A Comparative Study of Vo2 Max among the Basketball, Football, Volleyball and Hockey Male Players

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Abstract
Purpose: main purpose of the study was to compare the maximum oxygen consumption of male players of different games.

Methodology: Selection of subjects- For the purpose of present study 59 male players of different games from G.G.V, Bilaspur were selected randomly as the subjects for the study. The age of the subjects were ranging from 20-25 years.

Criterion Measures- Maximum Oxygen Consumption (VO2 Max) was determined by the Rockport walking test (Kline et. al., 1987) was used.

Statistical Method- Descriptive statistics, one way ANOVA and Post-Hoc Test (Scheffe’s Test) were used with SPSS 16.0 version. The level of significance was set at 0.05.

Result: The results of the study indicate that the significant difference was found among Basketball, Volleyball, Football and Hockey in relation to VO2 Max (F= 4.927, p<0.05). Another result of the study shows that the Football players (67.6700) have highest level of VO2 Max in comparison to Basketball (65.5550), Volleyball (60.2667) and Hockey players (62.3858).

Keywords: VO2 Max, Basketball, Football, Volleyball and Hockey players.

Introduction
By nature human being are competitive and aspire from excellence in every field. Sport is not an exception. Changes are the order of the day. Changes are taking place every day in every walk of life. Life of people, their philosophy, ways of living etc. are undergoing changes due to basic and applied research in various fields. Man has reached the space age from the primitive Stone Age because of continuous change. Records have been sprucing and the athletes as a result of combined improvement in the technique of training and coaching. New techniques are developed in laboratories and scientific methods are applied to obtain top-level performance. Sports by their vary nature are enjoyable, challenging, absorbing and require a certain amount of skill and physical condition (Doncash Seaton et al., 1956) .

Same is true in training of games such as Football, Basketball, Volleyball, Swimming etc. The complex nature of physical fitness includes the muscular strength, muscular endurance, cardio- respiratory endurance and the most important of them is the cardio- respiratory endurance (Peter V. Karpovich and Wayne E).

Cardio-vascular efficiency reflects the capacity of an individual to undertake and continues physical efforts of sub-maximal nature for a relatively longer period of time. To measure cardio-vascular efficiency, tests of physical work capacity and vo2 max. have been developed to use in laboratory and field situations to assist the scientists, physical educators and coaches.

The demand of oxygen differs from one sports to other sports. It’s a common observation that whenever athlete go for anaerobic type of training his/her anaerobic capacity is enhanced but along with this it is also observed that after anaerobic type of training the aerobic capacity of the athlete is also improves. Thus it is very essential to know that which type of training (aerobic/anaerobic) dominates to particular sports, or whether combination training is needed.
Objectives of the study
- To find out the level of maximum oxygen consumption of male players of different games.
- To compare the maximum oxygen consumption of male players of different games.

Methodology
Selection of Subjects
A total of 59 university level male players were randomly selected from different games of Guru Ghasidas Vishwavidyalaya, Bilaspur. Age of the subjects was ranging between 20 to 25 years.

Selection of Variables
Keeping the feasibility criterion in mind, Maximum Oxygen Consumption (VO\textsubscript{2} Max) was selected by the researcher as variable for the present study.

Criterion Measures
Maximum Oxygen Consumption (VO\textsubscript{2} Max) was determined by the Rockport walking test (Kline et. al. 1987). Formula for the calculating Maximum Oxygen Consumption (VO\textsubscript{2} Max) was –

\[
\text{VO}_2 \text{ Max} (\text{ml/kg. min}^{-1}) = 132.853 - .0769 \times \text{Weight (lbs)} - .3877 \times \text{Age (yr)} + 6.315 \times \text{Sex*} - 3.2649 \times \text{Walk time (min.)} - .1565 \times \text{Heart Rate (bpm.).}
\]

*Where, Male = 1 and Female = 0.

Statistical Analysis
For determining the comparison of VO\textsubscript{2} Max of different games descriptive statistics, one way ANNOVA and Post-Hoc Test (Scheffe’s Test) was used, the data analyzed with the help of SPSS (16.0 version) software and the level of significance was set at 0.05 level of confidence.

Result and Findings of the Study

Table 1: Descriptive table of VO\textsubscript{2} Max of male players belonging to different games

<table>
<thead>
<tr>
<th>Game</th>
<th>N</th>
<th>Mean</th>
<th>SD</th>
<th>Std. Error</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basketball</td>
<td>16</td>
<td>65.5550</td>
<td>3.65299</td>
<td>.91325</td>
<td>61.31</td>
<td>72.86</td>
</tr>
<tr>
<td>Volleyball</td>
<td>15</td>
<td>60.2667</td>
<td>7.26678</td>
<td>1.87627</td>
<td>46.63</td>
<td>70.69</td>
</tr>
<tr>
<td>Football</td>
<td>16</td>
<td>67.6700</td>
<td>7.33230</td>
<td>1.83307</td>
<td>54.15</td>
<td>80.13</td>
</tr>
<tr>
<td>Hockey</td>
<td>12</td>
<td>62.3858</td>
<td>2.86084</td>
<td>.82585</td>
<td>58.03</td>
<td>65.94</td>
</tr>
</tbody>
</table>

Table 1 shows that the descriptive statistics i.e. Mean, SD, Std. Error, Min. Max. etc. of VO\textsubscript{2} Max of male players of different games.

Table 2: Comparison of VO\textsubscript{2} Max of male players belonging to different games

<table>
<thead>
<tr>
<th>Variance</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>493.376</td>
<td>3</td>
<td>164.459</td>
<td>4.927*</td>
<td>.004</td>
</tr>
<tr>
<td>Within Groups</td>
<td>1835.916</td>
<td>55</td>
<td>33.380</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2329.292</td>
<td>58</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at .05 level of Significance.

The above table-2 indicates that there is a significant difference between different games in relation to maximum oxygen consumption. As the Sig. values were less than 0.05.

Table 3: Scheffe’s Post Hoc test of Maximum Oxygen Consumption of different games

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean Differences (I-J)</th>
<th>Std. Error</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>J</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basketball</td>
<td>Volleyball</td>
<td>5.28833</td>
<td>2.07644</td>
</tr>
<tr>
<td>Football</td>
<td>-2.11500</td>
<td>2.04268</td>
<td>.784</td>
</tr>
<tr>
<td>Hockey</td>
<td>3.16917</td>
<td>2.20635</td>
<td>.563</td>
</tr>
<tr>
<td>Volleyball</td>
<td>Football</td>
<td>-7.4033*</td>
<td>2.07644</td>
</tr>
<tr>
<td>Hockey</td>
<td>-2.11917</td>
<td>2.23764</td>
<td>.826</td>
</tr>
<tr>
<td>Football</td>
<td>Hockey</td>
<td>5.28417</td>
<td>2.20635</td>
</tr>
</tbody>
</table>

* The mean difference is significant at the 0.05 level.

Table 3 shows that the insignificant differences between the mean values of Basketball & Volleyball players (5.28833), Basketball & Football players (2.11500), Basketball & Hockey players (3.16917), Volleyball & Hockey players (2.11917) and Football & Hockey players (5.28417). Table 3 also shows that the significant difference between the mean values of Volleyball & Football players (7.40333), in relation to VO\textsubscript{2} Max.

Fig 1: Graphical representation of Mean scores of VO\textsubscript{2} max of male players belonging to deferent games
Discussion of the Findings
Singh Dhananjay and Patel Shrikrisna (2014) [21] have conducted a study on Comparative study of maximum oxygen consumption of different game players. They also found the significant difference in VO₂ max. Of different games and sports groups.
To conclude the discussion of finding it can be stated that subject chosen in this above study were mainly selected from different match practice groups, but the fact stands that even when they were grouped in various games/sports, they were also involved with overall physical education activity programme as academic requirement of each subjects, therefore the impact of other activities could not be nullified and thus above variations in VO₂ max. Of different games and sports groups were observed. But one finding is very clear that on an average the VO₂ max. of all the subjects irrespective of their games/sports were higher that the VO₂ max of normal sedentary individuals between 38-40 ml/kg. This might be attributed by the fact that regular participation in physical education programme influenced the overall VO₂ max.

Conclusions
On the basis of findings of the study, the following conclusions may be drawn:
- Football players (67.6700) have highest level of VO₂ Max in comparison to Basketball (65.5550), Volleyball (60.2667) and Hockey players (62.3858).
- The result of the study shows that there is a significant difference between the players different games in relation to maximum oxygen consumption (F=4.927, p<0.05).
- On the basis of Scheffe’s Post Hoc test we can conclude that the insignificant differences between the mean values of Basketball & Volleyball players, Basketball & Football players, Basketball & Hockey players, Volleyball & Hockey players and Football & Hockey players. It also shows that the significant difference between the mean values of Volleyball & Football players.

References
1. Campbell Kathryn D. The Validity of Work Load at 180 and 190 Heart Rate as a Predictor of Maximal Oxygen Consumption of Endurance Trained College Female Athlete Completed Research in Health, Physical Education and Recreation, 1978; 225:159.