THE IMPACT OF RECOVERY METHODS BY COOLING, VIBRATORY MASSAGE, AND COOL-DOWN EXERCISES AFTER HANDBALL MATCHES ON THE CONCENTRATION OF LACTIC IN THE BLOOD OF ELITE PLAYERS


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ABSTRACT

The study aims to identify the impact of recovery methods by cooling, vibratory massage, and Cool-down exercises after handball matches on the concentration of lactic acid in the blood of elite players. As for the hypothesis of the study, it is evident that there are significant differences between the measurements of the recovery methods after handball matches on the concentration of lactic acid in the blood of the elite players. The researchers used the descriptive method, and the participants were the Al-Diwaniyah Governorate handball elite team players and they have (12 players), their lengths ranged among (182.74±4.86cm), their weights (81.91±7.24kg), their ages (24.46±8.74years), and the concentration of lactic acid at rest time before the effort (1.23±0.58 mmol). The researchers measured the lactic acid after the end of the time of the three matches with (5min), then the recovery methods were used. Finally, the concentration of the lactic acid was measured after (10min). After the data were statistically processed using the (Pillai's Trace and LSD) test, it was concluded that the use of recovery methods by cooling, vibratory massage, and Cool-down exercises after handball matches have a positive effect in reducing the concentration of lactic acid in the blood and that cooling method is the best method used and the fastest in compensatory, and then followed by Cool-down exercises and finally vibratory massage.

Keywords: (recovery methods, handball, lactic acid).

I. INTRODUCTION

Sports training leads to the occurrence of various physiological changes that include all the body’s systems because the level of performanceadvances whenever these changes are positive in order to achieve the physiological change of the body’s systems physical load performance and endurance performance with high efficiency. Strong frequent exercise bouts lead to a diminution in muscle peak and mean power, depletion of energy stores, and accumulation of metabolic by-products, which will finally lead to muscle fatigue (Westerbald, Allen & Lännergren, 2002). The correct exchange between training and compensatory is one of the basic factors necessary for players to reach high levels. The training process is as a mixture of arousal and recovery, and it is wrong for the trainer to understand the training process as a group of stimuli only; without attention or consideration of recovery operations, when a player performs training loads, a set of functional processes are linked to the body that is linked to each other, and the body begins to compensatory after the completion of those training loads (Darwish et al. 1998).

The recovery process for all players after training and matches has become very important in the field of sports training and therefore it is no less important than the training itself, especially when some players are required to participate in matches and competitions during a specific number of hours that may range from (10-24hours)
Adequate recovery is needed to perform well during after match or training session (Bishop et al,2008).

The impact of training loads is not limited to the mere creation of physiological changes, and morphology during the work itself as it is related to the changes that occur during the post-work period (recovery). The body is not only exposed to (rest and work) conditions but also needs to be recovering (Abd El fattah,1999).

However, sometimes there is not enough time obtainable to recover adequately between the matches or training sessions; thus, performance is impaired. Different recovery modalities individually, or in the group, are often used by competitive athletes to boost recovery, reduce muscle pain, and get better performance (Barnett,2006). It is well known that the training processes themselves from the physiological point of view: they are demolitions in terms of metabolism, so there is a breakdown of energy sources in order to convert the chemical energy stored in the body into mechanical energy. There are also many cells that are torn during training, and conversely, the building process becomes more intense during the recovery. As the sources of energy consumed by the body during the working period are restored. As well as building body proteins, and disposing of waste resulting from metabolic processes, including lactic acid, so the recovery after work is the main part that complements the physiological adaptation necessary to raise the level of performance and ignore the recovery period, and lack of attention to it will inevitably lead to fatigue and lack of opportunity For construction operations, which leads to a lack of level. Therefore, the post-training period or the match, that is, the recovery period is a period no less important than the training period and the match itself recovery time is an important general in the sport of professionals. Recovery from training or a match is an integral part of a comprehensive training program and is necessary for performance and optimal improvement. If the recovery rate is improved, training volumes and intensity can be increased without the harmful impacts of overtraining (Bishop et al, 2008).

The term recovery in which a person is restored to vitality again plays an important role in returning the person to his normal health condition which appears for example in re-work, and coordination between different body parts, and in the athletic field the exchange that occurs between (training or a match) and recovery is a decisive and important factor that allows access to high performance. Training is determined by a single training unit, or during training throughout the year or (years) by a mixture of excitement and recovery. Recovery methods differ between the educational methods that the trainer uses during planning the training work; As well as the means that he uses with the aim of rebalancing the muscular work and the subsequent work of the physiological apparatus as well as psychological and medical and biological means (Al-Sakkar et al,1998).

Lactic acid takes a not too short period of time to get rid of a good percentage after every training or match and through slow, quiet running in the light of the heart rate (120 BPM) per minute as well as performing some stretching, flexibility, relaxation, and Cool-down exercises. Massage and sauna also work to get rid of the accumulation of lactic acid in the muscles (Al-Ali & Fakher, 2006). In addition, the application of the cooling method has become widely accepted in sports and this is supported by various organizations, including the Faculty of Sports Medicine (ACSM) and the International Federation of Sports Amateurs (IAAF) as well as the association (NATA) (Cary et al, 2015)

Many of the functional and chemical changes will occur on the body’s systems as a result of the great physical effort exerted by the player during the handball match period, since returning the player to his normal state increases his focus as well as his ability to continue in the next match on the second day and with the same efficiency with which he started the first match then he will need to use the means of recovery (cooling, vibrating massages, Cool-down exercises) between games as it helps to bring the player back to his normal state and faster in order to complete the matches to achieve good results by returning the body's functional systems to their natural state or close to them by getting rid of acid. The lactic system, which consists of the anaerobic system, enables the devices to keep pace with the muscular action by providing them with the energy needed to complete the matches. Recovery is defined as improving, renewing, energizing, restoring, strengthening, rebuilding, reproducing, compensating, recovering, or it is the period of time after pregnancy until it reaches the level that the individual was before performing the pregnancy or skipping it, and his willingness to perform a specific pregnancy from New (Khurbit &Turki, 2002). It is a general term used in the sense of restoring the regeneration of indicators of the physiological and psychological state of a person after being subjected to excessive pressure, or his influence affecting the performance of a specific activity. Or is the recovery condition that causes the player's ability to gradually return to his or her state in which it appeared, when the physical exertion is followed by the player ceasing to perform, that is, moving from pregnancy to rest (Al-Santresi, 1984).
In the problem of recovering healing has become one of the main problems that trainers are interested in, as the recent period has directed many types of research to solve many questions regarding the use of a set of methods to track their different impacts on both work and recovery, as well as not knowing the best on the part and lack of use on the other hand during intense tournaments, any match after a match. The players feel tired, not a cause for several of the most important of which is the gathering of lactic acid in the blood, which prompted the researchers to use cooling, vibratory massages and Cool-down exercises after the matches, and to know which ways are faster in improving the concentration of lactic acid and returning the handball player to his / her normal state or close to it. The researchers noticed poor performance in players and no improvement in the next matches. Where players use different recovery methods during competition and training to enhance recovery (Keokemoer & Magrieta, 2010), hence the study aims to identify the impact of recovery methods by cooling, vibratory massage, and Cool-down exercises after handball matches on the concentration of lactic acid in the blood of elite players. As for the hypothesis of the study, it is evident that there are significant differences between the measurements of the recovery methods after handball matches on the concentration of lactic acid in the blood of the elite players.

II. METHODS

Design:
The researchers used the descriptive method to solve the study problem.

Participants:
the participants were the Al-Diwaniyah Governorate handball elite team players and they have (12 players), their lengths ranged among (182.74±4.86cm), their weights (81.91±7.24kg), their ages (24.46±8.74years), and the concentration of lactic acid at rest time before the effort (1.23±0.58 mmol).

Tools:
Handball field, Lactic prom meter, a device for measuring weight and length,12 water pools, ice, medical thermometer, and stopwatch.

Procedures:
The participants (12 players) were divided into two teams and each team includes (6 players), then the researchers proceeded to conduct three games on Fridays, Saturday, and Sunday) on the date (20-21-22 Sept, 2019) and the matches between the two teams and the International law of handball are only applied. The measurement of the concentration of lactic acid using the Lactic meter on a sample after the end of the game is (5min), after which the recovery methods are used as follows:

1-The first game in which the researchers used the recovery by cooling, where the players descend after the end of the match with (5min) in cold water pools at a degree from (12° to 15°) and the player submerges his / her entire body with water except for the head and continues lying down to (10min) and the researchers took safety considerations that recommend The American Sports Medicine Association maintains the cleanliness and sterilization of the pond, as well as monitoring the player's temperature inside the pelvis, where the player's temperature drop should not increase (0.15°-0.25°) per minute (Armstrong et al,2007), the player's temperature is monitored by a medical thermometer while a The water temperature is controlled by a mercury thermometer and ice is added to the ponds to maintain the water temperature.

2-The second match, in which the researchers used a vibratory massage for the players after the end of the match with (5min) and for a period of (10min) by the specialized medical staff.

3-The third match. The researchers used Cool-down exercises after the end of the match with (5min) and for a period of (10min), which is a group of exercises with little intensity and includes walking, jogging, standing ... etc.

After using the recovery methods for the three matches, that is, after (10min), the lactic acid was measured in the blood of the two players.

Statistical analysis:
The researchers use the statistic SPSS to find out the results of (Pillai's Trace and LSD) test.
III. RESULTS

Table (1)

<table>
<thead>
<tr>
<th>The match</th>
<th>Time</th>
<th>Mean</th>
<th>SD(Error)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5min</td>
<td>8.954</td>
<td>0.058</td>
</tr>
<tr>
<td></td>
<td>10min</td>
<td>5.965</td>
<td>0.157</td>
</tr>
<tr>
<td>2</td>
<td>5min</td>
<td>9.093</td>
<td>0.096</td>
</tr>
<tr>
<td></td>
<td>10min</td>
<td>7.817</td>
<td>0.135</td>
</tr>
<tr>
<td>3</td>
<td>5min</td>
<td>9.103</td>
<td>0.117</td>
</tr>
<tr>
<td></td>
<td>10min</td>
<td>7.078</td>
<td>0.104</td>
</tr>
</tbody>
</table>

Table (2)

<table>
<thead>
<tr>
<th>Pillai's Trace</th>
<th>Value</th>
<th>F</th>
<th>Hypothesis df</th>
<th>Error df</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.989</td>
<td>128.905b</td>
<td>5</td>
<td>7</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Table (3)

<table>
<thead>
<tr>
<th>Pairwise Comparisons</th>
<th>Match number &amp; Measurement time</th>
<th>Mean Difference</th>
<th>Std-Error</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>1(5 min)</td>
<td>2(5 min)</td>
<td>-0.138</td>
<td>0.102</td>
<td>0.203</td>
</tr>
<tr>
<td>1(5 min)</td>
<td>3(5 min)</td>
<td>-0.148</td>
<td>0.123</td>
<td>0.253</td>
</tr>
<tr>
<td>2(5 min)</td>
<td>3(5 min)</td>
<td>-0.010</td>
<td>0.064</td>
<td>0.878</td>
</tr>
<tr>
<td>1(5 min)</td>
<td>1(10 min)</td>
<td>2.989*</td>
<td>0.193</td>
<td>0.000</td>
</tr>
<tr>
<td>2(5 min)</td>
<td>2(10 min)</td>
<td>1.138*</td>
<td>0.132</td>
<td>0.000</td>
</tr>
<tr>
<td>3(5 min)</td>
<td>3(10 min)</td>
<td>1.276*</td>
<td>0.129</td>
<td>0.000</td>
</tr>
<tr>
<td>1(10 min)</td>
<td>2(10 min)</td>
<td>-1.852*</td>
<td>0.183</td>
<td>0.000</td>
</tr>
<tr>
<td>1(10 min)</td>
<td>3(10 min)</td>
<td>-1.113*</td>
<td>0.22</td>
<td>0.000</td>
</tr>
<tr>
<td>2(10 min)</td>
<td>3(10 min)</td>
<td>0.738*</td>
<td>0.14</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Table (1) shows the mean and standard error for measuring the lactic acid concentration after the three matches in (5 min) & (10 min).

While Table (2) Test of Pillai's Trace is the multi-comparison between the concentrations of lactic acid after the end of the three matches, where the value of (p<0.05), that is, the presence of a very high difference.

Table (3) showed the value of LSD to compare between two measurements of lactic acid concentrations after the three matches.

Where the value of (p>0.05) after (5 min) for the three matches, i.e. between match No. 1 with 2, 1 with 3, 2 with 3, that is, the differences were random.

As for the value of (p<0.05) after (10 min) for the three matches, that is, between match No. 1 with 2, 1 with 3, 2 with 3, that is, the differences were significant between the recovery methods for the concentration of lactic acid.

IV. DISCUSSION

The study aims to identify the impact of recovery methods by cooling, vibratory massage, and Cool-down exercises after handball matches on the concentration of lactic acid in the blood of elite players, and in order to
Firstly: The measurement of lactic acid after the end of the match time after (5min) before using the recovery methods where the value was (p>0.05), meaning that the differences in them are random because the match effort is one for the players, which is (60 min) before proceeding to implement the recovery methods.

Second: Measuring lactic acid after the end of the match time after (10min) after using the recovery methods where the value of (p<0.00), meaning that the difference is significant is very high.

Third: To find out the best methods of recovery, the researchers used the Law (L.S.D), as the lack of lactic acid concentration guides us to the best method of recovery. Recovery was by cooling the best method used and the fastest in compensatory, followed by Cool-down exercises and finally vibratory massage.

It is used in the sports field in general, and training in particular. Recovery methods to compensatory, as the use of recovery methods, has become at the present time an essential and inseparable part of the training process and no less important than it. The study of the impact of after training loads on the level of the body’s functional condition is an important factor in appropriate planning processes - for training programs - to develop the athletic training process. Cooling recovery methods aim to return the player to his or her normal state in the least complete period of time (Darwish et al, 1998). In the first match, the researchers used the cooling method to re-recovery the players, as the results indicated a value of (p<0.05), meaning there are significant differences between the two measurements (5min) and (10min) and in favor of the measurement after (10min), as this method is considered one of the most common methods prevalence among all types of recovery methods and they have many physiological impacts, the researchers attribute the reason for the emergence of the difference is significant to the use of the recovery method by cooling after the game, as placing the body of the handball player inside cold pools except for the head stimulates relaxation points on the body to get rid of waste, including lactic acid As the recovery method stimulates blood circulation and accelerates the return of blood from the muscles to the bloodstream with the metabolic waste and metabolites it carries, which improves the ability of the members of the sample to drain lactic acid and reuse it to prepare energy in addition to speeding up its storage and also provides an alkaline environment regulating the pH raises the alkalinity of the body and works to balance it as the lactic acid builds up means an increase in the acidity as a result of the accumulation of hydrogen ions and then leads to a decrease (PH), which represents an acid degree, and the more hydrogen ions, the value of (PH) decreases and goes to acidity, so the less hydrogen ions, the value of (PH) increases and goes to alkalinity (Hassan & Abd El fattah, 1984) .

The physiological and chemical basis for compensatory by cooling is to replenish the player’s energy because the coldness of the water shrinks the blood vessels under the skin and the blood vessels in and around the muscles, which push the blood inside it which contains energy waste and wastes, including lactic acid, to the heart and pump it again to energy sources or disposal and put it out of the body as is the case for lactic acid, as the largest part of it is converted to glycogen by special enzymes to become a source of energy and the other part of it is thrown out. Cold baths do not only treat pain, pain, swelling, infections, tissue damage, and stimulate muscle cells to start repairing any rupture in them. Rather, they speed up and shorten the time period to recover recovery by getting rid of waste and renewing energy sources, as they make the player feel psychological comfort, as the player understands his advantages. And its benefits in renewing energies before starting the next competition, and experts advise in the field of sports the need to allocate special units to recover recovery as it works to improve performance and reduce the percentage of injuries. Therefore, the trainers should pay attention to compensatory due to its importance in restocking, reconfiguring energy sources and getting rid of lactic acid from the working muscles and from the blood, so that the faster compensatory, the lower the concentration of lactic acid formed during the work time (Khoreibet & Abd El fattah,2016). Throughout history, cold water diving has been used as a treatment method to restore physical and mental health, but at present, it is used as a method of recovery(Calder,2003). Our results showed that the cooling method to a significant decrease in the level of lactate in the blood of athletes (Crowe et al,2007).

After the second match, the researchers used a vibratory massage method to compensatory. Where the results were shown on the value of (p<0.05) that is, there were significant differences between the two measurements (5min) and (10min) and in favor of the measurement after (10min), where clear differences were shown in the decrease in the level of lactic acid formed in the blood or muscle, which leads this method to players reach recovery faster. And to keep up with the course of the physical effort completely during the match or with the...
same efficiency with which the players seemed, it is advisable to use the vibratory massage to participate in the next game after the end of the first game in order to facilitate disposal of sediment waste, especially lactic acid and muscle grafts in the shortest possible time to face the new effort that will be made the player participate in the following match (Al-Sakkar et al. 1998). The vibratory massage improves the blood circulation of the limbs and muscles and helps to move the blood inside the muscle fibers, which helps to increase the exchange of nutrients in them (Salama, 2008). It is also used to work on the speed of compensatory so that it improves blood circulation, which helps to get rid of accumulated lactic acid in the muscles as well as giving the body a feeling of relaxation and rest, the vibratory massage for a period not exceeding (15min) (Al-Beik et al., 1994). Performs vibratory massage after performing training or after performing competitions, which helps to remove fatigue and decrease (reduce) muscle tension and increase the speed of blood flow to the capillaries.

After the third match, the researchers used Cool-down exercises to compensatory, the results indicated a value of (p<0,05), meaning there were significant differences between the two measurements (5min) and (10min), and in favor of the measurement after (10min), where clear differences were shown in the drop of a level lactic acid formed in the blood, the researchers attribute this to the efficiency of Cool-down exercises in ridding the body of deposits of physical exertion, including lactic acid, which takes a short period of time to get rid of a good proportion after the end of training through Cool-down exercises in light of the heart’s work at a rate (120 BPM) (Al-Ali & Fakhera, 2006). The player’s body gets rid of lactic acid faster if the player performs Cool-down exercises during the recovery instead of fully rest (Abd El fattah, 2000). The use of Cool-down exercises removes fatigue and quickly compensates energy sources (Allawi,1992). In general, it helps to get rid of lactic acid the player performs light Cool-down exercises, as they work to quickly get rid of him (Salama, 2008).

To know out the best recovery methods for getting rid of lactic acid after the three matches after (10min), where the value of (p<0.05) shows there are significant differences between the means of recovery methods in terms of the least concentrated in lactic acid and the fastest in compensatory, as it is the best and according to the sequence (cooling, Cool-down exercises, vibratory massage).

Therefore, to get rid of lactic acid as soon as possible. The coaches and team therapists must rely on the use of modern equipment and techniques in the training method (Al-Lami et al., 2000).

V. CONCLUSIONS

The use of recovery methods by cooling, vibratory massage, and Cool-down exercises after handball matches have a positive effect in reducing the concentration of lactic acid in the blood and that cooling method is the best method used and the fastest in compensatory, and then followed by Cool-down exercises and finally vibratory massage.

VI. RECOMMENDATIONS:

The interest in using recovery methods to reduce the concentration of lactic acid after the end of the match.

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