that zinc is located mainly in epidermis and is bound to keratin. This incorporation of zinc in epidermal keratin becomes non-exchangeable and is practically lost to the organism.

The mean values of serum zinc in normal controls and leprosy group are 105.78/ug. and 91.20/ug with range from 88-123/ug and 79-104/ug respectively. Serum zinc is significantly reduced in leprosy in comparison to healthy controls, irrespective of presence or absence of trophic skin ulcerations and clinical types of leprosy.

Zinc is transported in plasma in protein bound form⁸. Possibility that lowered serum zinc in leprosy may be due to reduced binding to one or other fraction of plasma protein cannot be excluded. Beng Bee Oon⁹ et al have shown that mean serum zinc in leprosy is low (3.4 gm. range 2.8-4.3 gm./100 ml.) as compared to published normal values¹⁰ (4. 4 gm., range 3.50-4.58 gm

/100 ml.). But they could not find correlation between serum albumin and serum zinc in their patients.

Experimental evidence shows that toxæmia of chronic infection causes lowering of serum zinc, probably as a result of redistribution of zinc from serum to cells. Possibility of chronic toxæmia leading to such a redistribution of zinc from serum to cells cannot be excluded.

It is difficult to explain the significance of low values of serum zinc in leprosy patients. Serum zinc is also low in pulm. tuberculosis, another mycobacterial disease. Whether low serum is a manifestation of dermal pathology or systemic mycobacterial infection is far from clear. There was no significant difference in serum and skin zinc before starting dapsone, and after 90 days of therapy.

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