

Effects of Elastic Band Training in Youth Dance Sport Athletes

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Objective: To evaluate if the elastic band training was beneficial in dance sport athletes.

Materials and Methods: This was an intervention, pre- and post-test study and conducted at Nakhon Ratchasima Dance Club. The inclusion criteria were youth dance sport athletes who had an age between 11 and 17 years and agreed to participate the present study. The intervention of this study was elastic band training for eight weeks; three times per weeks with the 16 postures. At baseline and at the end of the study, participants were evaluated for the five outcomes including 3-minute step up and down, 30-second modified push-ups, 60-second sit-ups, sit and reach test, and body mass index.

Results: There were 10 youth dance sport athletes participated the present study; five male and five female athletes. The average age (SD) of the participants was 13.00 (2.21) years. Among five outcomes, four outcomes were significantly increased from the baseline except body mass index. The 3-minute step up and down was increasing from 176.90 to 396.60 with the highest t score of -15.51 ($p < 0.01$), while the 60-second sit-ups had the smallest t score of 2.684 (41.00 to 46.40; $p = 0.03$).

Conclusion: The eight-week intervention of the elastic band training significantly improved physical fitness and balance in the youth dance sport athletes.

Keywords: Fitness; Adolescent; Balance; Strength

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Dance is a joyful sport which may improve both physical fitness and psychological functions across all age groups^(1,2). A previous study showed that Tango-therapy significantly improved gait speed than the physical exercise in the elderly ($p = 0.016$)⁽³⁾. Samba dance also significantly improved cardiorespiratory parameters such as 19% increase oxygen uptake compared to the control group⁽⁴⁾. Physical fitness may prevent several cardiovascular diseases and obesity⁽⁵⁻⁹⁾. Additionally, a recent systematic review found that dance sport may improve well-being including

mood, fatigue, or depression⁽¹⁰⁾. One study found that dance intervention significantly reduced depression score compared with control (13.90 vs. 17.48; $p = 0.004$)⁽¹¹⁾. Even though dance is a sport, a previous study found that 50 to 85% of dancers had injury with an average of 1.28 injury per dancer or 5.51 injuries per 1,000 hours of dancing^(12,13). A long term study suggested that collegiate dancers should have upper-body strength endurance and power to prevent injury⁽¹⁴⁾.

Elastic band training is a resistance exercise that improve functional performance in the elderly persons⁽¹⁵⁻¹⁸⁾. It provided significantly improvement in balance and gait in the elderly. After eight weeks, the elastic band training significantly improved functional reach test from 18.1 to 22.0 cm ($p < 0.0001$) and dynamic gait index from 16.0 to 19.6 ($p < 0.0001$) than the control group⁽¹⁶⁾. Elastic band training is also significantly improved upper extremity strength endurance ($p < 0.001$), throwing velocity ($p = 0.001$), and maximal isometric strength ($p = 0.004$) than control in adolescent handball players⁽¹⁹⁾. However, there is limited data of elastic band training in dance sport athletes. This

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study aimed to evaluate if the elastic band training was beneficial in dance sport athletes.

Materials and Methods

This was an intervention, pre- and post-test study and conducted at Nakhon Ratchasima Dance Club. The inclusion criteria were youth dance sport athletes who had an age between 11 and 17 years and agreed to participate the study. Those who had co-morbid disease or previously practiced elastic band training were excluded. The participants were purposive sampling from those who were representing Nakhon Ratchasima province. The study protocol was approved by the human research ethics committee of Rajamangala University of Technology Isan (HEC-01-65-045).

The intervention of this study was elastic band training. This training was created by the authors based on previous literatures with an aim to improve health related physical fitness. There were 16 postures which had been evaluated by three experts, piloted with young athletes, and modified to be matched with the young athletes. The training was performed for eight weeks; three times per week on Monday, Wednesday, and Friday from 6:00 PM to 7:00 PM. The study protocol was approved by the institutional board review of the Rajamangala University of Technology Isan, Nakhon Ratchasima (HEC-01-65-045). All participants and their parents gave an informed consent prior to study participation.

At baseline and at the end of the study, participants were evaluated for the five outcomes including 3-minute step up and down, 30-second modified push-ups, 60-second sit-ups, sit and reach test, and body mass index. For the 30-second modified push-ups and the 60-second sit-ups, the participants were asked to perform push-ups and sit-ups correctly for 30 seconds and 60 seconds, respectively and recorded as numbers that the participants did. The 3-minute step up and down and the sit and reach test were performed as previously described and recorded as numbers and centimeters, respectively^(18,20). Body mass index was calculated by body weight in kilograms divided by height in meters².

Statistical analysis

The baseline characteristics and outcomes of the study

at baseline and at the end of the study were calculated by descriptive statistics and reported as mean (SD). The outcomes were tested for normality by Shapiro Wilk test. A pre- and post-test comparison was performed by paired t-test if data were normally distributed, while Wilcoxon sign rank test was used if data were not normally distributed. All analyses were performed by SPSS software, version 28.0.

Results

There were 10 youth dance sport athletes participated the study; five male and five female athletes. The average age (SD) of the participants was 13.00 (2.21) years, while the average (SD) weight and height (SD) was 49.13 (11.19) kg and 160.80 (11.44) cm, respectively.

Among five outcomes, only body mass index was not statistically different from baseline (18.73 to 19.04 kg/m²; p=0.11). The other four outcomes were significantly increased from the baseline (Table 1). The 3-minute step up and down was increasing from 176.90 to 396.60 with the highest t score of -15.51 (p<0.01), while the 60-second sit-ups had the smallest t score of 2.684 (41.00 to 46.40; p=0.03). The average number of 30-second modified push-ups was significantly increasing from 20.10 to 27.40 times (p<0.01), while the sit and reach test was also significantly longer from 18.65 cm at baseline to 20.74 cm at the end of the study (p<0.01).

Discussion

The present study showed that the eight-week elastic band training significantly improved physical fitness and balance in youth dance sport athletes but not body mass index.

The elastic band training facilitates functional fitness in all directions of movement. A systematic review found that the elastic band training significantly improved isometric strength by 7 to 42% and isokinetic strength variably⁽²¹⁾. Therefore, it was not surprising that the youth dance sport athletes had significant improvement in the outcomes including the 3-minute step up and down, the 30-second modified push-ups, and the 60-second sit-ups. Note that the previous systematic review included 24 studies from various sports and age groups including volleyball, tennis, swimming, teenagers, and post-menopausal women but not the youth dance sport athletes. Another study also showed

Table 1. Outcomes of elastic band training in youth dance sport athletes for 8 weeks (n=10)

Factors	Baseline	End of study	t-scores	p-value
3-minute step up and down, n	176.90 (11.82)	396.60 (44.01)	-15.51	<0.01
30-second modified push-ups, n	20.10 (2.85)	27.40 (3.92)	-7.55	<0.01
60-second sit-ups, n	41.00 (6.13)	46.40 (5.78)	-2.68	0.03
Sit and reach test, cm	18.65 (5.39)	20.74 (5.00)	-5.99	<0.01
Body mass index, kg/m ²	18.73 (2.49)	19.04 (2.32)	-1.75	0.11

that the elastic band training also significantly improved muscle strength in the elderly⁽¹⁸⁾. The grip strength was significantly higher in the elastic band training group than the control group (28.3 vs. 22.2 kg; $p=0.026$).

Another advantage of the elastic band training is balance. This study showed that the sit and reach test was significantly improved after the eight weeks of intervention. These results were similar to the two previous studies conducted in the elderly people^(16,18). In the healthy elderly subjects, the sit and reach test was increasing from 8.9 cm to 11.0 cm (2.1 mean difference) which was comparable with this study with a mean difference of 2.09 cm (Table 1). For body mass index, these results may similar to several studies that exercise may not reduce body weight. It might be several factors affecting the athletes' body weight such as diet and duration of the intervention⁽²²⁻²⁵⁾.

There are several limitations in this study. First, there was no comparison group with small sample size. However, the outcomes were significantly improved after the training. Second, this study conducted in only the youth dance sport athletes. Finally, the long-term outcome of injury prevention was not evaluated.

In conclusion, the eight-week intervention of the elastic band training significantly improved physical fitness and balance in the youth dance sport athletes.

What is already known on this topic?

Elastic band training has been shown to be beneficial in several populations such as elderly people, swimmers, handball players, or tennis players but not dance sport athletes.

What this study adds?

Elastic band training improved physical fitness and balance in youth dance sport athletes.

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Conflicts of interest

The authors declare no conflict of interest.

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