



P-ISSN: 2394-1685  
E-ISSN: 2394-1693  
Impact Factor (ISRA): 5.38  
IJPESH 2019; 6(5): 104-108  
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www.kheljournal.com  
Received: 28-07-2019  
Accepted: 30-08-2019

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## Enhancing the agility for female badminton athletes at Sai Gon University

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### Abstract

The purpose of this study was to find out the agility exercises for training and motivated female students at Sai Gon University to play badminton better. 30 female athletes volunteered and selected who divided randomize in two groups (ie. experimental and control). The 9-exercise for enhancing the agility was selected and applied to experimental group, while control group practiced according to a pre-determined 14-week training program. The results indicated that there were no significant differences between experimental and control group in pre-test; however, all test results in post-test showed significant differences between experimental and control group. Besides, the comparison of experimental and control group before the training program implementation displayed no significant differences in all tests ( $p>0.05$ ), while had significant differences between pre- and post-test in both experimental and control group. Besides, the growth rate in experimental had higher than control group. In conclusion, the 9-exercise for female badminton athletes at Sai Gon University indeed had a high potentiation effect on agility, which could be added inside our current training program as annual training of badminton club model.

**Keywords:** Agility, badminton, female athletes, the 9-exercise, Sai Gon University

### 1. Introduction

Badminton is a popular fast-paced indoor sport which can be played by an individual (single) or a team (double). Therefore, agility is very important in badminton competition to move quickly around the court (Bin, 2015) [2] and return the shuttle in less than one second decision (Dong *et al.*, 2018) [5]. Badminton demands on-court agility that includes both physical and perceptual quickness, and predicts the shot from the opponent (Abernethy *et al.*, 2012; Pathmanathan *et al.*, 2015) [1, 18]. Clearly, athletes need the agility to react from the return of opponent (Ooi *et al.*, 2009) [17]; Otherwise, it is going to land on your side, and lose the Game (Frederick *et al.*, 2014) [7]. In the other hand, agility indicates the ability to move our body to reach the destination of shuttle early with a correct and fastest footwork (Haj-Sassi *et al.*, 2012) [12]. There are many agility tests which have been developed many different sports such as football, volleyball, table tennis, etc. Almost the tests focused on the change of direction speed and the decision making of players (Farrow *et al.*, 2005; Gabbett & Benton, 2009; Veale *et al.*, 2010) [6, 8, 22]. We wondered that these agility tests were suitable and well applied for female athletes at Sai Gon University? Furthermore, Sai Gon University has been founded for 10 years; However, sport activities were always concerned by the President and university leaders and attracted the participation by many students. Badminton was the most choice of students for training at Sai Gon University, specially in female students (Son *et al.*, 2018) [20]. In order to reach the high level in badminton, agility was one of the key points we should prepare the good workouts (specific exercises in agility) for training (Nebahat & Serdar, 2018) [16]. According the head coach, there were lack of these agility workouts in badminton training program at Sai Gon University was our rationale of this study.

### 2. Methodology

#### 2.1 Participants

30 volunteer female athletes in badminton club model at Sai Gon University were chosen (such as in good condition, no using any drugs or any injuries treatment, no smoking, etc.).

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They were randomized divided in 2 groups: control group (use the normal training program as usual) and experimental group (added the agility workouts). All of subjects attended the 14-week training program, which had two training sessions per week (from 15h30 to 17h00 on Wednesday and Saturday each week). They were informed of the test procedures before providing written consent.

**2.2 Procedures**

Two weeks before training program began, participants reported to the head coach for their participation. They were under the health examination (resting heart rate, blood pressure, physical checking with no injuries or painful...) and

accepted all the testing throughout being trained. This study took 2 times for testing: (1) before training (pre-test) and (2) after 14-week training (post-test) from the first week of September to December, 2018. For each participant, all tests were performed in three times with the same condition and methods. Besides, participants were familiar with mentioned procedures as part of their regular training process.

**2.3 Validity of instruments**

**2.3.1 Training program:** A pre-determined 14-week training program as shown in Table 1 which was used in yearly training at Sai Gon University (Son, *et al.* 2018) [20].

**Table 1:** A 14-week training program in badminton at Sai Gon University

Months		September				October				November				December			
Weeks		Pre-test	1	2	3	4	5	6	7	8	9	10	11	12	13	14	Post-test
Physical fitness	Strength	Test	General				Specialization				Test						
	Endurance		General fitness				Anaerobic endurance										
	Speed		General		Speed endurance												
	Mix-		Basic		Mix-training												
Others training	Skills	Test	Basic		Advance		Specialization		Test								
	Tactics		Singles		Doubles												
	Mentality		Singles														
	Laws		Combined with tactical and physical training														

**2.3.2 Agility tests:** Based on the literature, former studies (Khoi, 2012; Golds, 2016; Kim, 2017; Dong *et al.*, 2018; etc.) [14, 10, 15, 5] and nature in badminton, we selected 4 tests to evaluate the agility in badminton, which suited for female students, facilities available and training level of participants (Son *et al.*, 2018) [20] at Sai Gon University after meeting the expert's opinions (must higher than 85% experts chosen). They were jumping rope in 30 seconds (times), loaded the heavy badminton racket in 30 seconds (times), and two multi-directional shuttle runs test such as 5 repetitives back and forth (seconds) and 5 repetitives left and right across the court (seconds).

**2.3.3 Agility exercises (the 9-exercise):** Based on the Frederick *et al.* (2014) [7], Golds (2016) [10], Khoi (2012) [14] and many former studies about badminton (Bin, 2015 [2]; Farrow *et al.*, 2005 [6], Ooi *et al.*, 2009 [17], etc) in line with the expert interview (higher than 85% was selected), we chose 9-exercise to enhance agility in badminton for female students, included (1) 3 x side to side rotation-base hop with 1 min break, (2) 5 x 6 coner defensive pattern-attack with 2

mins break, (3) 2 x backhand drive to forehand net kill to forehand drive to backhand net kill in 30s, (4) 2 x turn back smash forehand corner to turn back smash backhand corner in 30s, (5) 2 x smash go to net kill forehand corners in 30s, (6) 5 x badminton T-drill with 30s break, (7) 10 x badminton ladder drill with 10s break, (8) 2 x loaded heavy badminton racket wrist rotations, (9) 3 x side to side smash pick-up in 30 seconds with 2 mins break. These exercises were applied to the experimental group as showed in Table 2.

**2.4 Statistical analysis**

All data were expressed as mean and standard deviation values (mean±SD). Statistical analysis was performed by using the SPSS version 20 for Windows. Independent t-test was used to identify the differences between experimental and control group. Paired sample t-test was used to show the differences between pre- and post-test in each group. The growth rate calculation was used to evaluate the improvement after experimental process (Brody, 1927) [3]. Level of statistical significance was set at  $p < .05$ .

**Table 2:** Schedule implementation of the selected 9-exercise.

Exercises	September			October				November				December			
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
1		X		X		X		X		X		X			
2			X		X		X		X		X		X		
3	X	X			X	X	X	X	X			X	X	X	
4	X	X		X		X		X		X	X	X	X	X	
5							X		X		X				
6			X	X	X										
7						X	X	X							
8	X	X	X	X					X	X	X		X	X	
9	X		X		X					X		X		X	

**Notes:** (1) 3 x side to side rotation-base hop with 1 min break, (2) 5 x 6 coner defensive pattern-attack with 2 mins break, (3) 2 x backhand drive to forehand net kill to forehand drive to backhand net kill in 30s, (4) 2 x turn back smash forehand corner to turn back smash backhand corner in 30s, (5) 2 x smash go to net kill forehand corners in 30s, (6) 5 x badminton T-drill with 30s break, (7) 10 x badminton ladder drill with 10s break, (8) 2 x loaded heavy badminton racket wrist rotations, (9) 3 x side to side smash pick-up in 30 seconds with 2 mins break.

### 3. Results & Discussions

No participants dropped from the study. The average age, height, and weight of experimental group were  $19.27 \pm 0.59$  years,  $160.67 \pm 5.96$  cm, and  $52.53 \pm 7.59$  kg, respectively,

while the average age, height, and weight of control group were  $19.87 \pm 0.74$  years,  $157.06 \pm 2.43$  cm, and  $46.87 \pm 4.94$  kg, respectively (Table 3).

**Table 3:** Characteristic of participants

Contents	Experimental group (15)	Control group (n=15)
Age (years)	$19.27 \pm 0.59$	$19.87 \pm 0.74$
Height (cm)	$160.67 \pm 5.96$	$157.06 \pm 2.43$
Weight (kg)	$52.53 \pm 7.59$	$46.87 \pm 4.94$

There were no significant differences between experimental and control group in pre-test; however, all test results in post-

test showed significant differences between experimental and control group (Table 4).

**Table 4:** Comparison between experimental and control group

Test	Time	Experimental	Control	t	df	p
1 (times)	Pre-test	$54.27 + 5.05$	$53.80 + 4.66$	0.286	14	0.779
	Post-test	$62.07 \pm 4.81$	$56.40 \pm 4.59$	0.3712	14	0.002
2 (times)	Pre-test	$22.54 + 0.89$	$23.14 + 1.27$	-1.694	14	0.112
	Post-test	$20.05 \pm 0.76$	$22.43 \pm 1.02$	-7.087	14	0.000
3 (seconds)	Pre-test	$19.10 + 0.90$	$18.96 \pm 1.22$	0.057	14	0.955
	Post-test	$17.85 \pm 0.77$	$18.70 \pm 0.88$	-2.509	14	0.025
4 (seconds)	Pre-test	$16.20 + 1.17$	$16.21 + 1.11$	0.000	14	1.000
	Post-test	$21.53 \pm 1.54$	$18.73 \pm 1.53$	5.832	14	0.000

**Notes:** (1) jumping rope in 30 seconds (times), (2) loaded the heavy badminton racket in 30 seconds (times), (3) 5 repetitives back and forth (seconds), (4) 5 repetitives left and right across the court (seconds).

Moreover, the comparison of experimental and control group before the training program implementation displayed no significant differences in all tests ( $p > 0.05$ ) which could be state that both experimental and control group was at the same

level. Besides, there were significant differences between pre- and post-test in both experimental and control group. Besides, the growth rate in experimental had higher than control group in all tests (Table 5).

**Table 5:** Comparison between pre- and post-test in experimental and control groups

Test	Groups	Pre-test	Post-test	t	df	p	W%
1 (times)	Experimental	$54.27 \pm 5.05$	$62.07 \pm 4.81$	-39.000	14	0.000	13.41
	Control	$53.8 \pm 4.66$	$56.41 \pm 4.59$	-13.667	14	0.000	4.72
2 (times)	Experimental	$22.54 \pm 0.89$	$20.05 \pm 0.76$	16.133	14	0.000	11.67
	Control	$23.14 \pm 1.27$	$22.43 \pm 1.02$	4.475	14	0.001	3.13
3 (seconds)	Experimental	$19.10 \pm 0.90$	$17.85 \pm 0.77$	8.601	14	0.000	6.74
	Control	$18.96 \pm 1.22$	$18.7 \pm 0.88$	2.781	14	0.015	1.98
4 (seconds)	Experimental	$16.20 \pm 1.17$	$21.53 \pm 1.54$	-33.47	14	0.000	28.27
	Control	$16.20 \pm 1.11$	$18.73 \pm 1.53$	-6.141	14	0.000	14.50

**Notes:** (1) jumping rope in 30 seconds (times), (2) loaded the heavy badminton racket in 30 seconds (times), (3) 5 repetitives back and forth (seconds), (4) 5 repetitives left and right across the court (seconds).

According to Gibbons (2009) <sup>[19]</sup> noted that if female students do not find any value in training, they will leave when they have a chance. But if we took some promising steps that with co-ordinated attention have the potential to meet the female students needs and increase the chance that physical activity will become a regular part of their lives. In our study, the characteristic of Sai Gon students was that the percentage of female was much higher than male students (Son *et al.*, 2014) <sup>[19]</sup> in line with the participation in badminton was higher than another sport courses (eg. football, basketball, volleyball, table tennis, etc.). Clearly, if we could not meet the female expectation in improving their fitness, they would leave or choose another sport for training. Therefore, the adding 9 more exercises in agility (ie. 3 x side to side rotation-base hop with 1 min break, 5 x 6 coner defensive pattern-attack with 2 mins break, 2 x backhand drive to forehand net kill to forehand drive to backhand net kill in 30s, 2 x turn back smash forehand corner to turn back smash backhand corner in 30s, 2 x smash go to net kill forehand corners in 30s, 5 x badminton T-drill with 30s break, 10 x badminton ladder drill with 10s break, 2 x loaded heavy badminton racket wrist

rotations, 3 x side to side smash pick-up in 30 seconds with 2 mins break) for female in badminton throughout their training program was not nescceary, increased the excitement in training and met the needs in improving their fitness as well as might achieve the medal in competition. Besides, the 9-exercise were selected and guaranteed reliability and suited with female participation, facilities available and time in training.

Besides, the purpose of this study attempted to find out the agility exercises for training and motivated female students at Sai Gon University to play badminton better. The higher achievement in all tests between experimental and control group in post-test (not in pre-test) showed that the 9-exercise had indeed a better way for the development of female badminton agility at Sai Gon University. In line with the rate of growth of all tests were higher in experimental than in control group after 14-week training. Spiteri *et al.* (2014) <sup>[21]</sup> indicated that besides endurance, strength and fitness exercises, agility exercises should also be a part of exercise planning to achieve a high level of explosive leg strength and performance. Walklate *et al.* (2001) <sup>[23]</sup> noted that the

adding of the speed and agility exercise program were used in many different groups for 6-week that the speed of changing direction significantly increased in the agility exercise group. Although the speed and agility programs should be suitable to participants and specific in agility caused the application of classic exercise might not be advantageous for most sports (Brughelli *et al.*, 2008) [4]. In the other hand, the agility training for novice or amateur players (as our participants in this study) in badminton might be more consideration than physically challenging to avoid the waste efforts and many injuries might be happened unexpected (Dong *et al.*, 2018) [5]. While Holmberg (2009) [13] indicated that sprint and agility exercises applied to badminton athletes that, this exercise has been effective on agility.

In our study, the results indicated that the effect of 9-exercise in agility applied to the experimental group which might have a good result in loaded heavy racket, jump rope and speed footwork tests. These results suggested that the 9-exercise added might be a better measure of badminton specific agility performance than an equivalent pre-planned physical fitness activity in training program which similarly results in a former study of Frederick *et al.*, (2014) [7] caused the nature of badminton required the speed in changing direction and decision making (Bin, 2015; Kim, 2017; Son *et al.*, 2018) [2, 15, 20]. Another result showed that there were significant differences between pre- and post-test in control group ( $p < 0.05$ ). It could be stated that the current training program for female badminton at Sai Gon University was met the needs of participation in extra-curricular sports training, though it needed more work-outs in agility to enhance female students' ability and meet many different purposes of them. The limitation of this study was that we could not control the habits daily activities of participants during the experiment as well as eating habits, minds-physiological changing and the pressure of their major learning. However, participants were asked for co-operation to maintain regular habits in their eating and daily activities.

#### 4. Conclusion

In short, the 9-exercise was selected for female badminton athletes at Sai Gon University indeed had a high potent effect on agility, which could be added inside our current training program as annual training of badminton club model. Further studies should evaluate the 9-exercise in applied to pre-match period, male athletes or other universities to make a comparison the efficiency achieved.

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