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# EFFECT OF DIFFERENT ENVIRONMENTAL VOLLEYBALL PRACTICE ON SELECTED BIOCHEMICAL AND HEMATOLOGICAL VARIABLES

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## Abstract
The study was conducted to find the effect of different environmental Volleyball practice on selected biochemical and hematological variables. Twenty four male volleyball players were selected as subjects from the Department of Physical Education and Sports Sciences, Annamalai University. Their age ranges between 18-21 years. Selected subjects were grouped into two with each twelve members. Group I served as indoor game players and Group II as out door game players. Different environmental training such as indoor and out door volleyball game practices was carried out for 3 months duration (4 days/ week). Selected Biochemical and hematological variables were analyzed and measured using appropriate methods. The resulted data were collected and statistically analyzed using Paired T- test and they are significant at $p<0.05$. The study hypothesized that different environmental volleyball practice significantly modifies the biochemical and hematological variables. It is also revealed that outdoor volleyball game practice produces better effect than indoor practice.

Keywords: Total cholesterol, Glucose, Creatine kinase, WBC (white blood corpuscles), RBC (red blood corpuscles)

## Introduction
Volleyball is a very popular game worldwide. It enjoys one of the highest participation rates of any sport in the world. The most appealing aspects of the sport is that it can be played indoors and outdoors, by the young and the old, by males and females, and by both the able bodied and those with physical impairments.

A Review related that Volleyball is furthermore unique among team sports. It has been evolved into two distinct Olympic disciplines: an indoor version featuring six players on each team, and a two person per side outdoor game typically played on sand (beach volleyball) (Reeser etal., 2006).

Although the essential skills of the two disciplines are identical, important differences between indoor volleyball and beach volleyball do exist, including certain rules, the court dimensions, and the composition of the playing surface, the environmental conditions in which the players must compete, and subtle differences in the size and weight of the indoor and outdoor balls (Reeser etal.,2006).

The physiological demands of the two disciplines also differ to some extent: the average indoor match during the 2005 FIVB World Grand Champions Cup lasted about 95 minutes, with nearly 165 rallies over the course of the contest, whereas the average match on the FIVB Beach Volleyball World Tour lasts about 50 minutes with 90 rallies contested.

As with all sports, those who enjoy are true in any other game, specific factors make some players better than others. The objective of this study is to discover whether different environmental practice of volleyball game influences the biochemical and hematological variables in volleyball players.

## Methodology
To achieve the purpose of the study twenty four volleyball players were selected from the Department of Physical Education and Sports Sciences, Annamalai University. Their age ranges between 18-21years.

Selected subjects were divided into two groups with twelve members of each.

Group 1 served as indoor training group and

Group 2 served as out door training group.

Experimental training program was performed for 4 days /week for 3months.

### Training Programme
### Volley ball indoor and out door practice
The standard (indoor) volleyball game is the six-person team game, now played competitively by both men and women. It was invented in the U.S. in 1895 by William G.Morgan who created the game (at that time called mintonette) by blending elements of basketball, baseball, tennis and handball. Volleyball was designed to involve less physical contact than basketball to suit Businessman in Morgan's Young Men's Christian Association (YMCA) physical fitness classes. It

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became an Olympic sport in 1984 at the Los Angeles Olympic Games. (www.volleyball.org).

Six-person team volleyball is a non-contact team game played by two teams on a hard playing court divided by a net. The object is for each team to send the ball regularly over the net to ground it on the opponent's court, and to prevent the ball from being grounded on its own court. Play is initiated with a serve by the right back-row player to the opponent's court. The opposing team is allowed to hit the ball three times (in addition to the block contact) to return the ball to the opponent's court. The rally continues until the ball touches the ground/floor, goes out of court or the team fails to return it to the opponent's court or commits a fault. (www.volleyball.org).

Under the rally point scoring system, the team winning a rally scores a point and the right to serve if it's the receiving team (players rotate one position clockwise at service). A team wins a game by scoring 15 points with a two-point advantage and wins the match by winning the best of three or five games. (www.volleyball.org).

The game of beach volleyball, played outdoors on sand, originated in the early 1920s on the beach at Santa Monica, California. Over time it has been played as a six- five- fourthree-and two- person game. Two-person beach volleyball was added to the Olympics in Atlanta in 1996, when 24 men's teams and 16 women's teams represented their countries. (www.volleyball.org). Park and grass volleyball is also being promoted as a social game.

### Sport-specific skills

In all variations of volleyball there are six sport-specific basic skills:

· Serve: serves may be overhand or underhand and the ball is hit with the fist (underhand serve only) or the heel of the hand (both overhand and underhand serves).

· Forearm pass/Dig: the basic skill is called a 'pass' when receiving the serve and a 'dig' when handling an opponent's attack. When correctly executed contact with the ball is made with the lower forearms, just above the wrist.

· Set/Overhand pass: the ball is directed towards the net so that it may be spiked or hit by a team mate. In a correctly executed 'set', contact is made with the fingertips of both hands; the contact point is just above the forehead (hairline).

· Hit/Spike: the player jumps high into the air and contacts the ball overhead at the highest point of the jump and strikes it down onto the opposition's side of the net. The contact point is slightly in front of and as high as possible above the hitting shoulder.

First contact is made with the heel of the hand, followed by the palm and the fingers which then snap through the ball (the wrist snap provides topspin on contact).

· Block: players on the opposing team will try to block a spike by jumping with hands raised to intercept the spike and force the ball back to the hitter's side of the net. (www.volleyball.org; Briner & Kacmar, 1997).

Selected Biochemical variables include Total cholesterol; Glucose and Creatine kinase were analysed using Boheringer Manhim kit and heamatological variables include RBC and WBC was measured using count.

### Statistical analysis

The data will be collected before and after the different environmental practice performed by the experimental subjects. Selected Biochemical and hematological variables were assessed before and after 3 months of training program. The data were collected and analyzed using paired T- test. There differences was considered to be significant when $p<0.01$. Results showed that better improvement was seen in outdoor training volleyball players.

## Results

Table -1 Effect of indoor and outdoor volley ball training on total cholesterol, glucose and creatinine kinase in volleyball players.

| Groups | Total cholesterol mg/dl | t ratio | Glucose mg/dl | t ratio | Creatinine kinase U/L | t ratio |
|---|---|---|---|---|---|---|
| Indoor training | 174.38±0.29 | | 96.29±0.05 | | 216.17±0.04 | |
| Out door training | 161.47±0.36 | 87.41 | 89.29±0.05 | 705.36 | 198.25±0.02 | 1279.65 |

Data represents mean± SD from 12 subjects in each group.
Group comparison: Group 2 with 1.
(The table value required for significance at0.05 level of confidence with df 11 is 1.796 respectively)
There is a significant relationship among paired groups. $p<0.01$

Table-2 Effect of indoor and outdoor training on WBC and RBC count in volley ball players

| Groups | WBC×$10^{12}$/L | t ratio | RBC×$10^{9}$/L | t ratio |
|---|---|---|---|---|
| Indoor training | 7.06±0.18 | 23.79 | 5.02±0.09 | 52.86 |
| Out door training | 8.26±0.04 | | 5.79±0.05 | |

Data represents mean± SD from 12 subjects in each group.
Group comparison: Group 2 with 1.
(The table value required for significance at0.05 level of confidence with df 11 is 1.796 respectively)
There is a significant relationship among paired groups. $p<0.01$

Table 1 and 2 shows the effect of indoor and outdoor training on total cholesterol, glucose and creatine kinase; RBC and WBC in Volley ball players.

The levels of total cholesterol, glucose, CK, RBC and WBC were found to be altered due to the effective out door training. The results show the significant effect was seen only in out door players.

## Discussions

The present study shows that out door volleyball game practice is very effective in reducing total cholesterol, glucose and creatine kinase. Physical exercise is known to positively affect the lipid profile, i.e. to decrease the concentrations of total and LDL-cholesterol and of triacylglycerols, and to increase that of HDL (Herzberg, 2004; Hübner-Woźniak et al., 2007). Studies also show that the players in training will be able to maintain their lipid profiles and glucose within normal limits (Konrad Witek, 2009; Sugumar et al., 2009).

Creatine kinase activity may serve as an indirect indicator of training loads (Sitkowski et al., 1995) and the resulting muscle damage (Hübner-Woźniak etal., 2000) which may appear even several days post exercise(Nosaka etal., 1996). A Study also showed that creatine kinase activity on elite volleyball players in competition period and throughout the study found to be increased due to their training loads (Konrad Witek, 2009).

The results of the present study were indicative of very high training loads in indoor practice when compared to outdoor the players were subjected to. It shows though muscle damage was seen in both game practices. Also the plasma CK activity was higher in indoor practice, probably reflecting a higher muscular stress imposed by the high-intensity training at that moment. These overload increase could be a factor to induce a down-regulation of the enzyme activities. In our study CK activity is altered in out door volley players than indoor players and hence the muscle damage is less.

Present study shows that athletes doing intense exercise leads to greater risk of iron deficiency (Spodaryk etal., 1985). Erythrocyte destruction, exercise stress also cause anemia in athletes (Spodaryk etal., 1985; Weight et al., 1992). Iron deficiency has deleterious effects on the physical performance of athletes. At the cellular level, reduced oxygen transport capacity and lower oxidation capacity are obvious consequences of iron depletion (Beard and Tobin, 2000). Physical activity, endurance activity and resistance to fatigue in athletes depend on many factors. Studies concluded that anemia leads to decrease in haemoglobin, reduced RBC and WBC (Spodaryk etal., 1985; Weight et al., 1992 Jadwiga Malczewska-Lenczowska etal., 2009) count is most probably found in highly trained athletes. In our study we observed significant increase in RBC and WBC in outdoor game players than indoor players. Reduction in RBC and WBC count in indoor players was due to intense training and stress.

## Conclusion

Summing up, the observed changes in Biochemical and Hematological indices are suggestive of metabolic disturbances brought about by different environmental training.

Thus the study concluded that different environmental practice of volleyball game modifies the biochemical and hematological variables. It is also observed that outdoor volley ball game practice is found to be effective than indoor game.

## References

Beard J and Tobin.B. Iron status and exercise.Am J. Clin. Nutri.2000;72:594-597.

Briner Jr WW and Kacmar L. Common injuries in volleyball-mechanisms of injury,competition period. Sports Medicine (Auckland, N.Z.) 1997; 24(1), 65-71.

Herzberg G.R. Aerobic exercise, lipoproteins, and cardiovascular disease: benefit and possible risks. Can.J.Appl. Physiol 2004;29:800-807.

Hübner-Woźniak E., G.Lutosławska. Podstawybiochemii wysiłku fizycznego. Biblioteka Trenera, Warszawa.2000.

Hübner-Woźniak E., M.Malara, Z.Prawecki. Serum lipid profiles in competitive athletes. Phys.Educ.Sport 2007;51:28-31.

J C Reeser, E Verhagen, W W Briner, T I Askeland and R Bahr. A Review Strategies for the prevention of volleyball related injuries.Br J Sports Med 2006; 40:594–600.

Jadwiga Malczewska-Lenczowska, Romuald Stupnicki, Beata Szczepańska.Prevalence of iron deficiency in male elite athletes. Biomedical Human Kinetics,2009; 1, 36 – 41.

Konrad Witek. 2009. Changes in serum lipid profile of elite volleyball players in the prevention and rehabilitation. Sports Med. 1997;24(1):65.

Nosaka K and Clarkson P.M. Variability in serum creatine kinase response after eccentric exercise of the elbow flexors. Int.J.Sports Med. 1996;17:120-127.

Sitkowski D, G.Lutosławska, J.Pośnik, M.Brzuchalski. Relationship between plasma creatine kinase activity and aerobic performance indices in elite kayakers during a training microcycle preceding World Championship. Biol.Sport.1995; 12:3-13.

Spodaryk, K. Z.Szygu a, Z. Dabrowski and H. Miszta. The activity of erythrocyte enzymes in rats subjected to running exercises.Eur.J.Applied Physiol. Occup.Physiol.1985; 54;533-537.

Sugumar.C, M.Bernard Singh and Rama.M. Effect of aerobics cycling and weight training exercises on blood glucose levels.Training microcycle preceding World Championship. Biol. Sport.2009; 12:3-13.

Weight, L.M.P., Jalobes and T.D. Noakes. Dietary iron deficiency and sports anemia.Br.J.Nutr.1992; 68:253-260.