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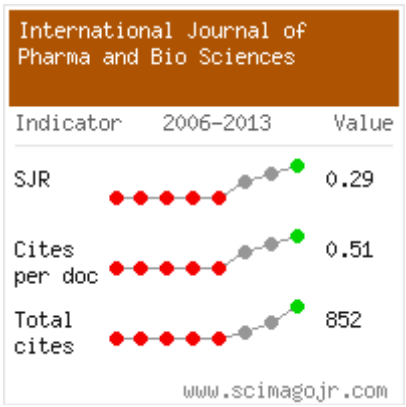

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ROLE OF ZINC SUPPLEMENTATION IN THERMAL BURN PATIENTS

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ABASTRACT

Thermal injury of the skin is an oxidation process, associated with biological and metabolic alteration. It generates free radicals from various cellular population by a number of pathways. And modulation of generated free radicals activity with antioxidants may improve outcome. The objective of our study was to study the role of zinc supplementation on wound healing power in post burn patients. We have undergone a case control study on 40 patients we have assessed serum zinc levels, malonaldehyde, glutathione peroxidase levels at the time of admission and compare it after supplementation. There was a significant decrease in serum zinc levels at the time of admission but after supplementation there was an increase in serum zinc levels and improved antioxidant status as represented by elevation of natural antioxidant level (glutathione peroxidase).

KEY WORDS: **Zinc, supplement, GSPX (Glutathione peroxidase burn patients.**

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INTRODUCTION

Burns involving >20% of the body surface results in extensive inflammatory endocrine, metabolic and immune changes[1]. (trace elements. In the most severe cases, the size of the wounds can reach 1.5 – 2 m^2 . the skin is one of the largest organsin humans and accounts for 15% of body weight and 10-25% of whole body protein turnover[2]. Trace elements are involved in the prevention of nutritional deficiencies, immune humoral and cellular defences. Wound healing micronutrient deficiencies are frequent after major burns[3] these patients suffer acute trace element depletion as the result of extensive exudative losses[4,5] copper, selenium, zinc are particularly depleted, all of which are involved in wound healing and in various aspects of immune defenses. Zinc ability to retard oxidative processes has long been recognized. In general the mechanism of antioxidation can divided into acute affects and chronic affect. The chronic effects involve exposure of an organism to zinc on along term basis, resulting in induction of some other substances that is the ultimate antioxidant, status the metallo thionine. Burn wound healing is a complicated process that requires several steps, and nay alteration at any point may delay the healing process. At any point may delay the healing process. In cutaneous thermal injury, several factors can increase tissue damage. Among these, the oxygen free radicals are important . oxidative stress contributes to secondary tissue damage and impaired immune functions after burn injury[6]. One of the famous trace elements widely used in the clinical setting for this purpose is zinc. Zinc is an essential trace element in the body, present in all organs tissues and body fluids[7,8]. Zinc play an essential role in growth immune function, antioxidant defence and wound healing[9]. Zinc deficiency leads to many pathological signs eg: growth failure neuropathy, diarrhoes, dermatitis, hair loss, bleeding tendency, hypotension, and hypothermia. In burn patients zinc is normally transported in plasma bound to proteins, while post burn these proteins are broken down owing to an increase catabolic rate and tissue damage[10]. Agay[14] et al showed that serum zinc level significantly decreased the after burn injury owing to redistribution to the liver. These trace elements act as major antioxidant enzymes cofactors variation in zn (zinc) and the cu (copper) is important[15].

MATERIALS AND METHODS

The present study was carried out in Burns unit in the department of plastic surgery, Narayana Medical College and Hospital Nellore. Study protocol was approved by the ethical committee of Narayana Medical college and Hospital Nellore. The study groups include 40 subjects this includes patients as well as healthy controls. Patients total 20 patients with different types of burn injuries admitted in burn ward in plastic surgery department of Narayana Medical College and Hospital Nellore. Controls are 20 healthy people zinc was measured by using atomic absorption spectromerty , erythrocyte glutathione peroxidase levels were determined by the RANSEL method malonldialdehyde (MDA) was measured by colorimetric method MDA and other aldehydes react with thiobarbituric acid and produce red-coloured products namely Thiobarbituric acid reactive substances (TBARS) measured by colorimetric method.

RESULTS

The study was conducted on a total number of 40 subjects (cases=20) (thermal burn patients) controls n=20 (healthy subjects)

Statistical analysis

Data analysis was done using SPSS version 11.0 . study variables were expressed in terms of mean ± standard deviation (S.D). variability across the study groups for each of the variable was assessed using nonparametric test mann whitney's test. The p value <0.05 was considered as significant. Within a study group relation between two variables was assessed using pearson's correlation test with p value <0.05 as significant limit. The mean and S.D of all parameters were calculated. The parameters include serum zinc levels , glutathione

peroxidase in thermal burns patients on admission and after supplementation with antioxidants enteral feeding was started within 24 hours, Patients received 2130± 800 kcal/d on day 1 by 7 days 2500 ± 1000 kcal/dy with no significant different between the groups.

Table I
shows serum zinc levels in cases and controls

		Mean(n=20)	Std
Serum Zn	Cases	74.91	18.41
	Controls	57.29	7.3

Table II
shows serum zinc levels after supplimenation

		Mean(n=20)	Std
Serum Zn day 1	Cases	69.29	15.67
Serum Zn day7	Controls	74.91	18.41

Table III
show Plasma MDA (µmol/l)

		Mean(n=20)	Std
Plasma MDA	Cases	0.24	0.01
	Controls	0.07	0.02

Table IV
show plasma GSH

		Mean(n=20)	Std
Plasma GSH	Cases	73.4	27.6
	Controls	54.3	11.3

Table V
show Plasma MDA (µmol/l)

		Mean(n=20)	Std
Plasma MDA	Cases	0.24	0.01
	Controls	0.07	0.02

MDA levels increased in cases which was highly significance p value <0.0001 which suggests there is increase oxidative stress.

DISCUSSION

Our study showed that following burn injury therewas a decrease in serum zinc, glutathione levels. When compared to healthy subjects (controls) following supplementation with oral zinc, serum zinc and glutathione peroxidase levels increased on day7. Wound healing is a major issue In burns and delayed healing with graft failure is a serious problem, trace elements directly affect most metabolic pathways. Zinc is required for most anabolic pathways, and deficiency has a negative effect on wound healing in non burn conditions (trace elements) in a study conducted by Bergel et al showed that copper, selenium, zinc supplement were associated with a beneficial effect on wound healing (0) (trace) , with a reduction of regrafting requirement. In the present study higher tissue zinc concentrations were

observed in both healthy and burned skin areas after 7datys of supplementation .The concentration being stable or further increasing thereafter. The evolution over time of the skin's antioxidant enzymes in the burned areas differed from that in the healthy donar skin. The concentration and activities of glutathione reductase, GSHPX, and glutathione increased significantly in the burned areas in the supplemented group by day 7 which contrasted with the lack of such an effect in the healthy donor areas[11,12]. Burn injury is associated with enchanced systemic inflammatory reactions and oxygen radical production[13]. After burn injury and more generally after trauma, imbalance between, oxygen species production and free radical scavengers determine the outcome of local and distant tissue damage, and further organ failure among antioxidants trace elements, zinc acts in immune system . antioxidant mechanisms and tissue repair. A zinc deficient status will have a deleterious effect on wound healing and on general recovery of burned patients. In burned patients, zinc intakes could be essential in early protection against oxidative damage. Lipid peroxidation in the wounds is considered partly responsible for secondary damage to distant tissues after burn injuries early wound excision has been adovated on this basis to reduce peroxide delivery. In perious studies showed that the urinary malondialdehyde excretion was lower in trace element supplemented patients than in controls reflecting lower lipid peroxidation[14,15]. In our study there isa marked increase in MDA levels in cases when compared to controls which shows that there is increased oxidative stress following burn injuries.

CONCLUSION

Large early trace element supplementation combining zinc, vitamin E is safe and beneficial after major burns. Clinical benefits were a reduction in the number of infectious complications (mainly pneumonia). Better wound healing as shown by the lower skin grafting requirements, and a non significantly shorter treatment time in ICU.

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