Device (H) and its effect on achievement of the Clean and jerk in weightlifting for cubs aged (16-18) years

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Abstract

The aim of the research is to identify the effectiveness of the (H) Machine and its impact on the performance of junior weightlifters, the experimental method was used to verify the hypotheses of the research, the research sample consisted of (16) players who represented the Juniors of Al-Kut Weightlifting Club in Iraq. They were divided randomly into two groups (experimental and control). The processes of homogeneity and equivalence were conducted on them, and the tribal measurements were taken, namely (height, age, and the relative performance of Clean and Jerk Lift), the trainer’s approach was used, and units were introduced using the (H) Machine, the data were processed statistically, as the most important conclusions were reached, namely that (H Machine helps in shortening the training period and the efforts exerted because of its specialty in skill training).

Keywords: H Machine, Weightlifting, Performance.

1- The First Topic:

1-1 Introduction:

Physical Exercise is a science that derives a large part of its theories, foundations and principles regarding the implementation of its operations from other sciences, such as: Engineering, Physics, Physiology, Biochemistry, and nutrition, which are all mixed together to help aid the training performance of the athlete. Also, through which, the performance levels of players are affected positively, and helps them achieve advanced and distinct results and goals.
In order to achieve these goals, the assets and equipment of training curricula must be developed, and their loads must be identified according to scientific formulas, granting the players' compatible capabilities.

The science of modern training depends mainly on approaching the form and method of performing the exercise, the use of public and private means that are consistent with the training stage, the nature of the competition and its conditions, and kinetic duties, and it is the right way to ensure progress in high economic and objective conditions, as “raising the athletic levels requires the use of various training methods, through which, "achieving the desired goal” (Qasim: 1999: 117).

High intensity sports, especially weightlifting, have increased in recent years in an unprecedented manner. This is due to the use of different and programmed training plans, methods, and programs that work to achieve the training goal in a correct and deliberate manner.

Weightlifting is a sport with special requirements, as it mainly requires enjoying high-intensity physical qualities. It is one of the important Solo-Sports that characterizes a rather tricky technical performance. The correct execution of the proper Clean and Jerk Exercise requires advanced techniques with a correct kinetic path that results in the success of these lifts. It is no secret that achieving high performance in this sport comes through raising the levels of physical athleticism, and monitoring skills and technical performance in a rather great manner. The weightlifter must possess performance monitoring and other qualities, in order to be invested in performance in a way that enables him not to fail in competitions by investing the best scientific methods and theories in Athletic Training.

There are many studies that determined the kinetic path of the weights, and it was analyzed in details, as the kinetic analysis answers many questions about the posture and purpose of the movement, and the comparison between a proper movement and a poor one, and it shows us the differences between the proper movements that are closely related, and enriched these studies with ideal values for the kinetic path of gravity, and gave relatively different extents, which may help us in both directions. The first trend is to correct movements according to their form and how they are executed. The second trend is in the field of shortening training time and effort. Previous studies (Haider, 2008) were used to design a typical kinetic path for the chest-press exercise, and place it in a regulated device with similar specifications to the typical exercise. Hence, the importance of the research lies in the design of the (H) Machine and Identifying its Effects on the Performance of “Clean and Jerk” Weightlifting Exercise for Juniors between (16 and 18) years of age.

1-2 Problem of the Research

The researcher noted that the training methods used in training and performance enhancing are traditional without resorting to biomechanical training methods will not lead to a better performance and execution. From here, the question was asked whether the training system has
an effect on the performance of Clean and Jerk Exercise. This is what the researcher will go through to find out.

1-3  Research Objectives

1. Designing (H) Machine as a biomechanical training aid in weightlifting.

2. Identifying the effects of this machine in enhancing the performance of Clean and Jerk Exercise for Junior weightlifters.

1-4  Research Hypothesis

1. There are statistically significant differences between the pre- and post-tests for the control and experimental groups, which are more towards the post-test in the performance of Clean and Jerk Lift.

2. There are statistically significant differences between the control and experimental research groups in the post-test in favor of the experimental group, which is training using (H) Machine in the performance of Clean and Jerk Lift.

1-5  Research Limits

1. Human Limits: Junior Weightlifters of Al-Kut Club.


3. Location: Wasit Sports Club Hall.

2- The Second Topic

2-1  Samples

The research sample was deliberately selected from the Junior Weightlifters of Al-Kut Sports Club, and their number is (16) players. They were all selected with a pre-test to determine the research variables in relation to the Kinetic path (heights - deviations), Performance of (Clean and Jerk Lift). The experiment was conducted on them in the special preparation stage of the team. The processes of homogeneity and parity were conducted on them after dividing them using the lot method into two groups according to their weight categories. Their division was as follows. The first group, (8) players: they utilize skillful physical training only. The second group, (8) players: its members use skillful physical training in addition to the use of the (H) Machine.

The researcher conducted procedures that aim at controlling the variables with a single starting point, according to the following differences: (height, age, Average Performance of Clean and Jerk Exercise). The researcher proceeded to homogenize the research sample for the members of
one group and for the control and experimental groups by using the coefficient of variation. The closer the coefficient of variation is to (1%), it is considered high homogenous, and if it exceeds (30%), it means that the sample is heterogeneous (Wadih and Hassan, 1999: 161). The results of the first group were (3.6% for height/5.8% for age/5.4% for average performance). While the results of the second group were (2.8% for height / 7.7% for age / 4.4% for average performance). As for the equivalence procedure, the researcher used the (T) Equation to verify that there were no differences between the two groups. After processing the data statistically, the researcher calculated the value of (t) for the independent samples, and adopted the null hypothesis, so it appeared that the calculated value of (t) was (0.139 for length / 0.183 for age/ 0.122 for average performance), which is less than the tabular value of (t) which is (2.120) below the significance level of (0.05) and a degree of freedom of (16). This indicates that the difference is not significant between the two groups, which is evidence of their statistical equivalence.

2-2 Equipment

1. The opinions of experts and specialists in the field of biomechanics were collected regarding the validity and possibility of the machine for training, as it was distributed to some of the experts. After they were collected and unloaded, they recommended the validity of the machine.

2. The opinions of experts and specialists in biomechanics have been collected to determine some of the common biomechanical variables of the kinetic path of Clean and Jerk Lift. The researcher used the sources and references related to the science of biomechanics of Clean and Jerk Lift for the purpose of determining some variables of the kinetic path, placing them in a questionnaire form, and presenting them to experts and specialists in biomechanics. After collecting the forms, unloading the data and treating them statistically, the variables, heights H, and deviations D, were accepted, which obtained an agreement percentage of (85.21% and above), with the regard that the number of experts is (5), appendix (2).

3. Auxiliary work team (*).


2-3 The (H) Machine

The device is designed according to the typical movement path of the Chest Snatch in terms of technical specifications that enable the athlete to adjust the movement path, and which gives the player self-correction (feedback) for the correct technical lift path. Appendix (3).

– Dimensions of Movement Path

Previous studies were used to develop a typical kinetic path for Clean and Jerk Lift.
The Iraqi typical kinetic path for the Clean and Jerk Lift was as follows:

1- (H1) the first height, which is the height of the deepest internal deviation of the weight towards the athlete, was in the means of the device (61.33 cm).

2- (H2) The second height was (88.43 cm) crossing and contacting height of the imaginary gravity line in the first snatching stage.

3- (H3) The third height is the height of the deepest external deviation of the weight away from the athlete in the second snatching stage, its value is (100.54).

See figure (1), it shows the shape of the movement path, indicating the heights and deviations.

- **Deviations were as follows:**

  1- The first stage (D1), which is the deepest internal deviation towards the athlete, and its range in the device was from (0 cm to 12 cm). After consulting experts and specialists in this regard, the typical Iraqi range was from (3 cm to 14 cm). The increased the distance is useful in the beginning so that the athlete improves gradually. This distance begins to decrease until it becomes within the typical range, and for all stages.

  2- The second stage (D2), which is the deepest external deviation and its range is from (0 to 14 cm), while the typical was between (0 and 15 cm).

  3- The third stage (D3) The distance of this stage in the device was between (3 and 4 cm), and for the model between (1.5 and 1.8 cm).

2-3-1 **Validity of the Device**

Face validity was adopted, "which means judging a thing by merely observing that it is true in measuring what it was set for." (Al-Sayyed: 1999, 151). The device was presented to experts in the field of mechanical engineering and physics to express their opinions about the scientific efficiency of the device with regard to the validity of the materials used in its manufacturing process, as well as the mechanical path and the endurance of the device withstand friction due to the sliding of the (bar) on the inner edges of the track.

2-3-2 **Device Stability**

The stability coefficient was calculated by the (retest) method, (Al-Mandlawi et al.: 67,1989), where the researcher deliberately chose a sample of (8) players who are good at performing the Clean and Jerk exercise. Where the test was conducted with the help of the device, and after a week, the test was repeated using the device also to determine its stability, as the two tests were evaluated by a specialized referee.

After the data for the reliability test was calculated, the researcher examined it statistically. This is done by calculating the value of the Pearson correlation coefficient between the scores of the
two tests. Which reached (0.918), and which is greater than the tabular value of (0.707) at (6) degrees of freedom, and at a level of significance of (0.05), and this indicates a significant correlation between the two tests, and that the stability of the device is effective.

![Image](image1.png)

Figure (1), The (H) Machine

2-4 Videotape

To achieve technical scientific observation. A fast camera (100) images per second from the right side of the athlete was used, at a distance of (5) meters and at a height of (85) cm, for the purpose of kinetic analysis of the kinematic variables to individual the sample, and extracting the kinetic path variables to benefit from its results in identifying the design of the device, how to use it, and comparing the exercise with and without the device. Dartfish Connect software was used for kinetic analysis.

2-5 The Main Experiment

2-5-1 The Pre-Test

[www.turkphysiotherrehabil.org](http://www.turkphysiotherrehabil.org)
The tribal tests were conducted for the research group members in the Wasit Governorate Club Championship and in the Badra Forum Hall on Wednesday 22/3/2020 at five in the evening with the help of the work team (*). The performance test was conducted for the elevation of the net and video photography, and the sample data were processed in relation to the measurement (height - age - average performance).

2-5-2 Training Program

The researcher referred to the sources and references specialized in training, as well as collected a number of opinions of experts and specialists in the field of sports training on the method of training and the introduction of the device within the training period of the experimental research group only. The sample approach was used and the training device was entered for a period of 8 weeks and within the following limits:

1. The program was applied during the special preparation period of the research sample.
2. The course duration is (8) weeks.
3. The time of each training session ranged between (80-100) minutes (4) sessions per week, which was targeted by the researcher to enter the device. Appendix (4)
4. The implementation of the training program started from 4/21/2020 until 6/16/2020.
5. The first week of the program, which is the first and second units, was an explanation given by the coach on how to perform the actual performance using the device, as well as applying the movement in front of the players so that they could know the correct performance. The researcher's work was limited to supervising the course of the program on the control and experimental groups, as well as following up on the stages of training on the auxiliary exercises.
6. The work on the device has been divided into:
   1. The first step: Training was conducted on the starting position, as well as how to hold the weight bar at the beginning of the first pull, and it was by (4) training sessions for a period of (4) weeks.
   2. The second step (the first pull and the movement of the knees): Training was conducted on the first stage of pulling, the movement of the knees and its importance, and how to deal with errors in this pull and their treatment with the device. They also learned how to snatch. This took (4) sessions for a period of (4) weeks.
6- The last week was training on the skill as a whole, and linking the parts of the activity, for a period of one week.
7- As for the control group, they practice the same parts of the skill, but without using the device.
2-5-3 The Post-Test

After completing the application of the terms of the training program on the device, the researcher conducted the post-test for the two groups on Monday 16/6/2020 in the teams’ tests of the annual weightlifting clubs, and under the same conditions as the pre-test for the performance test and videography, as well as taking the calendar data from the tournament judges.

3- The Third Topic: Results and Discussion

3-1 Presentation and discussion of the results of the pre and post tests for the relative achievement test

Table (1)

<table>
<thead>
<tr>
<th>Indication of Differences</th>
<th>(T) Value * Tabular</th>
<th>Calculated</th>
<th>Post0Test ±Z</th>
<th>X**</th>
<th>Pre-Test ±Z</th>
<th>X**</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Significant</td>
<td>2.447</td>
<td>6.11</td>
<td>0.08</td>
<td>1.35</td>
<td>0.02</td>
<td>1.16</td>
<td>Snatch</td>
</tr>
<tr>
<td>Significant</td>
<td>3.92</td>
<td>0.04</td>
<td>1.22</td>
<td>0.04</td>
<td>1.12</td>
<td></td>
<td>Snatch</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Control</td>
</tr>
</tbody>
</table>

* Tabular value (T) at (6) degrees of freedom and error probability of ≥ (0.05).

** Percentages of body-weight are relative values.

By presenting the results of the pre and post-tests of achievement with the Clean and Jerk Lift, significant differences appeared between the pre and post-tests of the two research groups in favor of the post tests. The researcher attributes this positive change in achievement to the following:

- The training program was positively reflected in the digital achievement of the research sample, “as the opinions of experts, no matter how different the sources of their scientific and practical culture, confirm that the training program inevitably leads to the development of performance, as it is built on a scientific basis in organizing and programming the training process, using appropriate and gradual intensity, noting the necessary individual differences, as well as the use of optimal repetitions, and effective rest periods under the supervision of
specialized trainers and under good training conditions with regard to the place, time and
equipment being used”, (Saad, 1996).

- The training curriculum fulfilled requirements in terms of economics in the movement by
targeting the movement only and not involving unwanted muscle groups during training, that
is, it targets performance directly, which leads to the development of these groups towards
serving their work in achieving high performance in effectiveness. This was in accordance
with the opinions of (Gonden and two others). "The best achievement comes through
increasing the level of muscles that are necessary in work and performance (Gonden, 2005)."

3-2 Presentation and discussion of the achievement results of the post-test for the two
groups (control-experimental).

Table (2)

Arithmetic means, standard deviations, calculated (t) value, and the significance of
differences for the post-test of the two groups (control-experimental) for performance of
the Clean and Jerk Lift

<table>
<thead>
<tr>
<th></th>
<th>Experimental</th>
<th>Control</th>
<th>(T) Value *</th>
</tr>
</thead>
<tbody>
<tr>
<td>X** ±Z</td>
<td>1.35 ±0.08</td>
<td>1.22 ±0.04</td>
<td>4.22</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th>Calculated</th>
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<th>خطأ</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15</td>
<td>0.05</td>
</tr>
</tbody>
</table>

* Tabular value (T) at (15) degrees of freedom and error probability of ≥ (0.05).

** Percentages of body-weight are relative values.

Table (2) shows the results of the tests for the two groups (control-experimental) for technical
performance in the post-test, as the results indicated that there were significant differences
between the two groups (control-experimental) in favor of the experimental group. Through the
statistical analysis of the results shown in Table (2), it was found that there was a significant
development in the achievement and for the two groups (control and experimental) in the post
test.

The researcher attributes this development in the achievement of the post-test for the two groups
to the development that occurred for the two groups in technical performance as a result of the
curriculum that contributed to enhancing the players’ physical and skill-set capabilities, as
finding the correct and modern scientific methods for the process of teaching good technical
performance, and then applying it is the basis for developing the skillful ability of the athlete in
executing these lifts with a good technique inevitably leads to the development of performance”,
(Nassif and Abdi, 1988). The researcher noticed the progress of achievement among the
members of the experimental group better than the achievement of the control group, as the
researcher attributes this progress to the use of the device, which led to avoiding and fixing errors in technical performance, and the provision of mechanical variables in favor of the lift, as one of the causes of errors in the technical performance is “the lifter’s failure to apply the mechanical rules of lifting, and not using the corrective mechanisms”, (Ali, 2002). “The process of correcting errors leads to the advancement of the athlete towards a better performance”, (Nassif and Abdi, 1988). Ali Shabout adds, “The failure to correct mistakes in performance exercises leads in turn to the lack of development in the level of performance”, (Ali, 2002). From this, we conclude that the device led to the development of the level of achievement and performance as a result of correcting the technique of performance derived from the typical kinematic variables of the movements' path.

4- The Fourth Topic

4-1 Conclusions

1- The device has a positive effect on the achievement and improving the performance technique of the Clean and Jerk Exercise.

2- The device is a training method that leads to the investment and saving of effort and time in training.

5- Recommendations

1- The trainers' need to use the device in the training program, because it has a clear impact.

2- Using the training device for different age groups.

References


2- David Lambi, Adel Helmy: Benefits and determinants of increasing fluid compensation before training and competitions, (1999), Athletics Bulletin, Cairo, Regional Development Center, p 25


11- Wadih Yassin Al-Tikriti: (1999), Learning the Olympic Lifts by the Reverse Method from the Partial Method, Qatar Weightlifting Federation.


Appendix

Appendix (1-2)

A list of the names of experts and specialists whose opinions were taken on the validity of the device, as well as the identification of biomechanical variables

<table>
<thead>
<tr>
<th>Name</th>
<th>Occupation and Specialization</th>
<th>Place of Work</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wadih Yassin Al-Tikriti</td>
<td>Prof. Dr. Biomechanical Training</td>
<td>College of Physical Education - University of Mosul</td>
</tr>
</tbody>
</table>
### Appendix (4)

**Shows a sample of the Training Sessions**

**Week / First week / Second week**

**Training Day/ (Friday)**

**Week Intensity/ 85%**

**Training Sessions/ 1**

**Unit Intensity/ (85%)**

<table>
<thead>
<tr>
<th>Section</th>
<th>Session Period</th>
<th>Exercises</th>
<th>Intensity</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Main section</strong></td>
<td>49</td>
<td>Steady Snatch from the Hack</td>
<td>90</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Steady Clean</td>
<td>80</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sitting Squats</td>
<td>95</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Inclined Leg Press</td>
<td>80</td>
<td>3</td>
</tr>
</tbody>
</table>

| Resting Periods |
|-----------------|-----------------|-----------------|---|
|                 | Repetitions     | Sets            |   |
|                 | 2 to 5 Minutes  |                 |   |
| Training on the (H) Machine | H%75 | 4 | 2 |