International Journal of Current Research in Life Sciences
Vol. 4, No. 6, pp. 239-240, June, 2015

IJCRLS

ISSN: 2319-9490

www.ijcrls.com

Full Length Research Article

Study of Corelation between copper level and SOD activity in Marasmic Children

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Accepted 27th May, 2015; Published Online 30th June, 2015

ABSTRACT

All children with PEM have micronutrient deficiency. This study was done in children (125) suffering from marasmus and compared with apparently healthy children(175) of the same age group who served as control. All the children's were subjected to estimation of serum copper and enzymatic activity of SOD. There was a significant decrease seen in the level of SOD and copper level in marasmic children as compared to control. Deficiency of trace elements leads to depleted antioxidant protection which may be contributing factor to patho-physiology of protein malnutrition.

Key words:

PEM, Marasmus, SOD , Copper.

INTRODUCTION

Inspite of many advances in medicine and technology, malnutrition is still common. One-quarter of third world population suffers from malnutrition (Ibrahim *et al.,* 1994). Malnutrition is estimated to be a contributory factor in 30-50% of all child death. Protein-energy malnutrition is applied to a group of related disorders that includes marasmus, kwashiorkor and marasmic-kwashiorkor. Marasmus is the end result of chronic semi-starvation often due to failure of lactation and use of dilute milk substitutes (Bartlop D. Marasmus, 1985). The human body has several mechanisms for defense against free radicals and other ROS (reactive oxygen species). The various defense are complementary to one another because they act on different oxidants or in different cellular compartments. One line of defense is a system of enzyme which includes (GPX, SODAND CATALASE) which decrease the concentration of most harmful oxidants. SOD (Super Oxide Dismutase) is an important copper metalloenzyme that protects lipid cell membrane structures from oxidation (Graham and Cordano, 1969). The aim of this study was to assess the level of copper and SOD in children suffering from PEM and their correlation.

MATERIALS AND METHODS

This study was carried out in 125 marasmic children. Children (age range 1-3years) were selected on basis of clinical findings and anthropometric parameters. 175 healthy children (age1-3yrs) were selected as control. The study protocol and procedures was approved by ethical committee of MGM medical college, Indore M.P. 2ml of blood was collected, 1ml of blood was transferred in plain vial for estimation of copper and rest 1ml was transferred in EDTA vial for estimation of SOD.

Method to determine SOD

SOD activity was measured by the inhibition of pyrogallol oxidation by using spectrophotometer at wavelength of 420nm, three readings were taken at interval of 1min which was according to the method of Marklund and Marklund (Bhor and Raghuram, 2004).The enzyme activity was expressed as IU/mgHb.

Method to determine copper

At pH 4.7 copper which is bound to cerulo-plasmin is released by reducing agent. It then reacts with specific color reagent 3,5Di-Br-PAESA to form a stable colored chelate. The intensity of the color is directly proportional to the amount of copper in sample. The O.D. is read at 580nm using spectro-photometer (Abe *et al.,* 1989).

Statistical analysis

Data obtained from study group was compared by student's t test. Correlation and analysis between variables were made by pearsons test. Values less than 0.05 was considered as statistically significant. All the results were expressed as mean with the standard deviation (mean ±S.D.).

RESULTS

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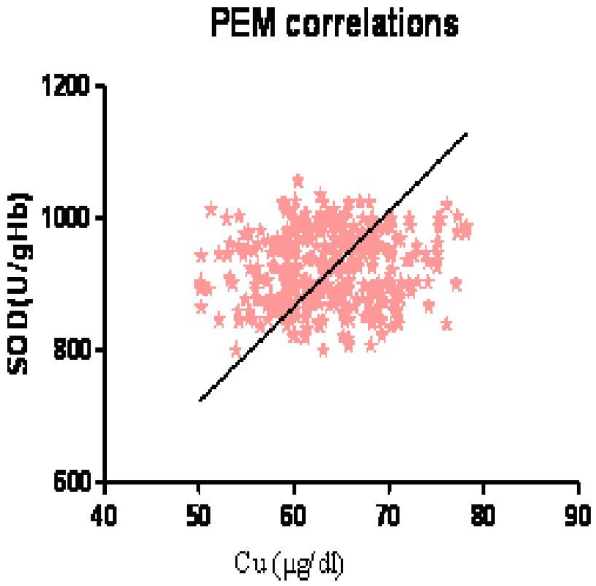
As compared to control the level of copper and S.O.D activity was decreased in malnourished children, which was statistically significant ($p<0.05$). Copper showed positive correlation with SOD which was statistically significant ($r=0.1295$, $p<0.01$).

Parameters	Control n=125	Marasmus n=175
Cu(µg/dl)	119.26±11.37	64.10 ±5.890
SOD U/gm Hb	1269.20±26.428	940.03±51.21



DISCUSSION

In our study there was a significant decrease in copper level in malnourished children as compared to control. This is in accord with the previous study done (Jain, 1976). Copper deficiency could be attributed to increase losses, inadequate intake and poor availability receiving long term parenteral nutrition and in population with high intake of cereals (Savitri Thakur, 1980). Deficiency of copper include anemia, neutronpenia, bone abnormalities, iron-deficiency anemia (Agette, 1995). The mean level of SOD was significantly reduced in malnourished children as compared to control and is in accord with the previous study done (Samir Mohammed Abou E.L. Hassan, 2000). The decrease could be due to either consumption in dismulating reaction where ROS are removed by SOD or being secondary to deficient levels of copper.

A positive co-relationship was observed between copper and SOD. Copper occurs at the active site of enzyme and exercise a redox function. During copper depletion, SOD activities decreases noticeably and remain low as long as the depletion last (Uavy *et al.,* 1985). Since children suffering from PEM have low copper levels, hence decrease in the availability of copper for synthesis of SOD molecule could be responsible for decreased enzyme activity. Low SOD activity in PEM could affect bacterial killing and lead to inadequate handling of oxygen free radicals (Evans, 1973).

Conclusion

As a cofactor trace elements plays a significant role in antioxidant protection, therefore deficiency of trace element may be responsible for increased peroxidation of membrane lipids.

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