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Assessment of anaemia in football players: An observational study

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Abstract:
Introduction*: Two distinct hematological phenomenon can occur in endurance-trained athletes: (a) a rheological adaptation to endurance exercise leading to a rapid increase of plasma volume which decreases hematocrit (Ht), and hemoglobin (Hb) levels (athletes' pseudoanemia) and (b) a true iron deficiency and anaemia. Most studies, in the past, had failed to differentiate these two conditions.Studies exist in the literature examining the prevalence of anaemia in athletic populations, yet it is still controversial whether anaemia is in fact more frequent in athletes than in non-exercising population.*
Aim *- To evaluate & assess hemoglobin and ferritin levels in football players and to compare these values with non-exercising controls*
Method*: n=30 male Professional football players in the age group of 18-25 years playing football for last 5 years were enrolled for the study. n=30 healthy age and sex matched non exercising individuals were taken as controls. Hemoglobin and serum ferritin levels were estimated in both the groups.*
Results:*The mean age was 20.36±2.23years in the study group and 20.96±2.0 years incontrols. The mean hemoglobin concentration in the football players was 14.92±1.16 gms% and in controls it was15.60±1.17 gms %(p=0.01). The serum ferritin levels in the study group were 65.05±54 ng/ml while in the controls it was 135± 40.90ng/ml (p=0.0003)*
Conclusion:*The chances of developing true anaemia in football players is the likely possibility in future, hence the study recommends to follow up these subjects to maintain iron stores.*
Key words- *Sports anaemia, hemoglobin, ferritin, football players*

I. Introduction

Sports physiology has made great strides in the last 20 years and has emerged as a subspecialty. "Blood in sports has two extremes". At one end is anaemia and at the other end is erythrocythemia and in particular, inducederythrocythemia: blood doping[1]It seems paradoxical that when most physiological parameters show improved function ,the haemoglobin level should fall with training but, most studies show that endurance trained athletes have a haemoglobin level lower than untrained controls[2]There has been a great deal of interest about anaemia in athletes owing to the critical role of haemoglobin in oxygen transport, the rate limiting step in aerobic exercise.[3]Studies exist in the literature examining the prevalence of anaemia in athletic populations. Yet it is controversial whether anaemia is in fact more frequent in athletes than in the non-exercising population[4-7]

II. Aims and Objective

The aim of the study was to evaluate and assess haemoglobin and ferritin levels in football players and to compare these values with non-exercising controls

III. Material and Methods

The study was approved by the institutional ethical committee (IEC).Informed written consent was taken from the subjects before enrollment in the study.

Inclusion criteria

n=30 male professional football players in the age group of 18-25 years playing football for last 5years were enrolled for the study.n=30 normal healthy age and sex matched non exercising individuals were taken as controls.

The haemoglobin and serum ferritin levels were estimated in both the groups .The estimation was done in one laboratory using standard techniques.

Statistical Analysis:

Results were analyzed using paired t test for intergroup comparison

IV. Observations and Results:

The mean age in years was 20.36±2.23 in the study group and in controls it was 20.96±2.0 The mean hemoglobin concentration in the football players was 14.92±1.16 gms% and in controls it was15.60±1.17 gms%(p=0.01). The serum ferritin levels in the study group were 65.05±54 ng/ml while in the controls it was 135± 40.90ng/ml (p=0.0003)(Table 1)

Table-1

Parameters	Football players	Non-exercising controls	P-value
Age in years	20.36±2.23	20.96±2.0	
Serum Hb(gms%)	14.92±1.16	15.60±1.17	0.01
Serum Ferritin(ng/ml)	65.05±54	135± 40.90ng/ml	0.0003

V. Discussion

In athletes anaemia could be due to hemodilution, intravascular hemolysis , iron deficiency or other nutritional deficiency. In the present study it was found to be iron deficiency. The results of the present study correlate with the studies done on sports hematology.[8]

The stress of exhaustive exercise causes an initial volume contraction due to fluid loss, which is then followed by plasma volume expansion. Expansion may be 6-25% greater than baseline and occurs within 3 hours after acute exercise The degree of volume expansion correlates with amount and intensity of exercise so that hard training elite, endurance athletes demonstrate the greatest plasma volume increase. The precise mechanism for this rebound overexpansion is not entirely understood, but probably involves renin, aldosterone and vasopressin as well as increased synthesis of albumin by the liver[9]

Some have postulated that this phenomenon is a favorable adaptation to exercise because decreased blood viscosity allows greater cardiac output and, despite a lower haemoglobin concentration, greater overall oxygen delivery[10]

Numerous case series and experiments have documented varying degrees of intravascular haemolysis in a number of athletic populations The frequency and severity of hemolysis has also been positively correlated to the amount of biochemical stress imparted to the foot of runners and football players("foot strike hemolysis")[11]

Others have postulated that hemolysis can also be associated with non traumatic factors .Elevated temperature may contribute to RBC fragility, and older RBCs may be more fragile leading to what Eicher has termed "runners macrocytosis because of the selective destructionof older RBCs.Exercise itself may lead to morphological changes of RBCs and increased fragility, resulting to anisocytosis, poikilocytosis and somatocytosis[12]

In all cases of iron deficiency the underlying etiology is either due to blood loss or nutritional deficits .Although it is most commonly due to blood loss in the industrialized world, physicians should be aware of restrictive diets that some athletes voluntarily pursue. Bloodloss most commonly occurs due to menstrual loss or the GI tract especially following intense endurance events ,but can also occur through thegenitourinary tract, fromexogenous route (blood donation), or pregnancy or birth.Obviously athletes can experience blood loss from any of these non athletic mechanisms.[13]

In most cases ,the source remains unidentified ,although gastric and colonic ischemic changes have been the most frequently documented lesions .Gastritis induced by non steroidal anti inflammatory drugs (NSAIDS) also occurs frequently in athletes due to high intake of NSAIDs for musculoskeletal problems[14]
Ischemic tubular damage, as well as traumatic renal and collecting system lesions have been implicated. However, hematuria is an uncommon contributor to blood loss and iron deficiency as compared to the frequency and severity of GI blood loss in athletes[15]

Some have suggested that iron loss in sweat may contribute to iron deficiency .It is unlikely that sweat losses are a significant contributor to iron deficiency[16]

We must not forget that athletes can also suffer from medical conditions unrelated to exercise and that any evaluation should take this into account.

VI. Conclusion

The study concludes that the chances of developing true anaemia in football players is likely possibility in future ,hence follow up of these subjects to maintain iron stores and to enhance performance is recommended.

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