

# The development of the take off and repulsion movements to improve the performance of some gymnastics skills for beginners

*Ahmed Mohamed Shwika*

## Introduction and importance of research:

The Researcher noticed a deficiency in the physical and skillful preparation before and during training vaulting, especially so in exercises aiming at developing The muscular power (speed strength) of the legs and arms muscles and the affecting on takeoff and repulsion on Straight Leg Through Vaulting pike, and, on the first and second flight phases and on the evaluation of the pike as a whole. Technical errors were also spotted and the gymnasts cannot in general perform the movement properly. According to Code of Points rules (10 – 2010), such phases are important.

In the Researcher opinion, the major component of this skill is closely related to the pike front roll, which requires strongly flexing hip joints, which affects the good performance of the roll. Evaluating vaulting table is affected by several factors:

- First flight to the moment of placing hands on the vaulting table
- Second flight from leaving hands of the table vaulting to dismount
- Implementation positions

Training can be more effective if general exercises are combined with special and competition exercises all the year round. This paper attempts to put that principle into practice. According to Essamabd el khaleq (13-2000), Bradshaw and Possignol (32-2004), Prassas. Kwon and Sands (37- 2006), special exercises can develop the physical abilities affecting performance, such as strength, strength endurance, and speed and motion range. Power is a physical requirement needed by the junior player, especially for the skills that has to do with takeoff, push and fast extension. Essamabd el khaleq (14-2005), Mohamed Mahmoud Abdel-Salam (27-2002) and Abul Ela Ahmed (1-2012) define it as a combination of strength and speed and explain that it reflects the ability of the neuro-muscular system to overcome resistances that require a high degree of quick muscular contractions.

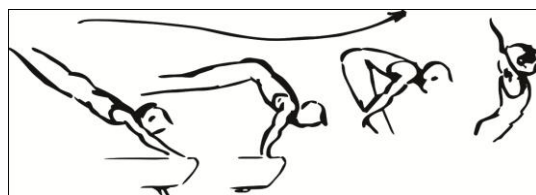


Figure 1 Straight Leg Through Vaulting pike

Straight Leg through vaulting pike is one of the takeoff movements, defined by Mohamed Ibrahim Shehata محمد شحاته (19-2003), citing Buchmann et al., as a movement made by an eccentric double-foot push, rotating the body around a free temporary cross axe connected to body moving upwards in the required direction. This routine leads to:

- 1- somersaults movements
- 2- Performing Leg swing movements.
- 3- Performing Rolling movements.

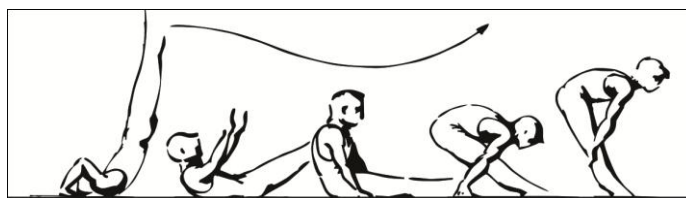


Figure 2 The pike front roll

The pike front roll is one of the rolling movements according to the similar artistic performance. These two skills are part of the compulsory gymnastics program for students in Faculty of Physical Education in Damietta.

Based on the classification made by Ahmed el Hady (2-2010), citing Roland Carrasco, of gymnastics exercises into sets of muscular work, these two skills fall into hip joint closure (Figure 1) and hip joint extension (retropulsion) (lowering the arms backwards) (Figure 2), and also the repulsion movement set (Figure 3), raising the higher limb (trunk) through special strength exercises, then the takeoff movement set (Figure 4), creating an eccentric push, causing the body to rotate around temporary, free axes (cross and sagittal axes). The muscular work involved is all about the hip-trunk (iliac us muscle) contraction and extension and the leg-hip (Quadriceps femora's muscle) contraction, and the foot-leg contraction.

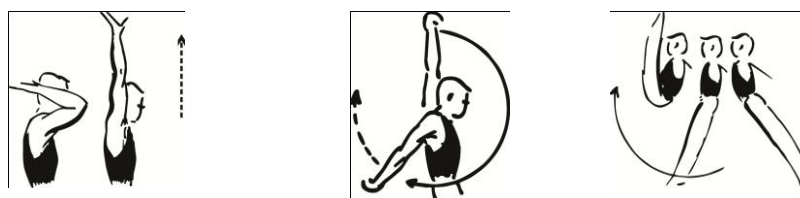


Figure 3 repulsion movement set

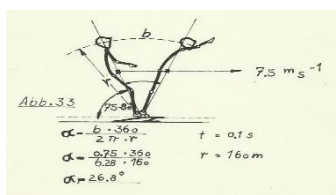


Figure 4 The takeoff movement set

A review of reference book specialised in gymnastics, Ahmed el hady (2-2010), citing Roland Carrasco, and an analysis of the two skills tackled by his paper, focused on the basic muscular work of each movement set (hip joint closure (Figure 1) and hip joint extension (retropulsion) (lowering the arms backwards) (Figure 2), and also the repulsion movement set, made it possible to identify the muscle groups working on these movements .

Based on the above-given technical description of the pike jump on vault and the pike front roll, the logical analysis of the requirements of the two skills will be as follows:

- The Power of the shoulder, arm, abdomen and back.
- The motion ranges of the bending and extending of the hip joints bending of the spine, and extending the shoulders;
- The Power of the leg extending muscles, especially in the preliminary stage of the skill (the take-off).

### **Previous studies:**

Objectives of the research were identified based on a thorough review of literature on the subject, including the studies by:

- Hanan Mohamed maleq (8-2001) analyzing the dynamics of hand push to perform forward hand spring followed by forward somersault tuck on the men's Olympic vaulting horse.
- Hatem abu hamda Helayel Ahmed (7-1992) the effect of leg and hand pushing on the performance level of forward somersault on the vaulting horse.
- Maysa Hanem abdel monem Ahmed (18-2014) developing explosive power, using some plyometric training exercises and its effect on performing jumps in under 13 year-old female athletes playing in gymnastics for all program.
- Elizabeth, J. B. & Peter, le, R.(33-2002)Identification of floor and vaulting aptitude in 8-14 year old talent selected female gymnasts.
- Frantisek vaverka, & Roman farana (34-2012) The Effect of biomechanical variable on the assessment of vaulting in top-level artistic female gymnasts in world cup competitions.

The researcher benefited from related studies in the method of selecting the sample and methodology used tools and data and the statistical method used to collect, in addition to information that will help develop the take off and repulsion for players

Through these studies possible for the research to identify the following objectives:

### **Aim of the research:**

The research aim at identifying the effect of developing the take off and repulsion movements on the improvement of:

- 1- Some physical abilities of the muscle groups working on the joints of hips, shoulders and legs.

- 2- The skill performance of the pike vaulting on vaulting table and the pike front roll on the floor.

### **Research hypotheses:**

There are statistically significant differences between the pre-measurements and post-measurements of the experimental group in:

1. the physical abilities of the muscle groups working on the joints of hips, shoulders and legs in beginners.
2. The skill performance of the pike vaulting on vaulting table and the pike front roll on the floor.

### **Research procedures:**

- The one-group experimental method was used by taking pre-measurements and post-measurements, being suitable for this type of research.
- The pilot study was conducted in the period 3 – 10 / 3/ 2015 and the basic study was conducted for 8 consecutive weeks in the period 14 /3 – 7/5/ 2015 Each week was divided into three training units, each lasting for 60 minutes distributed as follows: warming (10 minutes), main portion (40 minutes) and final portion (10 minutes).(attachment 1). The study was conducted on a random sample of the first year students of the faculty of physical education of Damietta (N=21) who performed the two skills with variant degrees. The basic study was conducted on 14 students.
- Pre-measurements were taken in the period 11-12/3/2015 of the basic variables (age, height and weight) –Physical tests included the motion range of extending and bending the joints of shoulders and hips and bending forward of the backbone, as well as the strength of shoulder joint extending muscles, and the trunk bending and extending muscles (Attach. 2).
- Because of the effect on performance of some other physical qualities, including speed of approach, double foot take off and push-ups, the following tests were conducted: a 30 m sprint to measure horizontal speed in seconds (it is noteworthy that the maximum distance allowed for an athlete to approach the vault is 25 meters), and strength of the arm bending and extending muscles and the leg extending muscles.
- Skillful performance was evaluated using the panel of judges' method (10-2010). A shoot was taken of each sample student performing the two skills, before and after the program. The video shoots were presented using the computer to a judge panel certified by the Egyptian gymnastics Federation.
- Observers were selected from among the judge panel to note the first flight level, and other observers were to note the second flight level. Visible marks were made on the wall parallel to the vaulting table at an appropriate distance, and at the heights stipulated by the rules so that observers may mark the height of the athlete's body during vaulting in an easy and clear manner. Parallel marks were also drawn on the floor intersecting the vaulting table to mark the athlete's landing distance related to the vertical plane of the far end of the vault.

- The score was to be recorded on the judge score form judging the skillful performance (Attachment 3) , (attachment 4)
- The data was demonstrated in a tabular form to show homogeneity of the whole sample before the experiment as shown in Table 1.

**Table 1**

**The statistical significance of the basic variables of the physical tests and evaluate the skill level of performance before the experiment**

<b>Variables/significance</b>	<b>before experiment N=14 mean <math>\pm</math> standard deviation</b>	<b>skewedness coefficient</b>	<b>coefficient of variation</b>
<b>I. Basic variables:</b>			
Age year	<b>19.210 <math>\pm</math> 0.802</b>	<b>0.437</b>	<b>-</b>
Height cm	<b>174.286 <math>\pm</math> 1.899</b>	<b>-0.499</b>	<b>-</b>
Weight kgm	<b>73.357 <math>\pm</math> 2.061</b>	<b>0.439</b>	<b>-</b>
<b>II. a) Joint motion range tests</b>			
1- shoulder joint extending cm	<b>65.00 <math>\pm</math> 0.680</b>	<b>1.218</b>	<b>0.0104</b>
2- shoulder joint bending cm	<b>20.00 <math>\pm</math> 1.454</b>	<b>0.000</b>	<b>0.073</b>
3- hip joint extending degree angle	<b>30.07 <math>\pm</math> 1.385</b>	<b>0.461</b>	<b>0.046</b>
4- hip joint bending degree angle	<b>66.71 <math>\pm</math> 2.016</b>	<b>0.193</b>	<b>0.0302</b>
5- bending backbone forwards cm	<b>-7.50 <math>\pm</math> 1.454</b>	<b>-0.350</b>	<b>0.194</b>
<b>b) Muscular strength tests:</b>			
6- Strength of shoulder bending musc. in 15.s.	<b>8.143 <math>\pm</math> 0.663</b>	<b>0.151</b>	<b>0.440</b>
7-strength of shoulder exte. muscle in 15 s.	<b>7.786 <math>\pm</math> 0.426</b>	<b>0.157</b>	<b>0.181</b>
8- Strength of trunk bendi.muscle in 15 s.	<b>7.571 <math>\pm</math> 1.089</b>	<b>-0.212</b>	<b>1.187</b>
9- Strength of trunk exte.Muscles in 15 s.	<b>8.790 <math>\pm</math> 0.893</b>	<b>-0.278</b>	<b>0.797</b>
10- Strength of leg exte.Muscles cm.	<b>33.75 <math>\pm</math> 1.233</b>	<b>0.642</b>	<b>0.397</b>
11- Strength of arm bend. muscles in 15 s.	<b>7.357 <math>\pm</math> 0.745</b>	<b>0.731</b>	<b>0.555</b>
12- Speed (sprint) 30 m/ s	<b>5.000 <math>\pm</math> 0.555</b>	<b>0.000</b>	<b>0.308</b>
<b>III. skillful performance evaluation tests:</b>			
1- pike vaulting table degree	<b>4.143 <math>\pm</math> 0.770</b>	<b>-0.264</b>	<b>0.593</b>
2- pike front roll on the floor degree	<b>4.429 <math>\pm</math> 0.852</b>	<b>- 0.178</b>	<b>0.725</b>

Table(1) a shows no data dispersion, and the scenes coefficient value varied between - 0.499and 1.218 thus sample subjects are all within the normal curve.

- As a pilot sample, 7 students were randomly selected from the total sample, after conducting measurements and tests to control and determine validity of tools of measurement and tests and decide how to apply the training program to develop the take off and repulsion as related to the pike vaulting and the pike front roll on the floor.
- Validity was verified of the tests and meeting all requirements and suitability to the purpose for which they were developed. The reliability coefficient of the tests was thus found by applying them to the pilot sample, and retesting them one week later, as shown in Table 2.

**Table 2**

**The statistical significance of reliability and validity of physical tests**

variables / significance	1 <sup>st</sup> measurement N=7 Mean $\pm$ st. dev.	2 <sup>nd</sup> measurement N=7 Mean $\pm$ st. dev.	validity coefficient	subjective validity coefficient
Joint motion range tests				
1- shoulder joint extending cm	71.429 $\pm$ 6.901	72.857 $\pm$ 7.559	**0.867	0.931
2- shoulder joint bending cm	22.714 $\pm$ 0.604	22.857 $\pm$ 1.574	**0.972	0.940
3- hip joint extending degree angle	29.86 $\pm$ 1.346	30.143 $\pm$ 1.57	0.956**	0.978
4- hip joint bending degree angle	0.952 $\pm$ 67.14	0.903 $\pm$ 67.43	**0.986	0.984
5- bending backbone forwards cm	8.000 $\pm$ 1.826	-7.71 $\pm$ 1.704	**0.964	0.982
Muscular strength tests				
6- Strength of shoulder bending muscles in 15 s	8.143 $\pm$ 0.690	8.286 $\pm$ 0.488	**0.849	0.921
7- Strength of shoulder extending muscles in 15 s	8.286 $\pm$ 0.489	8.429 $\pm$ 0.787	**0.930	0.964
8- Strength of trunk bending muscles in 15 s	7.857 $\pm$ 1.07	8,00 $\pm$ 1,155	**0.945	0.972
9- Strength of trunk extending muscles in 15 s	8,429 $\pm$ 1,272	8,571 $\pm$ 1,397	<u>**0.964</u>	<u>0.982</u>
10- Strength of leg extending muscles cm	33,43 $\pm$ 0,976	33,714 $\pm$ 0,76	<u>**0.971</u>	<u>0.985</u>
11- Strength of arm bending muscles in 15 s	7,143 $\pm$ 0,90	7,571 $\pm$ 0,976	*0.841	0.917
12- Sprint 30 m/ s	4,714 $\pm$ 0,750	4,571 $\pm$ 0,535	**0.884	0.940

\* The correlation significant at 0.05 = 0.754.

\*\* 0.01 = 0.874.

Table 2 shows that there is a correlative relationship between the first and second measurements in physical tests. Thus indicating reliability and validity of the tests used.

### The basic study:

- The training program was applied to the experimental group of the first year students of the faculty of physical education of Damietta University after the lectures. The program aimed at developing the take off and repulsion through the development of the muscle groups working on the hip and shoulder joints.

- The program was distributed over three stages as follows: the first stage lasted for 2 weeks and consisted of 360 minutes of training; the second stage lasted for 4 weeks and consisted of 640 minutes of training; the third stage lasted for 2 weeks and consisted of 360 minutes of training. Thus the program went on for 8 weeks with a total of 1360 minutes (22.67 hours) of actual training (attachment 5), (attachment 6) .

- The percentage of distributing the physical and skillful training load over the stages and weeks was 70:40:30 for physical preparation and 30:60:70 for skillful preparation in the three stages respectively. Thus the percentage for physical preparation was highest at the beginning and was gradually reduced, whereas the percentage for the skillful preparation was lower at the beginning السيد and gradually increased to maximum at the end of the program. Al Sayed Abdel Maksoud (5-2002) indicated that it is a mistake to stabilize the level of skills necessary for the عبد المقصود type of activity practiced during the preparation stage, as this may lead to building the skills on

an inadequate level of the functional potentials, i.e., no improvement is made of the level of skills. The level of physical preparation must therefore be increased.

- The application number seven (7) power exercises,(attachment 7) and the number (8) exercises for range of motion in the joints,(attachment 9) and training for speed. It is noted that strength and flexibility were taking a large share, due to their importance in the performance skills, and then came the speed.

- Individual differences were taken into consideration by applying the program individually. Progress in the training loads depended on the maximum level of each student and the gradual application of the program content based on scientific rules, providing. in the same time, for safety and security during the performance of tests and exercises.

- Scientific observations were made on the difficulty of the exercises, the best method to apply and advance them and the possibility of connecting them to other suitable exercises, so that they might be a guide for teachers and trainers in the area of study.

-It was legalized training loads to training special strength exercises:

### **1. power exercises:**

\* It was formed training load so that the maximum performance of the player, in every training (attachment 9)

\* High intensity interval training was used because of the training load included, which helps develop the muscle group working on the hip, shoulder and leg joints.and the intensity of 75 - 95 % as indicated Essam abd el khaliq ( 13-2000).

\* It was formed training load of the unit weekly, according to the model (2: 1) (28- 2001).

\*It was to determine seven exercises for the development of Special force as quickly, and not exceeding frequency of training for (20) reps. (Attachment 10). and ( 2 : 4 ) sets (28- 2001), and the rest period between sets 90-180 seconds (13- 2000 ).

\* Taking into account the gradient from easy to difficult, taking into account the element of suspense.

\* Taking into account the age characteristics, and satisfy their preferences and desires.

\* That training on the appropriate muscle groups include the nature of the Players movements. And also the group of non- muscle working, and be appropriate with the performance time.

### **2.Range of motion in the joints exercises:**

\* Was formed training load for stretching exercises by (1: 1) during the period of the program.

- \* The application number (8) stretching exercises for the muscle groups working((attachment 9).
- \* Was to determine the intensity of the exercise performance.( 95: 100% of the maximum tolerated player.
- \* Training performance time (10 - 30 sec), and rest periods of 15 - 20 sec. and reach to (1) min.(28- 2001).
- \* Is installed stretching exercises even tension and but without pain, taking into account exhale while stretching to facilitate muscle relaxation (20- 2007).
- \* The frequency of exercises stretching (2 - 3) reps.(26- 1998), and Indicates Mufti ibrahim (28-2001) that it has up to (5) reps., And describes the many specialists That the number of exercises stretching, which must be performed by the player rely on the aim of the training unit, and its intensity, time and the number of exercises that will be implemented for each muscle group.(Attachment 11)

#### **- The speed exercises:**

- \* It was applied to speed the unit training exercises weekly the intensity of 90%(Attachment 7)
- \*The number of reps. (5) times, rest periods between reps. (2) min.(13- 2000)
- \*It was recorded scientific observations degree difficulty and exercises most appropriate method in their submission and progress and the possibility of linking them with appropriate training.
- Post-measurements were taken in the period 9 – 11/5/2015 of the same physical and skilful tests subject of research.

## -Results presentation and discussion:

**Table 3**

**The statistical significance of the physical tests and the evaluation of skill level performance before and after the experiment**

variables / significance	before exper. N=14 Mean $\pm$ st. de.	After exper. N=14 mean $\pm$ sta.de	Differ. between means	T test value	Improve . Perce.
I. Joint motion range tests					
1- shoulder joint extending cm	71.43 $\pm$ 6.92	102.86 $\pm$ 1.95	-31.42	**11.286	%44.00
2- shoulder joint bending cm	22.43 $\pm$ 1.90	33.62 $\pm$ 1.46	-11.19	**14.756	%49.89
3- hip joint extending degree angle	30.07 $\pm$ 1.39	32.57 $\pm$ 1.74	-2.50	**6.00	%8.31
4- hip joint bending degree angle	66.71 $\pm$ 2.02	73.79 $\pm$ 2.26	-7.08	**13.40	%10.6
5- bending backbone forwards cm	-7.57 $\pm$ 0.94	4.71 $\pm$ 0.91	-12.29	**40.369	%62.277
Muscular strength tests					
6- Strength of shoulder bending muscles in 15 s	8.857 $\pm$ 0.690	13.29 $\pm$ 0.76	-4.429	**9.21	%50.01
7- Strength of shoulder extending muscles in 15 s	8.143 $\pm$ 0.683	12.00 $\pm$ 0.85	-3.857	**14.79	%47.37
8- Strength of trunk bending muscles in 15 s.	7.571 $\pm$ 1.089	10.14 $\pm$ 0.77	-2.57	**14.89	%33.95
9- Strength of trunk extending muscles in 15 s.	8.790 $\pm$ 0.893	11.21 $\pm$ 0.80	-2.42	**12.20	%27.53
10- Strength of leg extending muscles cm	33.75 $\pm$ 1.223	40.71 $\pm$ 1.14	-6.96	**15.69	%20.62
11- Strength of arm bending muscles in 15 s.	7.857 $\pm$ 0.690	11.12 $\pm$ 0.90	-3.286	**6.94	%41.82
12- Sprint 30 m/ s	4.857 $\pm$ 0.69	4.14 $\pm$ 0.38	-0.714	**3.87	%14.70
skillful performance level evaluation					
1- Pike vaulting degree	4.14 $\pm$ 0.77	6.93 $\pm$ 0.77	-2.79	**14.9	%67.27
2- Pike roll on the floor degree	4.43 $\pm$ 0.85	6.93 $\pm$ 0.73	-2.50	**14.38	%56.47

\* T value at 0.05 = 2.16

\*\* T value at 0.01 = 3.01

Table 3 shows that there are statistically significant differences between in all physical tests applied, favoring the experimental group after experiment. The table also shows the percentage of improvement which varied between 8.31% - 62.277% for the motion range of joints, between 14.70% - 50.01% for the muscular strength tests and between 56.47% and 67.27% for the evaluation of the skillful performance level (pike vault and front roll on the floor).

It is clear that there is significant progress in the motion range of joints, speed power of the working muscles (both contracting or relaxing), take off and repulsion, which had a positive effect on raising the level of the athletes' bodies higher than the horizontal level in the first flight and in the second flight too, as a major factor in the evaluation of vaulting (10-2010). The improvement noticed in developing the joint motion range confirms the statement by Mohamed Hassan Alawi & Mohamed Nasr El Din Radwan (22-2000) and Essam Abdel Khaleq (14-2005) that flexibility exercises and the movements that widens the motion range are vital in improving the motion level of the joints and the strength of the muscles working on them. This comes in conformity with statements by B. Don Franks, Edward T. Monteyyuruk Lyriboz, (30-1999), Bob Davis & Ross Bull, Jan Roscoe, Dennis Roscoe, (31-1995) and Ahmed El Hadyyoussef (2-2010), citing Heinz Reich that reaching top levels is the result of taking the technical level to the highest

level, through considering the required physical qualities so that they are compatible with the technical performance requirements. They also suggested that developing flexibility, as well as strength, plays an important role in reaching the highest sport ability and that the joints of the shoulder girdle, backbone and pelvis should be given priority. It is through these joints that the bending and extending movements are made, thus leading to a better performance of gymnastic movements. These results agree with those reached by Ahmed el hady Youssef (2-2010) who suggested that muscles elasticity, resulting from lengthening their muscle fibres are factors that contribute to increasing the power and speed of motor performance, because a stretched muscle can contract in a strong and quick manner. This emphasizes the results reached by Elizabeth, J. B & Peter, le, R. (33-2002) that strength and speed have the greatest effect on the performance level of the vaulting, and also with results reached by Mohamed sobhyhassanein & Ahmed kesra (24-1998), Ahmed khater & Alyfahmy el beik (4-1996), Patricia D. Miller (36-1995) and adelabdel basiraly (12- 1999), that muscle strength is one of the most important physical abilities on which the achievement of the highest levels of championship in sport activity depends. Insufficient muscle strength has a negative effect on the level of perfecting and developing motor performance. Khayreya el sokkary & Gaberbereqaa (9-2001) affirmed that muscle strength exercises are necessary and fundamental to improve performance.

Results of the research conformed with those reached by Mohamed Hassan allawi (21-1994), Essam abd el khaleq (14-2005) and Mohamed Sobhy hassanein (25- 2004), stating that exercises must be selected in such a manner as to widen the multiple motion range of the athlete so that he or she may be prepared with such flexibility to perform in different situations. It should be taken into consideration that flexibility of the backbone, hip and shoulders joints is a major component of comprehensive flexibility. The also stress the fact that strength exercises determine the degree of joint flexibility. The technical training for flexibility and strength must therefore be carefully planned to ensure the balanced development of the motor and joint systems. Special exercises should be practiced systematically to develop flexibility side by side with strength exercises. It is often impossible to reach a wide range of motion due to a lack of muscular strength. Muscular strength is therefore another factor of flexibility that should be taken into consideration when developing the joint motion range (flexibility). Ahmed el hadyoussef (2-2010), stresses the importance of connecting the stretching exercises to the strength exercises to ensure the balanced development of the motor and muscular systems, and avoid single-sided development. The author of this paper attributes this to the effectiveness of the take off and repulsion development program in which exercises helped develop the speed strength of the legs (during the take-off), In addition to the training program and speed applied codified on a scientific basis, which are commensurate with the age group under study helped to improve the speed of approaching, consequently improved the first flight stage, and the lower back muscles when pushing with its to help extend the trunk during the first flight in addition to developing arm muscles (when pushing with the hands), consequently improving the second flight stage. Strengthening the muscles working on hip joints made it possible to control the landing by extending the hip joints. This was confirmed by the studies of Frantisek vaverka, & Roman farana (34-2012) who said that the strength and speed used in the take-off help the athlete fly higher in the first flight, which in turn enables a strong pushing with the hands leading to an increase in the second flight time. This proves the first hypothesis: "There are significant differences between the two measurements pre and post improvement in range of motion in the joints, and muscle strength and speed measured, for the benefit of telemetric".

It was also found that the training program exercises helped strengthen the muscles working on the hip joints and the shoulder extending muscles, consequently improving the take off and repulsion, which had a positive effect on raising the level of the athletes' bodies higher than the horizontal level in the first flight and in the second flight too, as a major factor in the evaluation of vaulting. The results were in conformity with those reached by Ahmed El hady yousef& Mohamed mahmoud abdel salam (3-2003), citing Borrmann who stated that what matters about the vault (the vaulting table) is the height and distance of the second flight which can be achieved by the athlete after pushing with the arms. Resulting in a skillful performance evaluation tests of the pike vaulting table and the pike front roll on the floor showed a remarkable progress between the pre-measurement and the post-measurement, favoring the post-measurement. This proves excellence of the experimental group which received the training program to develop the take off and repulsion. It also proves the validity of the learning component of the program, dealing with progress in performing the pike vaulting and the pike front pike roll on the floor after 8 weeks from applying the program, compared to the pre-measurement. This proves the second hypothesis.

## **- References:**

### **References in Arabic:**

1. Abu Ela Ahmed Abdel-Fattah(2012): the modern sports training, Cairo, p. 147, p. 146
2. Ahmed El Hady Youssef (2010):Developed systemsin gymnastics training (using the basicmuscle work), Dar al Fikr al Araby, Cairo,p.99,p.30 - 32,p.27,p.47,p.57.
3. Ahmed El Hady Youssef & Mohamed Mahmoud Abdel Salam (2003): the basics of gymnastics teaching and training, faculty of physical education for boys, Alexandria University.
4. Ahmed Khater & AlyFahmy El Beik (1996): measurement in sport, 4<sup>th</sup> edition Dar al Kitab al Hadith, Cairo.P,377.
5. Al Sayed Abdel Maksoud (2002): sports training theories (the training and physiology of power), Markaz Al Kitab for publication. Cairo.
6. Amira Hassan Mahmoud and Maher Hassan Mahmoud (2009):Recent trendsin the science of sports training, Dar el wafa ledonyaa printing and publishing, Alexandria, p. 22, p. 175.
7. Hatem Abu Hamda Helayel Ahmed (1992): the effect of leg and hand pushing on the performance level of forward somersault on the vaulting horse, a Ph. D. dissertation, faculty of physical education, Minya University.

- 8.** Hanan Mohamed Malek (2001): analyzing the dynamics of hand push to perform forward hand somersault followed by a tuck roll on the men's Olympic vaulting horse. Assiut Journal of physical education sciences and arts, p.1-28.
- 9.** Khayreya El Sokkary & Gaber Bereqaa (2001) the integrated training series for the making of the 6-18 year-old champion, part 2, Monshaat el Maaref, Alexandria.
- 10.** Salah Askar (2010): the international gymnastics refereeing rules, sixth version.P.84-99.
- 11.** Sajid lella Mohamed Ahmed (2007): The effect of a program of exercises in two different ways to develop the range of motion in the joints age 11-12 years, Master Thesis, Faculty of Physical Education for Boys, Alexandria University p 43.
- 12.** Adel Abdel Basir Aly (1999): sports training and integration of theory & practice, Markaz Al kitab for publication, Cairo.
- 13.** Essam abd el khalk (2000):sports training, Nazareyat watatbiqat (theories and applications), 11<sup>th</sup> edition, Monshaat el Maaref, Alexandria.p.139, p200,p.216-217.
- 14.** Essam abd elkhalk (2005) :sports training, Nazareyatwatatbiqat (theories and applications), 11<sup>th</sup> edition, Monshaat el Maaref, Alexandria.p.174.
- 15.** Ali Fahmy pick and Imad Eddin Abu Abbas Abu Zaid and Mohamed Ahmed Abdo Khalil (2009) :Methods of measuringanaerobic and aerobicabilities, Alexandria p.94Knowledgefacility.p.94.
- 16.** Christopher Norris (2004): flexibility exercisesand fitness Stretching,translationd. Khaled AlAmeri,Daral-Faruq, p. 75.
- 17.** Kamal Abdel Hamid & Mohamed SobhyHassanein (1997): physical fitness and its components, 3<sup>rd</sup> edition, Dar al Fikr al Araby, Cairo.
- 18.** Maysa Hanem Abdel Monem Ahmed (2014): developing explosive power, using some plyometric training exercises and its effect on performing jumps in under 13 year-old female athletes playing in gymnastics for all program, a Ph. D. dissertation, faculty of physical education for boys, Alexandria University.

- 19.** Mohamed Ibrahim Shehata (2003): modern gymnastics training Dar al Fikr al Araby, Cairo.p.89,p.247
- 20.** Mohammed Jaber Briva and Ehab Fawzy Badawi (2007) : stretching exercises for athletes (foundations -concepts-differentsports) Monshaat el Maaref, Alexandria.
- 21.** Mohamed Hassan Allawi (1994): the science of sports training, 13<sup>th</sup> edition, Dar al Maaref printing and publication house, cairo
- 22.** Mohamed Hassan Allawi& Mohamed Nasr el Din Radwan (2000): measurement and evaluation in pysical education and sport, part 1, 4<sup>th</sup> edition, Dar al Fikr al Araby, Cairo.
- 23.** Mohamed Hassan Allawi& Mohamed Nasr el Din Radwan(2001): motor performancetests, Dar al Fikr al Araby, Cairo.,p295-297, p. 279, p.291-293.
- 24.** Mohamed Sobhy Hassanein & Ahmed Kesra (1998): encyclopedia of applied sports training, part 1, 4<sup>th</sup> edition, Markaz Al Kitab for publication, Cairo.
- 25.** Mohamed SobhyHassanein (2004): measurement and evaluation in pysical education and sport, part 1, 4<sup>th</sup> edition,. Dar al Fikr al Araby, Cairo
- 26.** Mohammed Abdul Rahim Ismail (1998) : muscle strength training and weight training programs for young people, Monshaat el Maaref, Alexandria. p.94.
- 27.** Mohamed Mahmoud Abdel-Salam (2002): Gymnasticsfor beginners, Dar el wafa ledonyaa printing and publishing, Alexandria, p.56.
- 28.** Mofty Ibrahim Hammad (2001): modern sports training: planning, application and leadership, Dar al Fikr al Araby, Cairo. P.88,p.184 p.197,198.p.
- 29.** Mohab Abdel Razek and Mahmoud Mohamed Hassan (2004): development of standardgradesfortestssome specialphysicalqualities ofan emergingartistic gymnasticsunder8-10 years, the EighthInternational Scientific ConferenceforSciencePhysical Education and Sports, Faculty of Physical Educationfor Boys, Alexandria University,p.548, p. 562, p. 548.

## References in English:

30. B. Don Franks, Edward T. Montey Yuruk Lyriboz, (1999): "The Health fitness Handbook". Human Kinetics. U.S.A.
31. Bob Davis& Ross Bull, Jan Roscoe, Dennis Roscoe, (1995): "Introduction into the theory of training and competition, study material for the international course for coaches, DHFK, Leipzig. PP.320: 355.
32. - Bradshaw, E. J., & Rossignol, P. L. (2004). Gymnastics: Anthropometric and biomechanical field measures of floor and vault ability in 8 to 14 year old talent-selected Gymnasts. Sports Biomechanics, 3(2), 249-262.
33. Elizabeth, J. B & Peter, le, R. (2002) Identification of floor and vaulting aptitude in 8-14 year old talentselected female gymnasts, ISBS, Caceres - Extremadura – Spain.P171-174
34. Frantisek Vaverka, & Roman Farana :(2012) The Effect of biomechanical variable on the assessment of vaulting in top-level artistic female gymnasts in world cup competitions, ActaUniversitatisPalackianae
35. Nelson,A.G&Kokkonen,j.(2007) : Stretching anatomy,humanKinetics,Usa.
36. Particia D. Miller (1995): "Fitness Programming and physical Disability" Human Kinetics, U.S.A.
37. - Prassas, S., Kwon, Y. H., & Sands, W. A. (2006). Biomechanical research in artistic gymnastics: a review. Sports Biomechanics, 5(2), 261-291.

## Abstract

### **The development of the take off and repulsion movements to improve the performance of some gymnastics skills for beginners**

*<sup>1</sup> Ahmed Mohamed Shwika*

The research aim to identify the impact of the training program of developing the take off and repulsion of arm to improve some of the physical abilities, and the skill performance of the pike vaulting on vaulting table and the pike front roll on the ground.

The researcher used the one-group experimental method by taking pre-measurements and post-measurements, and the study was conducted on a non-random sample of the first year students at the Faculty of Physical Education, Damietta (N=21). The two skills were performed by (N=14) of the total sample subjects in the basic study.

Pre-measurements were conducted on the basic variables, and physical tests were made of the motion range of the extending and bending movements (the motion ranges of the bending and extending of the hip joints and bending forward of the backbone), muscle strength (and extending the shoulder joints and bending and extending the trunk), speed of approach and strength of the double feet take off, strength of repulsion and the skilful performance level.

The program was distributed over three stages as follows: the first stage lasted for 2 weeks and consisted of 360 minutes of training; the second stage lasted for 4 weeks and consisted of 640 minutes of training; the third stage lasted for 2 weeks and consisted of 360 minutes of training. Thus the program went on for 8 weeks with three units a week (Module time 60 minutes for 60 minutes).

Results showed statistically significant differences in all applicable tests, and the program had a positive effect on raising the level of the athletes' bodies higher than the horizontal level in the first flight and in the second flight too, as a major factor in the evaluation of vaulting table.

---

<sup>1</sup> Lecturer, Sports Training Department (Gymnastics), Faculty of Physical Education, Damietta University