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The Development of the Take Off and Repulsion Movements to Improve the Performance of Some Gymnastics Skills for Beginners.

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Abstract

The research aims to identify the impact of the training program of developing the take off and repulsion of arms to improve some 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..

Introduction:

Requires the discovery of the most important performance technical good of skills - the constant pursuit of knowledge of the properties and elements of these skills, and requirements of physical characteristics affecting the performance, and developing them, a departure from the document the correlation between each of the technical performance of exercise physical requirements necessary for it, and that require the availability to reach to a high performance, as they represent the most important means of developing sports. And must be commensurate with the aims and duties of training, is not valid used without appropriate choice.

Physical abilities have the greatest effect on performance and achievement in sport in general and on gymnastics in particular, and vary with the kind of activity practiced. The higher the physical abilities are, the better the skillful performance becomes.

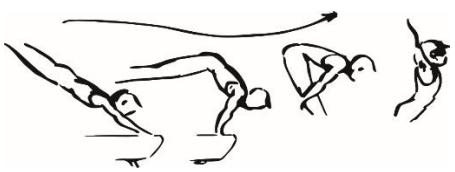
Several Researchers, e.g., Ahmed el hady (3-2010), citing Buchmann, Harra, and Ahmed el hady (4-2015), citing Roland Carrasco, suggest that a gymnast primarily needs speed strength in most of the movements performed by the different body parts, especially by the legs, back, abdomen and shoulders. citing Consilman, Fox and Mathews, that the best way to train speed strength which is similar to the motor track during a workout with the motor track it skill during the same performance in performing the skill per se.

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 gymnastics international judging rules (12 – 2010), such phases are important.

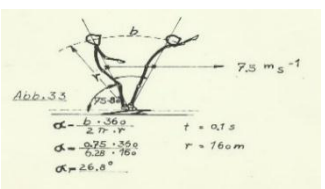
In the Researcher opinion, the major component of this skill is closely related to the pike front roll, which requires strongly flexing hip joints, which affects the good performance of the roll. Evaluating vaulting table is affected by several factors:

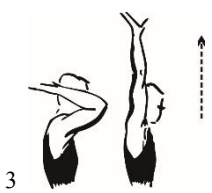
- First flight to the moment of placing hands on the vaulting table
- Second flight from leaving hands of the table vaulting to landing position and standing
- Implementation positions

This shows how important it is for the technical performance to carry out a double foot take off and a push up. These movements influence the evaluation of vaulting and show how it is connected to explosive power. 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 Essam abd el khaleq (16-2000), special exercises can develop the physical abilities affecting performance, such as strength, strength endurance, and speed and motion range. Speed strength is a physical requirement needed by the junior player, especially for the skills that has to do with takeoff, push and fast extension. Essam abd el khaleq (17-2005), Mohamed Mahmoud Abdel-Salam (31-2002) Abul ola (2-2012) 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.



Straight Leg through vaulting pike is one of the takeoff movements, defined by Ahmed El Hady (4-2015) and Mohamed Ibrahim Shehata (18-2003), 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:





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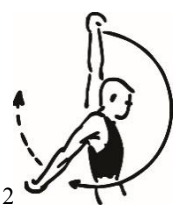

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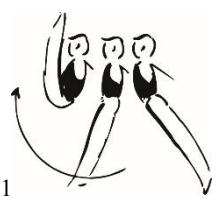

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1. Performing Balance over movements (somersaults).
2. Performing Leg swing movements.
3. Performing Rolling movements.

This can be achieved through some movements by several body parts when shifting from a supported position to an unsupported position for the movement.

The pike front roll is one of the rolling movements according to the similar artistic performance. It is a movement in which the body rotates around temporary turning axes and the support point, causing a transitory movement equal to the support area.

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 (3-2010), citing Roland Carrasco, of gymnastic 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.

A review of reference book specialised in gymnastics, Ahmed el hady (4-2015), 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 (Attachment 1).

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 speed strength 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 speed strength of the leg extending muscles, especially in the preliminary stage of the skill (the take-off).

According to Mufti ibrahim hammad (33-2010), Amira hassan mahmoud and Maher hassan mahmoud(8-2009), Abu ola abd el-Fattah (2 -2012), The motion range of the joints is an important factor that indicates the power and speed of motor performance, and makes the physical movements economic and effective in the same time, and Mohamed saad ghoraba (27-2003), citing Harra, Jensen & Hirst, and Corbin Nobel, Essam abd el khaleq (16-2000), Mohamed mahmoud abd el-Salam (31-2002) also state that it is an important physical quality for motor performance, both qualitatively and quantitatively. Together with other physical qualities, it is a mainstay in the acquisition and perfection of motor performance.

Nariman el khatib et al., (35-1997), and Mofty Ibrahim (32-2001) add that increasing the motion range and extending the muscles working on the joint enable the muscles to produce a greater power. This is due to the fact that muscles work more efficiently and produce more energy as a result of storing flexible energy in the muscle tissues during the process of extension, and liberate it during the contraction process. Flexibility also has an effective role to play in delaying fatigue and reducing muscle cramp and it also contributes to recovery and reduces muscle pain.

Talha husam el din (14-1997) confirmed the fact that flexibility exercises programs increase muscular strength and have an effect on the muscle feeding neuro-mechanisms. They also create the appropriate mechanical circumstances necessary to achieve the maximum contraction possible.

Muscles are the source of movement in the human body. They represent the power which causes movement. Kamal abd el hamid, Sobhy Hassanein (28-1997) suggest that they are a component of physical fitness and motor ability. They are also a major component of motor fitness, according to Clark, Mathews, Larson, Yocom, Bucher, Cuorton, Willgose, Flechman, Harra. They also cite Rogers and McCloy, who stated that persons with muscular strength can set up a high score of general physical ability.

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 (9-2001) analyzing the dynamics of hand push to perform forward hand somersault followed by a tuck roll on the men's Olympic vaulting horse.
- Hatem abu hamda helayel Ahmed (8-1992) the effect of leg and hand pushing on the performance level of forward somersault on the vaulting horse.
- Maysa hanem abd el monem Ahmed (17-2014) 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.(29-2002)Identification of floor and vaulting aptitude in 8-14 year old talent selected female gymnasts.
- Frantisek vaverka, & Roman farana (30-2012) 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 researcher to identify the following objectives:

Aims of the research:

The research aims 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- 2- The skill performance of the pike vaulting on vaulting table and the pike front roll on the ground.

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 ground.

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** – 10/5/2015, and the basic study was conducted for 8 consecutive weeks in the period 14/3/2015 – 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 2). 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) – (height was measured using a rest meter and weight by using an accurate medical equipment). 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. 3).
- 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 (12-2010). 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 mad 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 4) , (attachment 5)
- 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**

Variables/significance	before experiment N=14 mean ± standard deviation	skewedness coefficient	coefficient of variation
I. Basic variables:			
Age year	19.210 ± 0.802	0.437	-
Height cm	174.286 ± 1.899	-0.499	-
Weight kgm	73.357 ± 2.061	0.439	-
II. a) Joint motion range tests			
1- shoulder joint extending cm	65.00 ± 0.680	1.218	0.989
2- shoulder joint bending cm	20.00 ± 1.454	0.000	0.212
3- hip joint extending degree angle	30.07 ± 1.385	0.461	1.918
4- hip joint bending degree angle	66.71 ± 2.016	0.193	4.066
5- bending backbone forwards cm	-7.50 ± 1.454	-0.350	2.115

Variables/significance	before experiment N=14 mean ± standard deviation	skewedness coefficient	coefficient of variation
b) Muscular strength tests:			
6- Strength of shoulder bending musc. in 15.s.	8.143 ± 0.663	0.151	0.440
7-strength of shoulder exte. muscle in 15 s.	7.786 ± 0.426	0.157	0.181
8- Strength of trunk bendi. muscle in 15 s.	7.571 ± 1.089	-0.212	1.187
9- Strength of trunk exte. Muscles in 15 s.	8.790 ± 0.893	-0.278	0.797
10- Strength of leg exte. Muscles cm.	33.75 ± 1.233	0.642	0.397
11- Strength of arm bend. muscles in 15 s.	7.357 ± 0.745	0.731	0.555
12- Speed (sprint) 30 m/ s	5.000 ± 0.555	0.000	0.308
III. skillful performance evaluation tests:			
1- pike vaulting table degree	4.143 ± 0.770	-0.264	0.593
2- pike front roll on the floor degree	4.429 ± 0.852	- 0.178	0.725

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	1st measurement N=7 Mean ± st. dev.	2nd measurement N=7 Mean ± st. dev.	validity coefficient	subjective validity coefficient
Joint motion range tests				
1- shoulder joint extending cm	71.429 ± 6.901	72.857 ± 7.559	0.867**	0.931
2- shoulder joint bending cm	22.714 ± 0.604	22.857 ± 1.574	0.972**	0.940
3- hip joint extending degree angle	29.86 ± 1.346	30.143 ±1.57	**0.956	0.978
4- hip joint bending degree angle	0.952 ±67.14	0.903 ±67.43	**0.986	0.984
5- bending backbone forwards cm	8.000 ± 1.826	-7.71 ±1.704	**0.964	0.982
Muscular strength tests				
6- Strength of shoulder bending muscles in 15 s	8.143 ± 0.690	8.286 ± 0.488	0.849**	0.921
7- Strength of shoulder extending muscles in 15 s	8.286 ± 0.489	8.429 ± 0.787	**0.930	0.964
8- Strength of trunk bending muscles in 15 s	1.07 ± 7.857	1,155 ± 8,00	**0.945	0.972
9- Strength of trunk extending muscles in 15 s	1,272 ± 8,429	1,397 ± 8,571	**0.964	0.982
10- Strength of leg extending muscles cm	0,976 ± 33,43	0,76 ± 33,714	**0.971	0.985
11- Strength of arm bending muscles in 15 s	0,90 ± 7,143	0,976 ± 7,571	*0.841	0.917
12- Sprint 30 m/ s	0,750 ± 4,714	0,535 ± 4,571	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 (36 hours) of actual training (attachment 6), (attachment 7) .

- 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 and gradually increased to maximum at the end of the program. Al Sayed Abdel Maksoud (7-2002) indicated that it is a mistake to stabilize the level of skills necessary for the 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) Special strength exercises as fast, (attachment 8) and the number (8) exercises for range of motion in the joints, (attachment 9) and training for speed. It is noted that muscle 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. Speed strength exercises:

- * It was formed training load so that the maximum performance of the player, in every training (attachment 10)

- * High intensity interval raining 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 (16-2000).

- * It was formed training load of the unit weekly, according to the model (2: 1) (32- 2001).

- * It was to determine the number (7) exercises for the development of Special force as quickly, and not exceeding frequency of training for (20) reps. (Attachment 11). and (2 : 4) sets (32- 2001), and the rest period between sets 90-180 seconds (16- 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. (32- 2001).
- Is installed stretching exercises even tension and but without pain, taking into account exhale while stretching to facilitate muscle relaxation (23- 2007).
- The frequency of exercises stretching (2 - 3) reps. (30- 1998), and Indicates Mufti ibrahim (32-2001) that it has up to (5) reps., And describes the Nariman al-khatib et al. (35-1997) 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 12)

- The speed exercises:

It was applied to speed the unit training exercises weekly the intensity of 90% (Attachment 8)

- *The number of reps. (5) times, rest periods between reps. (2) min. (16- 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.

-Statistically scheduling data:

- It has been statistically scheduling data, through the computer using the program spss: Arithmetic average (mean) *Standard deviation * Skewers coefficient
- coefficient validity. * Coefficient of variation reliability coefficients
- Improvement percentage. *T tests * Paired samples test.

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 ± st. de.	After exper. N=14 mean ± sta.de	Differ. between means	T test value	Improve. Perce.
I. Joint motion range tests					
1- shoulder joint extending cm	6.92 ± 71.43	1.95±102.86	31.42-	**11.286	44.00%
2- shoulder joint bending cm	1.90 ± 22.43	1.46 ±33.62	11.19-	14.756**	49.89%
3- hip joint extending degree angle	1.3930.07 ±	32.57 ±1.74	-2.50	**-6.00	%8.31
4- hip joint bending degree angle	2.02 ± 66.71	73.79 ± 2.26	-7.08	**13.40	%10.6
5- bending backbone forwards cm	0.947.57 ± -	4.71 ±0.91	12.29-	**40.369	%62.277
Muscular strength tests					
6- Strength of shoulder bending muscles in 15 s	0.690 ± 8.857	0.76 ±13.29	4.429-	9.21**	%50.01
7- Strength of shoulder extending muscles in15 s	0.683 ±8.143	0.85 ±12.00	3.857-	14.79**	47.37%
8- Strength of trunk bending muscles t in 15 s.	7.571 ± 1.089	10.14 ±0.77	-2.57	**14.89	%33.95
9- Strength of trunk extending muscles in 15 s.	8.790 ± 0.893	11.21 ±0.80	-2.42	**12.20	%27.53
10- Strength of leg extending muscles cm	33.75 ± 1.223	40.71±1.14	-6.96	**15.69	%20.62
11- Strength of arm bending muscles in 15 s.	0.690 ± 7.857	0.90 ±11.12	-3.286	**6.94	%41.82
12- Sprint 30 m/ s	0.69 ± 4.857	0.38 ± 4.14	0.714-	**3.87	%14.70
skillful performance level evaluation					
1- Pike vaulting degree	4.14 ±0.77	6.93 ±0.77	2.79-	**14.9	%67.27
2- Pike roll on the floor degree	± 0.854.43	6.93 ±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 so 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 (12-2010). The improvement noticed in developing the joint motion range confirms the statement by Mohamed hassan allawi & Mohamed nasr el din radwan (25-2000) and Essam abd el khaleq (17-2005) 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. Montey yuruk Lyriboz, (36-1999), Bob Davis &Ross Bull, Jan Roscoe, Dennis Roscoe, (37-1995) and Ahmed el hady youssef (3-2010), 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 result agree with those reached by Ahmed el hady Youssef (3-2010) 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. (29-2002) that strength and speed have the greatest effect on the performance level of the vaulting, and also with results reached by Mohamed sobhy hassanein & Ahmed kesra (28-1998), Ahmed khater & Aly fahmy el beik (6-1996), Particia D. Miller (39-1995) and adel abd el basir aly (15-1999), 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 & Gaber bereqaa (11-2001) affirmed that muscle strength exercises are necessary and fundamental to improve performance.

Results of the research conformed with those reached by Mohamed hassan allawi (24-1994), Essam abd el khaleq (17-2005) and Mohamed Sobhy hassanein (29- 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 hady youssef (4-2015), citing Antenowa, 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 (39-2012) 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 youssef & Mohamed mahmoud abd el salam (5-2003), 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 the 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 (2000): sport training and physiological foundations, Dar al Fikr al Araby, Cairo.
2. Abu Ela Ahmed Abdel-Fattah (2012): the modern sports training, Cairo, p. 147, p. 146
3. Ahmed El Hady Youssef (2010): Developed systems in gymnastics training (using the basic muscle work), Dar al Fikr al Araby, Cairo.
4. Ahmed El Hady Youssef (2015): directed readings in gymnastics training, Markaz Al kitab for publication and distribution, Cairo.
5. Ahmed El Hady Youssef & Mohamed Mahmoud Abdel Salam(2003): the basics of gymnastics teaching and training, faculty of physical education for boys, Alexandria University.
6. Ahmed Khater & Aly Fahmy El Beik (1996): measurement in sport, 4th edition Dar al Kitab al Hadith, Cairo.P,377.
7. Al Sayed Abdel Maksoud (2002): sports training theories (the training and physiology of power), Markaz Al Kitab for publication. Cairo.
8. Amira Hassan Mahmoud and Maher Hassan Mahmoud (2009): Recent trends in the science of sports training, Dar el wafa ledomya a printing and publishing, Alexandria, p. 22, p. 175.
9. 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.
10. 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.
11. 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.
12. Salah Askar (2010): the international gymnastics refereeing rules, sixth version.P.84-99.
13. 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 43 p.
14. Talha Husam el Din et al (1997): the scientific encyclopedia of sports training (strength – ability – strength endurance - flexibility), Markaz Al Kitab for publication and distribution, 1st edition.
15. Adel Abdel Basir Aly (1999): sports training and integration of theory & practice, Markaz Al kitab for publication, Cairo.
16. Essam abd el khalk (2000):sports training, Nazareyat wa tatbiqat (theories and applications), 11th edition, Monshaat el Maaref, Alexandria.p.139, p200,p.216-217.
17. Essam abdel khalk (2005):sports training, Nazareyat wa tatbiqat (theories and applications), 11th edition, Monshaat el Maaref, Alexandria.p.174.
18. Ali Fahmy pick-and Imad Eddin Abu Abbas and Abu Zaid Mohamed Ahmed Abdo Khalil (2009): Methods of measuring anaerobic and aerobic abilities, Alexandria p. 94 Knowledge facility.p.94.
19. Christopher Norris (2004): flexibility exercises and fitness Stretching, translation d. Khaled Al Ameri, Dar al-Faruq, p. 75.
20. Kamal Abdel Hamid & Mohamed Sobhy Hassanein (1997): physical fitness and its components, 3rd edition, Dar al Fikr al Araby, Cairo.
21. 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.

22. Mohamed Ibrahim Shehata (2003): modern gymnastics training Dar al Fikr al Araby, Cairo.p.89,p.247

23. Mohammed Jaber Briva and Ehab Fawzy Badawi (2007): stretching exercises for athletes (foundations - concepts - different sports) Monshaat el Maaref, Alexandria.

24. Mohamed Hassan Allawi (1994): the science of sports training, 13th edition, Dar al Maaref printing and publication house, cairo

25. Mohamed Hassan Allawi & Mohamed Nasr el Din Radwan (2000): measurement and evaluation in pysial education and sport, part 1, 4th edition, Dar al Fikr al Araby, Cairo.

26. Mohamed Hassan Allawi & Mohamed Nasr el Din Radwan(2001): motor performance tests, Dar al Fikr al Araby, Cairo.ز, S295-297, p. 279, S291-293.

27. Mohamed Saad Ghoraba (2003):the effect of special dynamic flexibility on the effectiveness of performing some back arch movements for wrestlers as a basis of protective training, a thesis for the Master's degree, faculty of physical education, Tanta University.

28. Mohamed Sobhy Hassanein & Ahmed Kesra (1998): encyclopedia of applied sports training, part 1, 4th edition, Markaz Al Kitab for publication, Cairo.

29. Mohamed Sobhy Hassanein (2004): measurement and evaluation in pysial education and sport, part 1, 4th edition,. Dar al Fikr al Araby, Cairo

30. Mohammed Abdul Rahim Ismail (1998): muscle strength training and weight training programs for young people, Monshaat el Maaref, Alexandria. p. 94.

31. Mohamed Mahmoud Abdel-Salam (2002): Gymnastics for beginners, Dar el wafa ledomya a printing and publishing, Alexandria, p. 56.

32. 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.

33. Mufti Ibrahim Hammad (2010): overall reference in sports training, Dar al-Hadith book, Cairo, p. 199

34. Mohab and Mahmoud Abdel Razek Mohamed Hassan (2004): development of standard grades for tests some special physical qualities of an emerging artistic gymnastics under 8-10 years, the Eighth International Scientific Conference for Science Physical Education and Sports, Faculty of Physical Education for Boys, Alexandria University, p. 548, p. 562, p. 548.

35. Nariman el Khatib, Abdel Aziz el Nemr and Amr el Sokkary (1997): sports training: muscular extension, Markaz Al Kitab for publication, Cairo.

References in English

36. B. Don Franks, Edward T. Montey Yuruk Lyriboz, (1999): "The Health fitness Handbook". Human Kinetics. U.S.A.

37. 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.

38. 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

39. 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, Acta Universitatis Palackianae

40. Nelson,A.G&Kokkonen,j.(2007) : Stretching anatomy,human Kinetics,Usa.

41. Particia D. Miller (1995): "Fitness Programming and physical Disability" Human Kinetics, U.S.A