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Research Paper

Study of Lipid Peroxidion & Antioxidant Status in Septicemia

Medical Science

KEYWORDS : Septicemia, Shock, MDA, Antioxidants Vitamin E & Vitamin C, Lipid peroxidation.

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ABSTRACT

Septicemia is a serious, rapidly progressive life threatening infection which may lead to increased free radical formation & hence lipid peroxidation which reduces antioxidant status of patients leading to oxidative stress. This study involves 30 voluntary controls, 30 patients of septicemia & 30 patients of septicemia with shock of age group 15-75 years. All three groups underwent investigative measurement of serum vitamin E &Vitamin C. Lipid peroxodation formation measured by MDA & antioxidant status was measured by estimating serum Vitamin E & Vitamin C. Results reveal significant rise in MDA levels in Septicemia(p<0.001) & Septicemia with Shock (p<0.001) as compared to Control. Serum Vitamin E & Vitamin C levels in both the groups are significantly decreased (p<0.001) as compared to Control. Since Vitamin E & Vitamin C have Antioxidant property can be used as supportive help in treating the cases of Septicemia.

INTRODUCTION-

Septicemia is defined as the presence of bacteria in blood and is often associated with severe diseases, accompanied by systemic effects like toxemia, multiple small hemorrhage, heterophilic leucocytosis, and DIC. (Disseminated Intravascular Coagulopathy (1).

Septicemia is a serious, rapidly progressive, life-threatening infection that can arise from infections throughout the body, including infections in the lungs, abdomen, and urinary tract. It may precede or coincide with infections of the bone (Osteomyelitis), central nervous system (Meningitis), or other tissues. Septicemia can rapidly lead to septic shock and death. Septicemia associated with some organisms such as meningococci can lead to shock, adrenal collapse and DIC, a condition called Waterhouse-Friderichsen syndrome. (2).

MDA is used as an index of lipid peroxidation .ROS (Reactive Oxygen Species) generation causes peroxidation of PUFA (Polly Unsaturated Fatty Acids) of the membrane. This hampers the membrane integrity, which could be one of the possible reasons of Septicemia & septicemia with Shock.

Vitamin-E other antioxidant nutrients including selenium, vitamin C, nd β – carotene to quench free radicals, peroxides and other potentially harmful substances. Vitamin E is fat-soluble and is found mainly in the cell membranes and fatty structures of most cells. Vitamin E detoxifies peroxides thus preventing generation of even more toxic hydroxyl and superoxide radicals and singlet. Vitamin E appears to be the first line defense against peroxidation of PUFA. The tocopherols act as antioxidants, breaking free radical chain reaction as a result of their ability to transfer phenolic hydrogen to a peroxyl free radical of a peroxidized PUFA. α- tocopheroxyl radical reacts with further peroxyl free radical to form non free radical product. (10).

Vitamin C is water soluble antioxidants role as an antioxidant is indicated by its free radical scavenging action. As a reducing agent and antioxidant agent it directly reacts with $O_2^{\cdot}$ and $OH^{\cdot}$ & various lipid peroxidases.it plays important role in sparing vitamin E as well, which is another lipid soluble antioxidant. So it may be said that role of vitamin C is very beneficial in septicemia & septicemia with shock. Strong oxidizing agent reacts with organic substances to produce more ROS such as $OH^{\cdot}$ (8,9).

MATERIAL AND METHODS

Present study was carried out in Department of Biochemistry B. J. Medical College Pune. Present study include 90 patient out of 30 patient are control.Age group 15-75 years.

Serial No.	Group of patient	Number of patients
1.	Control	30
2.	Septicemia	30
3.	Septicemia With shock	30

After obtaining consent venous blood was collected from patient under aseptic precaution by venous puncture using 10 ml blood was collected plasma & serum were separated by centrifugation at 3000 rpm for10 minutes at room temperature. Samples stored at 4°C prior to analysis samples were analyzed in one week for above mentioned parameters.

All Methods were standardized first & standard graph were plotted. Lipid Peroxide was measured by precipitating lipoproteins with TCA & boiled with TBA that reacts with MDA to get pink colored complex as per Buege and Aust method (1979) ((13). Serum Vitamin E was estimated by Baker and frank method (1968) (9).

Serum vitamin C was estimated by Aye Kyaw's Method (1978) (1 4).

All results were expressed in mean ±SD Statastical analysis was done by using student's 't' Test. Correlation Coefficient was determined between lipid peroxide& Vitamin c & Vitamin E. was determined which is highly significant (p<0.001).

DISCUSSION & RESULTS

In present study, serum Malondialdehyde (MDA), Vitamin E, Vitamin C levels were estimated in a) Septicemia b) Septicemia with Shock and is compared with control patients.

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• **Table I :-** Serum MDA, Vitamin E, Vitamin C in Control, Septicemia, Septicemia with shock.

Study Groups	MDA (nmol/ml) Mean ± SD.	Vitamin E (mg%) Mean ± S.D.	Vitamin C (mg% Mean ± S.D.
Control n=30	4.957 ± 1.262	1.254 ± 0.101	1.340 ± 0.201
Septicemia n=30	11.747 ± 2.003**	0.730 ± 0.165**	1.056 ± 0.150**
Septicemia with shock n=30	15.765 ± 1.536**	0.40 ± 0.063**	0.876 ± 0.102**

The results are expressed as mean ± S.D.** Highly significant (P < 0.001)

Statistical analysis shows: - MDA level in septicemia and septicemia with shock is increased as compared to control (P<0.001) is highly significant. Vitamin E level in septicemia and septicemia with shock is decreased as compared to control (P< 0.001) is highly significant. Vitamin C level in septicemia and septicemia with shock is decreased as compared to control (P<0.001) is highly significant.

• **.Table II:** MDA, Vitamin E and Vitamin C in patients with a) Septicemia*(P>0.05)

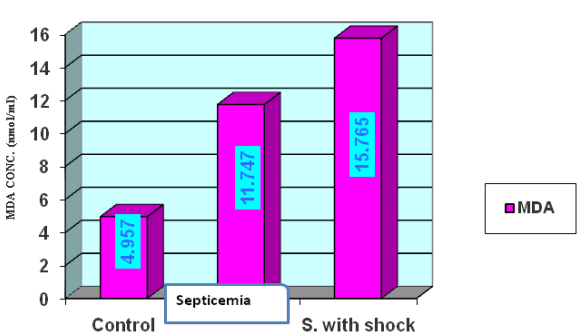
Correlation Variables	r – values
i) MDA with vitamin E	- 0.138
ii) MDA with vitamin C	- 0.147

• **Table III:** MDA, Vitamin E and Vitamin C in patients with Septicemia with shock*(P>0.05)

Correlation Variables	r – values
ii) MDA with vitamin E	- 0.178
ii) MDA with vitamin C	- 0.192

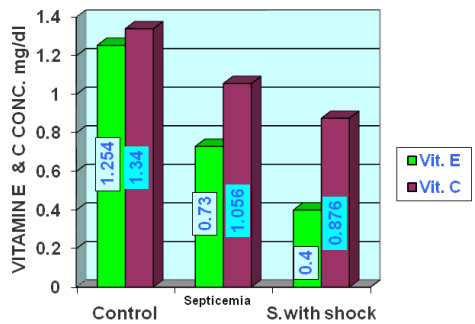
- Correlation between MDA, vitamin E, vitamin C was negative in septicemia group patients but it was not significant (P>0.05).

Fig.5: SERUM MDA LEVELS IN CONTROL, SEPTICEMIA, SEPTICEMIA WITH SHOCK



- Correlation between MDA, vitamin E, vitamin C was negative in septicemia with shock group patients but it was not significant (P>0.05).

Fig.6: SERUM VITAMIN E AND VITAMIN C LEVELS IN CONTROL, SEPTICEMIA, S. WITH SHOCK



The results showed significant rise in MDA level in septicemia (15.747± 2.003 nmol/ml) compared to controls (4.957±1.262 nmols/ml) indicating increase in lipid peroxidation.While Vitamin E (0.730±0.165 mg %) and Vitamin C levels

(1.056±0.150mg%) were decreased significantly compared to controls. (Vitamin E 1.254±0.101 mg %) and (Vitamin C 1.340±0.201 mg%) indicating defective antioxidant mechanism.

In septicemia with shock patients there was significant increase in MDA levels (15.765±1.536 nmols/ml) compared to controls (4.957±1.262 nmoles/ml) indicating increase in lipid peroxidation.

Vitamin E (0.40±0.063 mg %) and Vitamin C (0.876±0.102mg%) levels were highly significantly low compared to controls.

Infections due to gram-negative bacteria and other organisms can lead to septicemia and shock in some patients. Endotoxins, which cause these pathological events, stimulate macrophages to elaborate tumour necrosis factor and other lymphokines. These lymphokines can augment free radical generation by polymorphnuclear leucocytes, macrophages and other cells, which may produce respiratory distress syndrome, multiorgan failure, and irreversible shock seen in septicemia. (Prabha PS et al) (14).

It appears that oxidative stress developed in septicemia due to leucocytes, neutrophil activation and altered arachidonic acid metabolism. Increase lipid peroxidation and oxidative damage can be partly compensated by supplementation of antioxidant and some microvascular changes in liver and DNA damage is partly compensated. (17)

CONCLUSION:

Among various other antioxidants, vitamin E and vitamin C appears to have potent antioxidant activity for prevention of inflammation produced by septicemia. Regular medical treatment in septicemia is very important. Supportive help of antioxidant may be beneficial for recovery of septicemia.

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