Effect of Physical Effort with Different Intensity on Some Blood Variables at Sitting Volleyball Players (Amputees)

Amgad Abdul Latif Ibrahim

Department of Athletic Training, Faculty of Physical Education, Mansoura University, Damietta, Egypt

Abstract: The research aims to identify the impact of both exercises with medium intensity for a long period of time and high intensity for a short period of time on some blood variables, prothrombin time (PT), partial thromboplastin time (PTT), platelets and Haematocrit. The author used the experimental method with two-experimental-group design. Research sample was intentionally selected from the physically disabled sitting volleyball players (amputation), totally 10 players, divided randomly into two groups after homogeneity, 5 players per each group. Results indicated statistically significant differences between pre and posttests of both exercises with medium intensity and high intensity on some blood variables in favor of the posttest and there are differences in favor of high-intensity group. The study recommended to work on the need to codify loads of training in terms of intensity, volume and density proportioning to each player individually, taking into account the age and physical, functional condition, the sitting volleyball players (amputation) having aspirin daily to reduce blood viscosity and conducting analysis of blood clotting (biochemical analysis) periodically.

Keywords: Physical exertion • Intensity • Blood variables • Skill transmission • Volleyball Sitting • Amputees

INTRODUCTION

Athletic training in team and individual sports activities leads to some skillful, physiological, physical and cognitive changes, which in turn reflect on the games as well as the efficiency of body vital organs. The author suggests that sitting volleyball sport is one of competitive sports activities, which are practiced by Paralympics either amputees or paralytics. It is even practiced at higher levels. The last achievement for our national sitting volleyball team was in Athens Olympic Championship 2004.

Sitting volleyball sport is of local, international and global competitive team sports. It is not time-limited and its results scored by points, which may prolong the time of the match. This may be result in physical pressure during performance to sitting volleyball player who depends on crawl out of his skillful performance. Therefore, several physiological changes have negative and positive effect during the competition will arise. Thus, professionals in the field of sports, especially in sitting volleyball sport, should recognize and be aware of changes, functional and chemical responses or other changes occurring inside the human body to be adapted with sports activity.

Cardiovascular System, therefore, is one of vital body organs because of its importance and vital role played by blood in the life of athlete. Abdel-Hamid (1999) indicate that blood is an essential component in formatting the internal environment of the body and in securing appropriate life to body tissues so that cells remain in a relatively stable chemical milieu. Blood has many functions and each component of blood has a certain function, which all supplemented in the general blood functions. [1]

Author noted, through his experience as a coach in the field of volleyball for sitting players, then in the academic field as a coach of volleyball subject in Physical Education College, that the performance of sitting volleyball players (amputees) during training has declined. Moreover, some of them could not efficiently exercise for long time leading to the loss of large amounts of water as well as feeling tired, lacerations and muscle tension. Author believes that there is a relationship between sitting volleyball players' injuries (amputation) and athletes' during exercising, especially in athletes of...
higher levels, who are trained for long periods. This urges
author to study the impact of different physical activity
intensity (moderate for a long period of time- high for a
short period) on some blood variables and skillful
performance at the sitting volleyball players (amputees).
As they are players in sports clubs and exercise on
different training loads intensity in order to reach the
highest possible skillful level, allowing us to identify the
appropriate intensity for players’ training and to attempt
to raise the level of skill avoiding the negative impact on
blood variables. Author, therefore, determines the effect
of different physical activity intensity on some blood
variables at sitting volleyball players.

The Research Aims To:

- Identify the impact of each exercise with intensity
  (moderate for a long period, high for a short period)
  on some blood variables (Prothrombin time (PT),
  partial thromboplastin time (PTT), platelets and
  Haematocrit) at sitting volleyball players (amputees).
- Identify the differences between post-tests of
  exercises with intensity (moderate for a long period,
  high for a short period) on some blood variables
  (Prothrombin time (PT), partial thromboplastin time
  (PTT), platelets and Haematocrit) at sitting volleyball
  players (amputees).

Hypotheses:

- There would be statistically significant differences
  between pre and post-tests for each exercises with
  intensity (moderate for a long period, high for a short
  period) on some blood variables (Prothrombin time
  (PT), partial thromboplastin time (PTT), platelets and
  Haematocrit) at sitting volleyball players (amputees)
  for favor of post-test for each group separately.
- There would be statistically significant differences
  between pre and post-tests for each exercises with
  intensity (moderate for large period of time- high for
  a short period of time) on some blood variables
  (Prothrombin time (PT), partial thromboplastin time
  (PTT), platelets and Haematocrit) at sitting volleyball
  players (amputees) for favor of high intensity group.

MATERIALS AND METHODS

Method: The author uses the method of two-group
experimental design (pre and post-tests).

Sample: A research sample of 10 players was intentionally
selected of sitting Volleyball players (amputation). It is
randomly divided into two groups after conducting
homogeneity procedure, including 5 players per group.

Data Collection Tools:

- Medical scale for measuring body weight to the
  nearest kg.
- Restameter device for measuring the length of the
  student to the nearest cm.
- Official documents to identify the date of birth.
- Sterilized plastic syringes (for only one use) as well
  as disinfectant - Cotton wool - pipes filled with
  anticoagulation (sodium citrate).
- Chemicals for the detection of PT and PTT.
- Automatic blood coagulation measuring device,
  model Sta 8000.
- Automatic blood counter, model Cobas, to measure
  platelets and Haematocrit.

Homogeneity: Homogeneity was performed for research
sample, which consists of 10 players, on 23/09/2009 at the
variables under discussion. It, therefore, shows
distributed moderation of the variables under discussion.
They are rates fall below the curve of moderation, which
ranges between (±3) and proves the homogeneity of
research sample.

Basic Study:

- Moderate intensity exercise program for the first
group.
- High intensity exercise program for the second
group.

Time for Two Programs: Through the referenced
framework of research, previous studies and some
identical programs in the team and individual games,
author prepares two proposed programs for 8 weeks
period, from 01/10/2009 to 27/11/2009. They include 24
Training Units, 3 units per week and daily training unit
lasts for 90 minutes.

Pre-Test: The author conducts pre-test on research
sample on 29/09/2009; blood samples were withdrawn by
specialists:

- Blood samples were withdrawn from research sample
  prior to the basic experiment.
• Samples were divided into two parts; the first is 1.8 cm of blood and 0.2 cm of sodium citrate in order to measure the rates of PT, PTT. They were also separated by centrifuges on the speed of 3000 rpm for 5 minutes. The second part was added to tubes containing EDTA solution, anticoagulant, which was well mixed to count platelets and to identify the percentage of Haematocrit in blood.

• Samples were transferred in icebox to the laboratory where medical analyses are directly done after 1.30 hours of sampling.

• PT and PTT were measured in automatic blood coagulation measuring device, Sta 8000.

• Platelets and the percentage of Haematocrit were measured by automatic blood counter, model Cobas.

**RESULTS AND DISCUSSION**

Table 1 shows the existence of significant differences between pre and post tests for a medium intensity long duration in the variables of blood and for the benefit of measurement after the effort, because the researcher used the medium intensity and increasing the time used in the performance which led to an increase in speed rates of thrombosis in the prothrombin time PT and time of thromboplastin PTT and an increase in the number of platelets and increased Alheimtokret after the severity of moderate intensity, may also be due to increased secretion of sweat from the body due to the length of the training performance and thus increasing concentration of the blood which leads to an increase Alheimtokret and increased rates of secretion of platelets associated with red blood cells from the spleen and bone marrow and is also increasing as a result of peripheral vascular contractions, which occur as a result of increased secretion of hormones adrenaline and adrenaline in response to light pulses of nerve associated with sports training.

This is confirmed by Taha and Khalil [2] that the concentration of blood associated with physical activity often occurs due to lack of plasma volume and this means that the cells and blood protein, which represents the bulk of the volume of blood has become more focused in the blood and blood concentration in this case leads to an increase concentration of red blood cells may reach such an increase to 25%, which increases the value of the research sample of blood for a medium intensity (n 1 = n 2 = 5)

**Post-Test:** The author follows the same steps applied in the pre-test.

**Basic Study Application:** It was applied for a two-group in the period from 01/10/2009 to 27/11/2009.

### Table 1: Significant differences between pre and post variables in the research sample of blood for a medium intensity (n 1 = n 2 = 5)

<table>
<thead>
<tr>
<th>P</th>
<th>Z</th>
<th>Total level</th>
<th>Average level</th>
<th>Number levels</th>
<th>Direction</th>
<th>Reference</th>
<th>Transaction Statistics</th>
<th>Measurements</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.012</td>
<td>-2.80*</td>
<td>26.0</td>
<td>6.50</td>
<td>4</td>
<td>-</td>
<td>Prothrombin time PT</td>
<td>0.012</td>
<td></td>
</tr>
<tr>
<td></td>
<td>3.00</td>
<td>3.00</td>
<td>1</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.009</td>
<td>-2.29*</td>
<td>22.0</td>
<td>5.50</td>
<td>4</td>
<td>-</td>
<td>Thromboplastin time PTT</td>
<td>0.009</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.00</td>
<td>2.00</td>
<td>1</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.011</td>
<td>-2.54*</td>
<td>1.50</td>
<td>1.50</td>
<td>1</td>
<td>-</td>
<td>Platelets</td>
<td>0.011</td>
<td></td>
</tr>
<tr>
<td></td>
<td>16.00</td>
<td>4.00</td>
<td>4</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.005</td>
<td>-2.34*</td>
<td>16.50</td>
<td>5.50</td>
<td>3</td>
<td>-</td>
<td>Alheimtokret</td>
<td>0.005</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.00</td>
<td>1.00</td>
<td>2</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 2: Significant differences between pre and post variables in the research sample of blood level of the Group of high intensity (n 1 = n 2 = 5)

<table>
<thead>
<tr>
<th>P</th>
<th>Z</th>
<th>Total level</th>
<th>Average level</th>
<th>Number levels</th>
<th>Direction</th>
<th>Reference</th>
<th>Transaction Statistics</th>
<th>Measurements</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.011</td>
<td>-2.66*</td>
<td>11.0</td>
<td>3.50</td>
<td>3</td>
<td>-</td>
<td>Prothrombin time PT</td>
<td>0.011</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.00</td>
<td>0.50</td>
<td>2</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.021</td>
<td>-2.41*</td>
<td>18.00</td>
<td>4.50</td>
<td>4</td>
<td>-</td>
<td>Thromboplastin time PTT</td>
<td>0.021</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1.00</td>
<td>1.00</td>
<td>1</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.019</td>
<td>-2.27*</td>
<td>11.00</td>
<td>3.50</td>
<td>3</td>
<td>-</td>
<td>Platelets</td>
<td>0.019</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2.00</td>
<td>1.00</td>
<td>2</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.005</td>
<td>-2.45*</td>
<td>10.00</td>
<td>2.50</td>
<td>4</td>
<td>-</td>
<td>Alheimtokret</td>
<td>0.005</td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.50</td>
<td>0.25</td>
<td>1</td>
<td>+</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3: Significant Differences between both posttests of the intensity exercises in the Variables (n 1 = n 2 = 5)

<table>
<thead>
<tr>
<th>P</th>
<th>Z</th>
<th>Total level</th>
<th>Average level</th>
<th>Number levels</th>
<th>Direction</th>
<th>Reference</th>
<th>Transaction Statistics</th>
<th>Measurements</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.011</td>
<td>-2.584*</td>
<td>5.50</td>
<td>5.50</td>
<td>1</td>
<td>Low</td>
<td>Prothrombin time PT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.025</td>
<td>-2.516*</td>
<td>4.50</td>
<td>4.50</td>
<td>1</td>
<td>Low</td>
<td>Thromboplastin time PTT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.012</td>
<td>-2.68*</td>
<td>8.00</td>
<td>2.00</td>
<td>4</td>
<td>High</td>
<td>Platelets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.003</td>
<td>-2.786*</td>
<td>4.00</td>
<td>4.00</td>
<td>1</td>
<td>Low</td>
<td>Alheimtokret</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Alheimtokret and up to 50% without a commensurate increase in the number or the contents of the red blood cells in the blood and increase the concentration of red blood cells lead to increase the capacity of oxygen to the blood. These results are consistent with prior studies [3, 4]. Table 2 shows the existence of significant differences between the measurements in the pre and post test for a high intensity in the variables of blood and for the sake of telemetric, due researcher these results to distinguish training this group severity of high and low time used in the performance, which increases the rates of decomposition of fibrin leads to an increase in the rapid rates of thrombosis in the prothrombin time PT and time of thromboplastin PTT and an increase in the number of platelets and increased Alheimtokret after workouts high intensity. These results are consistent with the results of previous studies [4-6].

Table 3 indicated that there are significant differences between measurements Badien the two sets of research (moderate for a long period, high for a short period) in the variables of blood. Table 4 also indicates the average of the differences between the two research groups in PT 7.78%, PTT 12.29 %, platelets 1.70% and Haematocrit 5.58%. The author attributes these results to distinction of moderate intensity exercises with increasing the time used in the performance, which leads to an increase in the speed rates of PT, PTT and an increase in the number of platelets and increased Haematocrit after moderate intensity physical exercises. This means that moderate physical activity intensity, which lasts for a long period, leads to increased secretion of sweat and to speed of configuration of coagulation coefficients resulting from the increased blood viscosity by increasing few ratios of them in high physical activity intensity for short time. Differences range from PT, PTT, platelets and Haematocrit, respectively. These results may be due to sports activity, which leads to increase the excretion of concentrated red blood cells from the spleen and bone marrow in response to the requirements of physical activity. In addition, greater need for oxygen, which is found in the hemoglobin of red blood cells illustrating, the need to increase the secretion of these cells intensively. Because of these two reasons, the coefficient of blood viscosity rises and thus the percentage of Haematocrit increases in the blood. Ismail and Abdel-Fattah [7] indicated that the tendency increase for blood to clot in the veins and arteries is due to increase of the body's blood concentration as well as clothes pressing and they advised to take 1-2 aspirin every 4 hours to work on blood thinners and fluid intake in abundance.

Salama [8] said that the plasma is a yellow liquid color pale transparent is about 55% of blood volume and contain about 90% by weight of water and the rest are substances that are dissolved and the most important dissolved substances is plasma and continued to make physical effort and sweat secretion help to move part of the liquid plasma to cellular fluid, any liquid between the cells and this in turn leads to an increase of blood viscosity on the state of rest and blood become more intense . These findings are consistent with the results of the study of Weiss et al. [9]. Differences between post-tests are due to both high physical activity intensity of short period and moderate physical activity intensity of long period. This, therefore, indicates that the secretion of platelets continues according to the duration or intensity of sports activity. These results are consistent with the results of a study of
El-Sayed [5] that an increase in the clotting factors happens after the performance of effort and recalled directly proportional to the length of time and intensity of exercise.

CONCLUSION

- There are significant differences between pre and post tests measurement for each of the exercises of medium intensity and low intensity on some blood variables for telemetric.
- There would be statistical significant differences between the two post-tests for each research groups (moderate intensity- high intensity) in the variables of (PT, PTT, platelets) in favor of high intensity physical group training.
- There are differences between the two groups of research (medium intensity - high intensity) in prothrombin time PT 7.78%, thromboplastin PTT 12.29%, platelets 1.70%, 5.58% Alheimtokret for the high intensity group training

Recommendations:

- 1-To confirm that sitting volleyball players (amputation) daily take aspirin drug to reduce the viscosity of blood.
- Medical analysis of a blood clot should be periodically done (biochemical analysis).
- Training loads should be rationed in terms of intensity, size and density to be appropriate with each player's abilities and to take into account the age, physical and functional condition.
- To make sure those sitting volleyball players (amputation) get adequate amounts of water instead of the proportion of missing sweat because of continuous training for a long time and to reduce the viscosity of blood, especially in training.
- An analysis of blood clotting factors and anticoagulants on selecting young sitting volleyball players (amputation) should be done.

REFERENCES