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Effect of physical exertion training on bio-kinetic abilities in weightlifting among students of Physical Education and Sports Sciences

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ABSTRACT

The objective of this research was to study the effect of physical exertion training on bio-kinetic abilities in weightlifting among students of Physical Education and Sports Sciences. The present study had a pre-posttest experimental design in which participants were recruited in two groups: experimental group and control group. A total of 30 students of Physical Education and Sports Sciences constituted the sample of the study. The sample selection was done by a comprehensive inventory method. Participants were equally allocated into two groups with n=15 in each group. Participants of experimental group were made to perform special physical exercises with three training units per week during eight weeks. The statistical analysis was carried out using SPSS. The results of the study showed that the physical exertion training has a positive effect on developing some bio-kinetic abilities in weightlifting among first-year students of Physical Education and Sports Sciences.

KEYWORDS

Physical exertion training; Bio-kinetic abilities; Weightlifting effectiveness

1. INTRODUCTION

Sports training is an essential pillar and an important necessity in the training process, so raising the level of sports must be based on sound scientific foundations. The training programs should be based on scientific foundations to make the training process more beneficial. There are certain capabilities every athlete must possess to reach the highest levels of their sports performance, like explosive power, speed, endurance, etc.

As per the scientific literature, physical performance of weightlifters can be enhanced by specifically developing certain capabilities by upgrading their training programs. Training programs should incorporate special physical effort training with the sole purpose to raise their level of physical performance and overall better output in their sport activities. Success of any training program is based on scientific foundations in terms of comprehensive physical numbers, which have an important role in raising the level of physical competence among students for the effectiveness of weightlifting.

The researchers noted that there is a weakness in some bio-kinetic abilities in weightlifting, which affects the physical performance of the students. Therefore, the objective of this research was to study the effect of physical exertion training on bio-kinetic abilities in weightlifting among students of Physical Education and Sports Sciences. The research hypothesis was that the physical exertion exercises would have a positive effect on developing some bio-kinetic abilities in weightlifting among the students.

2. METHODS

2.1. Design and participants

The present study had a pre and post-test experimental design, and the participants were allocated into two groups: experimental group and control group. The research community was determined for students of the first year of the College of Physical Education and Sports Sciences of the University of Baghdad, for the academic year 2020-2021. The study was completed within the time frame of 3/3/2021 to 11/5/2021. A total of 30 participants were recruited, and 15 participants were allocated in each of the two groups (experimental and control group). Homogeneity and equivalence procedures were carried out for the sample (Tables 1 and 2).

Table 1. Homogeneity of the sample

Variables	Unit	Mean	Median	SD	Skewness
Height	cm	174.11	172	4.161	0.741
Weight	kg	76.54	74.34	5.491	0.437
Age	Years	20.78	20	2.893	0.672

Table 2. Equivalence of sample groups in the pre-test

Variables	Tests	Unit	Experimental		Control		t value	p value	Sig type
			Mean	SD	Mean	SD			
Power characteristic with speed	Bench-press	Count	9.001	1.33	8.323	2.403	0.843	0.366	Non sig
	Half squat	Count	8.013	1.922	7.067	0.077	2.453	0.075	Non sig
Explosive power	Medical ball throw	Meter	4.350	1.506	4.110	1.212	0.651	0.444	Non sig
	Vertical jump	Cm	2.432	4.903	2.121	2.422	0.386	0.686	Non sig
Endurance of force	Bench-press	Count	24.432	2.686	22.671	0.574	0.234	0.884	Non sig
	Half squat	Count	19.125	1.983	18.435	2.845	0.606	0.641	Non sig

2.2. Instruments

To carry out all the tests we used: adhesive tape, a straight bench which was tilted upwards at an angle of 30-40 degrees, legal iron flange, medical ball of 3 kg, electronic stopwatch, dumbbells of various weights, and iron discs of varying weights.

The test used in this study were the following: 1) Power characteristic with speed test for the two arms: Bench-press thrust test for 10 seconds (Hassanein, 1999). 2) Power characteristic with leg speed test: 10 second half-squat test (Frederic, 2002). 3) Arms explosive power test: a test of throwing a medical ball of 3 kg with both hands from a sitting position on a chair (Allawi & Radwan, 2000). 4) The power leg explosive test: Sargent's Stability Vertical Jump Test. 5) Power endurance test for the arms: the propulsion test in a supine position upside down (30 seconds Bench Press) (Majeed & Al-Yasiri, 2003). 6) Leg Endurance Power Test: Half Squat Test 30 seconds (Bulland, 2007).

2.3. Intervention program

The pre-tests were conducted on the weightlifting hall in the College of Physical Education of the University of Baghdad on Wednesday 3/3/2021. The implementation of the exercises began on 7/3/2021 and lasted until 9/5/2021. The duration of the intervention program was 8 weeks. The total number of training units was 24. The number of weekly training units was 3. The weekly training days were Sunday, Tuesday and Thursday. The training method used was the high-intensity interval training method. Post-tests were conducted on 11/5/2021, after completing the special exercises within the prescribed period. The researchers took into account the provision of conditions similar to the pre-tests in terms of time, place, tools used and the method of conducting the tests.

2.4. Statistical analyses

The data were processed through the Statistical Package for the Social Sciences (SPSS). We analyzed means and standard deviations of all the variables. Also, we compared these means with Student's t-tests. The significance level was set at $p<0.05$.

3. RESULTS

Results are presented in tables 3, 4 and 5. In table 3, we present the results of the pre and post-tests in the bio-kinetic abilities of the experimental group. In table 4, we present the results of the pre and post-tests in the bio-kinetic abilities of the control group. In table 5, we present the results of the post-tests in the bio-kinetic abilities of the control and experimental groups.

Table 3. Results of the pre and post-tests in the bio-kinetic abilities of the experimental group.

Variables	Pre-test		Post-test		Deviations of differences	t value	p value	Type sig
	Mean	SD	Mean	SD				
Power characteristic with speed test for the two arms: Bench-press	9.241	0.654	11.875	0.547	0.777	7.645	0.000	Sig
Power characteristic with speed test for the two arms: Half squat	8.843	0.432	9.443	0.872	0.543	8.932	0.001	Sig
Arms explosive power of throwing a medical ball	4.563	0.851	5.631	0.883	0.874	6.784	0.002	Sig
Power leg explosive: Vertical Jump	2.432	1.875	2.678	0.542	0.321	4.876	0.003	Sig
Power endurance for the arms: Bench-press	24.543	0.743	25.932	0.542	0.643	4.853	0.001	Sig
Power endurance for the arms: Half squat	19.125	0.743	20.432	0.762	0.741	8.43	0.004	Sig

Table 4. Results of the pre and post-tests in the bio-kinetic abilities of the control group.

Variables	Pre-test		Post-test		Deviations of differences	t value	p value	Type sig
	Mean	SD	Mean	SD				
Power characteristic with speed test for the two arms: Bench-press	8.344	0.445	9.678	0.654	0.863	6.653	0.004	Sig
Power characteristic with speed test for the two arms: Half squat	7.341	0.765	8.783	0.653	0.763	8.654	0.005	Sig
Arms explosive power of throwing a medical ball	4.110	0.543	5.141	0.752	0.654	5.763	0.004	Sig
Power leg explosive: Vertical Jump	2.310	0.431	2.421	0.984	0.852	7.863	0.002	Sig
Power endurance for the arms: Bench-press	22.671	0.674	23.534	0.453	0.762	4.563	0.007	Sig
Power endurance for the arms: Half squat	18.435	0.743	19.643	0.841	0.731	7.941	0.008	Sig

Table 5. Results of the post-tests in the bio-kinetic abilities of the control and experimental groups.

Variables	Pre-test		Post-test		Deviations of differences	p value	Type sig
	Mean	SD	Mean	SD			
Power characteristic with speed test for the two arms: Bench-press	12.689	0.653	10.567	0.563	6.543	0.004	Sig
Power characteristic with speed test for the two arms: Half squat	10.567	0.542	9.631	0.432	8.321	0.006	Sig
Arms explosive power of throwing a medical ball	6.832	0.731	5.779	0.541	7.764	0.005	Sig
Power leg explosive: Vertical Jump	2.742	0.654	2.541	0.673	5.443	0.000	Sig
Power endurance for the arms: Bench-press	27.141	0.782	25.318	0.841	7.873	0.004	Sig
Power endurance for the arms: Half squat	21.561	0.631	20.452	0.563	6.231	0.002	Sig

4. DISCUSSION

The results of the present study revealed that the training program prepared using weights-specific physical effort exercises directed at specific muscles led to the development of some bio-kinetic capabilities. The researchers attributed this to the presence of a significant difference in the explosive power and power characteristic of speed and power endurance for the experimental group, as a result of continuing the training units and the adequacy of training in terms of intensity, size and

comfort, as well as the diversification between them. The excitability of the nervous system shows that there is a development in the level of physical performance (Carter, 2001),

Statistical findings revealed improvement in the power characteristic with speed of the muscles of the arms and legs. The results of the present study were in accordance with the study conducted by Othman (1999). They stated characteristic with speed does not develop spontaneously or spontaneously, but rather through regular training The process of upgrading the level of strength characterized by speed requires work using weights and using body weight. Improvement was also observed in the explosive power of the muscles of the arms and legs. The possible reason could be the increase in weight and the gradual addition in the training units, and the high intensity would have caused physiological responses in the muscle tissue to meet these conditions in training. Followed by the development in the internal reactions of the body, the players adapted to this training. Further explosive power causes more firing at motor unit level, then causing a rapid increase in the number of muscle fibers and their contractions, followed by a qualitative adjustment in the nervous system. Regular training on exercises adapts the organs and increases their ability to continue playing for a longer period of time with a heavy load (Al-Mandalawi and Saeed, 1999).

A significant improvement was also seen in power endurance for the muscles of the arms and legs. This improvement could be justified by the fact that the training program used by this group, using exercises with weights, has developed power endurance as a result of giving appropriate training doses. Furthermore, the formation of lactic acid causes local adaptation of the muscles of arms and legs, which increased their resistance to fatigue when performing physical exertion exercises, even with greater load intensity.

5. CONCLUSION

In conclusion, the results of this study showed that the physical exertion training has a positive effect on developing some bio-kinetic abilities in weightlifting among first-year students of Physical Education and Sports Sciences.

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CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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