

The Effect of Training Programs with Elastic Resistance Bands and Bosu Ball Techniques on Physical and Skillful Levels in Ballet

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The purpose of this paper is to develop two programs, one with elastic resistance bands while the other with Bosu ball and to identify their effects on each of muscular power for legs, agility, static and kinetic balance and on ballet skills; *Sissonne Echappe*, *Grand Jete* and *changemet de pieds*. The experimental design was adopted in this study using two experimental groups where one of them applied a training program with elastic resistance bands technique while the other group applied a training program with Bosu ball technique. The duration of these programs were 8 weeks each with three training units per week. The duration of each unit within the program was 60 minutes. Results demonstrated the positive effect of each program on the physical and skillful level of the study sample and the superiority of the group that used Bosu ball over the group that used elastic resistance bands in physical and skillful variables.

Keywords: muscular power for legs, agility, static and kinetic balance, ballet skills

Introduction

Physical preparation of the player is considered to be one of the most important aspects of educational process due to its effect on fulfilling skills with a right technical form and with least efforts. Physical requirements vary from a skill to another in ballet in terms of relative importance of each element with respect to the other elements although the muscular power takes the first place of importance, especially for jumping skill. So, female player of ballet should have a high level of legs' power, balance and agility to ensure perfect practicing of jumps.

Rubber resistant bands is considered as a non-traditional techniques for the development of physical abilities, as it works to strengthen muscles in the kinetic path that is similar, to a high degree, to the performance nature of the skills, as well as it is easy to use and it provides many directions of movements during exercise.

Sayed (2006) has demonstrated the positive effect the rubber resistant bands have on the development of muscular power and strength of legs amongst 200 m rally runners. (Sayed, 2006)

Sulyman (2002) has also demonstrated the effectiveness of rubber bands on the development of power and strength etc... power and on the improvement of performance level in rhythmic exercises. (Sulyman, 2002)

Bosu ball is considered one of training aids as it helps to improve strength, balance, agility and other physical characteristics. Practicing with Bosu ball is characterized by challenge and effectiveness which increases stimulation of trainer's drives and attracts his attention for training. (Wayne, L.W., 2005)

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Studies by Zemkova and Jelen (2012) and by Bakken and Filmand (2012) have reported a positive effect of Bosu ball on the development of balance and muscular power. Ballet is considered an integrative motor activity that requires a great deal of cleverness in terms of body muscular control, two types of balance, muscular power and other physical characteristics.

Based on the importance of training aids and techniques which can affect positively on the development of physical abilities leading in turn to a higher level of skilful performance, the researcher suggested two programs to be applied with rubber resistant bands and Bosu balls to raise the performance level of Ballet.

The purpose of the current study was to develop two programs using both of rubber resistant bands and Bosu balls to identify the effect of both programs on physical variables represented in muscular power, static balance, kinetic balance and agility and skilful variables represented in Sissonne, Echappee, Grand Jete and Changement de piede, and also to compare the effect of both programs on the physical and skilful variables under study, we hypothesized the following

Hypothesis 1: There would be statistically significance differences between pre-and post-measurements of the first experimental group (Bosu ball) in the physical and skilful variables under study in favor of post-measurement,

Hypothesis 2: There would be statistically significance differences between pre-and post-measurements of the second experimental group (rubber resistant bands) in the physical and skilful variables under study in favor of the post-measurement,

Hypothesis 3: There would be statistically significance differences between post-measurements of the two experimental groups in the physical and skilful variables under study.

Method

Participants

Thirty ballet female players (aged 10-13) who were subscribers in ballet school in the Railway club were enrolled in the study as a sample that was purposively selected. The sample was subdivided into two groups; the main study sample (20 female players) and the pilot (explanatory) study sample (10 female players). The main study sample was randomly divided to two experimental groups (10 female players each). The homogeneity and valence between both groups in age, height, weight, muscular power, static balance, kinetic balance, agility, Sissonne, Echappee, Grand Jete and Changement de piede variables have been calculated.

Procedure

Two questionnaire forms were designed to seek the opinions of experts about the physical fitness elements for the skills under study and their measuring tests to determine the appropriate elements that match the purpose of this study.

According to the previous questionnaire, the researcher has chosen the physical elements that rated more than 75% of experts' agreement. The tests of measuring these elements include: 1: Vertical jump test for Sargent to measure the muscular power of legs, 2: Zigzag running test to measure agility, 3: Standing on toes to measure the static balance, 4: Jumping and balancing over marks test to

measure the kinetic balance. These tests have been standardized on the pilot study sample drawn from the study population after excluding the main study sample.

The performance level of skills under study has been evaluated separately; the female player performs three trials for each skill, average (mean) mark of these trials was recorded where the total mark of one skill is five. These procedures were supervised by a committee consisting of three experts in kinetic expression.

Program

Based on the previous literature and the opinions of experts, the program's duration has been determined (8 weeks) with frequency: 3 training sessions per week and with time: 60 minutes per training unit using the interval training with high intensity to develop the power characterized by speed and agility and with low intensity to develop balance element. Components of training loads have been controlled by means of measuring the maximum number of repetitions for each exercise practiced by each player individually. They have been registered in special records and the average (mean) of the whole sample has been calculated to determine the percentage of each exercise. Table (1) shows the components of training load.

Table (1) Components of Training Loads during Rubber Resistant Bands and Bosy Ball Programs

Week	Load intensity	Sets	Repetitions	Rests between sets (min)
First	%50	3	6	1.0
Second	%55	3	8	1.5
Third	%60	3	10	1.5
Fourth	%65	3	12	2.0
Fifth	%70	4	12	2.0
Sixth	%75	4	14	2.5
Seventh	%75	4	15	2.5
Eighth	%80	4	16	3.0

Table 2 shows a model for a training unit with rubber bands

Table (2) A Model for a Training Unit with Rubber Bands

First Week











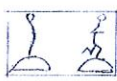




Unit parts	Duration	Unit content	Objective	Figure	Intensity	F.R	Sets	Rests between sets
Warm-up	10 min	Warm-up exercises to prepare body muscles and internal systems for the main part. Subdivided into: Starting position: Stand with your feet about hip-distance apart Motion: Fix the rubber band around the ankles, jump high with Open arms and legs to sides. Standing position: Stand with your feet about hip-distance apart. Motion: jumping, keep your feet open. Switch moves; forward and backward. Standing position: Stand with feet about hip-width apart. Motion: Hold two ends of a resistance band in hands behind back then bend and straighten knees alternatively. Standing position: Balanced standing on the right feet. Fix rubber band around ankles. Motion: Raise the free leg up with feet bending and return back to standing position. Then repeat. Standing position: Stand with feet about hip-width apart. Motion: Place the resistance band under your right feet and grasp each handle. Raise arms to sides from hips and slowly release back down to the start position. Switch legs; repeat. Standing position: Stand with feet about hip-width apart. Motion: Extend forward, hold the ends of resistance band in hands. Lie with inclined chest to the ground as in press move and slowly release back down to the start position. Standing position: Stand with feet about hip-width apart. Motion: fix rubber band around ankles. Jump high two times then make a star with quarter rotation to the right	Warm up		50%	6	3	1 min
			Power of legs		50%	6	3	1 min
			Power of legs		50%	6	3	1 min
			Muscular strength of legs		50%	6	3	1 min
Main part			Balance		50%	6	3	1 min
1-Special physical preparation	45 min		Balance		50%	6	3	1 min
			Agility		50%	6	3	1 min
			agility		50%	6	3	1 min
2-Skilled preparation	15 min	Sissonne skill training			50%			
closure part	5 min	Cool-down exercises			50%			

Table 3 shows a model for a training unit with rubber bands

Table (3) A Model for a Training Unit with Bosu Ball First week

Unit parts	Duration	Unit content	Objective	Figure	Intensity	F.R	Sets	Rests between sets
Warm-up part	10 min	Warm-up exercises to prepare body muscles and internal systems for the main part.			50%	6	3	1 min
		Subdivided into: Starting position: Stand on the Bosu ball with your feet about hip-distance apart. Motion: Jump high with both feet. Raise arms forward and overhead with your palm facing upward. Standing position: Stand on the Bosu ball with your feet about hip-distance apart. Motion: Jump high with both feet. Raise knees up and raise arms overhead and landing to the ground. Starting position: Stand on the Bosu ball.	Muscular power of legs		50%	6	3	1 min
Main part	45 min	Motion: Jump high with both feet. Raise knees up and raise arms overhead and landing to the ground. Starting position: Stand on the Bosu ball.	Muscular power of legs		50%	6	3	1 min
		Motion: Run in the area with maximum speed. Starting position: Run in the area with maximum speed.	Muscular strength of legs		50%	6	3	1 min
		Motion: Fix knee on the Bosu ball. Raise the opposite arm and leg up. Starting position: Stand on one foot on the Bosu ball.	Legs muscle, balance		50%	6	3	1 min
		Motion: Raise arms to sides from hips. Starting position: Stand on the Bosu ball.	Balance		50%	6	3	1 min
1-Special physical preparation		Motion: Jump with bouncing two times, then rotate quarter a cycle. Starting position: Stand on the Bosu ball.	Agility		50%	6	3	1 min
		Motion: Move one step backward with right leg. Switch to left leg. Repeat by standing again on the Bosu ball and switch between legs; left leg then right leg.	Balance		50%	6	3	1 min
2-Skilled preparation	15 min	Sissonne skill training			50%			
Closure part	5 min	Cool-down exercises			50%			

The researcher conducted pilot studies on the pilot study sample (10 female players) after excluding the subjects of the main study sample from the same population to perform/carry out the validity and reliability of physical tests, to determine the maximum intensity for each exercise of the training program and to identify the appropriateness of the program for the female players between 7th to 15th of June, 2014.

Pre-measurement:

Pre-measurements have been conducted for both study groups in all variables under study, that is; age, height, weight, physical tests, skilled performance level between 16th to 26th of June, 2014.

Program application

For the first experimental group, the training program with Bosu ball have been applied between 1st of July to 6th of September, 2014 for 8 weeks with frequency 3 training units per week. Duration of training unit is 60 minutes. The measurements were taken on Sundays, Tuesdays and Thursdays from 9 to 10 A.M.

For the second experimental group, the training program with elastic resistant bands have been applied with the same terms of application adopted for the first experimental group, but the measurements were taken on Saturdays, Mondays and Wednesdays from 9 to 10 A.M.

Post-measurements

Post-measurements have been conducted for both study groups in all study variables after the application of two training programs. The measurements were taken between 7 - 10 September, 2014 taking into consideration the same circumstances and measurement conditions that have been followed in the pre-measurement.

Results

Results of the first experimental group, Table (4) shows significant differences between pre- and post- measurements of the first experimental group (Bosu ball) in physical and skillful variables

Table (4) Significant Differences between Pre- and Post- Measurements of the First Experimental Group (Bosu Ball) in Physical and Skillful Variables $N_1=10$

Serial No.	Variables	Measuring units	Difference Sign	No.	Mean of rank	Sum of rank	Z Value	Sig.
1	Legs' power	Cm.	-	0	0	0	2.807	0.005
			+	10	5.50	55		
			=	0				
2	Agility	Sec.	-	10	5.50	55	2.803	0.005
			+	0	0	0		
			=	0				
3	Static balance	Sec.	-	0	0	0	2.807	0.005
			+	10	5.50	55		
			=	0				
4	Kinetic balance	Degree	-	0	0	0	2.807	0.005
			+	10	5.50	55		
			=	0				
5	Sissonne	Degree	-	0	0	0	2.831	0.005
			+	10	5.50	55		
			=	0				
6	Echappee	Degree	-	0	0	0	2.836	0.005
			+	10	5.50	55		
			=	0				
7	Changement de piede	Degree	-	0	0	0	2.825	0.005
			+	10	5.50	55		
			=	0				
8	Grand Jete	Degree	-	0	0	0	2.850	0.004
			+	10	5.50	55		
			=	0				

Level of significance ≤ 0.05

Table (4) has demonstrated that there were significant differences between pre- and post-measurements of the experimental group in all physical and skillful variables in favor of the post-measurement. Z value ranged between 2.803 to 2.850.

Table (5) shows percentage of change between pre- and post- measurements of the first experimental group (Bosu ball) in physical and skillful variables

Table (5): Percentage of Change between Pre- and Post- Measurements of the First Experimental Group (Bosu Ball) in Physical and Skillful Variables $N_1 = 8$

Serial No.	Variables	Measuring units	Mean of pre-measurement	Mean of post-measurement	Difference between two means	Percentage of change
1	Legs' power	Cm.	19.6	24.9	5.3	%27.04
2	Agility	Sec.	7.59	6.48	1.11	%14.62
3	Static balance	Sec.	2.17	4.09	1.92	%88.48
4	Kinetic balance	degree	36.0	71.9	35.9	%99.72
5	Sissonne	Degree	2.3	4.15	1.85	%80.43
6	Echappee	Degree	2.65	4.7	2.05	%77.36
7	Changement de piede	Degree	2.25	4.35	2.1	%93.33
8	Grand Jete	Degree	2.35	4.4	2.05	%87.23

Table (5) has demonstrated the percentages of change between pre- and post-measurements of the first experimental group (Bosu ball) in physical and skillful variables where the percentages ranged between 14.62 to 99.72%.

Results of the second experimental group, Table (6) shows significant differences between pre- and post- measurements of the second experimental group (elastic resistant bands) in physical and skillful variables.

Table (6): Significant differences between pre- and post- measurements of the second experimental group (elastic resistant bands) in physical and skillful variables $N_2=10$

Serial No.	Variables	Measuring units	Difference		Mean of rank	Sum of rank	Z Value	Sig.
			Sign	No.				
1	Legs' power	Cm	-	0	5.50	55	2.848	0.004
			+	10				
			=	0				
2	Agility	Sec.	-	9	5	45	2.673	0.008
			+	0				
			=	1				
3	Static balance	Sec.	-	0	0	0	2.805	0.005
			+	10				
			=	0				
4	Kinetic balance	Degree	-	0	0	0	2.812	0.005
			+	10				
			=	0				
5	Sissonne	Degree	-	0	0	0	2.694	0.007
			+	9				
			=	1				
6	Echappee	Degree	-	0	0	0	2.831	0.005
			+	10				
			=	0				
7	Changement de piede	Degree	-	0	0	0	2.820	0.005
			+	10				
			=	0				
8	Grand Jete	Degree	-	0	0	0	2.848	0.004
			+	10				
			=	0				

Level of significance ≤ 0.05

Table (6) has demonstrated that there were significant differences between pre- and post-measurements of the second experimental group (elastic resistant bands) in favor of the post-measurement in all physical and skillful variables. Z value ranged between 2.673 to 2.848.

Table (7) shows Percentage of change between pre- and post- measurements of the second experimental group (elastic resistant bands) in physical and skillful variables.

Table (7): Percentage of change between pre- and post- measurements of the second experimental group (elastic resistant bands) in physical and skillful variables $N_2 = 10$

Serial No.	Variables	Measuring units	Mean of pre-measurement	Mean of post-measurement	Difference between two means	Percentage of change
1	Legs' power	Cm.	19.8	22.4	2.6	%13.13
2	Agility	Sec.	7.6	6.89	0.71	%9.34
3	Static balance	Sec.	2.01	3.46	1.45	%72.14
4	Kinetic balance	degree	37.2	63.2	26	%69.89
5	Sissonne	degree	2.2	3.55	1.35	%61.36
6	Echappee	degree	2.35	4.1	1.75	%74.47
7	Changement de piede	degree	2.45	3.85	1.4	%57.14
8	Grand Jete	degree	2.3	3.8	1.5	%65.22

Table (7) has demonstrated that the percentages of change between pre- and post-measurements of the second experimental group in physical and skillful variables ranged between 9.34 to 74.47%.

Differences results of experimental and control groups, Table (8) shows significant differences between first and second experimental groups in physical and skillful variables

Table (8): Significant differences between first and second experimental groups in physical and skillful variables $N_1 = N_2 = 10$

Serial No.	Variables	Measuring unit	First experimental group (Bosu ball)		Second experimental group (rubber bands)		U Value	Sig.
			Mean of rank	Sum of rank	Mean of rank	Sum of rank		
1	Legs' power	Cm.	13.85	138.5	7.15	71.5	16.5	0.009
2	Agility	Sec.	7	70	14	140	15	0.007
3	Static balance	Sec.	13.55	135.5	7.45	74.5	19.5	0.019
4	Kinetic balance	Degree	13.3	133	7.7	77	22	0.035
5	Sissonne	Degree	14	140	7	70	15	0.007
6	Echappee	Degree	13.8	138	7.2	72	17	0.011
7	Changement de piede	Degree	13.85	138.5	7.15	71.5	16.5	0.009
8	Grand Jete	Degree	14.3	143	6.7	67	12	0.003

Table (8) has demonstrated that there were significance differences between post-measurements of the first experimental group (Bosu ball) and of the second experimental group (elastic resistant bands) in favor of the first experimental group (Bosu ball) in all physical and skillful variables. U values ranged between 15 to 22.

Discussion

For the first experimental group, the results of physical variables are discussed as follows

As demonstrated by tables (4), (5), there were significant differences between pre- and post-measurements of the first experimental group (Bosu ball) in favor of the post-measurement. The percentages of change ranged between 14.62 to 99.72%.

The researcher referred this improvement in the physical variables to training with Bosu ball as an assistive tool in training was positive and effective for raising the physical level of female players. Findings agree with those of a study by Wageih and Abdullah (2012) in that the availability of equipment and assistive tools is one of the basic elements, upon which any sports training program is built, that has a positive effect on training and on its good outcomes.

Training with Bosu ball has also helped in developing the muscular power of legs according to studies by Zemkova and Jelen (2012), Mabrouk (2008) and Hassan (2004).

Findings also revealed the improvement resulted in the level of balance and agility elements amongst the first experimental group. The researcher suggested that training with Bosu ball helps produce a variety of workouts by means of practicing on its spherical surface or moving from ground to ball or using two balls together etc.... This helps produce a variety of agility and balance workouts and gives more amusement and motivation that have a positive effect on the performance level of kills under study.

Results agree with those of a study by Yaggie and Campball (2006), and a study by Wageih and Yahia (2012) that demonstrated the positive effect of Bosu ball on the development of agility and balance elements as well as the improvement of the skilful performance in the different activities such as basketball and ballet.

Thus, the first hypothesis that states that " There would be statistically significance differences between the means of pre-and post-measurements of the first experimental group (Bosu ball) in the physical and skilful variables under study in favor of the post-measurement" has been satisfied.

Results of table (6) and (7) suggested that there were statistically significance differences between pre-and post-measurements of the second experimental group (rubber resistant bands) in all variables under study in favor of the post-measurement. The percentages of change ranged between 9.34 to 74.47%. The researcher attributed this improvement to the training program with rubber resistant bands where it included movements characterized by flexibility, elasticity and strength for all body joints and muscles in a constant and regular way taking into consideration the gradual load increase- number of repetitions- within secure boundaries of training. Therefore, the proposed program has been achieved its objectives concerning the development of physical agility elements represented in the muscular power of legs, agility and both types of balance.

Usage and variation of music during the program produce an exciting and amusing atmosphere amongst female players that help practicing without feeling bored or tired. This smoothly aligned with Wayne's claim (2005) that the special-purpose exercises are important since they aim to strengthen the main sets and in the same kinetic path that too much similar to the type of motor activity. (Wayne's, 2005)

Results also demonstrated that there is an improvement in the performance level of skills under study represented in Sissonne· Echappee ·Grand Jete and Changement de piede .The researcher attributed this improvement to the proposed program which led to an improvement in the flexibility of joints and tendons and in the muscles' strength due to the continual practicing. This proposed program had an effective influence on the performance of skills in a streamline way and with saved effort which helps to raise the level of skilled performance.

Results agree with those suggested by Abdul-Fattah (2006), Ali (2004) in that the rubber resistant bands produce a positive effect on the special physical abilities and on the skilled performance level.

Thus, the second hypothesis that states that" There would be statistically significance differences between pre-and post-measurements of the second experimental group (rubber resistant bands) in the physical and skilful variables under study in favor of the post-measurement" has totally been satisfied.

Results of table (8) suggested that there were statistically significance differences between post-measurements of the first experimental groups (Bosu ball) and the second experimental group (rubber resistant bands) in the physical and skilful variables under study in favor of the first experimental group. U-value ranged between 12 to 22. The researcher attributed these differences to the training program with Bosu ball. This program has a positive effect on the psychological aspect since it is characterized by challenge. It stimulates the abilities of players, resulting in higher acceptance and amusement during practicing. It also has a positive effect on the physical aspect since it requires the players to keep his balance and their muscular power and agility workouts they perform on the Bosu ball to be effective. This would contribute in developing the physical elements under study and hence improve the performance level of ballet skills.

These findings agreed with those of studies by Wageih and Yehia (2012) and a Yaggie and Campbell (2006) in that the Bosu ball produces a positive effect on the improvement of physical characteristics and on the skilled level.

Thus, the third hypothesis that states that" there would be statistically significance differences between two post-measurements of two experimental groups in the physical and skilful variables under study" has been satisfied.

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