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Original Research Article

Study on serum copper, zinc and selenium trace element levels in Psoriasis

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ABSTRACT

Introduction: Psoriasis is one of the skin disorder, mainly characterized by scaly papules and plaques. The etiology of psoriasis is multifactorial and still not properly understood. In our study, we tried to elucidate the relation between psoriasis and trace elemens namely Zinc, Copper and Selenium.
Materials and Methods: This study enrolled 50 psoriasis patients with 37 males and 13 females, with 10-80 years age. The patients were randomly selected from the outpatient clinic of Dermatology, Venereology and Leprosy Department, Narayana medical college and hospital. The age, sex matched 50 healthy volunteers included as controls in this study. Levels of serum Copper (Cu), Zinc(Zn), and Selenium(Se) analysed using Atomic absorption Spectrophotometery.
Results: In our study, the mean Serum Zinc, Selenium and Copper levels were 61.9680±15.96824, 64.2060±17.44780 and 56.4120±8.51976 respectively, lower than the controls which was stastically significant (P<0.05).
Conclusion: In psoriasis, serum Cu, Zn and Se levels were observed to be low, needs to manage therapeutically by oral supplementation. More studies are required to carryout to standardize the diagnostic levels of Cu, Zn and Se and their role in psoriasis pathogenseis.

1. Introduction

Psoriasis, chronic inflammatory and hyper proliferative papilosquamous skin disease, characterized by erythematous papules and plaques with silvery white scales cover. It ranges in severity from a few plaques to involvement of almost the entire body surface.[1] The pathogenesis of psoriasis is still poorly understood. It results from the interactions between genetic predisposition and a large spectrum of environmental risk factors, such as diet, alcohol consumption, stress, obesity, smoking.[2] Essential trace elements like copper, Zinc, selenium, manganese, iodine, iron, cobalt, tin, molybdenum, and chromium.[3]

There is very limited data available on role of trace elements in etiopathogenesis of psoriasis. In the current study, the role of trace elements in psoriasis was investigated.[4]

The environment and skin metabolism may contribute to treatment of psoriasis, by producing oxygen species which causes the oxidative stress.[5,6] Trace elements influences the immune responses and enzymatic activities, the imbalance in trace elements leads changes in the enzymatic dependant

Table 1: Mean serum levels of Zn, Cu and Se in cases and controls.

	Cases N=50	Control N=50	p value
Zinc	61.9680 ±15.96824	78.2280 ± 12.80776	<0.0001
Copper	64.2060 ± 17.44780	114.5800 ± 19.71284	<0.0001
Selenium	56.4120 ± 8.51976	85.6300 ± 11.95779	<0.0001

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Table 2: Correlation between the trace elements in Psoriasis subjects

		ZINC (r value)	COPPER(r value)	SELENIUM (r value)
ZINC	Pearson Correlation	1	-0.062	-0.009
	P Value		0.667	0.952
	N	50	50	50
COPPER	Pearson Correlation	-0.062	1	-0.160
	P Value	0.667		0.266
	N	50	50	50
SELENIUM	Pearson Correlation	-0.009	-0.160	1
	P Value	0.952	0.266	
	N	50	50	50

Table 3: Paired sample t test was performed between the two different trace elements in psoriasis patient to identify significance difference between them.

		Mean	N	Std. Deviation	t- value	P value*
Pair 1	ZINC	78.2280	50	12.80776	-16.87	<0.0001
	COPPER	114.5800	50	19.71284		
Pair 2	ZINC	78.2280	50	12.80776	-3.142	0.003
	SELENIUM	85.6300	50	11.95779		
Pair 3	COPPER	114.5800	50	19.71284	8.581	< 0.0001
	SELENIUM	85.6300	50	11.95779		

*P<0.05 – Statistically significant

bioprocesses such as keratinization and melanin formation.[7]

Zinc, copper, selenium have the role as cofactors for antioxidant enzymes.[8–10] Previous studies tried to identify the unknown cause and mechanism of psoriasis.[11–13]

2. Materials and Methods

2.1. Patient selection

This study comprises 50 psoriasis patients, with age 10-80 years, randomly selected from Department of Dermatology, Venereology and Leprosy, Narayana medical college and hospital. The control sample contains age matched 50 healthy volunteers. Exclusion criteria like patient who had other skin disorders, suffering from cardiac, diabetic, hypertension or psychiatric problems.

2.2. Methods biochemical assay

The serum levels of Zinc, Copper and Selenium levels were estimated by using Atomic absorption spectrophotometer.

All patients and controls have undergone laboratory investigations for trace elements Zinc, Copper and Selenium in serum samples. The clinical and laboratory results were carried out statistical analysis using SPSS (version 16.0). Data expressed as mean±S.D, and Student ' st- test was used to test mean difference between two groups. All the p values are having less than 0.05 are considered as statistically significant.

3. Results

Out of 50 psoriatic patients 37(74%) were male and 13 female (26%). The mean age of psoriasis patients and controls was 50 year. The mean serum levels of three trace elements in cases and controls and p value are shown Table 1.

4. Discussion

Psoriasis is an immune-mediated skin disease characterized by the production of reactive oxygen species due to the over expression of proinflammatory cytokines. Trace elements are essential to biochemical processes in the body and are involved in immunological and inflammatory reactions. The process of keratinization and melanin formation are enzyme dependent processes and influenced by the deficiencies/excess of trace elements[14] Zinc, Copper and Selenium are involved in the destruction of free radicals through cascading enzyme systems.[15]

Zinc and Copper are an integral part of as many as 40 metalloenzymes, including Cu/Zn superoxide dismutase with antioxidant and antiinflammatory activity.[16,17]

Skin is the third most Zinc abundant tissue in the body (skeletal muscle 60%, bones 30%, liver 5%, and skin 5%).[18] The epidermis contains more Zinc compared with the dermis.[19] In our study, serum zinc levels in psoriasis patients was found to be significantly lower than the control group. This is in accordance with several studies.[20–22]

Copper is one of those nine minerals that are recognized as essential nutrients for humans, as it plays a crucial role in different physiological processes in all human tissues,[23] as

well as in the skin.[24] The body of a 70-kg healthy individual has about 110 mg of copper, 50% of was found in bones and muscles, 15% in skin, 15% in bone marrow, 10% in liver and 8% in the brain.[25] In our study, the serum level of Copper was significantly lower in psoriasis patients than the control group. This is similar to study done by Bhatnagar et al and Lee et al.[26,27] However several other studies reported a higher level of Serum Copper levels.[28–31]

Selenium is an essential trace element, which has antiproliferative and immune-modulating properties. The key role of Selenium in human metabolism is attributed to its presence in the glutathione peroxidase, which protects cells against harmful effects of free radicals.[32] This active component can influence immune response and is involved in redox reactions which protect membranes from oxidative damage. This is caused by changing the expression of cytokines and their receptors or making immune cells more resistant to oxidative stress.[33] Deficit of Se is one of the risk factors that may predispose to inflammatory skin disorders. In our study, the serum level of Selenium was significantly less in psoriasis than the control. These results showing similar to the previous studies.[34–37] In the study carried out by Elhaddad et al., found significant increased Selenium levels in psoriatic patients with different severity scores.[6]

5. Conclusion

The lower levels of serum trace elements Zinc, Copper, Selenium in psoriasis patients which is in accordance with various studies showed that trace elements have role in the pathogenesis of psoriasis. However large randomised control studies are needed to establish their role.

6. Source of Funding

None.

7. Conflict of Interest

None.

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