Comparison of Body Mass-Index and Nutrient Adequacy Ratio of Inter Collegiate and All India Interuniversity Male Volleyball Players

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Abstract: The purpose of the study was to evaluate the BMI (body-mass index) and NAR (nutrient adequacy ratio) of intercollegiate and all India Interuniversity male volleyball players. The players who had reached the semi-final level in their respective tournaments were selected at both intercollegiate (N = 48) and interuniversity level (N = 48). The BMI was computed using the standard formula weight in kg/height (in m) squared. The NAR was derived by 3-day dietary recall. In the case of BMI both the interuniversity level and intercollegiate level male volleyball players are observed to be normal and also there is no significant difference in their BMI scores. On comparing the NAR, it was observed that none of the players were consuming adequate RDA (recommended dietary allowances) as per the levels recommended by national institute of nutrition for volleyball players. The all India interuniversity players had a higher NAR for energy (0.89), protein (1.05), fat (0.76) and carbohydrate (0.91) than intercollegiate players who had a lower NAR for energy (0.64), protein (0.71), fat (0.58) and carbohydrates (0.66), which could be probably due to the fact that training strategies and nutritional intervention of players are more focused at interuniversity level as compared to intercollegiate level.

Key words: RDA, height and weight, BMI.

1. Introduction

Volleyball is a team game belonging to a group of sports disciplines that involve indirect fighting. The time of each match is indefinite; there is a specific scoring system, limited contact with the ball and rotations in positions. It is an interval game, classified as a technical game, and in terms of motoric features belongs to a group of strength and speed sports [1].

Nutrition is an important component of any physical fitness program. The main dietary goal for active individuals is to obtain adequate nutrition to optimize health and fitness or sports performance (Berning, 2000). This is not only important to help to improve performance but also to promote healthy dietary practices in the long term [2].

Nutrition plays a very important role in attaining high level of achievements in sports [3]. Nutritional status has a direct bearing on the level of physical performance, that’s why sports nutrition is considered as an integral part of sports medicine [4].

Elite performance in sports does not merely depend upon systematic training of physiological variables and technical aspects of sports but, it also demands training of psychological characteristics of the sportsman for success [5]. In order to excel in sports physical and physiological preparation of sports person is not enough. Today in order to make a sports person capable of attaining sports performance comparable to national and international standards complete psychological preparation is also required. Therefore approach towards complete psychological preparation in addition to physical and physiological preparation is to be carried out from earlier levels of performance that is college and university levels. Complete physical,
physiological, psychological, and nutritional preparation will enable a sports person to achieve a level of performance in commensuration to his/her prerequisites.

Anthropometric dimensions and morphological characteristics play an important role in determining the success of a sports person [6]. One of the commonly used nutritional variables today is computation of BMI (body mass index). Its use over the years has increased because it requires only two variables: weight and height that can be easily computed.

One of the popular procedures adopted for calculating quantities of nutrients in the diet required to maintain good health among people is RDA (recommended dietary allowances). The actual amount of each nutrient required to maintain good health differs from person to person and also varies from sedentary to an individual who is active. The requirement of nutrients for a sports person is different from a non-sports person and similarly this requirement varies among sports persons of different performance levels. Macro- and micro-nutrients taken in the diet can facilitate working out number of calories consumed by an individual.

Therefore, the present study was conducted to assess the nutritional status and BMI (body-mass index) of intercollegiate and all India interuniversity male volleyball players to find out the nutritional deficiencies and gaps among them for which nutrition education to these players as well as coaches can be imparted in future researches. This would help to prepare future players with a better nutritional status.

2. Materials and Methods

The present study was confined to volleyball players who had participated at intercollegiate and all India interuniversity level competitions. Keeping in mind the purpose of the study, four male teams who qualified for semi-finals in the intercollegiate tournament of Delhi University and four male semi-final teams of all India interuniversity volleyball tournament held at Kurukshetra University, Kurukshetra were selected as subjects for the study. The total number of subjects was 96 i.e. intercollegiate level \( N = 48 \) and all India University level \( N = 48 \).

2.1 Nutritional Variables

(i) BMI of the subject was computed from weight and height using the following formula: 

\[
\text{BMI} = \frac{\text{weight (kg)}}{\text{height (m)} \times \text{height (m)}}
\]

(ii) Dietary survey by 24 hour recall: The dietary intake data of the subject were collected for 3 consecutive days in a week (inclusive of holiday) using 24-hour recall method. Information on the total cooked amount of each preparation was noted in terms of standardized cups. The cups are used mainly to aid the respondent recall the quantities prepared and fed to the individual member.

2.2 NAR (Nutrient Adequacy Ratio)

The data on nutrient intake were expressed in terms of NAR. NAR represents the adequacy for a nutrient based on the corresponding RDA for that nutrient. NAR for nutrients for each subject’s was computed as:

\[
\text{NAR} = \frac{\text{subjects three days mean intake of the nutrient}}{\text{RDA of the nutrient for the subject}}
\]

This was further classified as:

- Extra NAR (> 1.00).
- Adequate NAR (1.00).
- Fairly adequate NAR (0.66-1.00).
- Inadequate NAR (< 0.66 )

2.3 Analysis of Data

The results presented in Table 1 revealed that all India interuniversity and intercollegiate level male volleyball players have normal BMI scores as per the WHO (world health organization) norms and also they do not significantly differ in respect of BMI. The obtained \( t \)-value of 1.24 is less than the value of 1.98 with 94 degrees of freedom.
The analysis of data pertaining to comparison of intercollegiate and all India interuniversity male volleyball players with respect to total calories and computation is presented in Table 2.

The data presented in Table 2 show the comparison of mean nutrient intake in intercollegiate and all India interuniversity male volleyball players with RDA. With respect to energy, the mean intake of intercollegiate players was 2,893 ± 1,065, whereas it was 4,049.76 ± 1,070 for all India interuniversity male volleyball players. On comparing the same with RDA, intercollegiate players depicted NAR of 0.64 which was inadequate, whereas all India interuniversity male volleyball players depicted 0.89 which was adequate. On comparing the protein intake 120.41 ± 42.2 of all India interuniversity players with RDA (169 gms), the mean NAR was 1.05 which was adequate where as it was 0.71 in intercollegiate players which was fairly adequate. On comparing the fat intake 172.5 ± 39.4 of all India interuniversity players with RDA (125 gms), the mean NAR was 0.76 which was fairly adequate where as it was 0.58 in intercollegiate players which was fairly adequate. On comparing the carbohydrate intake 445.92 ± 44.4 of all India interuniversity players with RDA (675 gms), the mean NAR was 0.91 which was fairly adequate where as it was 0.66 in intercollegiate players which was inadequate.

The NAR of subjects with respect to above variables of intercollegiate and all India interuniversity male volleyball players is presented in Fig. 1.

### Table 1  Comparison of mean BMI of intercollegiate and all India interuniversity male volleyball players.

| Variable (factor) | Intercollegiate | All India interuniversity |
|-------------------|-----------------|--------------------------|
|                   | N = 48          | N = 48                   |
|                   | Mean ± SD       | Mean ± SD                |
| BMI               | 22.32 ± 2.50    | 23.94 ± 2.41             |
| t-value           | 1.24*           |                          |

* means the obtained t-value of 1.24 is less than the value of 1.98 with 94 degrees of freedom.

### Table 2  Comparison of mean nutrient intake among intercollegiate and all India interuniversity male volleyball players.

| Nutrient          | Intercollegiate | All India Interuniversity |
|-------------------|-----------------|--------------------------|
|                   | N = 48          | N = 48                   |
|                   | RDA             | Mean ± SD                |
|                   | Mean ± SD       | Mean ± SD                |
|                   | t-Value         |                          |
| Energy (kcal/kg)  | 4,500           | 2,893.02 ± 1,065.0       |
|                   |                 | 4,049.76 ± 1,070.0       |
|                   |                 | 5.30*                    |
| Protein (g/day)   | 169             | 120.41 ± 42.2            |
|                   |                 | 177.06 ± 44.4            |
|                   |                 | 6.40*                    |
| Fat (g/day)       | 125             | 72.5 ± 39.4              |
|                   |                 | 95.91 ± 36.6             |
|                   |                 | 3.01*                    |
| Carbohydrate (g/day) | 675         | 445.92 ± 44.4           |
|                   |                 | 619.50 ± 42.2            |
|                   |                 | 5.00*                    |

* Significant at 0.05 level, \( t_{0.05}(94) = 1.98 \).
3. Discussion

The study reveals that NAR in respect to total energy, protein, fat and carbohydrates of all India interuniversity volleyball players is much higher as compared to intercollegiate level male volleyball players. According to Ref. [7] volleyball is an intense physical activity therefore the volleyball players require sufficient amount of energy in order to meet the aerobic and anaerobic demands of the game so that overall performance can be enhanced. But, none of the players selected for this study were consuming adequate RDA for energy, protein, carbohydrate and fat. Regular intake of a hypo calorie diet may lead to weight loss among players and can deteriorate the performance. The result of the present study can also be compared to the study in which the volleyball players were consuming low energy diets, which shows the need for nutrition education and the necessity of further research into it [8].

4. Conclusion

On the basis of the results of present study, it can be conducted that players at all levels tend to consume low calorie and low nutrient diets which might lead to degradation in the performance. Therefore, there is a major need to provide nutrition education to players as well as coaches in order to overcome the nutritional gaps created by lack of macronutrient consumption.

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