

## The Effectiveness of Acrotramp Training on Power and Skill Performance of Some Ballet Jumps

**Dr.Sara Yahia Ibrahim**

Department of Dance Training and Erythmics,  
Faculty of Physical Education for Girls in Gezira -  
Helwan University

### Introduction and Research Problem

The training programs have taken a form, structure and organization that include a recent development in the devices and means used during the training process, the use of which has become a necessity for the physical, skill and psychological rehabilitation of the ballet dancers through its effective role. It provides the ballet dancers from the beginning with the skill clear kinetic imagination without feeling bored, adding suspense element to the training, and obtaining the physical qualities and kinetic fitness necessary for performance. It has been proven by experience that the use of these devices leads to higher levels of athleticism.

**Dalia Maarouf (2020)**, citing **Mohamed Ibrahim (2014)**, mentions that the **Acrotramp** is a device that is used in training different movements suitable for all ages, using different movements in terms of ballet dancer's levels (beginners, juniors, high levels). It is a system designed to support the skill level and leads to the development of the ballet dancers' ability to increase the flight period as it provides them with a high boost in the air and has an effective value as an aid device in developing different jumps types skill performance and the optimal use of arms and legs movements during altitude, which leads to a safe landing and proper technical performance of the kinetic skill, In addition to the development of the ballet dancers physical and motor abilities, resulting in saving time and effort. (4: 348)

**Acrotramp** has numerous benefits; it develops kinetic balance and control of the body during movement in the air and helps in the integration of rhythm and movement ability. It is a device similar to the specifications of the trampoline, and it is always equipped with rebound training systems, it also allows the ballet dancer to perform a full movement chain on it. (13: 70)

**The Acrotramp** also helps in elevation and boosting, which allows the ballet dancer to elevate to high distances, making them perform the skill correctly and easily. "**Boloban et al,**" (2016) confirm that **the Acrotramp** nature determines the execution of complex movements that are followed by

groups one after the other in small time periods; where the body is forced to make decisions much faster than those that occur in other movements. (18: 4)

Through the kinetic performance on **the Acrotramp**, the researcher assumes its ability to develop the **Power** and skill performance of the ballet jumps under study, where jumping skills require ballet dancers to have high physical abilities, including muscular ability, due to its importance in performing the kinetic duty resulting from the coordination of lower extremities movements.

**Power** is one of the most important physical traits of ballet, as the ability to jump is one of the important indicators of ballet dancers. "**Abd El Aziz El Nimr, Nariman El Khatib**" (2005) defines it as "the ability to exert maximum force in the least possible time.", this requires a degree of compatibility in integrating strength and speed into one component; the greater the muscular capacity, the more it is possible to raise the body's weight for the same vertical distance in a shorter time, or to raise the body's weight for a greater vertical distance at the same time. (7:138)

**Siddiq Tolan, Mohamed Abo Odah (2016)** both mentions that **Power** determines the performance level in many one movement sports competitions; especially those where the level is related to elevation speed where the body's push is related to the Ballet dancer's ability to exert maximum speed and high strength, in order to obtain the maximum launch. Hence, the possibility of success in such skills depends to a large extent on muscular power. (5:56)

**Ballet skills** express the ability and strength that lies in the human body and is not seen by the eye. These skills are also characterized by the clear kinetic expression of deep psychological movement, inner feeling, and the authentic psychological thinking that appears through the ballet practice. Ballet is considered one of the branches of kinetic expression and complex art that combines several arts with each other; music, acting, silent gesture, decor, clothing, and script.

(19: 9, 10) (10: 146)

The basic skills in **ballet** are (Plie - relevé - Tendu - Saut- Le Tourne ). Saut or Jumping is considered one of the most important ballet pillars; it is "a group of movements that require an outstanding ability to control the body muscles in general and the legs muscles in particular." The jumping skills success depends on the Ballet dancer's ability to perform the skills in a specific period, the more work productivity in the unit time, the better the efficiency in the jump's skill performance.

(12: 64, 127) (6: 6-23)

Through the researcher's experience in ballet training, she noticed Low in the jump's performance of some ballet dancers, Where it was found that this decrease is due to the fact that traditional training improves the level of performance of their physical ability, but it takes a long time to improve, as the traditional exercises for jumps work to master the skill with a longer period of time for the dancer to master it The researcher would not be able to obtain similar studies that used the assistive device Acrotramp, which is 60 cm high, 2.20 m wide, and 6.70 m long, has a metal frame with a PVC belt bed covered with a layer of Sportex, to contribute in improving both the **Power** and some ballet jumps skill performance (**Changement - Sissonne - Ba du chat**). This prompted the researcher to stimulate her motivation to use modern assistive devices such as **the Acrotramp** to help ballet dancers' increase their skill performance by improving their **Power** to perform some ballet jumps.

### Research Objectives:

This research aims to identify the effect of Acrotramp training on both **Power** and the skill performance level of some ballet jumps (**Changement - Sissonne - Ba du chat**).

### Research Hypothesis:

1. There are statistically significant differences between the experimental group pre and post measurement in the **Power** and skill performance level of some ballet jumps in favor of the post measurement.
2. There are statistically significant differences between the control group pre and post measurement in the **Power** and skill performance level of some ballet jumps in favor of the post measurement.
3. There are statistically significant differences between the two post measurements of the experimental and control groups in the **Power** and skill performance level of some ballet jumps in favor of the experimental group.
4. The improvement rates vary between the control and experimental groups in the **Power** and the skill performance level for some ballet jumps in favor of the experimental group.

### Research Procedures:

### Research Methodology:

The researcher used the experimental method for its suitability with the research nature by using the experimental design of two groups: experimental and control and conducting its pre and post measurements.

### Research Community and Sample:

The researcher chose a community and research sample from ballet dancers at “B K Sports Academy”, ages from (14-16) years old in Al-markhia city in Qatar, and their total number was (30) participants; (8) Ballet dancers were randomly selected to conduct the pilot study and scientific procedures and (2) Ballet dancers were excluded for not meeting the training program dates. Homogeneity was conducted from the sample total number consisting of (28) participants table (1). The basic sample number became (20) participants divided into two groups (experimental group - control group), each consisting of (10) Ballet dancers, and equivalence was conducted from the two groups, table (2).

### Research Sample Homogeneity:

**Table (1) Statistical characterization of the total research sample in the variables under study n = 28**

Variables		Measurement Units	Mean	SD	Torsion coefficient
Age		Year	14.71	1.12	-0.242
Height		Cm	158.75	4.08	0.353
Weight		Km	56.18	6.19	-0.407
Power	Long jump from stability	Cm	108.56	12.23	0.249
	Vertical jump from stability	Cm	18.36	2.00	0.275
Skill Performance	Changement	Grade	2.00	0.52	-0.723
	Sissonne	Grade	2.00	0.50	-0.543
	Ba du chat	Grade	1.78	0.56	-0.163

Table (1) shows that the torsion coefficients of the growth variables (age - height – weight), **Power** (wide jump from stability - vertical jump from stability) and skill performance (Changement - Sissonne - Ba du chat) for the total research sample ranged between (- 0.723 and 0.275), that is, it was

limited between ( $\pm 3$ ), which indicates that the total research sample is free of non-moderate distributions in those variables.

### Research Sample Equivalence:

Table (2) the significance differences between the experimental and control groups for  $n=10$  the growth variables and test variables under study  $n_1=n_2$

Variables		Measurement Units	Experimental group N=10		Control group N=10		Calculated T
			Mean	SD	Mean	SD	
Age		Year	15.20	0.92	14.70	0.95	1.861
Height		cm	161.10	5.07	158.70	3.37	1.950
Weight		Km	55.60	6.33	57.50	4.81	-0.801
Power	Long jump from stability	Cm	109.00	14.20	108.40	11.50	.105
	Vertical jump from stability	Cm	18.70	2.00	17.60	1.84	1.492
Skill Performance	Changement	Grade	1.95	0.60	2.00	0.53	-0.246
	Sissonne	Grade	2.05	0.55	1.95	0.50	0.557
	Ba du chat	Grade	1.80	0.54	1.85	0.58	-0.156

T tabular value at a significant level (38) (0.05) = 2.262

Table (2) shows that there are no statistically significant differences between the two groups, as calculated "t" value was less than the tabular "t" value, which indicates the equivalence of the two groups in growth variables (age - height - weight), **Power** (wide jump from stability - Vertical jump from stability) and skill performance (Changement - Sissonne - Ba du chat).

### Data Collection Tools and Methods:

#### 1- Tools and Equipment Used:

- Restameter to measure length (cm) and weight (kg).
- Research sample data registration form attachment (1).
- Skill performance evaluation form attachment (2).
- Used Tests attachment (3).
- Leg **Power** test (broad jump from stability, vertical jump from stability).
- Acrotramp device. Attachment (4).

### Pilot Study

The researcher conducted the pilot study from 3/7/2021 to 7/14/2021 on a sample of (8) Ballet dancers from the same research community and outside the main research sample, with the aim of:

- 1- Ensure the used scale validity and its suitability for the sample under study.
- 2- Ensure the validity of the used equipment.
- 3- Determine the training load component that suits the research sample.
- 4- Conducting scientific procedures (validity and reliability) for the tests used.

### Scientific Procedures Used:

**Validity:** The researcher calculated the validity coefficient of the research variables.

**Table (3) Validity coefficients for the Power and the skill performance level for ballet n1=n2=4**

Variables	Measurement Units	Significant group N=4		Insignificant group N=4		T	
		Mean	SD	Mean	SD		
Power	Long jump from stability	Cm	119.50	0.58	99.00	7.35	5.562
	Vertical jump from stability	Cm	21.50	1.00	18.50	1.73	3.000
Skill Performance	Changement	Grade	2.50	0.00	2.00	0.41	2.449
	Sissonne	Grade	2.50	0.00	1.63	0.25	7.000
	Ba du chat	Grade	2.38	0.25	1.13	0.25	7.071

T tabular value at a significant level (0.05) = 2.447

Table (3) shows that there are statistically significant differences at the level (0.05) between the two pilot research groups (significant and in significant) in Muscular Power tests and Skill Performance for ballet and calculated "T" value reached (2.447), which is greater than the tabular "T" value, which confirms the scale's ability to differentiate between the significant and in significant which indicated the tests.

**Reliability:** The researcher calculated the reliability coefficient for the research variables

Table (4) Reliability coefficients for Power and skill performance level n=8

Variables		Measurement Units	First application		Re-application		R
			Mean	SD	Mean	SD	
Power	Long jump from stability	Cm	109.25	11.97	109.88	12.45	0.989
	Vertical jump from stability	Cm	20.00	2.07	20.50	2.07	0.933
Skill Performance	Changement	Grade	2.25	0.38	2.14	0.42	0.869
	Sissonne	Grade	2.06	0.50	2.06	0.45	0.973
	Ba du chat	Grade	1.75	0.71	1.74	0.58	0.982

Tabular "R" value at significance level (0.05) = 0.632

Table (4) shows that there is a significant correlation between the test first application and its re-application at the significance level (0.05), where the correlation coefficients ranged between (0.869, 0.989), which indicates that the **Power** and skill performance level are at a high degree of reliability.

### Acrotramp Training Program Application: Attachment (6)

#### Program objective:

It aims to develop Acrotramp training program and its effect on both

**Power** and skill performance level.

#### Program Developing Foundation:

- 1- The program should be gradual from easy to difficult and from simple to complex.
2. The program should be flexible so that it can be modified or changed if necessary.
3. Diversity between work and rest, easy and difficult.
4. Taking the individual differences into account during the Acrotramp training program implementation.
5. Increasing the repetitions diversity and increasing the unit's number from the beginning of the program application until the completion of its application.
6. Considering the need for good warm-up and breathing training to prepare the body for work in the main part, and to perform cooling

down and relaxation exercises in the final part to return the body to its natural state.

7. Appropriateness of the selected Acrotramp exercises with the research sample and the available capabilities.
8. Availability of the security and safety factor.

### Program Content: Attachment (V)

After reviewing the scientific references and Arabic and foreign related studies, in order to determine the programs time structure and the exercises that fit the research sample, the researcher reached the following:

The program took (8) weeks and included (24) training units in terms of (3) training units per week, and the training unit time was (60) minutes distributed as follows:

**Table (5) The training unit components and the proposed program time distribution**

Part	Week	Execution	Time	Repetition/ Group	Intensity
Warm-up		Warm up for all body parts	5 min	8-10R/ 1G	
Main part	1 <sup>st</sup> /2 <sup>nd</sup>	A training series using the Acrotramp tool to improve Power and skill performance level of some ballet jumps	50 min	6-8R/ 5-6G	60-70%
	3 <sup>rd</sup> / 4 <sup>th</sup>		50 min	6-8R / 6G	70-80%
	5 <sup>th</sup> / 6 <sup>th</sup>		50min	8-10R /5 -7G	80-85%
	7 <sup>th</sup> /8 <sup>th</sup>		50min	6-8 R/ 5-8G	80-85%
Cooling down		Cool down exercises from different positions	5min	1-4R /1G	

### Pre-Measurements:

The researcher conducted the pre measurements on the experimental and control sample from Saturday 24/7/2021 to Wednesday 28/7/2021 on the growth variables (height - weight - age) and Muscular ability(long jump from stability, vertical jump from stability) and the skill performance level of some ballet jumps (Changement- Sissonne- Ba du chat) under study through forming a panel of 2 female trainers in charge of the training, with no less than 5 years of experience **attachment (°)** using the skill performance evaluation form **attachment (2)**.

### Acrotramp Training Program Application:

The researcher implemented the program, that lasted for (8) weeks. It included (24) training units running on a course of (3) training units per week, and the training unit timing was (60 min) starting Saturday 31/7/2021 until Wednesday 21/09/2021, during Saturdays, Mondays, and Wednesdays from 3:00 pm until 4:00 pm, at “B K Sports Academy” in Al-Markhia city. The control group followed the academy’s training system at the same time as the experimental group.

### Post Measurements:

After completing the program application, the researcher conducted the post measurements on the experimental and control sample, on Saturday 24/9/2021 to Wednesday 28/9/2021 on the **Power** (long jump from stability - vertical jump from stability) and skill performance level of ballet jumps (Changement- Sissonne- Ba du chat). The researcher took into account that the measurement is done in the same order and conditions that were made in the premeasurements.

### Statistical Treatments Used:

The researcher used the appropriate statistical treatments for the research nature, using the statistical program (SPSS v.24) to perform the arithmetic and statistical operations of the research:

- Arithmetic mean
- Standard Deviation
- Torsion Coefficient
- T-test to measure the significance differences (correlation coefficient)
- Improvement and change percentages.

## Results Presentation and Discussion

### First: Results Presentation

Table (6) significance differences between the pre and post measurements of the experimental group in Power and skill performance level n = 10

Variables		Pre-Measurements		Post Measurements		T
		Mean	SD	Mean	SD	
Power	Long jump from	109.00	14.20	129.80	7.35	-7.460

	stability					
	Vertical jump from stability	18.70	2.00	39.00	2.62	-17.873
Skill Performance	Changement	1.95	0.60	4.35	0.41	-12.348
	Sissonne	2.05	0.55	4.25	0.54	-11.000
	Ba du chat	1.80	0.54	4.40	0.46	-10.614

T tabular value at a significant level (19) (0.05) = 2.262

Table (6) shows that there are statistically significant differences between the pre and post measurements of the experimental group in **Power** and skill performance level in favor of the post measurement, which ranged between (-7.460, -17.873) where the calculated “T” value was higher than the “T” tabular value.

**Table (7) significance differences between the pre and post measurements of the control group in Power and skill performance level n = 10**

Variables		Pre-Measurements		Post Measurements		T
		Mean	SD	Mean	SD	
Power	Long jump from stability	108.40	11.50	115.40	11.82	-9.791
	Vertical jump from stability	17.60	1.84	26.30	3.37	-7.660
Skill Performance	Changement	2.00	0.53	2.65	0.82	-2.751
	Sissonne	1.95	0.50	2.80	0.63	-3.597
	Ba du chat	1.85	0.58	2.80	0.42	-5.019

T tabular value at a significant level (19) (0.05) = 2.262

Table (7) shows that there are statistically significant differences between the control group pre and post measurements in **Power** and skill performance level in favor of the post measurement, as it ranged between (-2.751, -9.791), where the calculated “T” value was higher than the tabular value.

**Table (8) Significance differences between the experimental and control groups in the post measurement of Power and skill performance level n1 = n2 = 10**

Variables		Experimental group n=10		Control group n=10		T
		Mean	SD	Mean	SD	
Power	Long jump from stability	129.80	7.35	115.40	11.82	3.271

	<b>Vertical jump from stability</b>	39.00	2.62	26.30	3.37	9.405
<b>Skill Performance</b>	<b>Changement</b>	4.35	0.41	2.65	0.82	5.869
	<b>Sissonne</b>	4.25	0.54	2.80	0.63	5.513
	<b>Ba du chat</b>	4.40	0.46	2.80	0.42	8.113

T tabular value at a significant level (38) (0.05) = 2.101

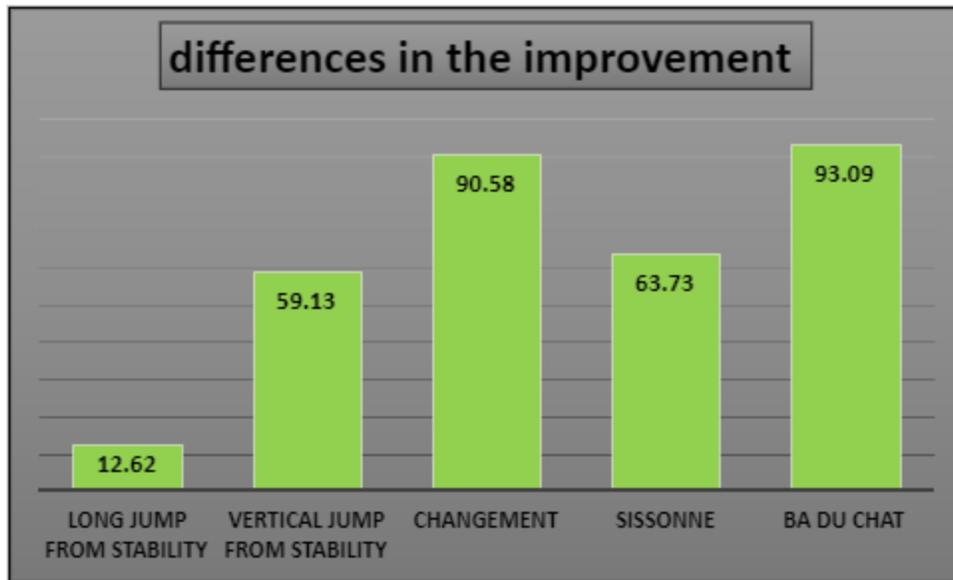
Table (8) shows that there are statistically significant differences between the post measurement of the experimental and control groups in **Power** and skill performance level in favor of the experimental group, which ranged between (3.271, 9.405), where the calculated “T” value was higher than the tabular value.

**Table (9) Percentages of improvement in Power and skill performance for the experimental and control groups n1= n2=10**

Variables		Experimental group n=10			Control group n=10			Improvement %
		Pre	Past	%	Pre	Past	%	
<b>Power</b>	<b>Long jump from stability</b>	109.00	129.80	19.08	108.40	115.40	6.46	12.62
	<b>Vertical jump from stability</b>	18.70	39.00	108.56	17.60	26.30	49.43	59.13
<b>Skill Performance</b>	<b>Changement</b>	1.95	4.35	123.08	2.00	2.65	32.50	90.58
	<b>Sissonne</b>	2.05	4.25	107.32	1.95	2.80	43.59	63.73
	<b>Ba du chat</b>	1.80	4.40	144.44	1.85	2.80	51.35	93.09

T tabular value at a significant level (38) (0.05) = 2.101

Table (9) shows that there are differences in the improvement percentages between the experimental and control groups post measurements in **Power** and skill performance in favor of the experimental group, which ranged between (12.62%, 93.09%).



Shape (1) Percentages of improvement in Power and skill performance for the experimental and control groups

## Second: Results Discussion

Table (6) shows that there are statistically significant differences between the pre and post measurements of the experimental group in **Power** and skill performance level in favor of the post measurement, which ranged between (-7.460, -17.873) where the calculated “T” value was higher than the “T” tabular value.

The researcher attributes this positive effect on the variables of **Power** and skill performance level to **the Acrotramp** training used, where the researcher took into account during the training designing the variation in muscular work direction of the lower extremities and the usage of **Power** in multiple motor paths. This contributed to the **Power** high level of the experimental sample members, hence, positively affected the skill performance level of the ballet jumps under study.

**Witassek, et al (2018)** study points that jumping training using tools that gain elasticity and rebound properties are characterized by being performed quickly and with short contact times, in addition, it can help to match the use of optimal motor patterns to perform the jumps. (22:69)

These results are in agreement with the study of Atilgan, **Atilgan Oya Erkut (2013)**, **Karakollukçu et al (2015)**, **Bahman zadeh et al (2016)** that training to increase the muscle ability level and the skill performance level of jumping using assisting tools to help rebound faster has led to significant

differences in both **Power** and skill performance level of jumping skills. (16) (21) (17)

**This achieved the first hypothesis which states; there are statistically significant differences between the experimental group pre and post measurement in the Power and skill performance level of some ballet jumps in favor of the post measurement.**

Table (7) shows that there are statistically significant differences between the control group pre and post measurements in **Power** and skill performance level in favor of the post measurement, as it ranged between (-2.751, -9.791), where the calculated “T” value was higher than the tabular value.

The researcher attributes the result to the control group punctuality in the academy’s special training, where they were trained on the jumping skills under study, so the researcher paid attention that the academy's training should be applied simultaneously with the proposed program application for the experimental sample 3 days a week **Attachment(V)**.

These results are consistent with what **Mufti Ibrahim (2002)** asserts that any training program based on scientific foundations leads to the development of the Ballet dancer's training status and increase the ballet dancer’s performance level, but the improvement amount is the difference between one program and another.

(11:260)

**This achieved the second hypothesis which states; there are statistically significant differences between the control group pre and post measurement in the Power and skill performance level of some ballet jumps in favor of the post measurement.**

Table (8) shows that there are statistically significant differences between the post measurement of the experimental and control groups in **Power** and skill performance level in favor of the experimental group, which ranged between (3.271, 9.405), where the calculated “T” value was higher than the tabular value.

The researcher attributes these results to the proposed Acrotramp training program, where the researcher took into account that during the warm-up period, paying attention to muscle stretching and joint flexibility exercises so that the muscles and joints become ready to perform exercises using **the Acrotramp** assistance device efficiently. In addition to improving the trunk and leg’s muscular ability, this clearly appears in the **Power** improvement of the experimental group over the control group. The researcher

believes that the exercises using **the Acrotramp** training tool led to muscle fibers contraction time shortening and an improvement in the compatibility between the working muscles and the corresponding muscles. When designing the exercises using **the Acrotramp** assistant device, the researcher considered that the exercises should be similar to the skill performance of jumping skills.

**Ahmed El Hady (2010)** and **Gamal Farag (2012)** points out that the best development of **Power** is to perform exercises similar to the skill performance.

(1:484) (3:165)

These results are in agreement with "**Heba Al-Najjar**" (2004) study; that the exercises using the assistance device Acrotramp contribute to the **Power** development of the trunk and legs. (13)

**This achieved the third hypothesis which states;**

**there are statistically significant differences between the two post measurements of the experimental and control groups in the Power and skill performance level of some ballet jumps in favor of the experimental group.**

Table (9) shows that there are differences in the improvement percentages between the experimental and control groups post measurements in **Power** and skill performance in favor of the experimental group. Where the change percentages ranged between (19.08%, 144.44%), and the improvement percentages for the control group between (6.46%, 51.35%). It also shows the differences between the improvement rates, which ranged between (12.62%, 93.09%), which indicates the effect extent of Acrotramp training on the level of both **Power** and skill performance.

The researcher attributes this result to the variation in **the Acrotramp** training, which targeted the lower extremities muscles, and provided a great opportunity for the Ballet dancers to train on jumps faster and more accurately, while helping them control their compatibility during the flight phase and knowing how to take the appropriate motor path for each type of jump under study. Also, it helped training as many muscle groups as possible to improve muscle ability.

The researcher also believes that the use of tools and assistive devices works to develop various aspects; fitness, kinetic, and psychological, adds suspense factor and give gradual opportunities to perform difficult ballet skills successfully and quickly, and develop the fitness elements for ballet skills. Hence, the researcher found it important to use a new assistive device such as the Acrotramp device.

"**Essam Abd El Khalek**" (2003) indicates that the specific means and devices play an important role within the training process, as they help to clearly realize the goal of the training and help the coach to consume time and effort and increase the Ballet dancers' motivation and enthusiasm. (9:12)

"**Jensen and Shultz**" (2007) confirmed that the training method for the physical qualities development is preferably suiting to the muscle work type. Also, the movements performed on devices and assistance tools commonly have a positive effect in increasing the skill performance level. (20:84)

These results are in agreement with the studies of "**Eman Wagih**" (2003), "**Abla Mohamed**" (1992), "**Hind Abd El Razek**" (2000), and "**Walaa Al Moghazi**" (2016), where those studies confirmed that standardized training programs increase improvement rates of both **Power** and skill performance of ballet jumps under study. (2) (8) (14) (15)

**This achieved the fourth hypothesis which states;**  
**the improvement rates vary between the control and experimental groups in the Power and the skill performance level for some ballet jumps in favor of the experimental group.**

## Conclusions

Through the researcher findings and within the limits of the study sample, the following was concluded:

1. The proposed Acrotramp exercises led to an improvement in the **Power** level of Ballet dancers by 27.44%.
2. The proposed Acrotramp exercises led to an improvement in the skill performance level of some ballet jumps under study for ballet dancers by 46.92%.

## Recommendations

In light of the research results and the sample limits, the researcher recommends the following:

- 1- The necessity of using the proposed program to develop the **Power** that will affect the ballet jumps skill performance.
- 2- Conducting several more different training programs on different age groups for ballet dancers.
- 3- Using the proposed program to develop the branches of motor expression skills.

## References

### Frist: Arabic References

- 1- أحمد الهادي يوسف (2010): أساليب متطورة في تدريب الجمباز، دار الفكر العربي، القاهرة.
- 2- إيمان وجيه محمد حسين " (2003): "تأثير برنامج بليومترك مقترح لتقوية عضلات الطرف السفلى على النشاط الكهربائي لبعض العضلات العاملة وعلى بعض مهارات الباليه"، رسالة ماجستير غير منشورة ، كلية التربية الرياضية بنات ، جامعة حلوان ، القاهرة.
- 3- جمال صبي فرج (2012): القوة والقدرة والتدريب الرياضي الحديث، دار دجلة، عمان، الأردن.
- 4- داليا معروف الحضري (2020): "تأثير استخدام الاكروتامب على بعض المتغيرات البدنية ومستوى أداء الدورة الهوائية الأمامية على جهاز الحركات الأرضية"، المجلة العلمية لعلوم وفنون الرياضة، جامعة حلوان، كلية التربية الرياضية للبنات بالجزيرة، اكتوبر، الجزء ٨.
- 5- صديق محمد طولان، محمد حسين أبو عودة (2016): أساليب العمل العضلي للاعب الجمباز الحديث " القوة العضلية-تمارينات اللياقة البدنية، مؤسسة عالم الرياضة والنشر، الإسكندرية.
- 6- صفية احمد محي الدين، سامية ربيع محمد (2018): الباليه والرقص الحديث، كلية التربية الرياضية للبنات بالجزيرة، جامعة حلون، القاهرة.
- 7- عبد العزيز النمر، نريمان الخطيب (2005): التدريب الرياضي تدريب الأثقال (تصميم برامج القوة وتخطيط الموسم التدريبي، مركز الكتاب للنشر، القاهرة.
- 8- عبلة محمد فرحان" (1992) "دراسة فاعلية تدريبات البليومترك على مهارة الوثب فى التعبير الحركي"، مجلة علوم وفنون الرياضة، المجلد الرابع، العدد الثالث، كلية التربية الرياضية بنات، جامعة حلوان، القاهرة.
- 9- عصام عبد الخالق (2003): التدريب الرياضى (أسس-نظريات - تطبيقات)، ط١٢، دار المعارف، القاهرة.
- 10- ماجدة فهمي عز (1988): الفن المعاصر، المجلد الثاني، العدد الثاني، اكااديمية الفنون، القاهرة.

- 11-مفتي إبراهيم حماد (2002): البرامج التدريبية المخططة لفرق كرة القدم، ج ١، مركز الكتاب للنشر، القاهرة.
- 12-نجاح التهامي (1992): الباليه، مطابع جامعة حلوان، القاهرة.
- 13-هبة محمد إبراهيم النجار (2004): "تأثير استخدام جهاز الأكروترامب على مستوى أداء السلاسل الجمبازية والسلاسل الأكروباتية على جهازي الحركات الأرضية وعارضة التوازن طبقا لمتطلبات القانون الدولي للجمباز"، رسالة ماجستير، كلية التربية الرياضية للبنات، جامعة حلوان.
- 14-هند عبد الرزاق متولى (2000): "تأثير تدريبات البليومتر ك على بعض المتغيرات البدنية والفسولوجية ومستوى أداء وثبات الباليه لطالبات الفرقة الأولى بكلية التربية الرياضية بنات"، رسالة ماجستير غير منشورة، كلية التربية الرياضية بنات، جامعة حلوان، القاهرة.
- 15-ولاء محمد المغازي (2016): "تأثير استخدام التدريبات المركبة على القدرة العضلية الخاصة ببعض وثبات الباليه"، بحث منشور بالمجلة العلمية لعلوم وفنون الرياضة، جامعة حلوان، كلية التربية الرياضية للبنات بالجزيرة، العدد يونية، ١٠١.

## Second: Foreign References

- 16-Atilgan, O. E. (2013): "Effects of trampoline training on jump, leg strength, static and dynamic balance of boys" , Science of gymnastics journal, 5(2).
- 17-Bahman Alizadeh, Hasssan Mohamedzadeh, Ali Khazani, Ali Dadras. (2016): "Effect of a Trampoline Exercise on the Anthropometric Measures and Motor Performance of Adolescent Students", International Journal of Medicine, 2016;7:91.
- 18-Boloban, V. N., Tereshchenko, I. A., Otsupok, A. P., Krupenia, S. V., Kovalenko, Y. O., & Otsupok, A. P. (2016): Perfection of coordination with the help of jump exercises on trampoline, Physical education of students, 20(6), 4-17.

- 19-Eberhard Rebling (1959):** Ballet Geslern and Heaute Hemschel verlag,  
Barlin.
- 20-Jensen and Shultz (2007):** Applied Kinesiology the Scientific study of  
Human Performance, 2 Nd ed., Inc.
- 21-Karakollukçu, M., Aslan, C. S., Paoli, A., Bianco, A., & Sahin, F. N.**  
**(2015):** “Effects of mini trampoline exercise on male gymnasts’  
physiological parameters” a pilot study, The Journal of Sports  
Medicine and Physical Fitness, 55(7-8) , 730-734.
- 22-Witassek, C., Nitzsche, N., & Schulz, H. (2018):** “The Effect of Several  
Weeks of Training with Mini-Trampolines on Jump  
Performance, Trunk Strength and Endurance Performance”,  
German Journal of Sports Medicine/Deutsche Zeitschrift fur  
Sportmedizin.