



A STUDY ON PHYSICAL EXERCISES TO IMPROVE PHYSICAL FITNESS FOR FEMALE ATHLETES OF TUG OF WAR IN HO CHI MINH CITY, VIETNAM

Nguyen Quang Vinh¹ⁱ,

Nguyen Quang Son²

¹Associate Prof.,

Ho Chi Minh City University of

Physical Education and Sports,

Vietnam

²Associate Prof.,

University of Economics Ho Chi Minh City,

Vietnam

Abstract:

The paper used routine methods in the field of physical education and sports to identify 6 assessment tests and 14 physical activities aiming to enhance level of physical fitness for tug of war athletes in Ho Chi Minh City. After the experiment, the results indicated that the 14 physical activities have positive impact on the participants' fitness level.

Keywords: physical exercises, strength, tug of war, Ho Chi Minh City

1. Introduction

Tug of war is considered one of the most common and ancient folk sports (Li, 2015). It is a team sport that pits two teams against each other by motion of two legs of each player in a straight line and which can be played on a flat surface, having an indoor competition type on wooden floors or on neoprene mats or outdoor on dirt or grass courts. In an international tug of war, the upper body from the hips, back, arms, and chest is in a static state to fix the rope and the legs are always in a state of motion, the posture falling backwards with an angle of 45° and the state of motion. Thus, the athletes should be required to maintain balance and good sense of space.

Especially, there are high requirements for cardiovascular and respiratory, good aerobic and anaerobic energy exchange capacity, strength of hands to hold the fixed rope, the soles of feet should be tightly close to the floor and the strength of two legs is used.

ⁱ Correspondence: email vinhqn@upes.edu.vn

In international tug of war, athletes have to expend a lot of energy, so they only achieve best results when they store enough energy needed for the tournament.

The tournament is a confrontation competition that is for each weight class by gender and ends in the same session or in one day. Thus, when competing in many games with many opponents, accompanied by exertion (professional endurance), the amount of energy of athletes is not the same and depending on the match, on the opponent that the process of providing energy can be anaerobic without producing lactic acid and an aerobic process. The above condition shows that fitness is an important factor and determines the performance of athletes in tug of war. In order to prepare good physical fitness for athletes, it is necessary to have appropriate physical activities that are not only fit with the physiological and psychological characteristics of athletes but also suitable for the real conditions of facilities.

2. Research design and method

2.1 Objectives of the study

The study is aimed at finding out the suitable physical exercises for the female athletes who were members of a tug of war team in Ho Chi Minh city. The study results will be used as the training references enhancing best performance of tug of war team.

2.2 Instruments and participants

Research instruments used in this study were reference materials, questionnaire, physical fitness testing, experimental and statistics analysis.

The participants were 10 female athletes aged ranging from 16 to 18 years old who played for tug of war team in Ho Chi Minh city, Vietnam and 14 experts, coaches.

3. Results and discussion

3.1. Selecting some physical development exercises for female athletes of tug of war team District 1, Ho Chi Minh City

The selection of exercises is proceeded in 2 steps as follows.

Step 1: synthesizing physical development exercises in tug of war from various resources. However, tug of war is a relatively new sport so the documents about tug-of-war are very limited, especially materials on physical development exercises. Therefore, we proceed as below:

- Piloting the questionnaire with 01 expert and 03 coaches who have experience in training tugging athletes in Ho Chi Minh City on the use of physical development exercises in tug of war.
- Based on the conditions of facilities, equipment for the study, characteristics of tug of war, physiological and physical characteristics of the research subjects, we designed 14 physical development exercises.

Step 2: Delivering the questionnaire to 14 experts and coaches twice. The questionnaire was designed in the format of Two Likert Scale which were 'Agree' and 'Disagree'. Chi-square test (χ^2) of the 2 times of interview is presented in Table 3.1.

Table 3.1: Results of the questionnaire

Exercises	Interview result				χ^2	Sig
	1 st time (n = 14)		2 nd time (n = 14)			
	Agree	%	Agree	%		
1	Jump forward and back 30m each time				0.00	1.00
2	Walk as duck forward and back 30m each time				1.74	0.19
3	Face to face Squat in a minute				0.00	1.00
4	Run upstairs fast to the 1st floor and run down slowly continuously within 10 minutes				0.00	1.00
5	Jump the stairs with 2 feet, jump continuously to the top then walk down. Perform continuously within 10 minutes.				0.00	1.00
6	Jump and switch the legs continuously on the 40cm step in 1 minute, do it twice				2.67	0.10
7	Stand in Annin Sogi position and lower the body weight so that the knees are slightly perpendicular, stand for 1 minute. Do it 2 times				0.00	1.00
8	Hang your hand on the crossbar or on the rope, 3 times, 30 seconds each time				0.00	1.00
9	Push the wheelbarrow in pairs of the same body weight, push 30m, 2 times				0.00	1.00
10	Take turns to do push-ups in a row. The first person does push-ups and the rest of the team do push-up hold, do so to the end of the row, each person does 15 times.				0.00	1.00
11	Practice running forward and back after the whistle in a distance of 30m for 30 seconds. Proceed 3 times				0.00	1.00
12	Running in variable speed in a football field according to the signal of whistle (5 seconds for a horn signal). The distance to run is perimeter of the football field, the starting point is to run at a fast speed, after hearing the whistle will slow down, then hear the whistle will run faster, repeat the same with 3 rounds of the football field which is 400m peripheral.				1.74	0.19
13	Pulling a wheel of truck in 10 metres (carrying out two times)				0.00	1.00
14	Continuously turning a wheel of truck in 10 metres (carrying out two times)				0.00	1.00

The results in Table 3.1 show that for all the tests with χ^2 calculated value is less than χ^2 from the table (=3.84), sig>0.05, thus there is consistency between the 2 times of interview. From the results in Table 3.1, we decided to select 14 exercises above as the number of agreed votes was over 75% in both times.

3.2. Evaluate the effectiveness of the physical development exercises for the female athletes of tug of war team

3.2.1. Identify fitness tests for female athletes of the tug of war team

The process was carried out in 3 steps:

Step 1: Synthesizing of tests to assess the physical fitness level of the athletes from different authors. Due to the late introduction of International Tug-of-war sport to Vietnam, there are few studies found in the field. To select the tests, we have reviewed some previous researches such as Nguyen Ngoc Cu (1998); Nguyen The Truyen, Nguyen Kim Minh & Tran Quoc Tuan (2002), Tony Martin (2009) and Doan Cong Tuan (2011). Furthermore, based on the features of tug of war, facilities for the research, we decided to choose 7 tests for evaluation physical fitness.

Step 2: Consulting with 14 experts and coaches through a questionnaire two times. The questionnaire was designed in the format of 'Agree' and 'Disagree'. The results of Chi-square test (χ^2) of the 2 times of interview are presented in Table 3.2 below.

Table 3.2: The results of questionnaire consulting experts and coaches about the selection of tests

Tests	Interview result				χ^2	Sig	
	1 st time (n = 14)		2 nd time (n = 14)				
	Agree	%	Agree	%			
1	Right-handed force (Kg)	11	78.57	11	78.57	0.00	1.00
2	Left-handed force (Kg)	11	78.57	12	85.71	1.74	0.19
3	Push-ups in 1 minute (times)	12	85.71	12	85.71	0.00	1.00
4	Step up stairs in 1 minute (times)	11	78.57	11	78.57	0.00	1.00
5	Leapfrogging 30m (seconds)	12	85.71	12	85.71	0.00	1.00
6	Duck walking 30m (seconds)	13	92.86	12	85.71	2.67	0.10
7	Single rope skipping for 2 minutes (times)	10	71.43	10	71.43	0.00	1.00

The results in table 3.1 show that the tests χ^2 calculated value is less than χ^2 from the table (=3.84), sig>0.05, thus there is consistency between the 2 times of interview. From the results in Table 3.2, we decided to choose those tests with 75 % of the experts' agreement. Six tests were selected including: Right-handed force (Kg), Left-handed force (KG), Push-ups in 1 minute (times), Step up stairs in 1 minute (times), Duck walking 30m (seconds), Duck walking 30m (seconds).

Step 3: Check the reliability of the tests.

In order to determine the reliability of the tests, the athlete participants were tested 2 times, the time between the two intervals was 5 days, the test conditions between the two times were the same. Then, the correlation coefficient (r) of the content of the two tests will be calculated and the test results are presented in Table 3.3.

Table 3.3: Reliability of physical fitness assessment tests for female athletes of tug of war team

No	Tests	1 st time	2 nd time	r	sig
		$\bar{X} \pm S$	$\bar{X} \pm S$		
1	Right-handed force (Kg)	31.10 ± 6.14	30.90 ± 5.90	0.99	0.00
2	Left-handed force (Kg)	25.40 ± 4.81	25.90 ± 4.58	0.95	0.00
3	Push-ups in 1 minute (times)	25.80 ± 3.52	26.10 ± 3.07	0.91	0.00
4	Step up stairs in 1 minute (times)	118.40 ± 14.96	118.80 ± 11.86	0.96	0.00
5	Leapfrogging 30m (seconds)	18.86 ± 1.78	18.88 ± 1.80	0.96	0.00
6	Duck walking 30m (seconds)	26.66 ± 1.93	26.42 ± 1.81	0.96	0.00

The results from Table 3.3 revealed that the six tests were reliable ($0.91 \leq |r| \leq 0.99$ and $\text{Sig} < 0.05$).

Physical fitness is an important determinant of athletes' performance. Due to the actual requirements of the competition, players who want to attack, defend, and counter-attack must master a variety of techniques, so they must have a solid level of physical fitness. A tug of war athlete must be 'as fast as a short distance runner and as strong as a weightlifter, as enduring as a long distance runner, as flexible as an acrobat'. It means that tug of war athletes must move quickly, have good physical fitness and flexibility to win. Therefore, the above tests are very suitable for assessing the physical fitness of tug-of-war athletes.

3.2.2 Evaluation of the effectiveness of physical development exercises for female athletes of the tug of war team

3.2.2.1 Building the experimental plan

We developed the procedure to conduct the experimental training with the selected exercises. The 10 athletes of tug of war received 3-month training with 3 sessions a week and each session lasted 2 hours. To assess the effectiveness of these exercises, the tests selected above were used. The results of pre-training and post-training were compared and presented in Table 3.4 below.

Table 3.4: The comparison of assessment tests before and after the experimental training

No	Tests	Before the experiment	After the experiment			
		$\bar{X} \pm S$	$\bar{X} \pm S$	\bar{W}	t	Sig
1	Right-handed force (Kg)	31.10 ± 6.14	33.60 ± 6.47	6.14	3.77	0.00
2	Left-handed force (Kg)	25.40 ± 4.81	27.60 ± 4.74	5.64	4.12	0.00
3	Push-ups in 1 minute (times)	25.80 ± 3.52	27.90 ± 2.81	8.20	3.71	0.00
4	Step up stairs in 1 minute (times)	118.40 ± 14.96	126.90 ± 11.50	7.27	4.41	0.00
5	Leapfrogging 30m (seconds)	18.86 ± 1.78	17.93 ± 1.63	4.07	5.29	0.00
6	Duck walking 30m (seconds)	26.66 ± 1.93	25.73 ± 1.95	3.56	4.31	0.00
\bar{W}		5.81				

The data in Table 3.4 show that after the experimental training, the physical fitness levels of all female athletes of the tug of war team increased and the figures were statistically significant different before the experiment and after the experiment ($\text{sig} < 0.05$). The results indicated that the fitness level of these players gained some improvement after the treatment with $\bar{W} = 5.81\%$. Among the selected tests, *push-ups* had the highest improvement level with $\bar{W} = 8.20\%$ meanwhile the test *duck walking* gained the lowest score of development with $\bar{W} = 3.56\%$.

The results of specific tests after the experimental training are presented in Figure 3.1 below.

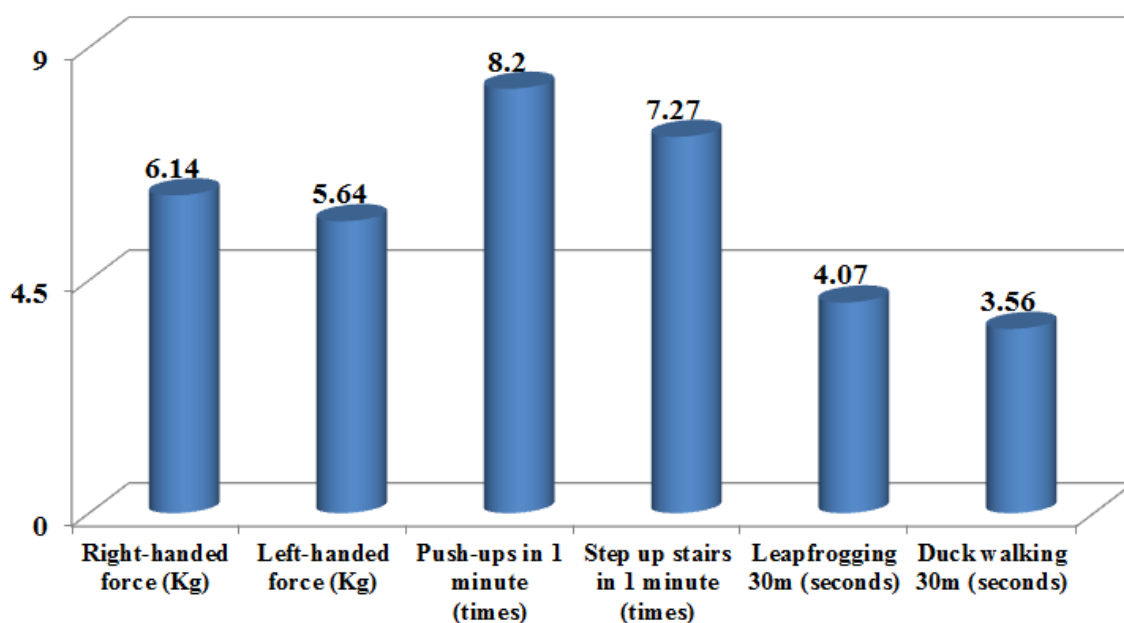


Figure 3.1: Results of specific tests after experimental training

In short, the results show that the twelve physical exercises have positive impact on the physical development of the athlete subjects and they could be employed for training these players of tug of war.

4. Conclusion

The study figured out 14 selected physical exercises employed for training the physical fitness for the female athletes of tug of war. In addition, the study also decided six tests used to assess the physical fitness for these subjects.

The results after the treatment revealed that the 14 physical exercises had positive effect on the physical fitness level of the tug of war athletes of a team in Ho Chi Minh city. The mean development level is found $\bar{W} = 5.81\%$ in which *push-ups* gained the highest level with $\bar{W} = 8.20\%$ meanwhile the test *duck walking* was recorded the lowest score of development with $\bar{W} = 3.56\%$.

Conflict of Interest Statement

The authors declare no conflicts of interests for this study.

About the Authors

Nguyen Quang Vinh is Associate Professor, Academic Affairs, Ho Chi Minh University of Physical Education and Sports. His research interests include physical education, teachers' beliefs and PE curriculum planning.

Nguyen Quang Son is Associate Professor, Physical Education Department, University of Economics. His research interests are mainly in physical education and teacher development.

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