

**NUTRITIONAL PROFILE AND IMPACT OF IRON SUPPLEMENTATION ON THE BIOCHEMICAL STATUS OF SELECTED SPORTS PERSONS****Dr. Wrishikesh M. Barabde**

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**ABSTRACT**

**BACKGROUND:** In addition to affecting performance, nutrition can also help with injury avoidance, improved exercise recovery, body weight maintenance, and general health improvement. The study will contribute to giving athletes solid knowledge and comprehension of sports nutrition, which can help them reach their personal performance potential. The low-cost supplements produced from locally available foods can be popularized to other sports persons. The supplement can be patented and suggested for commercial production, so that it is available for all sports persons. It has been suggested that the best methods for reducing hunger and malnutrition in developing nations are those that focus on food. The use of affordable, easily accessible, and nutrient-dense foods in the creation of supplemental foods has been advised. Indigenous foods that are readily available in the area can be used to create supplementary foods that are wholesome, affordable, and shelf-stable for vulnerable people.

**AIM:** Nutritional profile and impact of iron supplementation on the biochemical status of selected sports persons. The purpose of the study is to determine if food iron supplementation will improve iron status of sports persons.

**MATERIAL AND METHOD:** This study was conducted among 100 subjects in the Department of Medicine. The required information was collected from each sports person by direct interview method. The survey was conducted during the break hours without disturbing their routine.

**RESULTS:** The popularization of Nutri ball and Nutri mix had a welcoming response among the sports persons and therefore can be recommended as a supplement on a regular basis. Hematological parameters including hemoglobin, serum iron, and serum ferritin and transferrin saturation showed a significant increase. Both the products were found to be nutri dense products and can contribute considerably to dietary iron when supplemented for sports persons. The TIBC and UIBC experienced a significant decrease with after research days of supplementation from baseline values in groups I and II. Both iron rich products significantly improved iron status of the sports persons on supplementation

**CONCLUSION:** The present study reveals that the nutritional status of the sports persons is very poor with unhealthy dietary practices. The formulated supplements can be recommended on a regular basis for consumption by sports persons. Iron status can be improved by providing it in dietary form, the best and natural solution to iron deficiency.

**KEYWORDS:** Nutrition, Iron supplementation, Biochemical status and Sports person

**INTRODUCTION:**

A physical activity involving organised competition and governed by rules is referred to as a sport. Promotion of physical education and sports is now a given in the modern society. Sports and physical education are now seen as international disciplines because they foster global understanding and interconnectedness. As a result, it is acknowledged that it is each country's moral and social responsibility to promote physical education and sports.<sup>(1,2)</sup>

The formula for athletic success is complicated. Science, training, strategies, skill, and drive all play a role in success. The crucial significance of nutrition is overlooked when this success criterion is taken into account. A high degree of athletic achievement is mostly dependent on nutrition. All across the world, athletes are constantly looking for the ideal diet to achieve a high level of performance. Athletics continues to be the area of nutrition where faddism and ignorance are most glaring. Coaches are frequently cited by athletes as a key information

source. Peers, coaches, electronics, and print media are among additional sources. Sports nutrition advice and instruction are becoming more and more necessary to assist athletes in changing their eating patterns.<sup>(3)</sup>

Because it is essential for preserving a person's physical health, nutrition plays a significant part in the world of sports. A player who engages in muscular activities needs to eat optimally to perform physically well. In order to maintain the player's ideal body build and composition, a balanced diet must be event-specific and tailored to their individual needs. In order to perform well as a player, one's diet must be tailored to the particular requirements of an event and their training. The body would lose nutrients from its reserves when it was subjected to intense exercise. Therefore, a healthy diet that is balanced provides the energy and other nutrients needed for training and contests. A wide variety of nutrients are necessary for athletes to perform better and live healthy, active lives. These come from the daily diet that is ingested. In order to deliver all the nutrients required by an individual in sufficient quantity and in the right balance, the diet's components must be carefully chosen.<sup>(4)</sup> In order to increase the recommended daily allowance, nutritional supplements including carbs, proteins, vitamins, and minerals have long been utilised in a variety of sports.<sup>(5)</sup>

One of the most important minerals that affects athletic performance is iron. In muscle cells, iron is a component of haemoglobin, myoglobin, cytochromes, and a number of enzymes that are all involved in the transport and metabolism of oxygen for the production of aerobic energy during endurance exercise. Depending on the athlete's iron condition, the advantages of iron supplements may vary.<sup>(6)</sup> Athletes with iron deficiency anemia suffer from the symptoms which affect their performance.

Nutrition plays an important role in attaining a high level of achievement in sports. One of the causes for the failure of Indian athletes could be lack or the dearth of systematic human metabolic studies and dissemination of information through proper channels. The legitimate role of nutrition is poorly understood by athletes and coaches alike. Poor interaction

between the scientific community and coaches may be a limiting factor in India. Nutrition information is in demand. Only a handful of studies are available on nutritional need and nutritional status of athletes. There is a need for fundamental research in the field of nutrition, to understand the existing practice and effort should be made to alleviate the problem areas. There is a growing need for sports nutrition counseling and education to help athletes to improve their eating habits.

The purpose of the study is to determine if food iron supplementation will improve iron status and physical fitness components of sports persons.

## MATERIAL AND METHODS

Through the process of purposeful random sampling, 100 athletes (20–35 years old) were chosen. All of the chosen samples completed the organised, tested, and standardised interview programme. For the duration of the study, a subsample of n=50 people was given two supplements—Nutri ball and Nutri mix—that were iron-enhanced. Prior to and during the supplementation of the product, the following biochemical parameters were calculated: blood haemoglobin, serum iron, serum ferritin, total iron binding capacity, unsaturated iron binding capacity, and transferring saturation.

### Inclusion criteria:

- Sports persons (both male and female) involved in team and individual events aged between 20 and 35 years of age for the base line survey.
- Sports persons involved in individual events between 20 and 35 years of age for supplementation study, i.e. male sports persons having hemoglobin.

### Exclusion criteria:

- Sports persons above 35 years of age.
- Sports persons of other colleges were excluded from the study.
- Sports person with soy allergy were excluded for Nutri ball supplementation.

### Selection of Subjects:

Hundred sports persons performing individual and team events from the above places were selected based on their willingness to participate

in the study. From among them, 30 sports persons were selected for supplementation study. The two group simple randomised design was used to choose the sub sample. In a two-group basic randomised design, the population is first established, and then a sample is randomly chosen from the population. Additionally, this design requires that when things are randomly chosen from the population, they are randomly assigned to the experimental and control groups. Two groups are produced as a result of this design, serving as population representations.<sup>(7)</sup>

### Nutri Ball and Nutri Mix:

Snack foods offer a good reach for promoting the consumption of nutritious foods among all age groups. Rice Flour (*Oryza sativa*), Rice flakes (*Oryza sativa*), bajra (*Pennisetum typhoideum*), samai (*Panicum miliare*), soyabean (*Glycine max Merr*), gingelly seed (*Sesamum indicum*) and jaggery (*Saccharum officinarum*) were selected and used for the preparation of Nutri balls. Nutri Balls are ready to eat, convenient and consumed as any time snack. The iron content of the formulated Nutri ball and Nutri mix were analysed by Wong's method

### Sample Collection

A sterile disposable syringe was used to draw blood from the femoral vein in the morning (after their work outs) on an empty stomach. Ten ml of blood was drawn from each subject before and after the period of study. Four ml of whole blood was transferred into EDTA tubes and remaining six ml was transferred into normal tubes for serum separation. Blood

samples were collected using two different vacutainers. The EDTA vacutainer into which 4ml of blood was transferred was used for determining Hemoglobin level. The remaining 6 ml blood was centrifuged at 3000 rpm for ten minutes for separation of serum. The serum was transferred to the serum container and stored at 4°C. This was used for estimation of serum iron, serum ferritin, transferrin saturation, Total Iron Binding Capacity and Unsaturated Iron Binding Capacity

The following parameters were analysed before and after supplementation.

### Methods:

- Blood hemoglobin of the selected subjects was estimated by standard cyanmethemoglobin method both before and after supplementation.
- Serum iron was estimated by Bathophenanthroline Method both before and after supplementation.
- Estimation of serum ferritin enzyme-immuno assay technique
- Determination of serum transferrin saturation, total iron binding capacity and unsaturated iron binding capacity

### Statistical Analysis:

The results were analyzed using SPSS package. Demographic variables were described using frequency statistics. Paired t – test was used to assess the impact of supplementation. Correlations, t-tests, post hoc tests and ANOVA were used to assess the hypothesis

### RESULT:

**Table 1: The levels of Hemoglobin, Iron, Ferritin, Transferrin Saturation, TIBC, UIBC in Groups I and II without supplementation**

Variables	Group I Mean± SD	Group II Mean± SD
Hemoglobin (g/dl)	12.33±0.45	12.65±0.34
Iron (µg/dl)	115.85±54.22	115.69±23.74
Ferritin(ng/ml)	55.44±12.48	47.50±10.82
Transferrin saturation (%)	26.37±11.62	33.46±9.78
TIBC(µg/dl)	374.86±70.39	345.51±42.94
UIBC(µg/dl)	265.77±79.18	271.87±50.80

**Table 2: Impact of Supplementation on Hemoglobin, Iron, and ferritin, Transferrin Saturation, TIBC and UIBC Levels in Groups I and II.**

Variables	Group I Mean± SD	Group II Mean± SD
Hemoglobin (g/dl)	15.11±0.68	15.33±0.62
Iron (µg/dl)	120.99±28.43	123.37±25.67
Ferritin(ng/ml)	65.9±15.34	59.17±14.63
Transferin saturation (%)	35.46±11.04	38.73±12.52
TIBC(µg/dl)	361.09±58.88	345.97±43.79
UIBC(µg/dl)	249.48±66.35	253.68±42.99

**Table 1 and 2** showed that the significant improvement in the hemoglobin levels is due to the daily consumption of iron rich nutri ball by group I and nutri mix by group II for a period of research. The above table clearly depicts that there was a significant increase in serum iron levels in group I on supplementation of Nutri ball for three months. Supplementation of nutri mix also showed a significant increase in group II. The significant improvement in serum iron levels due to the daily consumption of iron rich supplements formulated by the investigator. The initial levels of serum ferritin were significantly increased to post intervention for a period of research in group I and group II. The iron supplementation, particularly rice flakes and dehydrated manathakkali leaves have a favourable response on the storage form of body iron. It is observed that the mean initial transferrin saturation level was found to be lower and had significantly increased on supplementing Nutri Ball and Nutri Mix in group I and group II respectively. The mean initial TIBC level was found to be higher and had significantly decreased from and from on supplementing Nutri Ball and Nutri Mix in group I and group II respectively. The mean initial UIBC level was higher and had significantly decreased from in group I and group II respectively.

## DISCUSSION

Nutritional status is a critical determinant of athletic performance. Sports nutrition is still at the embryonic stage and constant research in the field is going on. It is believed that aside from the limits imposed by heredity and training, no single factor plays a great role in optimizing performance than diet. Athletes world over are in a constant search of a perfect diet to accomplish high level of performance.

Nutrition not only plays a role in performance, but it also helps to prevent injuries enhance recovery from exercise, help maintain body weight and improve overall health.

In a 12-week trial, **Campbell et al. (1999)<sup>(8)</sup>** compared the effects of a vegetarian diet with an omnivore diet on changes in body composition and skeletal muscle size in older men (51–69 years) as a result of resistance exercise. There were significant advantages for omnivores, who decreased fat mass by 6%, gained mass free of fat by 4%, and increased Type II fibre area by 9% in comparison to vegetarians.

Only 5% of sportswomen consumed non-vegetarian diets, according to **Dhore (2011)<sup>(4)</sup>**, who found that 85% of sportswomen consumed vegetarian diets, 10% mixed diets, and 12% non-vegetarian diets. Contrarily, the majority of study participants were not vegetarians.

In addition to affecting performance, nutrition can also help with injury avoidance, improved exercise recovery, body weight maintenance, and general health enhancement. Every sportsperson should have a solid working knowledge of exercise science and sports nutrition in order to maximise their individual performance potential. (**Bakulin and Efimo, 1996<sup>(9)</sup>**; **Loucks, 2004<sup>(10)</sup>**)

**Murray et al. (2001)<sup>(11)</sup>** optimised the ingredients based on colour, taste, flavour, consistency, and general acceptability using the sensory evaluation. Similar to the previous study, the current one optimised the amount of iron-rich items by using sensory criteria such as appearance, colour, texture, flavour, and taste.

Rice flakes and herbs were used by **Gupta et al. (2012)<sup>(12)</sup>** in the creation of a snack with additional value. Both the sensory and

nutritional quality of the prepared herbal rice flakes mix were deemed to be satisfactory. **Gupta and Prakash (2011)**<sup>(13)</sup> incorporated green leafy vegetables into traditional products with an aim to improve their micronutrients content and found that addition of dehydrated greens increased the nutrient density of all products.

The present study results are on par with the study conducted by **Subasshini and Ayesha (2014)**<sup>(14)</sup> who showed a significant increase in the haemoglobin level of the subjects with 't' values of 1.9391, 4.5381 and 2.425 significant at 1% and 5% level. Similar observations were made by **Kanani and Poojara (2000)**<sup>(15)</sup>; **Lawless et al. (1994)**<sup>(16)</sup> in their studies indicating that iron supplementation has positive effects on haemoglobin (Hb) levels and growth.

**Mielgo-Ayuso et al. (2015)**<sup>(17)</sup> examined the effects of 11 weeks of iron supplementation (T 11) on hematological and strength markers in elite female. Hematological parameters were serum iron (sFe), serum ferritin (FER), transferin saturation index (TSI), and hemoglobin (Hb); CG(Control Group)

Similar observations were made by **Hinton et al. (2000)**<sup>(18)</sup> who showed significant increase in sFer, sFe, and TS after three week than in the placebo group. **Ishizak et al. (2006)**<sup>(19)</sup> looked at the effects of a four-week iron-rich diet that provided 18.2 mg/d and found that rhythmic gymnasts' blood ferritin levels were significantly affected. After 12 weeks of daily ingestion of 35 mg of dietary iron, serum ferritin levels in women of reproductive age showed a considerable improvement, according to **Hoppe et al(2013)**<sup>(20)</sup>. Twenty iron-depleted nonanemic women were given either iron (iron group) or a placebo (placebo group) for six weeks, according to a six-week randomised double-blind trial done by **Brutsaert et al. in 2003**<sup>(21)</sup>, validating the findings of the current investigation. Serum iron and transferin saturation considerably increased in the iron group following therapy.

In athletes with borderline iron status, **Karamizrak et al. (1996)**<sup>(22)</sup> investigated the relationship between iron status and physical working ability as well as the impact of oral iron therapy on these variables. The study's

findings demonstrated that iron treatment raised Hb, serum iron, serum ferritin, and transferin saturation in both males and females. **Skarpańska-Stejnborn et al. (2014)**<sup>(23)</sup> did not document significant effects of chokeberry juice supplementation on the levels of ferritin, TIBC and UIBC.

## CONCLUSION:

According to the current study, athletes have very poor nutritional status and engage in bad eating habits. Iron-rich foods that are readily available locally work well in the creation of iron-rich supplements. Iron supplementation for twelve weeks unquestionably enhanced the biochemical and physical fitness aspects of the group. The formulated supplements can be recommended on a regular basis for consumption by sports persons. Iron status can be improved by providing it in dietary form, the best and natural solution to iron deficiency. Healthcare professionals should be aware of the prevalence of low iron status and its serious implications. Preventive measures should be taken through assessment, diagnosis and education of sports persons on dietary intake.

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