# The effect of the resistance exercises of using the elastic cords on neuromuscular coordination and some of the physiological variables to enhance the level of the skilful performance of uneven parallel Bars

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**Abstract:** This research aims at designing a program using the elastic cords and knowing its effect on the neuromuscular coordination and some of the physiological variables represented in (pulse and vital capacity) and improving the level the skillful performance of uneven parallel Bars.. The female researcher applied the experimental method to two groups, one is the experimental group and the other one is the control group. The research was applied to a sample which consisted of (24) students in the fourth grade, Department of Dymnastic, whose ages ranged between (21 - 20) years old, in the university year 2012 /2013, One of the instruments of collecting data is physical and physiological measurements. The results indicated that the elastic cords have a positive impact on the neuromuscular coordination and some of the physiological variables and this was reflected in the level of the skillful performance of the uneven parallel Bars. The female researcher recommends that it is necessary to use the elastic cords in different performance forms in the other sports activities.
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## 1. Introduction

Currently, the sport of the gymnasium witnessed an obvious development on a world scale, which we see in that superb performance that combines between the innovation and difficulty in forming a group of kinetic movements on the different sets. This execution reflects the interest of the developed countries in controlling all the scientific efforts through the research about what is new in the field of training.[Esam Eldin,2003]

The elastic cords are considered one of the important and ideal types of exercises of resistances because it is possible to practice them without being limited to wide areas. In addition it is regarded as a key component in the programs of sports rehabilitation in activating the injured muscle and is used in the programs of prevention of the injuries as well as improving the general physical fitness.

Who quoted from "Mathews", indicates that a lot of kinetic performance requires the neuromuscular coordination. The gymnast's efficiency in performance Depends on according to what coordination he has the significance of the coordination emerges from the complicated movements that require more than one part of the body at a time. Also it doubles in importance if these parts move in different directions [Mohammed, 2001].

Who quoted from "Komadel" sees that the rate of heart activity is one of the physiological measures as the rate of the heart is directly related to several factors like the increase in blood pressure and pulmonary ventilation, oxygen consmption and expulsion of carbon dioxide,. That's way, the rate of the pulse is considered to be the most suitable way to observe the reaction of the living things in their practice for the physical effort. [Mohammed, 2000]

The vital capacity is one of the aspects that expresses the respiratory efficiency and the efficiency of the functions of lungs of the individuals. It clarifies to great extent the physiological ability of lungs because most players, who own a high degree of vital capacity are qualified to reach a high level and make a substantial progress in the sports activities, especially in the activities that breathing plays an important role in. [Mohammed,1997]

The Performance on the uneven parallel Bars requires following the kinetic route and controlling the accuracy of exchange between the hang and the fast support, which necessitate a large amount of strength and speed especially for the shoulders and arms With the availability of agility, coordination, the kinetic feeling and the accurate beauty besides quick reaction of the female player so that she can perform the complex movements around the different axes of the body.[ Mohammed,2003].

Through the female researcher's teaching the curriculum of gymnastics to the fourth grade students, she has observed that the female students, department of gymnastics, find difficulty in performing some kinetic skills on the uneven parallel Bars that are taught to them along with the quick appearance of signs of fatigue on them during the kinetic performance; this affects the level of the performance of students to the kinetic sentence as a whole. The female researcher

accounts for this to the students' lack of the neuromuscular coordination and some of the physiological variables that are considered to be the first pillar that continuance in the kinetic performance and enhancing the kinetic performance are based on.

This urged the researcher to try employing modern training techniques such as training using elastic cords and, knowing its effect on the neuromuscular and some physiological variables to enhance the level of the skillful performance of the uneven parallel Bars.

**2.The procedures of the research:-**

The researcher applied the empirical method with pre – post measurements to two groups; one is experimental group and the other is control one,The study has been applied to a sample, (24) female students in the fourth grade, department of Gymnastics at the Faculty of Physical Education for girls, the university year 2012 / 2013. their ages ranged between (20 – 21) years.They were divided into two equal groups, each has (12) female students. One of them is the experimental group that the program using the elastic cords which applied to and the other control group that the traditional program in the faculty, Where they were calibrated all elastic cord used in the program with their counterparts have been applied in previous studies on samples similar to this sample and that in the interest of chemistry in Cairo; make sure it the same kind have been determining the length of the rope (3m) and the handles are made of the same material and the average tensile strength pregnancy or cutter 41 kg and the average ratio of 279.6% Elongation, was applied to. The measurements have been varied to collect data. They included physical measures which are (coordination –muscular ability – muscular strength - flexibility –agility) and physiological measures that include measuring the pulse during the rest and effort and measuring the vital capacity with spirometer. The level of the skillful performance has been measured by a committee of arbitration who consisted of four professors of the teaching staff who have experience of over 10 years.

The transaction was carried out to make sure its scientific validity of the application of the sample during the exploratory.

The proposed program has been carried out by using the elastic cord for 8 weeks.3 training units weekly have been taught. The time ranged from (45) minutes at the beginning to (75) minutes at the end of the program. The time of warm-up lasted (10) minutes at the beginning of every training unit throughout the period of implementing the suggested program.

The female researcher gradated in the time of the main part by increasing from (30) minutes at the beginning of the program until it reached (60) minutes at the end of the program by increasing the time by(10) minutes every two weeks. The main part has been divided into two parts, the first part includes the exercises of the elastic cords and its time starts (20) min. it has been gradually increased by (10) minutes every two week until the end of the program reaches (50 minutes) but the second part includes the skillful preparation of the kinetic sentence on uneven parallel Bars. The time of this part starts (20) minutes until the end of the program.According to the experts' opinions, the researcher decided the intensity suitable for the program: the medium intensity 60% to 69 %of the max rate of the student's pulse.

**3. Results**

It has become clear from the results of the table (1) that there are statistically significant differences between the pre- and post-measure for the experimental and the control in the neuromuscular and some physiological variables and the level of skillful performance of the uneven parallel Bars. The value of calculated "T" (t value) was more than the table at the level of significance (0.05) in favour of the post-measurement expect for the pulse at rest.

The female researcher accounts for the improvement in the coordination of neuromuscular and some physiological variables and the level of skilful performance to the effectiveness of the exercises of the resistance using the elastic cords. the progression from the easy to the difficult in implementing the exercises of resistance have been taken into consideration to suit the nature of sample of the research according to the physical and skilful level in addition to the variation in exercises of different muscles (legs –arms – the trunk) either individually or with the help of a mate, and either the performance was directed so that the body would take different positions or by using movements of coordination in different directions. This leads to improving the neuromuscular and also the continuity in performing these exercises leads to improvement in pulse and vital capacity. Thus this improvement is, of course, reflected on the level of skillful performance of the uneven parallel Bars. This agrees with what " Mohammed (9) and "Westcott" (16) and Khayria el Sokary (3) that improvement in the level of performing the physical abilities especially (Agility and coordination) depends largely on improving in other physical abilities. It also affects positively the level of skillful performance.

This result agrees with the study of Hisaed.(14), Frank (13) Fayza Ahmed (7), and Mohammed (17)as their result refereed to the effect of the exercises of elastic cords on the physical physiological abilities and the level of skilful performance.

Table (1) The significance of difference between the pre and post measures for the experimental group in the neuromuscular and physiological coordination and the skillful level N= 12

| tests | Pre-measurement | | Post-measurement | | The differences between the two means | The value of calculated" t" |
|---|---|---|---|---|---|---|
| | | | | | | |
| The numbered circles | 5.25 | 1.02 | 7.34 | 0.86 | 1.84 | 4.60 * |
| Throwing and receiving the balls | 10.99 | 1.08 | 15.25 | 0.99 | 4.26 | 9.68* |
| Rope skipping | 2.51 | 0.51 | 4.98 | 0.67 | 2.47 | 9.88* |
| The pulse at rest | 88.75 | 8.31 | 87.54 | 6.54 | 1.21 | 0.38 |
| The pulse at effort | 98.15 | 6.80 | 120.14 | 6.10 | 21.99 | 7.99* |
| The vital capacity | 2.61 | 0.60 | 3.21 | 0.31 | 0.60 | 3.00 |
| The skillful level | 7.34 | 0.61 | 13.25 | 0.89 | 5.91 | 17.91* |

The value of table" T" at statistically significance level 0.05 = 2,201

Table (2): The significance of differences between pre – post measurements of the control group in the neuromuscular and physiological coordination and the skillful level N= 12

| Tests | Pre-measurement | | Post- measurement | | The differences between the two means | The value of calculated" t" |
|---|---|---|---|---|---|---|
| | | | | | | |
| The numbered circles | 5.24 | 0.67 | 6.20 | 1.12 | 0.96 | 2.46* |
| Throwing and receiving the balls | 10.89 | 1.10 | 12.61 | 1.15 | 1.72 | 3.58* |
| Rope skipping | 2.52 | 0.53 | 3.75 | 0.64 | 1.23 | 4.92* |
| The pulse at rest | 88.73 | 8.33 | 89.36 | 7.68 | 0.63 | 0.18 |
| The pulse at effort | 98.16 | 6.75 | 135.02 | 8.94 | 36.86 | 10.91* |
| The vital capacity | 2.63 | 0.57 | 2.70 | 0.54 | 0.07 | 0.29 |
| The skillful level | 7.36 | 1.34 | 9.32 | 1.10 | 1.96 | 3.77* |

The value of table t value at the statistically significance level, 0.05= 2.201

It has become cleat through the table (2) that there are statistically significance differences between the pre- and post- measurements of the control group in neuromuscular coordination and the physiological variables and the level of skillful performance to the uneven parallel Bars. Calculated "T" value was more than the table" t "value at the level of significance in favor of the post- measurement except (the pulse at rest – the vital capacity).

The female researcher accounts for this significance to the traditional exercises and that helped to enhance the neuromuscular coordination and some physiological variables and the level of skillful performance (under study).

Table (3): The significance of differences between the pre-and post - measurements of the experimental and control groups in the neuromuscular coordination and the skillful performance N= 12

| tests | Pre-measurement | | Post- measurement | | The differences between the two means | The value of calculated" t" |
|---|---|---|---|---|---|---|
| | | | | | | |
| The numbered circles | **7.34** | **0.86** | **6.20** | **1.12** | **1.14** | **2.65*** |
| Throwing and receiving the balls | **15.25** | **0.99** | **12.61** | **1.15** | **2.64** | **5.74*** |
| Rope skipping | **4.98** | **0.67** | **3.75** | **0.64** | **1.23** | **4.39*** |
| The pulse at rest | **87.54** | **6.54** | **89.36** | **7.68** | **1.82** | **0.60** |
| The pulse at effort | **120.14** | **6.10** | **135.02** | **8.94** | **14.88** | **4.61*** |
| The vital capacity | **3.21** | **0.31** | **2.70** | **0.54** | **0.51** | **2.55*** |
| The skillful level | **13.25** | **0.89** | **9.32** | **1.10** | **3.93** | **9.14*** |

The value of table t value at the statistically significance level, 0.05 = 2.201

It has become clear from table (3) there are statistically significance differences between the post-measurements of the experimental and control groups in neuromuscular coordination and some physiological

variables and the level of skillful performance of the uneven parallel Bars (under study). The calculated" t" value was more than the table "t" value at level (0.05) in favour of the post- test of the experimental training group. The researcher attributes that to the effectiveness of the exercises of resistance using the elastic cords that the individuals of the experimental group practiced whereas the control group practiced the traditional program at the faculty. The proposed program for the elastic cords includes a set of exercises that helped to improve the neuromuscular coordination, the pulse, the vital capacity and the level of skillful performance.

Abo-Eleala (1997) (1), ensures the importance of training to develop the different physical abilities as they develop the level of skillful performance of individual.

These results agree with the study of both Ahmed and Emad (1995) (2), Jett, (2003) (15), Rabab farouk (2006) (5), Rania Atia (2008) (4), in which it refereed that the exercises of resistance using the elastic cords are the most important exercises that lead to improving the physical and physiological abilities and the level of skillful performance.

Table (4): The rate of change of the post-measurement from the pre-measurement of the experimental and control groups in the neuromuscular and physiological coordination and the skilful level.

| Tests | Experimental group | | | Control group | | | The differences between the two groups |
|---|---|---|---|---|---|---|---|
| | Pre- | Post- | rate of change% | Pre- | Post- | rate of change% | |
| The numbered circles | 5.25 | 7.34 | 39.80% | 5.24 | 6.20 | 18.32% | 21.48% |
| Throwing and receiving the balls | 10.99 | 15.25 | 38.76% | 10.89 | 12.61 | 15.79% | 22.97% |
| Rope skipping | 2.51 | 4.98 | 98.41% | 2.52 | 3.75 | 48.81% | 49.60% |
| The pulse at rest | 88.75 | 87.54 | 1.36% | 88.73 | 89.36 | 0.71% | 0.65% |
| The pulse at effort | 98.15 | 120.14 | 22.40% | 98.16 | 135.02 | 37.55% | 15.15% |
| The vital capacity | 2.61 | 3.21 | 22.99% | 2.63 | 2.70 | 2.66% | 20.33% |
| The skillful level | 7.34 | 13.25 | 80.52% | 7.36 | 9.32 | 26.63% | 53.89% |

It has become clear from the table (4) the individuals of the experimental has outclassed the individuals of the control one in the rate of the variation of post- measurement as follows:-

I) In the neuromuscular coordination, the rates of variation ranged between (38.76%: 98.41%) in favour of the experimental group while they ranged between (15.79%: 48.81%) in favour of the control group with a difference ranged between (21.48%: 49.97%).

II) The physiological variations: the rates of variation ranged between (1.36%: 22.99%) in favour of the experimental group while they ranged between (0.71%: 37.55%) in favour of the control group with a difference ranged between (0.65%: 20.23%).

III) In the skillful level, the rates of variation reached (80, 52 %) in favour of the experimental group whereas they reached (26.63 %) in favour of the control one with a difference which reached (53.89 %).

The female researcher accounts for these differences and the rates of improvement to the effectiveness of the suggested program using the elastic cords. They were various and comprehensive for the different parts of the body (legs, trunk and arms) differ according to ways of doing them, either individually or with the help of a partner (doubles) or with the help of the horizontal bar.

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