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Influence of Six Weeks Zinc Supplementation on Selected Physical Physiological and Hematological Variables among Basketball Players

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Abstract: The purpose of the study was designed to find out the effect of six weeks zinc supplementation on selected physical, physiological and hematological variables among basketball players. In this study, the investigator selected 20 male basketball players from Shanmuganathan Engineering College, Arasampatti, Pudukkottai, Tamil Nadu, India. Their age were ranged between 18 to22 years. These players were randomly distributed into two groups namely experimental (10) and control (10) group respectively. The Independent variable selected for the present study was supplementation of zinc. The criterion variables selected for this study were Physical (Speed & Power), Physiological (VO2max & Blood pressure) and Hematological (Neutrophils, Lymphocytes and Eosinophil). The data were statistically examined by applying one way univariate ANCOVA from the collected data before and after the experimental period. The result of the study reveals that there existed significant improvement on VO2max, Neutrophils, Lymphocytes & Eosinophil and insignificant improvement on Speed, Power and Blood Pressure.

Key Words: *Zinc, Physical, Physiological, Hematological and Basketball.*

Introduction:

The evidence of human deficiency began to emerge during the 1960s, when cases of zinc – responsive dwarfism and delayed sexual maturation were first reported in Egyptian adolescents (Prasad AS, 1991).

Since then, a number of intervention trials have been carried out to assess the impact of zinc supplementation particularly in low – income population who are likely to suffer from zinc deficiency (Brown KH et.al, 2002).

A deficiency of zinc may result in the loss of the senses of taste and smell. It can also cause

fingernails to become thin, peel and develop white spots. Other possible signs of zinc deficiency include acne, delayed sexual maturation, fatigue, growth impairment, hair loss, high cholesterol levels, impaired night vision, impotence, increased susceptibility to infection, infertility, memory impairment, a propensity to diabetes, prostate trouble, recurrent colds and flu, skin lesion and slow wound healing.

Most disease and illness result be caused by deficiencies in a variety of minerals or vitamins. Such is the case with tuberculosis (TB). It was found that individuals who are lacking in proper diet and the essential nutrients associated with balanced food intake such as the elderly, the homeless, alcoholics, children and HIV – infected people are more susceptible to TB than those receiving proper nutrition. Recent studies in Indonesia suggest that zinc and vitamin A could boost the effect of TB medications after only months of supplementation (Karyadi E, West CE, Schultnick W, et.al, 2002)

The benefits of the zinc supplementation are necessary to every cell of the body. Among other things, this abundant trace mineral is responsible for over 100 enzymatic activities, including every major physiological function reliant upon enzyme reactions. For, instance, Zinc is necessary for carbon dioxide (Co2) exchange between cells. When zinc levels are depleted, Co2 exchange is slowed, possibly leading to a toxic build up within the body. Although, next to iron, zinc is the most available trace mineral in the body, the body itself cannot produce this nutrient. The only way to obtain zinc which is primarily stored in the muscles is through diet. Zinc is found in high concentration in both red and white blood cells, kidney, liver, pancreas, skin and in the retina of the eye. In males, Zinc can also be found in the prostate.

Hypothesis:

There would be significant improvement on selected physical, physiological and hematological variables among the basketball players due to six weeks supplementation of zinc.

Methodology:

In this study, the investigator selected 20 male basketball players from Shanmuganathan Engineering College, Arasampatti, Pudukkottai, Tamil Nadu, India. These selected subjects involved in regular basketball training and take part in the competition .Their age ranged between 18 to22 years. These subjects were randomly distributed into two groups namely

experimental (10) and control (10) group respectively. The Independent variable selected for this present study was supplementation of zinc. The criterion variables selected for this study were Physical (Speed & Power), Physiological (VO2max & Blood pressure) and Hematological (Neutrophils, Lymphocytes and Eosinophil). The data pertaining to the study were collected with the help of standardized test item which are presented below Table- I. The data were statistically examined by applying one way univariate ANCOVA from the collected data for before and after the experimental period.

Table – I Selection of Test

S. No	Variables	Test/ Method
A	Physical Variables	
1.	Speed	50 mts Run
2.	Power	Sargeant vertical Jump
B	Physiological Variables	
1.	VO2 max	Cooper‟s 12 min Run/Walk
2.	Blood Pressure	Sphygmomanometer
C	Hematological Variables	
1.	Neutrophils	Leishman‟s Method (Clinical Method)
2.	Lymphocytes	
3.	Eosinophil	

Result and Interpretation of The Study:

One way univariate ANCOVA was applied to know the significant mean improvement between control and experimental groups on physical, physiological and hematological variables.

Table – II

Summary of One Way Univariate Ancova for the Adjusted Post Test Mean Value on Dependent Variables Between Experimental and Control Group

Adjusted Post – test mean			Sources of Variance	Sum of Square	df	Mean Square	F -ratio
Criterion Variables	EG	CG					
Speed	5.26	5.27	B	212.09	1	212.09	3.26
			W	1104.76	18	64.98	

Power	57	52	B	61.91	1	61.91	3.68
			W	285.53	18	16.79	
VO2 max	64	58	B	104.71	1	104.71	8.39*
			W	212.03	18	12.47	
Blood Pressure	96.10	96.35	B	77.60	1	77.60	1.03
			W	1270.88	18	74.75	
Neutrophils	52.10	48.75	B	295.27	1	295.27	15.49*
			W	323.98	18	323.98	
Lymphocytes	44.21	40.75	B	2164.95	1	2164.69	1353.09*
			W	27.35	18	1.60	
Eosinophil	10.1	8.5	B	4715.07	1	4715.07	7.33*
			W	642.59	18	642.59	

*Significant at 0.05 level of confidence. Table value required for significance at 0.05 level of confidence df 1 & 18 was 4.22

From the above table, it is observed that the F – ratio value of adjusted posttest mean of VO2 max, Neutrophils, Lymphocytes and Eosinophil are 8.39; 15.49; 1353.09 and 7.33 respectively which are greater than the table value 4.22 with df 1 and 18 required for significance at 0.05 level of confidence. Hence it indicates that there existed significant improvement on VO2 max, Neutrophils, Lymphocytes and Eosinophil of the experimental groups after the six weeks supplementation of zinc.

It is also observed from the table – II that the F – ratio value of adjusted posttest mean of Speed, Power and Blood Pressure are 3.26; 3.68; 1.03 respectively which are less than the table value 4.22 with df 1 and 18 required for significance at 0.05 level of confidence. Hence it is understood that there existed insignificant improvement on Speed, Power and Blood Pressure of the experimental groups after the six weeks supplementation of zinc.

Discussion on Findings:

During maximal exercise, oxygen transport to muscle is the limiting factor for aerobic performance. Accordingly zinc levels are associated with greater oxygen transport and improved aerobic performance. Muscular fatigue is a critical importance and as such it has been the subject matter of numerous investigators. Although many factors have been identified, a clear remains elusive. In the last decade there has been an increasing interest in

the effect of regular vigorous exercise on the immune system. Although moderate exercise appears to stimulate the immune system, there is also evidence that intense exercise can cause alternations of the immune system. Recently, we have observed that daily high and maintained physical training over a prolonged period of time (7) provokes marked modifications in the immune system of elite sportsmen. These alterations are observed both in basal conditions and in response to the maximal physical training over a prolonged period of time. (CORDOVA, A, M. ALVAREZ-MON, 1995).

Zinc is the most ubiquitous of all trace elements involved in human metabolism. More than one hundred specific enzymes require zinc for their catalytic function (Cousins RI, 1996). The elderly subjects who received supplemental zinc demonstrated improvement in delayed cutaneous hypersensitivity, number of circulating T cells and serum IG antibody response to tetanus toxiod (Duchateau Jet.al., 1981). In other studies of experimentally induced mild zinc deficiency among adults, a reduction in serum thymulin and specific subpopulation of lymphocytes occurred during zinc depletion and these returned to normal levels following zinc repletion (Prasad AS et.al., 1988). Even relatively small imbalances in zinc levels adversely affect immune system function. International studies indicate that when malnourished children from countries such as South America, south Asia, India and Africa are given zinc supplements ranging from 4 to40 mg per day, the duration of incidences of infection diarrhea is shortened (Black RE, 1988).Further studies show that when zinc is given to individuals with low zinc levels, the number of T – cell lymphocytes increased along with their ability to fight infection (Beck RW, Prasad AS, Kaplan j, Fitzgerald JT, Brewer GJ. 1997).

Since zinc plays a relevant role in the regulation of the cellular metabolism. Several physiological functions are modulated by this trace element including the immune system. Based on the above information and result of the present study, it is concluded that zinc supplementation along with regular training contributed significantly on the development of VO2 max which is important aerobic performance and hematological variables such as Neutrophil, Lymphocytes and Eosinophil which are responsible for development immune system.

Conclusions:

- There existed significant improvement on VO2 max in experimental group due to the influence of supplementation of the zinc.
- There existed significant improvement on Neutrophil, Lymphocytes and Eosinophil in

experimental group due to the influence of supplementation of the zinc.

- There existed insignificant improvement on Speed, Power and Blood pressure.

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