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The Effect of Power of Agility of Core Stabilization Exercise by the Musical Type

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Abstract

Background/Objectives: The purpose of this study was to investigate the effects of core stabilization exercise combined with music of various tempo and mode on the power of agility.

Method/Statistical Analysis: 65 healthy adults who didnot major in music were recruited and each participant were randomly divided five groups. All groups were performed core stabilization exercise for 3 weeks. To confirm the effect of core stabilization exercise combined with music of various tempo and mode, they were measured before and after the exercise.

Findings: After applying the core stabilization exercise, the power of agility was improved in all groups, and the fast tempo groups improved the power of agility more than the slow tempo groups. However, there was no significant difference between the major mod and minor mode groups.

Improvements/Applications: Tempo was affected on the power of agility. But mode was not affected on the power of agility.

Keywords: *Power of agility, Music, Tempo, Mode, Core stabilization exercise.*

Introduction

Recently, a variety of core stabilization exercises have been applied to enhance the physical fitness and exercise performance of the general public and to prevent injuries[1]. The core muscles are the muscles of the spinal, pelvis, hip, and abdominal muscles that maintain the stability of the vertebrae[2]. Core stabilization exercises can improve muscle strength, power of agility, flexibility, and balance in high school girls and middle-aged women, accompanied by the training of the gluteus maximus muscle[3-4]. In addition, it has been reported that female tennis players can positively improve their basic stamina and athletic performance[5]such as improving leg strength, muscular endurance, and power of agility[6]. However, even though exercise is important, exercise is stressful if it is boring and does not cause interest. Therefore, various method are sought to exercise without physical and psychological stress caused by exercise. Among them, music therapy has been applied to reduce psychological stability and stress from exercise since long time ago[7]. The effect of this music causes human physical, psychological, and emotional responses, and the rhythm and dynamics of the music motivate them to bring about regular and systematic behavior[8]. It has been reported that the physical exercise activity using music not only increases exercise ability and coordination but also induces motivation during exercise learning[9]. Also, it is reported that the rhythm of music has a similarity with human movement and thus affects physical function[10]. Previous papers showing the effects and effects of music tempo reported that slower tempo music improves concentration than faster tempo music[11]. It has also been reported that applying a slower tempo improves body flexibility[12]. The mode consists

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of major and minor. Major is associated with joy and happiness, and minority is associated with sadness[13-14]. There were not many papers that examined exercise performance ability by applying mode or combining mode and tempo. Therefore, it is necessary to investigate how tempo and mode affect exercise performance and to find a more efficient way to exercise by applying music later on. We measured the wits after three weeks of core stabilization in the experimental group with four music combinations of tempo and mode and the control group without music. We investigated which music is effective in improving the performance of exercise given above.

Method

The subjects of this study were 65 adults who meet the following conditions for Seongnam Senior Experience Complex and fully understood and agreed on the contents of the experiment. The selection criteria were neurological diseases and no hearing impairment, and no orthopedic, symptoms and functional limitations. Before performing this study, the subjects were fully explained about the contents and procedures, and all subjects completed the agreement for the experiment. All groups were randomly assigned to exclude preferences. The general characteristics of the subjects are as follows [Table 1].

Table 1. Physical characteristics of subjects

Item	Number	Age	Height	Weight	Leg length	
					Left	Right
FMjG	13	51.2±1.6a	171.2±8.4	64±10.3	89.7±5.3	89.7±5.5
FMnG	13	51.4±1.5	165.1±7.1	61.9±11.6	86.1±3.9	86.7±3.7
SMjG	13	51.6±1.8	168.9±8.9	66.2±9.3	88.5±4.2	88.6±4.3
SMnG	13	52.3±2.6	170.9±7.3	64.5±11.7	87.7±5.0	87.8±4.6
NMG	13	51.2±1.5	169.2±8.5	61.9±11.8	88.4±4.5	88.6±4.8

[a]Mean±SD, FMjG: Fast Major Group, FMnG: Fast Minor Group, SMjG: Slow Major Group, SMnG: Slow Minor Group, NMG: No Music Group

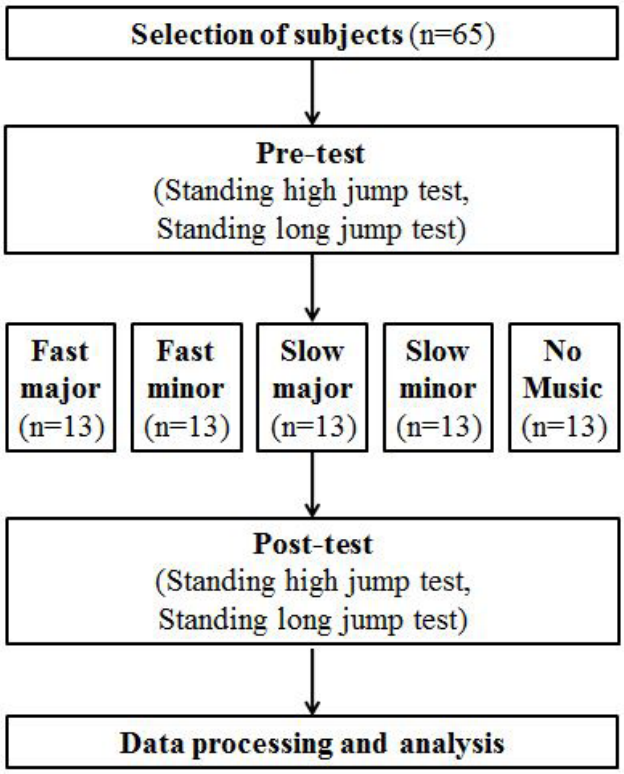

Figure 1. Experimental diagram

The subjects were randomly assigned to five groups: fast major group, fast minor group, slow major group, slow minor group, and no music group. Prior to the experiment, we used the standing high jump test and standing long jump test. And the experiment was conducted for 3 weeks and the core stabilization exercise was performed three times a week. After the experiment, the same method was used to evaluate the change in power of agility [Figure 1].

The power of agility test was standing high jump test and standing long jump test, and this test has been used in many studies[15].The standing high jump test is as follows. The subject stands 20cm from the wall and stands side by side with the wall. And the subject jumps as high as possible on the spot, hitting the measuring plate with his fingertips. We measured and recorded thee gap between the height of the fingertips in jumping and the height of the fingertips in standing place[16]. The standing long jump test is as follows. The subject spreads both feet lightly at shoulder width and then stands so that the tip of the foot does not deviate from the reference line. Then land as far as you can. At this

time, measure the distance from the reference line to the nearest landing point(heel line) at right angles. The unit of measurement was recorded in cm and the decimal point was rounded to the second place[17].

Experiment was conducted in a closed and quiet location. In addition, participants were instructed about the exercise program, and after simple stretching, they lie on the mat and listen to their music through the earphone. The exercise method was performed referring to the method used in the previous paper[3,18]. The first exercise is the bridge. The subjects lay on a mat and attach both arms to the ground. They bent their knees, attached the soles of the feet to the mat, looking at the ceiling, gave strength to the buttocks and raise their pelvis. They relaxed on the buttocks and repeated the action of lowering their pelvis[3]. The second exercise is plank. The subjectscollect the feet, stretches his arms with the elbows and shoulders at a right angle, and falls down, holding the inverted togu. Keep straight from head to toe[18]. The bridge exercise was performed in three sets of 10 seconds and the flank exercise in three sets of one minute. After each set, 10-second break was given, followed by a 30-second rest before the next exercise.

Music application of each group is as follows. Fast tempo music was chosen as three songs of allegro music, and slow tempo music was chosen as three songs of quiet and adagio music. And, the major group music was chosen as the major mov music, and the minor group music was chosen as the minor mov music. They listened to the music only during the core stabilization exercise.

The data collected in this study are statistical program SPSS ver. 25.0, and different analytical techniques were applied according to the purpose. First, the analysis of pre- and post-exercise differences was performed using the corresponding sample T-test. The differences between groups after exercise were analyzed using one-way ANOVA. Statistical significance was set at $p < 0.05$.

Result and Discussion

Corresponding sample t-test was used to show the significance of the difference between before and after application of luck program in each group measured by "standing high jump test". There were statistically significant differences in all groups ($p < 0.05$) [Table 2]. In addition, after exercise program in all groups increased significantly before application [Table 2]. The results of the ANOVA showed that all groups showed significant differences [Table 3]. There was a significant difference between all groups except the fast major group, the fast major group, and the slow main group ($p < 0.05$) [Table 4].

Corresponding sample t-test was used to show the significance of the difference between before and after application of luck program in each group measured by "standing long jump test". The results were statistically significant ($p < 0.05$) [Table 2]. In addition, after exercise program in all groups increased significantly before application [Table 2]. Using the ANOVA analysis to see the mean difference between the groups, all groups showed significant differences [Table 3]. There was a significant difference between all groups except the fast major group, the fast major group, and the slow main group ($p < 0.05$) [Table 5].

Table 2. Comparison of before and after in-group for power of agility

Item	DV	Average (a-b)	SD	t	p
Standing high jump	FMjG	8.008	2.143	-13.470	0.000*
	FMnG	8.023	2.545	-11.367	0.000*
	SMjG	4.130	1.983	-7.509	0.000*
	SMnG	4.550	3.242	-5.060	0.000*
	NMG	2.727	1.213	-8.105	0.000*
Standing long jump	FMjG	27.765	21.946	-3.905	0.002*
	FMnG	25.815	5.698	-9.375	0.000*
	SMjG	12.738	8.598	-5.342	0.000*
	SMnG	12.242	18.729	-2.357	0.036*
	NMG	1.973	4.846	-7.421	0.000*

[a]Mean±SD (*p<0.05), DV: Dependent Variable, a-b: After-Before, SD: Standard Deviation

Table 3. Comparison between groups for each exercise

		Square sum	Mean squared	F	p
Standing high jump	Inter-group	359.568	89.892	31.387	0.000*
	Intra-group	171.841	2.864		
	All	531.409			
Standing long jump	Inter-group	5331.904	1332.976	11.651	0.000*
	Intra-group	6693.064	111.551		
	All	12024.968			

(*p<0.05)

Table 4. Comparison of mean differences between groups for standing high jump test

		Average Difference	p
FMjG	FMnG	-0.446	0.664
	SMjG	3.528	0.000*
	SMnG	0.664	0.000*
	NMG	3.377	0.000*
FMnG	FMjG	0.664	0.962
	SMjG	5.804	0.000*
	SMnG	0.664	0.000*
	NMG	0.446	0.000*
SMjG	FMjG	0.664	0.000*
	FMnG	3.974	0.000*
	SMnG	0.664	0.999
	NMG	3.823	0.009*
SMnG	FMjG	0.664	0.000*
	FMnG	6.250	0.000*
	SMjG	0.664	0.999
	NMG	-3.528	0.005*
NMG	FMjG	0.664	0.000*
	FMnG	-3.974	0.000*
	SMjG	0.664	0.009*
	SMnG	-0.151	0.005*

(*p<0.05)

Table 5. Comparison of mean differences between groups for standing long jump test

		Average difference	p
FMjG	FMnG	1.377	0.999
	SMjG	15.338	0.037*
	SMnG	15.980	0.027*
	NMG	30.888	0.000*
FMnG	FMjG	-1.377	0.999
	SMjG	13.962	0.071
	SMnG	14.603	0.053
	NMG	29.512	0.000*
SMjG	FMjG	-15.338	0.037*
	FMnG	-13.962	0.071
	SMnG	0.642	1.000
	NMG	15.550	0.033*
SMnG	FMjG	-15.980	0.027*
	FMnG	-14.603	0.053
	SMjG	-0.642	1.000
	NMG	14.908	0.046*
NMG	FMjG	-30.888	0.000*
	FMnG	-29.512	0.000*
	SMjG	-15.550	0.033*
	SMnG	-14.908	0.046*

(*p<0.05)

According to the preceding paper on power of agility, the experimental group that listened to fast tempo music was more effective in improving power of agility than the control group that did not listen to fast tempo music[19]. In this study, as in the previous papers, it was found that fast tempo music listening had the effect of improving power of agility. Previous studies reported that fast tempo induces high arousal in emotions and slow tempo induces low arousal in emotions[20-21]. Therefore, in this study, high emotional arousal had a positive effect on the improvement of power of agility when applying fast tempo music.

According to the preceding paper, mode is related to emotion[13-14]. In addition, negative emotions and athleticism of athletes were reported to have a significant relationship[22]. This suggests that the mode of music affects emotions, and thus the mode of music can affect motility. However, no significant difference was found in the power of agility between major mode and minor mode in this study. This suggests that the difference in emotion through music in nor related to the improvement of the power of agility, but more in-depth study is needed.

In this study, the experimental group was randomly selected to exclude the preference for music. However, it was found that the preferred music appreciation had a positive effect on the police's job stress and fatigue reduction[23]. And previous studies have shown that fatigue and stress caused by sleep deprivation have an effect on exercise performance such as power of agility and balance[24]. Based on these results, it is expected that if the research is conducted by applying the preference for music in the future, more significant results will be obtained than the previous studies.

Conclusion

The purpose of this study was to investigate the effects of tempo and mode on exercise performance in normal adults. The subjects were divided into five groups: fast major, fast minor, slow major, slow minor, and no music listening. They performed core stabilization exercises three times a week for three weeks. We measure the power of agility before the experiment and evaluated the changes after the experiment, and we came to the following conclusions: First, the fast tempo improves the power of agility more than the slower tempo. Second, there were no significant differences in power of agility between major mode and minor mode applications.

Ethical Clearance: Not required

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Conflict of Interest: Nil

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