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# RESEARCH ON SOME PHYSICAL EDUCATION GAMES USED TO PROMOTE THE PHYSICAL DEVELOPMENT OF 12-YEAR-OLD SCHOOLBOYS IN CA MAU CITY, VIETNAM

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**Abstract:**
The paper has used standard scientific research methods in the field of Sports Science, including reference materials and interviews, to identify 30 physical education games for 12-year-old male pupils in Ca Mau City, Vietnam. Through a one-school-year experimental program (2018 - 2019) and utilizing the approaches of pedagogical testing, pedagogical experimentation, and statistical math, it has been proven that 30 movement games offered in physical education classes have a positive influence on children's development. More importantly, these exercise games have a bigger impact on the development of physical fitness and motor functions than on height growth.

**Keywords:** physical education games, 12-year-old male students, Ca Mau City, Vietnam

## 1. Introduction

Physical education (PE) is a mandatory content in Vietnamese training programs, with the goals of increasing learners' health awareness, developing motor skills, and forming the habit of regular exercises for stamina and physical fitness, all of which contribute significantly to the physical wellbeing of the young generation. Physical development and health status are now seen as the primary goals of PE in educational institutions. Secondary pupils agree that sports practice appears as important as academic learning. More notably, the method of play-based learning has become more favored in schools.

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Folk games have been widely used to stimulate students' interest in physical activities, so assisting them in developing cognitive, sensitivity, and observation skills.

It is undeniable that games are very appealing to young people; as a result, in developing countries, PE games are frequently gathered, developed, and actively applied to increase students' involvement. Moreover, a PE games system has been well-constructed to make the contents convenient to deploy, remaining cost-effective and acceptable to current facilities, and therefore serving as a means of teaching and promoting students' physical development. Despite various adjustments to the PE program for learners, particularly at the lower secondary level, PE games remain effectively delivered in a disciplined, mechanical manner according to the teacher's textbook. The existing gaming programs for middle school children seem to be primarily designed to offer students the name of the game and how to play it basically, rather than to help them extensively grow physically. In fact, PE games are sometimes conducted within a limited period; in particular, some games are merely played for three to five minutes. As a result, movement density tends to be constrained, and a few active individuals can participate in such activities. Furthermore, a number of reports also reveal that extracurricular activities have not effectively utilized PE games to achieve the aims of education and enjoyment. Being aware of the roles of PE games and the existing issues, the authors decided to perform the study titled: "Research on Some Physical Education Games Used to Promote the Physical Development of 12-year-old Schoolboys in Ca Mau City, Vietnam".

The article's goal is to select a variety of appropriate PE games for 12-year-old male pupils in Ca Mau City. The findings of the study also help to improve the quality of PE instruction for young learners in general.

## 2. Methodology

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

Physical fitness tests were used for research subjects including: Height (cm), weight (kg), BMI (kg/m$^2$), Quetelet (g/cm), cardiac function (HW), 30-meter flying sprint (s), Long jump (cm), Force of dominant hand (KG), Crunch for 30 seconds (times), Shuttle run 4 x 10m (s), Run a 5-minute mile (m).

Participants: 100 schoolboys at the age of twelve, involved in two groups:

- Experimental group: 50 students of Luong The Vinh Secondary school.
- Control group: 50 students of Ngo Quyen Secondary school.

Surveyees: 27 PE teachers and 18 PE administrators at secondary schools in Ca Mau City.

## 3. Results and discussions

### 3.1. Selection of PE games for 12-year-old schoolboys in Ca Mau City

To identify PE games for 12-year-old boys in Ca Mau City, the study conducted 2 steps:

**Step 1:** Reference Materials

Synthesized the PE games offered by reliable scholars and experts including Le Van Be Hai (2015) [5], Tran Thi To Hoai (2008) [6], Tran Dong Lam, Dinh Manh Cuong (2005) [7], Ha Thi Kim Linh (2010) [8], Nguyen Viet Minh (2007) [9], Ho Chi Minh City University of Sports and Education (2010) [18], Nguyen Van Thanh (2017) [13], Le Anh Tho (2014) [14], Le Anh Tho (2010) [15], Dao Ba Tri (1999) [17], etc. Based on the PE curriculum for middle school students and practical conditions at Ca Mau City's middle schools, 30 featured games were chosen for this research.

**Step 2:** Questionnaire and Interviews

Perceived from the main findings of references, a questionnaire was created, and 45 PE instructors and administrators from Ca Mau City junior high schools were invited to the interviews. Two interviews were performed one month apart, using the same response ways (agree, disagree), the same questions, and the same participants, in order to determine the degree of similarity among the outcomes of the two interviews through the index $\chi^2$ (squared). Table 3.1 displayed the results.

**Table 3.1:** Comparing the results of two interviews about PE games for 12-year-old students in Ca Mau City

| No. | PE games | 1st (n = 45) | | 2nd (n = 45) | | $\chi^2$ | P |
|---|---|---|---|---|---|---|---|
| | | Agree | % | Agree | % | | |
| 1 | Running games (by numbers) | 43 | 95.56 | 42 | 93.33 | 0.79 | > 0.05 |
| 2 | Circular relays | 44 | 97.78 | 42 | 93.33 | 1.05 | *> 0.05* |
| 3 | 6-time ball passing | 43 | 95.56 | 43 | 95.56 | 0.24 | *> 0.05* |
| 4 | Pass and jump | 42 | 93.33 | 41 | 91.11 | 1.23 | > 0.05 |
| 5 | Triangle circuit | 42 | 93.33 | 40 | 88.89 | 1.96 | > 0.05 |
| 6 | Relay race | 42 | 93.33 | 43 | 95.56 | 0.18 | > 0.05 |
| 7 | Obstacle course | 41 | 91.11 | 40 | 88.89 | 1.66 | *> 0.05* |
| 8 | Flag capture | 43 | 95.56 | 42 | 93.33 | 0.79 | > 0.05 |
| 9 | Moving physical objects | 42 | 93.33 | 43 | 95.56 | 0.18 | > 0.05 |
| 10 | Cat and mouse | 40 | 88.89 | 41 | 91.11 | 0.86 | > 0.05 |
| 11 | Make nets and catch fish<br>*How to play:<br>- Form a "fish bond" by drawing a big circle on the field.<br>- 2 students in the position of "net" will hold each other's hand and run to catch "fish" students by snapping "fish" into their arms.<br>- "Fish" students who are caught will become a new part of the "net", and continue to catch the remaining "fish".<br>- The game ends when all the "fish" are caught. | 43 | 95.56 | 42 | 93.33 | 0.79 | *> 0.05* |
| 12 | Trong nu trong hoa (Planting Buds Planting Flowers)<br>*How to play:<br>- High jumping: two children sit face to face on the ground, their feet against one other. The other kids will have to jump over their legs. Every round, the feet will be raised higher by stacking one foot on top of the other, until there are four feet in the air (about four feet tall). Jumping | 41 | 91.11 | 43 | 95.56 | 0.13 | > 0.05 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | children are not permitted to touch their toes while jumping.<br>- Long jumping: two children sit on the ground, facing each other, with their legs apart. After each round, the legs will be extended further. The guideline is to avoid touching the legs. | | | | | | |
| 13 | Crawling relay | 42 | 93.33 | 42 | 93.33 | 0.62 | *> 0.05* |
| 14 | Worm<br>*How to play: Children are supposed to move like worms, with both hands raising the body and not allowing the torso to touch the ground when they crawl. | 44 | 97.78 | 42 | 93.33 | 1.05 | > 0.05 |
| 15 | Palanquin race<br>*How to play: Two palanquin makers join their hands to construct a palanquin. The person being carried on the palanquin clings to the shoulders of the palanquin makers to maintain the balance. Following that, the two palanquin builders rapidly carried their friend in the palanquin to the finish line. | 41 | 91.11 | 43 | 95.56 | 0.13 | > 0.05 |
| 16 | Surf jump | 40 | 88.89 | 41 | 91.11 | 0.86 | > 0.05 |
| 17 | Scramble games | 40 | 88.89 | 42 | 93.33 | 0.41 | *> 0.05* |
| 18 | Catching | 42 | 93.33 | 41 | 91.11 | 1.23 | *> 0.05* |
| 19 | Hopping relay | 43 | 95.56 | 42 | 93.33 | 0.79 | *> 0.05* |
| 20 | Rabbit jump | 44 | 97.78 | 43 | 95.56 | 0.34 | > 0.05 |
| 21 | Hopscotch relay | 42 | 93.33 | 43 | 95.56 | 0.18 | > 0.05 |
| 22 | Keo cua lua xe (a folk game of singing a chorus) | 42 | 93.33 | 43 | 95.56 | 0.18 | > 0.05 |
| 23 | Passing and catching the relay ball | 41 | 91.11 | 42 | 93.33 | 0.50 | > 0.05 |
| 24 | Relay of throwing a ball into baskets | 43 | 95.56 | 41 | 91.11 | 1.51 | > 0.05 |
| 25 | Rolling the ball by hand | 43 | 95.56 | 42 | 93.33 | 0.79 | > 0.05 |
| 26 | Shuttlecock kicking (by feet or by hands) | 43 | 95.56 | 43 | 95.56 | 0.24 | > 0.05 |
| 27 | Controlling a shuttlecock and kicking it to the specified spot | 42 | 93.33 | 43 | 95.56 | 0.18 | > 0.05 |
| 28 | Throw a shuttlecock to the specified spot | 40 | 88.89 | 41 | 91.11 | 0.86 | > 0.05 |
| 29 | Run and kick | 42 | 93.33 | 41 | 91.11 | 1.23 | > 0.05 |
| 30 | Passing the ball by numbers | 40 | 88.89 | 42 | 93.33 | 0.41 | > 0.05 |

Table 3.1 shows that the outcomes of the two interviews were both $\chi^2$calculated < $\chi^2$table = 3.84 at the probability threshold P > 0.05. At such the probability threshold, the differences between the two observed values were not statistically significant. In other words, the teachers and administrators in the two interviews had a high level of consensus on their responses.

Based on the above data, the article was supposed to choose the games which had the total number of agreements on more than 80% of the total votes in both interviews. According to the above principle, 30 games were adopted for assisting the physical development of 12-year-old schoolboys in Ca Mau City, including: Running games (by numbers); Circular relays; 6-time ball passing; Pass and jump; Triangle Circuit; Relay race; Obstacle course; Flag capture; Moving physical objects; Cat and mouse; Make nets and catch fish; Trong nu trong hoa (Planting Buds Planting Flowers); Crawling relay; Worm; Palanquin race; Surf jump; Scramble games; Catching; Hopping relay; Rabbit jump; Hopscotch relay; Keo cua lua xe (a folk game of singing a chorus); Passing and catching the relay ball; Relay of throwing a ball into baskets; Rolling the ball by hand;

Shuttlecock kicking (by feet or by hands); Controlling a shuttlecock and kicking it to the specified spot; Throw a shuttlecock to the specified spot; Run and kick; Passing the ball by numbers.

### 3.2. Evaluation of the PE games' effectiveness on 12-year-old male students in Ca Mau City

#### A. Develop an experiment plan

An experiment was conducted with 12-year-old children in Ca Mau City to assess the usefulness and feasibility of 30 different PE games (results of section 3.1). The significance and effectiveness of deploying certain games in physical education were utilized to support the scientific hypothesis.

Experimental Subjects: 100 male students at the age of twelve, dividing them into two groups:

- Experimental group: 50 students from Luong The Vinh Secondary School.
- Control group: 50 students from Ngo Quyen Secondary School.

Experimental Period: 1 school year.
Experimental Location: Luong The Vinh Secondary School
Experimental Form: Parallel comparative experiment
Evaluation Criteria: Height (cm), weight (kg), BMI (kg/m$^2$), Quetelet (g/cm), cardiac function (HW), 30-meter flying sprint (s), Long jump (cm), Force of dominant hand (KG), Crunch for 30 seconds (times), Shuttle run 4 x 10m (s), Run a 5-minute mile (m).

#### B. Conduct the experiment and evaluate the effectiveness of PE games for 12-year-old male students in Ca Mau City

**a. Before the experiment**

A measure of the differences between the mean values of two independent samples was implemented to assess the participants' physical fitness of the experimental and control groups before the experiment. The results were presented in Table 3.2.

Table 3.2 indicated that there was no difference in the physical assessment tests of the experimental and control groups ($t_{calculated} < t_{table} = 1.984$), with $P > 0,05$. In other words, the students from the two groups had similar physical conditions prior to the experiment, and there was no difference in the baseline level. After that, the authors proceeded to the following experimental stages on experimental subjects in accordance with the set plan.

**Table 3.2:** Comparison of the mean values of physical assessment tests of the experimental control groups before the experiment

| | Test | $\overline{X_{EG}}$ | S | $\overline{X_{CG}}$ | S | d | t | P |
|---|---|---|---|---|---|---|---|---|
| **Schoolboys (n = 50)** | Force of dominant hand (KG) | 20.22 | 3.36 | 19.68 | 2.05 | 0.55 | 0.98 | >0.05 |
| | Crunch for 30 seconds (times) | 16.80 | 3.14 | 15.96 | 2.81 | 0.84 | 1.41 | >0.05 |
| | Long jump (cm) | 172.02 | 15.73 | 166.84 | 16.37 | 5.18 | 1.61 | >0.05 |
| | 30-meter flying sprint XPC (s) | 5.43 | 0.60 | 5.45 | 0.47 | 0.02 | 0.14 | >0.05 |
| | Shuttle run 4 x 10m (s) | 11.18 | 0.59 | 11.23 | 0.66 | 0.06 | 0.46 | >0.05 |
| | Run a 5-minute mile (m) | 860.32 | 130.63 | 849.42 | 148.53 | 10.90 | 0.39 | >0.05 |
| | Sit and reach - flexibility (cm) | 6.70 | 3.12 | 6.42 | 2.22 | 0.28 | 0.52 | >0.05 |
| | Height (cm) | 141.12 | 8.17 | 142.62 | 7.16 | 1.50 | 0.98 | >0.05 |
| | Weight (kg) | 34.03 | 6.43 | 34.83 | 6.32 | 0.80 | 0.63 | >0.05 |
| | BMI (kg/m$^2$) | 17.04 | 2.60 | 17.05 | 2.35 | 0.01 | 0.02 | >0.05 |
| | Quetelet (g/cm) | 240.38 | 38.70 | 243.35 | 37.12 | 2.97 | 0.39 | >0.05 |
| | Cardiac function (HW) | 13.24 | 0.98 | 13.14 | 0.90 | 0.10 | 0.34 | >0.05 |

## b. After the experiment

The paper went on to evaluate the fitness conditions of the participants after the experiment to measure the impacts of multiple games on the physical changes of 12-year-old schoolboys. Table 3.3 showed the difference in the mean values between the two experimental groups.

**Table 3.3:** Comparison of the mean values of physical assessment tests of the experimental control groups after the experiment

| | Test | $\overline{X_{EG}}$ | S | $\overline{X_{CG}}$ | S | d | t | P |
|---|---|---|---|---|---|---|---|---|
| **Schoolboys (n = 50)** | Force of dominant hand (KG) | 23.14 | 3.26 | 21.88 | 2.06 | 1.26 | 2.31 | <0.05 |
| | Crunch for 30 seconds (times) | 18.72 | 2.61 | 17.56 | 2.89 | 1.16 | 2.11 | <0.05 |
| | Long jump (cm) | 178.04 | 15.39 | 170.74 | 16.04 | 7.30 | 2.32 | <0.05 |
| | 30-meter flying sprint XPC (s) | 5.19 | 0.62 | 5.41 | 0.46 | 0.22 | 2.01 | <0.05 |
| | Shuttle run 4 x 10m (s) | 10.90 | 0.60 | 11.15 | 0.63 | 0.25 | 2.05 | <0.05 |
| | Run a 5-minute mile (m) | 885.64 | 130.02 | 863.46 | 149.18 | 22.18 | 0.79 | **>0.05** |
| | Sit and reach - flexibility (cm) | 9.00 | 2.81 | 7.96 | 2.06 | 1.04 | 2.11 | <0.05 |
| | Height (cm) | 147.00 | 7.85 | 147.92 | 6.55 | 0.92 | 0.64 | **>0.05** |
| | Weight (kg) | 36.02 | 6.47 | 36.81 | 6.23 | 0.79 | 0.62 | **>0.05** |
| | BMI (kg/m$^2$) | 16.63 | 2.47 | 16.76 | 2.20 | 0.13 | 0.28 | **>0.05** |
| | Quetelet (g/cm) | 244.36 | 38.00 | 248.12 | 35.85 | 3.77 | 0.51 | **>0.05** |
| | Cardiac function (HW) | 12.44 | 0.86 | 12.64 | 0.86 | 0.20 | 1.15 | **>0.05** |

**Note:** Df = 98, $t_{05}$ = 1.984

According to the data in Table 3.3, it was clear that the experimental group's average value of the physical assessment tests was higher than the control group's in terms of force of dominant hand, crunch for 30 seconds, long jump, 30-meter flying sprint, Shuttle run 4 x 10m and flexibility (sit and reach) ($t_{calculated} > t_{table}$ = 1.984, P<0.05); Equivalent in the tests of 5-minute running, height, weight, Quetelet, BMI and cardiac function ($t_{calculated} < t_{table}$ = 1.984, P>0.05). In a nutshell, the experimental group outperformed the control

group on the aspect of fitness conditions (except stamina); both groups were equivalent in bodily function indicators and overall strength.

Following that, Table 3.4 was also made to compare the physical growth rates of the two groups after the experiment.

**Table 3.4:** The growth rate of physical fitness tests of lower-middle schoolboys in the experimental and the control groups before and after the experiment

| | Test | Before the experiment | | After the experiment | | | | |
|---|---|---|---|---|---|---|---|---|
| | | $\overline{X}$ | S | $\overline{X}$ | S | $\overline{W}$ | t | P |
| Experimental group (n = 50) | Force of dominant hand (KG) | 20.22 | 3.36 | 23.14 | 3.26 | 13.79 | 47.84 | <0.05 |
| | Crunch for 30 seconds (times) | 16.80 | 3.14 | 18.72 | 2.61 | 11.60 | 11.34 | <0.05 |
| | Long jump (cm) | 172.02 | 15.73 | 178.04 | 15.39 | 3.48 | 17.96 | <0.05 |
| | 30-meter flying sprint XPC (s) | 5.43 | 0.60 | 5.19 | 0.62 | 4.66 | 6.99 | <0.05 |
| | Shuttle run 4 x 10m (s) | 11.18 | 0.59 | 10.90 | 0.60 | 2.56 | 22.07 | <0.05 |
| | Run a 5-minute mile (m) | 860.32 | 130.63 | 885.64 | 130.02 | 2.97 | 66.83 | <0.05 |
| | Sit and reach - flexibility (cm) | 6.70 | 3.12 | 9.00 | 2.81 | 35.20 | 18.53 | <0.05 |
| | Height (cm) | 141.12 | 8.17 | 147.00 | 7.85 | 4.11 | 26.48 | <0.05 |
| | Cardiac function (HW) | 13.24 | 0.98 | 12.44 | 0.86 | 5.72 | 10.45 | <0.05 |
| | $\overline{W}$ | | | | | 9.34 | | |
| Control group (n = 50) | Force of dominant hand (KG) | 19.68 | 2.05 | 21.88 | 2.06 | 10.71 | 26.18 | <0.05 |
| | Crunch for 30 seconds (times) | 15.96 | 2.81 | 17.56 | 2.89 | 9.72 | 10.69 | <0.05 |
| | Long jump (cm) | 166.84 | 16.37 | 170.74 | 16.04 | 2.35 | 11.48 | <0.05 |
| | 30-meter flying sprint XPC (s) | 5.45 | 0.47 | 5.41 | 0.46 | 0.71 | 6.58 | <0.05 |
| | Shuttle run 4 x 10m (s) | 11.23 | 0.66 | 11.15 | 0.63 | 0.75 | 5.22 | <0.05 |
| | Run a 5-minute mile (m) | 849.42 | 148.53 | 863.46 | 149.18 | 1.68 | 7.06 | <0.05 |
| | Sit and reach - flexibility (cm) | 6.42 | 2.22 | 7.96 | 2.06 | 24.01 | 15.58 | <0.05 |
| | Height (cm) | 142.62 | 7.16 | 147.92 | 6.55 | 3.68 | 19.40 | <0.05 |
| | Cardiac function (HW) | 13.14 | 0.90 | 12.64 | 0.86 | 3.79 | 7.56 | <0.05 |
| | $\overline{W}$ | | | | | 6.38 | | |

**Note:** Df = 49, $t_{05}$ = 2.01

Table 3.4 suggested that the physical assessment tests of male students in the experimental and control groups both had a positive trend, which was statistically meaningful because $t_{tính} > t_{bảng}$ = 2.01, with P < 0.05. The experimental group had an average growth rate $\overline{W}$= 9.34%, in which the item regarding the flexibility gained the highest growth $\overline{W}$= 35.20% while the item of shuttle running 4 x 10m had the lowest one $\overline{W}$= 2.56%. The control group also had an average growth rate $\overline{W}$= 6.38%, in which the item of the flexibility gained the highest growth $\overline{W}$= 24.01% while the item of 30-meter flying sprint had the lowest development $\overline{W}$= 0.71%.

The research team compared the growth rates of the control and experimental groups after the experiment to validate the impact of the PE games. The statistics were seen in Table 3.5.

Table 3.5 demonstrated that there was a significant difference between the performances of the experimental and control groups in terms of average growth rate and physical evaluation ($t_{calculated} > t_{table}$ = 1.984, P<0.05). It was proven that the

experimental group outweighed the control group. Although there was a difference in two of the items (the 30-second crunch and height), the difference was not statistically significant ($t_{calculated} < t_{table} = 1.984$, P>0.05). Hence, such a minor difference should be regarded as equivalent.

**Table 3.5:** Comparison of average growth rates of physical assessment tests of the experimental and control groups after the experiment

| | Test | $\overline{W_{EG}}$ | S | $\overline{W_{CG}}$ | S | d | t | P |
|---|---|---|---|---|---|---|---|---|
| **Schooloys (n = 50)** | Force of dominant hand (KG) | 13.79 | 2.99 | 10.71 | 3.03 | 3.08 | 5.11 | <0.05 |
| | Crunch for 30 seconds (times) | 11.60 | 8.00 | 9.72 | 6.87 | 1.88 | 1.26 | ***>0.05*** |
| | Long jump (cm) | 3.48 | 1.45 | 2.35 | 1.51 | 1.13 | 3.84 | <0.05 |
| | 30-meter flying sprint XPC (s) | 4.66 | 4.92 | 0.71 | 0.79 | 3.95 | 5.61 | <0.05 |
| | Shuttle run 4 x 10m (s) | 2.56 | 0.88 | 0.75 | 1.06 | 1.81 | 9.27 | <0.05 |
| | Run a 5-minute mile (m) | 2.97 | 0.60 | 1.68 | 1.81 | 1.30 | 4.81 | <0.05 |
| | Sit and reach - flexibility (cm) | 35.20 | 25.41 | 24.01 | 13.92 | 11.19 | 2.73 | <0.05 |
| | Height (cm) | 4.11 | 1.20 | 3.68 | 1.40 | 0.43 | 1.66 | ***>0.05*** |
| | Cardiac function (HW) | 5.72 | 2.33 | 3.79 | 2.22 | 1.94 | 2.69 | <0.05 |

**Note:** Df = 98, $t_{05}$ = 1.984

Figure 3.1 might make it easier for readers to observe the comparison.

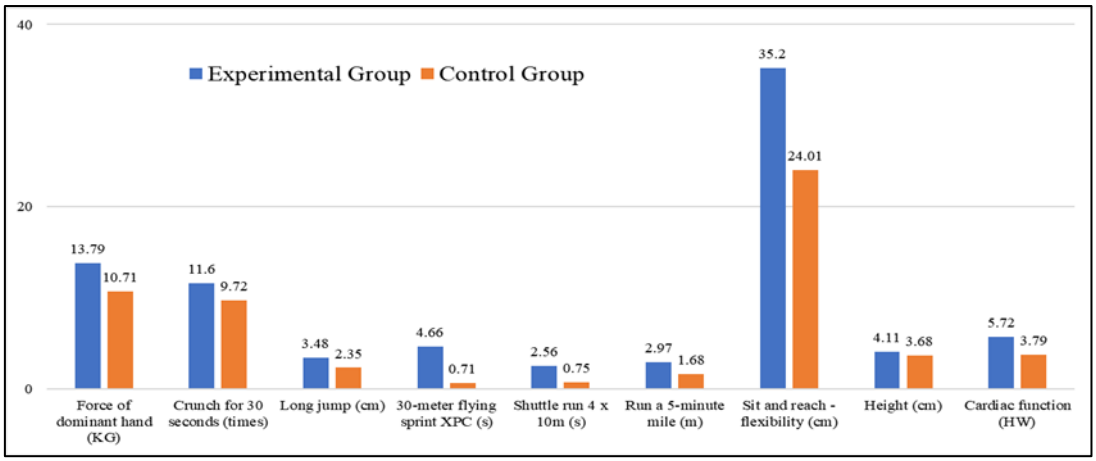


**Figure 3.1:** Comparison of the average growth rates of physical assessment tests of the experimental control groups after the experiment

## 4. Conclusion

The study selected 30 popular PE games used in physical training classes for lower junior high school students in Ca Mau City based on reference materials and interviews.

The article also suggested a method to put such 30 PE games into practice. The experiment's results indicated that all 30 games had a positive influence on players' physical development, which was proven by physical assessment tests. After the experiment, it could be seen that the results of the experimental group outperformed that

of the control group. It has been reconfirmed that the utilization of physical activities aided the experimental group's physical development.

**Conflict of Interest Statement**

The authors declare no conflicts of interests.

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