A Study on body composition and dietary intake among Interuniversity Female hockey players

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Abstract: The purpose of the study was to evaluate the body composition and dietary intake of female hockey players of interuniversity level. Fifty female hockey players of interuniversity level were recruited in the study. The analysis of body composition exhibits that female hockey players possess a mean value of 17.59 (±0.02) percent of body fat. The dietary intake was collected by using recall method for a period of 3 days. The dietary intake amount was calculated by using Diet cal computer software. The dietary analysis depicts that they are consuming a mean total of 349.5 (±260.27) calories from proteins, 1066.27 (±546.05) calories from carbohydrates, 1254.22 (±998.45) calories from fats, 2101.73 (±690.7) mgs of calcium and 13.74 (±3.11) mgs of iron. The results revealed that while comparing their caloric intake with the values of Indian council of Medical Research (ICMR) guidelines, it has been found that the female hockey players of present study had 6% more body fat and were taking fewer amounts of calories from carbohydrates, more calories from fats and proteins from their daily diet.

Keywords: Energy intake, Carbohydrates, Proteins, Lipids, Field hockey

INTRODUCTION

A sport is a non-deviant and competitive form of physical activity that is guided by some rules and organization. In recent decades the participation of females has remarkably increased over the years (Dunn, 2007; Dawar, 2012). According to the latest census of National Collegiate athletic association, the registration of female athletes has been increased with 190,000 females (Shriver et al, 2013). Female athletes participating in football have special nutritional requirement as per the extreme level of cardiovascular, metabolic and energy demands needed during the both practice and competition period (Nepocatych et al, 2017).

Adequate nutritional intake is essential for maintaining optimal health and athletic performance over a long training period (Sammarone Turocy et al, 2011). It also helps in maintaining appropriate body composition, immune, endocrine and musculoskeletal function (Burke & Broad, 2006). The analysis of body composition is important to improve sports performance (Calo et al, 2009). Changes in the range of body composition due to low energy intake or overconsumption may lead to declining effect on athlete’s performance (Rodriguez et al, 2009).

Nutritional imbalance can lead to as much harm to the athlete as good nutrition can help. Some studies reported that female athletes have limited knowledge of nutrition and they cannot meet the internal demands and external pressures over body which ultimately leads to injuries or health related problem during sport activities (Rastmanesh 2007; Dunn 2007; Chapman 1997). Hockey is the national sport of India. It is one of the old known sports which came into existence about 1200 years ago. There is a dramatic increase in the participation level among women in a game of hockey and it has been played globally in the modern era (Davar, 2012).
There are some previous researches which have investigated the dietary intake and body composition of female athletes participating in volleyball, swimming, soccer and gymnastics (Clark et al, 2003; Hassapidou & Manstrantoni, 2001; Ousley-Pahnke & Gretebeck, 2001). However, there is very limited research on the population of female hockey players. Thus, the purpose of the study is to analyze the dietary intake and body composition among female hockey players of Interuniversity level.

**MATERIALS & METHODS**

The present study is an observational study. It was conducted on 50 female hockey players who were participated in a camp at Interuniversity level being held at Punjabi University Patiala, Punjab. Subjects were selected by an Observational study. The subjects were informed about the procedure of the study and a written informed consent was taken for their volunteer participation before the data collection.

The inclusion criteria for selecting the subjects were: 1) only female hockey players who participated in a camp were included. 2) Age range between 20-25 years. The subjects who were not co-operative and not willing to participate in the study were excluded. The materials used in the present study were anthropometric rod, weighing machine, skinfold caliper, dietary recall software, personal computer and steel measuring tape.

**Procedure**

The anthropometric measurements including height, body weight, body mass index and skinfold thickness were measured during the first day. Height was measured by 2 meter long anthropometric rod with a minimum calibration of 1mm. The body weight was measured by portable weighing machine of 120 Kg capacity having a minimum calibration of 0.5 Kg.

BMI was calculated with following formula.

\[ BMI = \frac{\text{weight in Kg}}{\text{height in meter}^2} \]

Skinfold thickness was measured at various sites such as biceps, triceps, supra-iliaic and subscapularis by Skinfold caliper. All skin folds were taken from right side of the subject. When applying the full pressure of caliper, after two second measurement reading was recorded.

Body composition was calculated by Durnin and Womersley (1974) equation which is used for calculation of body density of hockey players. Following was the formula to derive:

Body density = \(1.1599 – 0.0717 \log \left[ \text{biceps} + \text{triceps} + \text{suprailiac} + \text{subscapular} \right]\) [for age 20 to 29]

For calculating the Percent Body Fat, the following equation devised by Brozek et al(1963)

\[ % \text{Body Fat} = \left[ \frac{4.57}{\text{body density}} – 4.50 \right] \times 100 \]

Lean Body Mass was calculated by subtracting the total body fat weight (Kg) from body weight (Kg) and can be represented by the following equation.

\[ \text{Lean Body Mass} = \text{Body Weight (Kg)} – \text{Body Fat Weight (Kg)} \]

Following method was used for the dietary analysis and daily energy expenditure of the subjects.

- For determining the caloric intake, three day dietary recall method was used to record everything eaten and drunk along with the specific amount eaten by the subjects.
- It was used for the dietary analysis of food consumed by the subject. Through dietary recall method, nutrient intake and energy expenditure of the subjects was calculated.
- Personal computer was used for loading the dietary intake and energy expenditure data.
RESULTS

The study entitled “Analysis of body composition and nutritional intake among Interuniversity female hockey players” was carried out on 50 female hockey players from the camp being held at Punjabi University Patiala, Punjab. Data was analyzed using SPSS version 16.0. The demographic and anthropometric characteristics of female hockey players were calculated by average mean and standard deviation.

<table>
<thead>
<tr>
<th>Table 1: Body Weight (Kg), Height (cm) and BMI (Kg/m²) of female hockey players</th>
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</thead>
<tbody>
<tr>
<td><strong>Mean</strong></td>
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<tr>
<td>Height (cm)</td>
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<tr>
<th>Figure 1: Height (cm), Body Weight (Kg) and BMI (Kg/m²) of female hockey players</th>
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</table>

Female hockey players of the present study had mean height of 162.64 cm (±5.11) and mean body weight as 53.04 kg (±5.74). The mean BMI value of 20.05 kg/m² (±1.96) indicates that these players have the optimal values of normal limits of BMI and they are in normal zone of BMI.

<table>
<thead>
<tr>
<th>Table 2: Body Composition of female hockey players</th>
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<tbody>
<tr>
<td><strong>Mean</strong></td>
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<tr>
<td>Percent Body Fat (Kg)</td>
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<tr>
<td>Total Body Fat (Kg)</td>
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<td>Fat Free Mass (Kg)</td>
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</table>
The analysis of body composition exhibits that these female hockey players possess a mean value of 17.59 (±0.02) for percent body fat. These subjects are found to have 6% more body fat when compared with normal values for percent body fat of hockey players. In terms of absolute value for fat free mass these subjects has been found to possess 43.71 Kg (±4.85) fat free mass.

### Table 3: Dietary intake of female hockey players

<table>
<thead>
<tr>
<th></th>
<th>Number of subjects</th>
<th>Mean</th>
<th>Standard Deviation</th>
<th>ICMR Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbohydrates (gm)</td>
<td>50</td>
<td>266.56</td>
<td>45.50</td>
<td>427.5</td>
</tr>
<tr>
<td>Total Fat (gm)</td>
<td>50</td>
<td>139.35</td>
<td>36.98</td>
<td>126.6</td>
</tr>
<tr>
<td>Total Protein (gm)</td>
<td>50</td>
<td>87.41</td>
<td>21.64</td>
<td>71.25</td>
</tr>
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</table>

Female hockey players are ingesting a mean 266.56 gm of carbohydrates, 139.35 gm of fats and 87.41 gm of proteins in their daily diet. While ICMR recommends a daily intake of 427.5 gm of carbohydrates, 126.6 gm of fats and 71.25 gm of protein. Thus, it is evident that female hockey players had been ingesting 160.94 gm of less carbohydrates, 12.75 gm of more fats and 16.16 gm of more proteins in their daily diets.
Table 4: Net caloric intake of female hockey players

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</tr>
</thead>
<tbody>
<tr>
<td>Carbohydrates (Calories)</td>
<td>50</td>
<td>1066.27</td>
<td>546.05</td>
<td>1710</td>
</tr>
<tr>
<td>Total Fat (Calories)</td>
<td>50</td>
<td>1254.22</td>
<td>998.45</td>
<td>1140</td>
</tr>
<tr>
<td>Total Protein (Calories)</td>
<td>50</td>
<td>349.57</td>
<td>260.27</td>
<td>285</td>
</tr>
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</table>

Figure 4: Net caloric intake of female hockey players

The dietary analysis of these hockey players depicts that these were consuming a mean total of 349.5 calories from proteins, 1066.27 calories from carbohydrates and 1254.22 calories from fats. While comparing these caloric intakes of female hockey players with the ICMR values, it has been found that the hockey players of present study were taking 643.73 less calories from carbohydrates and 114.22 calories and 64.57 calories more from fats and proteins respectively.

DISCUSSION & CONCLUSION

While planning a balanced diet, one must know the adequate amounts of each nutrient required for a particular type of sports. In India, the adequate amounts of some of the nutrients have been established by the National Institute of nutrition, Hyderabad. Efforts have been made to report the adequate amounts of nutrients called RDA (Recommended dietary allowances). The diet of the female hockey players of the present study has been compared with the RDA values given by ICMR. According to the National Institute of Nutrition (2010) a daily diet of any sports person should consist of 60% carbohydrates, 30% fats and 10% proteins.

Out of the total energy intake 20-30% should come from fats. However, hockey players of present study are taking 44.87% fat which shows that these players are ingesting 14.87% more fat that lead to high percentage of body fat (17.59%). Sports nutritionists have suggested that people participating in daily exercise program should increase the carbohydrates in their diet from 58% to 70% of the total calories consumed. But, the present study shows that these players are ingesting less than half of the required carbohydrates. Therefore, it has been concluded that these players should increase carbohydrate intake while reducing fat intake to attain an optimum value of percent body fat and to improve overall performance.
The body composition of present female hockey players suggested that although these players are possessing minimum range of percent body fat (17.59%). However, if these female lost their 6% body fat that would lead to the required percent body fat i.e. 10% to 12% which would certainly improve their performance level too. The present study concluded that female hockey players should take appropriate level of each component of nutrition and maintain normal range of body composition to improve overall athletic performance.

REFERENCES