Biochemical Assessment of Athletes

[1]Priya A. Sangole,[2]Dr.Manisha P.Kale

[1]Research Scholar,[2]Professor and Head
[1] Department of Home Science,
[1]Sant Gadge Baba Amravati University Amravati, Maharashtra.

Abstract:

A variety of biochemical measures is available to assess iron status because it ranges from deficiency states to iron overload in humans. Some common measurements include hemoglobin. Measurement of hemoglobin concentration In whole blood is the most widely used assessment tool for iron deficiency anemia, as an indicator of iron deficiency, it is relatively insensitive and exhibits low specificity. Anemia is a global problem prevalent both in the developing and developed countries ,approximately 1.3 billion individuals in the world suffer from anemia making it one of the most important public health issues. In the nutritional agenda, sports anemia is most commonly seen in athletes specially women due to their increased requirements. Recent study indicates that endurance training creates an added demand for iron that many athletes are unable to meet (cowell et.al 2003) keeping this view in mind the present study was taken up with the objective to check and improve the Hemoglobin level among the athletes through Biochemical studies.

Keywords: Biochemical Assessment, Measurement of hemoglobin, Z test.

I. Introduction:

A variety of biochemical measures is available to assess iron status because it ranges from deficiency states to iron overload in humans. Some common measurements include hemoglobin, hematocrit, various erythrocyte indices, ferritin, serum iron, total iron-binding capacity, transferrin, transferrin saturation soluble transferring receptors, free erythrocyte protorphyrin and zinc protoporphyrin. These status indicators vary in their sensitivity and specificity.

Measurement of hemoglobin concentration In whole blood is the most widely used assessment tool for iron deficiency anemia, as an indicator of iron deficiency, it is relatively insensitive and exhibits low specificity. Hemoglobin concentrations decrease only during the late stages of iron deficiency after tissue iron stores have been greatly reduced. Moreover ,hemoglobin concentration may be affected by other nutritional perturatxhemoglobin concentration may be affected by other nutritional perturbations, such as folic acid, copper and vitamin B12 deficiency and other conditions including pregnancy, tobacco, smoking, infection and inflammation as well as dehydration.

A common method for measurement of hemoglobin in blood includes spectrophotometry after anticoagulation with heparin or EDTA and conversion to cyanomethemoglobin. (Driskell). Anemia is a global problem prevalent both in the developing and developed countries ,approximately 1.3 billion individuals in the world suffer from anemia making it one of the most important public health issues. In the nutritional agenda, sports anemia is most commonly seen in athletes specially women due to their increased requirements.

Anemia has been identified as the most common medical condition among athletes especially among female athletes (Antonio et.al 20001).Red blood cell count and hemoglobin concentration has been shown to be lower in athletes than sedentary individuals (Boyadjiev and Taralov 2001).female athletes have yet another source of blood loss- menstruation which leads to physiological loss of iron (Baxter et.al 1994) menstrual blood loss is one of the principal factors responsible for iron depletion. Recent study indicates that endurance training creates an added demand for iron that many athletes are unable to meet (cowell et.al 2003) keeping this view in mind the present study was taken up with the following objectives.

II. Objectives :-

1) To estimate the hemoglobin level of female and male athletes.
2) To assess the prevalence of anemia.
3) To compare the mean haemoglobin level of athletes.

III. Material and Methods :-

The present study was based on purposely selected 126 male and 32 female athletes aged between 20-29 years collected from Hanuman Vyayam Prasarak Mandal Amravati, Maharashtra. The age of the subjects were recorded from the date of birth registered in their institute. Any biochemical examination blood and urine are two easily available body fluids which are used in biochemical assessment of the nutritional status (Shubhangini Joshi 2002).

The hemoglobin level was estimated by trained technicians from Hind Laboratories ,Amravati. 5 ml of blood sample was taken from the entire sample respondents to check the hemoglobin assessment, the respondents to check the hemoglobin level in the blood using the Cyanmet hemoglobin method (ICMR 2000) prior to the hemoglobin assessment. The respondents were explained the need for the method of blood sample collection, to create awareness and to remove their apprehensions, if any. The tests were carried out in government approved laboratories.

The collected test results were analyzed using following Statistical methods,

1) Diagrammatic representation (Histogram, Pie chart etc.),
2) Descriptive Statistics(Mean ± SD),
3) Test of Hypothesis(Z-test).

IV. Result and Discussion

- **Percentage distribution of hemoglobin levels of athletes**

Table 1 :- Percentage distribution of hemoglobin levels of athletes

(Source- Hemoglobin concentration for the diagnosis of anemia and assessment of severity WHO)

Sr no	Grades of Anemeia	Hb levels (g/dl)	ATHLETES	
1	Female (32)		NO	%
	Severe	< 8	-	-
	Moderate	8-10.9	20	62.5
	Mild	11-11.9	11	34.37
	Normal	≥12	1	3.12
2	Male (126)			
	Severe	< 8	-	-
	Moderate	8-10.9	4	3.17
	Mild	11-12.9	105	83.33
	Normal	≥13	17	13.49
		Total	158	100
		Total prevalence of anaemia	140	88.60

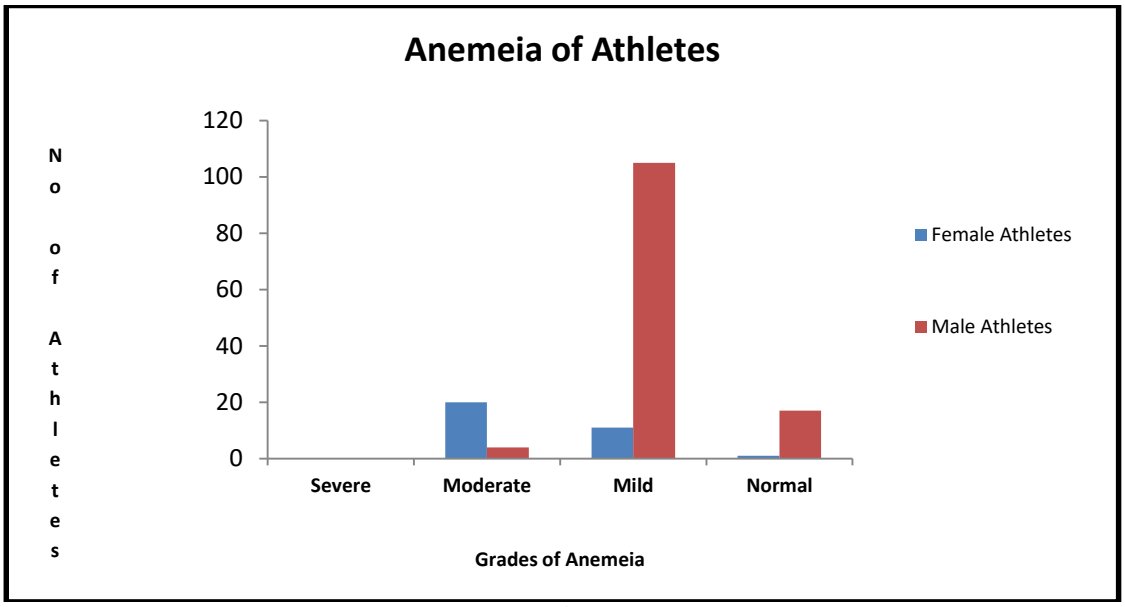

Diagram 1- Percentage distribution of hemoglobin levels of athletes

(Source:- Compiled by Researcher)

Result :-

There was a high prevalence of anemia (88.60%) among the athletes which was really a matter of concern . 3.12 percent had normal 12g/dl hemoglobin values for female athletes according to WHO (1992) as per the classification of different grades of anemia no athletes found in severe categories .62.5% female and 3.17% male athletes found in moderate anemic whereas 34.37% female and 83.33 male athletes came under the category of mild anemia .This could be an outcome of their poor food habit, inadequate intake of iron rich foods ,lack of nutritional knowledge.

- **Mean hemoglobin levels of athletes :-**

Table 2 :- Mean hemoglobin levels of athletes
(Source:- Compiled by Researcher)

Gender	No of Athletes	Hb (g/dl) (Mean ± SD)
Female	32	10.57 ± 0.86
Male	126	12.34 ± 0.90

- **Z-test to test Mean hemoglobin levels of athletes :-**

A large sample test i.e. Z-test is applied to test the following hypothesis,

H_0 :- There is no significant difference obsevered in average Hemoglobin levels of Male and Female Athletes during biochemical assessment.

Table 3 :- z-Test: Two Sample for Means

(Source:- Compiled by Researcher)

z-Test: Two Sample for Means		
	FEMALE	*MALE*
Mean	10.57	12.34
Known Variance	0.86	0.9
Observations	32	126
Hypothesized Mean Difference	0	
z	-9.38	
P(Z<=z) two-tail	0.00	
z Critical two-tail	1.96	

Result :-Mean Hb levels of female athletes were 10.57 as moderate anaemic category and Mean Hb level of Male athletes found that 12.34 in the mild anaemic category. Result shows that the female athletes having a low Hb level as compared to male athletes.

Here, $|Z_{cal}| > Z_{tab}$,

Reject H_0 ,

So, we conclude that there is no significant difference obsevered in average Hemoglobin levels of Male and Female Athletes during biochemical assessment.

V. Conclusion :-

It is concluded that the mean heamoglobin level of athletes was less than normal value. There was highly prevalent among male and female athletes.

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