



Science, Movement and Health, Vol. XIII, ISSUE 2 supplement, 2013
September 2013, 13 (2), 240-245

EFFICIENCY OF BODY BALANCE EXERCISES ON THE ABILITY & FLEXIBILITY OF THE LOWER LIMB, THE SKILFUL AND RECORD LEVEL FOR CONTESTANTS OF THE TRIPLE JUMP

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Abstract

Purpose. The position of the body balance is considered an essential component in most of the athletic activities generally, and in the field & track competitions especially. It is a main factor in activities which require a sudden change in movements in which the player lose his balance, and the necessity of regaining this balance quickly to start a new movement. This study aims to identify the effect of balance body position exercises concerning stretching on the ability & flexibility of the lower limb, and the triple jump performance in female physical education students.

Methods. The sample contains (20) students from the second year, has been randomly assigned to control and experimental group. Homogeneity and equality between groups were considered in the following variables: age, height, weight, ability of legs' muscles (A, M, L), flexibility of legs' joints, consists of hip drape (F, H, D), extend the hip (F, E, H), knee drape (F, K, D), exit end the knee (F, E, K), feet drape (F, F, D), extend the feet (F, E, F), the skilful level consists of distance of the Hop (D, H), distance of the step (D, S), distance of the jump (D, J), and the digital level (D, L). The experimental group was subjected to 8 weeks, 3 sessions weekly, with a total of 24 training sessions of balance body position exercises training. The medical protractor was used to measure flexibility of the joints and jumping ahead with both legs to measure the explosive power of the lower limb

Results. The data showed a significant exceeding of the experimental group compared with the control one of the study variables (legs' ability which (U=*18. -), flexibility of leg joints, which (U=*12. -) (U=*15. -) (U=*2. 50-) (U=*3. -) (U=*9. -) (U=*4. 50-), skilful and digital level) which (U=*12. 5-) (U=*9. -) (U=*3. -) (U=*1. -) of contestants the triple jumping ($p < 0.05$).

Conclusions. According to the results, consider raising the efficiency of responsible muscles about balance body position in order to be able to perform stretching exercises from the best position of the body which leads to the efficiency of such exercises and the resulting improvement in the skilful and digital level of the contestant.

Key words: Balance Exercises, Ability, Flexibility, Triple Jump.

Introduction

Improving body balance is important for effective athletic performance because agility relies on proper balance. Striving to improve balance is a good idea for everyone, because having good balance makes a person steadier on his or her feet and this may help prevent dangerous falls.

The position of the body balance is considered an essential component in most of the athletic activities generally, and in the field & track competitions especially. It is a main factor in activities which require a sudden change in movements in which the player lose his balance, and the necessity of regaining this balance quickly to start a new movement (Foad, 1995). The expression of body position refers to the relationship between the different parts of the body. Its importance is clear as the proper body position represents the fundamental base for training styles. Exercises starting with incorrect body position do not

achieve the desired goal, which causes the increase in certain tissues' job and the decrease in other tissues' job. Consequently it leads to imbalance on the short run concerning the strength and flexibility (Norees, 2008).

Reaching to and keeping the balanced body position is achieved by both muscles and tissues which lack the ability to contract on their own. Therefore the balance between muscles responsible for the movement and those responsible for the body balance position is highly important (Norees, 2008).

The triple jump completion is considered one of the complicated ones which require full cooperation between each of the nervous and muscular systems in order to be able to perform the best movements (A. Abd El Hameed, 2009). The focal base is changing more than once to reach the desired goal, so the movement balance is considered one of the most important physical characteristics needed for the triple jump player, for its ability to control and combine

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movements (Anetabeen, 2004). The experiments proved the importance of studying gravity centre of the body during performing the triple jump (Ahmed, 1997).

Keeping balance of the body position is achieved through prolonging the tensed muscles, and increasing the stiffness of the balance muscles (Norees, 2008)

Balance' muscles tend to be deep inside the body and keep body position, such as the deep abdominal muscles and the hip muscles. Those muscles slightly contract, yet stay contracted for a long time, so the stiffness of those muscles are limited, and in a relaxing condition. Muscles malfunction and disorganizing cause difficulty of the nervous pulses to reach those muscles, though they control all muscles (Norees, 2008).

The researcher noticed, through her teaching of the triple jump, the deficiency of the skilful and digital level of the students which may be because of the decrease in flexibility and ability level of their lower limb. Those physical elements are very important and related to the triple jump which may suggest that the benefit of such exercises is not enough to perform the skill better, as the ability element is one of the most important special physical elements in triple jump (Ahmed, 1997) which need enough strength for all the holding muscles for the joints of limbs, knees, and foot ankle to push the body to the required direction (The Egyptian Federation of athletics for amateurs, 1995). The ability of legs' muscles is clear through the work of movement joints in the body during the extending and draping of the leg joints in the most important stages of the movement work in the triple jump, they are (hop - step - jump) as the ability factor plays a very active and positive role in the jump level (Ahmed, 1997).

As the triple jump skill is one of the complicated movement skills which require repetitive and fast movements where the movement series of take-off, flight, and landing are repeated three times, the final results specified by the level of the horizontal speed in the take - off movement (K. American Sport Norees, 2008 & education program, 2008) and depends mainly on the lower limb of the body in the movement, so it is necessary to train on how to reach and keep the balance of the pelvis area, and the lumber spine before starting the exercises of prolonging the lower part muscles.

Consequently there is an improvement in the functional efficiency of muscles which appear in the developed skilful and physical performance. Thus the player can perform movements on a large scale and with the best production of strength and speed, and this is because of the importance of prolonging the joints of the limb, knee, and the foot to the maximum possible degree during the take - off (Abd el Hameed, 2009) and the importance of the balance strength in the pelvic area and the back bone to achieve the flexibility and strength of the lower limb (Porcary, et al. 2011). So

the researcher performed such a study in a trial to keep the balanced position of the body during performing the prolonging exercises and benefitting of them in functioning the muscle positively during performing the movement.

The purpose of the study is to examine the effectiveness of the proposed program to keep the balanced position of the body in correspondence with the prolonging processes on the strength and flexibility of the lower limb, and the level of the skilful and digital performance of the triple jump competition.

Materials and Methods

The researcher used the experimental method by designing two groups, one of them is experimental and the other is control by applying the pre post test to measure each of (the ability of legs' muscles using the test of broad jumping with the feet), (the flexibility of the legs' joints using the medical protractor to measure the flexibility and it includes the extending and draping of the limbs' joints - extending and draping of the knees - extending and draping of the feet), (level of the skilful performance and it includes the length of the hop distance - the length of the step distance - the length of the jump distance), and (the digital level of the triple jump)

Participants

The sample was chosen by the random and intentional method from the female students in the second year in the faculty of Physical Education for girls, their number is (20) students, as per (10) students for each group, homogeneity and equality of the sample were considered in the sample in: age, height, weight, and all the study variables. The proposed training program was applied using the special exercises for keeping the balance of the pelvis and the lumber spine accompanied on the experimental group with the prolonging exercises for the lower part of the body which use in the traditional program in the college. Same prolonging exercises were only applied to the control group for (8) weeks per (3) training sessions a week.

Program Procedures

The training program contains the special exercises of keeping the balanced position of the pelvis and the lumber spine area as the study concentrates on the lower limb of the body which depend on the deep abdomen muscles, such as the Internal Oblique muscle, and the Transverses Abdomens muscle, and the flat abdomen muscles, such as the External oblique muscle, the Rectus Abdomens and the gluteal (K. Norees, 2008). As the exercises of the deep abdomen exercises ranging from (8 - 20) time with considering that performing some of the abdomen exercises on an unstable base, such as the Swiss ball, as it helps the flat and deep abdomen muscles to perform more efficiently



(Anatabeen, 2004) and practicing the exercises of the lower part slowly, and with encouraging to keep the final position of the prolonging for a time ranges from (20 – 30) seconds, with breathing naturally and feeling of relaxing. Prolonging exercises which use in traditional program such as the prolonging of the hip Flexor muscle and the iliopsoas muscle, and the Hamstring muscle should be appropriate to the levels of the beginners and increase gradually to the intermediate level (Norees, 2008). The intensity of the exercise ranges from (50 – 80 %) from the maximum number a person could stand using the periodical training method: low and high intensity, and with an increase of 5% each week. The training groups range from (3 – 6) ones and the time of each range from (30 – 90) minutes including the warming and calming down periods, the in between periods of rest range

from (30 – 60) seconds between repetitions, and from (60 – 180) seconds between groups.

Procedures. Measures were performed before and after the training program for all the study variables which are:

Ability for leg muscles (A, L, M), flexible joints of legs consists of { drape the hip (F,D,H), balance the hip (F,B,H) drapes the knee (F,D,K), balance the knee (F,B,K) ,drape the feet (F,D,F), balance the feet (F,B,F) } and level of skill consists of { distance Hop (D, H) , distance step (D, S) , distance jump (D,J) } and level digital (L,D)

Data Analysis. All statistical analyses were performed using the non-parametric statistics and it includes the Descriptive Statistics and the Wilcoxon Signed Test (Z), and the Mann – Whiney test (U) as per 0.05<P as P was considered as Statistically Significant

Results

Table.1 shows that significance clear positive differences for the post tests in (A,L,M) (F,D,H) (F,B,H) (F,D,K) (F,B,K) (F,D,F) (F,B,F) (D, H) (D, S) (D,J)and (L,D) in the experimental group.

Variables	Pre test		Post test		Z	sign	Variables	Pre test		Post test		Z	sign
	mean rank	Sum of ranks	Mean rank	Sum of ranks				Mean ranks	Sum of ranks	Mean ranks	Sum of ranks		
A,L,M	-	-	5.50	55.	*2.80	.005	F,B,F	-	-	5.50	55.	*.05	.005
F,D,H	-	-	5.50	55.	*2.81	.005	D, H	-	-	5.	45.	*.08	.008
F,B,H	-	-	5.-	45.	*2.67	.008	D, S	-	-	5.50	55.	*.05	.005
F,D,K	-	-	5.50	55.	*2.82	.005	D,J	-	-	5.50	55.	*.05	.005
F,B,K	-	-	5.50	55.	*2.82	.005	L,D	-	-	5.50	55.	*.05	.005
F,D,F	-	-	5.-	45.	*2.69	.007							

Table.2 shows that significance clear positive differences in (A,L,M) (F,B,H) (F,D,K) (F,B,K) (D, H) (D, S) (D,J)and (L,D) for the post tests also shows that no significant positive for the post tests in (F,D,H) (F,D,F) (F,B,F) in the control group

Variables	Pre test		Post test		Z	sign	Variables	Pre test		Post test		Z	sign
	mean rank	Sum of ranks	Mean rank	Sum of ranks				Mean ranks	Sum of ranks	Mean ranks	Sum of ranks		
A,L,M	-	-	5.50	55.-	*2.80	.005	F,B,F	4.-	16.-	4.-	12.-	.342	.733
F,D,H	7.50	7.50	4.69	37.50	1.77	.075	D, H	3.25	6.50	6.06	48.50	*2.15	.031
F,B,H	1.-	1.-	4.50	27.-	*2.23	.025	D, S	-	-	5.-	45.-	*2.67	.007
F,D,K	-	-	5.50	55.-	*2.81	.005	D,J	-	-	5.50	55.-	*2.81	.005
F,B,K	3.-	6.-	5.57	39.-	*1.97	.048	L,D	-	-	5.50	55.-	*2.81	.005
F,D,F	6.17	37.-	4.50	18.-	.977	.329							

Table 3. Shows the Mean rank, sum of rank and U score in(A,L,M) (F,D,H) (F,B,H) (F,D,K) (F,B,K) (F,D,F) (F,B,F) (D, H) (D, S) (D,J)and (L,D) between post tests for the Experimental and control group which the experimental group was more superior to the control group in all variables than control group.

Variables	Experimental group	control group	U	sig
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	mean rank	Sum of ranks	mean rank	Sum of ranks		
A,L,M	13.70	137.-	7.30	73.-	*18.-	.014
F,D,H	14.30	143.-	6.70	67.-	*12.-	.004
F,B,H	14.-	140.-	7.-	70.-	*15.-	.007
F,D,K	15.25	152.50	5.75	57.50	*2.50	.00
F,B,K	15.02	152.-	5.80	58.-	*3.-	.000
F,D,F	14.60	146.-	6.40	64.-	*9.-	.002
F,B,F	15.05	150.50	5.95	59.50	*4.50	.001
D, H	14.25	142.50	6.75	67.-	*12.5	.004
D, S	14.60	146.-	6.40	64.-	*9.-	.002
D,J	15.20	152.-	5.80	58.-	*3.-	.000
L,D	15.40	145.-	5.60	56.-	*1.-	.000

Discussion

It is clear from the statistical analysis of table (3) the improvement in each of : Ability for legs' muscles (A,L,M) , flexible joints of legs consists of drape the hip (F,D,H) balance of the hip(F,B,H)drape the knee (F,D,K),balance the knee(F,B,K), drape the feet(F,D,F),balance the feet (F,B,F) and level of skill consists of distance Hop (D,H) ,distance step D,S), (distance jump(J,D) and level digital(L,D) for the experimental group comparing to the control group in the post tests. The researcher attributes this to the systematic training of the proposed program exercises specialized for the deep and flat abdomen muscles which are responsible for the body balance as it helped the passing of the line of the body gravity center through the stability base and its existence in the middle of the body which helps reaching the right position of the body (Norees, 2008). As the flat abdomen muscles pull the pelvis to the rib cage when performing the tensing whereas the deep abdomen muscles pull the abdomen wall to the backbone, and consequently they have greater ability to keep the balance of the trunk, (Norees, 2008). References point out that the exercises of the deep abdomen muscles lead to the reaching of the nerve pulse, which control all the muscles, to the deep muscles, and change the bad functioning of the muscle to its good functioning and achieving the right body position which represents the base for coordination between body muscles and the resulting full benefit from this exercise (Norees, 2008). So , the researcher attributes the improvement in the ability and flexibility of the lower limb of the sample participants in the experimental group to the positive influence of the balance exercises specialized for the area of pelvis and back bone and reaching the body balanced position during the performing the movement which lead to performing the prolonging exercises related to the skill type of the lower limb effectively with the benefit from them and the consequent results of the efficiency of the exercises of ability and the flexibility of the joints dealt with by the

researcher during her training for the triple jump. (Frederick & Frederick, 2006) and (Brain, et al. 2007)confirmed that as they point out that prolonging muscles from the right position of the body gives muscles the ability to perform their function more effectively and producing an amount of speed and strength. This is because of the keeping the flexible energy in the muscular tissues during the prolonging stage, then it is released to perform highly contracting movements. This is matching with the study of (Bazett – Jones, et al. 2009) ; Wong , et al. 2011) (Fletcher , 2009) as they pointed out that the 6 – week training period of the prolonging exercises for the legs affect the speed, ability, and flexibility of athletes.

The researcher attributed the improvement occurred in the experimental group in the skillful level in comparing to the control group Table 2 to the positive effect of the proposed program and the reaching to the balanced body position in the pelvis and back bone area and the improvement of the muscles' ability and the joints' flexibility ,which on its role led to the improvement of skillful level concerning the coordination in distances in all the stages of triple jump (hop – step – jump) resulting from the active extending of the limb, knee, and the ankle joints to the maximum degree in each take - off point from the different stages of jump and also the active bending to complete the rest of the stage . (The American Sport Education program, 2008) refers to the necessity that all triple jump stages should be almost equal and this is matching with the study of (Wilson , et al. 2008) as they point out that the most skillful triple jump players and who enjoy high level of balance during movement got high scores in coordination between the different jump stages comparing with less skillful players and this is a result of the regular training , this is confirmed by (Alfanno , 1994) (Homel , and Muller , 1999)(Wilson , et al. 2009) also points out that the intensive trainings similar to the skill were more effective in coordination models in the triple jump stages . The



study also is matching with (Foad , 1995) & (Saad , 2002) as they point out that the right performance of the skill requires a player's high ability to keep the body in a balanced position, and that the international players score supremacy concerning the flight angle of the take-off for each of the hoop, the step, and the jump .

The researcher attributes the improvement in the digital level of the experimental group compared with the control group to what have been improved in each of the legs' ability and flexibility and the skilful level in the triple jump as the (The Egyptian federation of Athletics For Amateurs 1995) referred to the importance of acquiring and mastering the skill of triple jump.

This is matched with the study of (Mohamed, 2010) (S. Rushdie, 2007) (O. Ahmed, 2002). As they pointed out that players who use the highest degree of leg strength score supremacy in the digital level of triple jump.

Referring to table 1, it is clear that there are substantial differences in the control group in post-measures compared to the pre-measured in all variables except in (F, D, B), (F, B, F) (F, D, H). This improvement is attributed to the traditional program accompanied with the exercises of triple jump. The researcher attributes the occurring deficiency in the flexibility of some joints, and the decrease in the improvement percentage in all variables comparing to the experimental group to the inability to reach the balanced body position during the performance of prolonging exercises. The imbalance of muscles during the movement is producing changes in the body position and the decrease in the strength and in the performance level (Ban, 2008) this also matches with (Rawhy, 2010) as she referred to the importance of balance element in achieving the ability necessary for succeeding the skill accuracy.

Conclusion

The researcher recommended the necessity of focusing on the exercises which achieve the balanced body position before starting in the prolonging exercises for their significant role in achieving the hopeful benefit from the physical fitness elements, and the digital and skilful level for the triple jump and the other sport activities.

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