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APPLICATION OF AEROBIC EXERCISES TO IMPROVE PHYSICAL FITNESS AMONG FEMALE STUDENTS AT KHANH HOA UNIVERSITY, VIETNAM

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Abstract:
Using conventional research methods in physical education and sports, the study selected 24 aerobic exercises to improve physical fitness for female students at Khanh Hoa University. The selected exercises were initially applied in practice, and their effectiveness was evaluated. The results showed that the exercises were highly effective in developing physical fitness among the research participants.

Keywords: content, tests, assessments, students of Basketball, Bac Ninh Sports University

1. Introduction

With the attention of the university leadership, since 2023, the Department of Physical Education at Khanh Hoa University has included Aerobics in the formal physical education curriculum. This represents a breakthrough in applying new subjects to physical education teaching for students.

For occupations that require professional and comprehensive physical activity, such as hotel security, wait staff, room attendants, receptionists, tour guides, firefighters, and similar professions, aerobic exercises are highly suitable because they focus on muscular strength in the abdominal region and lower limbs. However, observations show that the physical fitness level of female students at Khanh Hoa University is still not truly good.

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With the aim of identifying suitable aerobic exercises and training methods to develop students' physical fitness, we conducted the study: application of aerobic exercises to improve physical fitness among female students at Khanh Hoa University.

2. Research Methods

The study employed the following research methods: document review, pedagogical observation, interview, pedagogical testing, pedagogical experiment, and statistical mathematics.

3. Research Results and Discussion

3.1 Selection of aerobic exercises to improve physical fitness among female students at Khanh Hoa University

Based on document review, pedagogical observation, and direct interviews with staff engaged in physical education at Khanh Hoa University, the study selected 27 aerobic exercises to improve physical fitness for female students, divided into the following nine groups:

A. Dynamic strength group (push-up movement group)

- Prone push-ups (2 sets × 8 counts),
- Leg raise on stall bars (2 sets × 8 counts).

B. Static strength group (support-hold movement group)

- Legs apart, straight-leg support hold (2 sets × 8 counts),
- Side plank/support (2 sets × 8 counts),
- Front split (2 sets × 8 counts),
- Side split (2 sets × 8 counts).

C. Jumping and turning group

- 180° jump turn with knee tuck (1 set × 8 counts per movement),
- Jump with front leg kick (1 set × 8 counts per movement),
- Jump with front-back leg split (1 set × 8 counts per movement),
- Jump with side leg split (1 set × 8 counts per movement),
- 360° jump turn with straight legs (1 set × 8 counts per movement),
- 360° turn on one leg (1 set × 8 counts per movement).

D. Balance group

- Back balance (1 set × 8 counts per movement).

E. Movement and running group

- Lateral formation movement (4 sets × 8 counts),

- Longitudinal formation movement (4 sets × 8 counts),
- Diagonal formation movement (4 sets × 8 counts).

F. Leg-swing movement group

- Jump with front leg swing (3 sets × 8 counts per movement),
- Jump with side leg swing (3 sets × 8 counts per movement),
- Jump combined with front and side leg swings (3 sets × 8 counts per movement).

G. Muscle stretching group

- Front split stretch (5 sets × 8 counts per movement),
- Side split stretch (5 sets × 8 counts per movement),
- Deep stretch (5 sets × 8 counts per movement).

H. Flexibility movement group

- Back bridge (2 sets × 8 counts per movement),
- Split combined with trunk flexion (2 sets × 8 counts per movement).

I. Coordinated movement group

- Arm coordination (5 sets × 8 counts per movement),
- Leg coordination (5 sets × 8 counts per movement),
- Whole-body coordination (5 sets × 8 counts per movement).

Based on the exercises selected through document review, pedagogical observation, and direct interviews, the study administered questionnaires to lecturers, coaches, and experienced professional staff involved in teaching and coaching Aerobics. Twenty-three questionnaires were distributed and twenty were returned, including 12 coaches and lecturers (60.00%), 2 referees (10.00%), 3 experts (15.00%), and 3 managers (15.00%).

The percentage composition of the interview participants is shown in Chart 1.

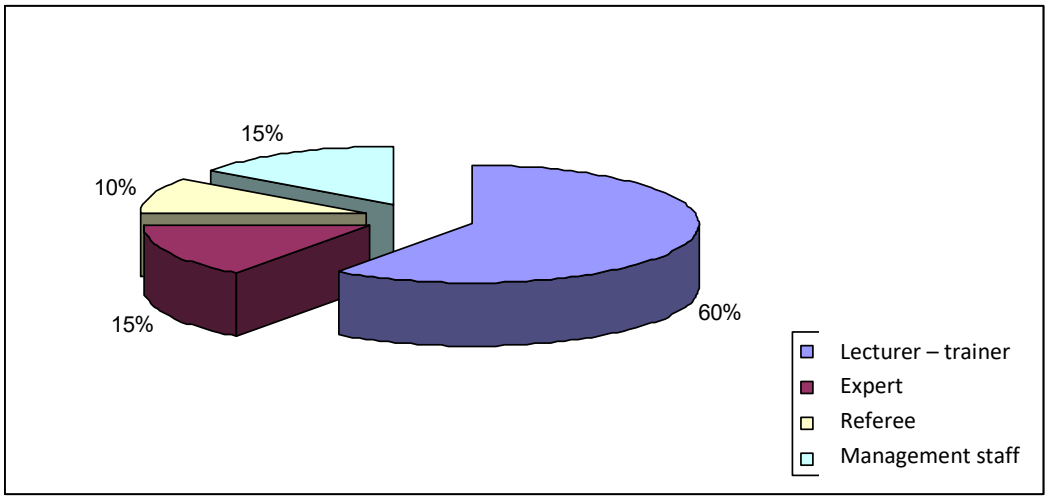

Chart 1: Percentage composition of interview participants

We selected exercises receiving approval from at least 70% of the total responses to develop physical fitness for female students at Khanh Hoa University. The results are presented in Table 1.

Table 1: Interview results for selecting aerobic exercises to develop physical fitness among female students at Khanh Hoa University (n=20)

No.	Exercise group	Exercise	Approved mi	Approved %	Not approved mi	Not approved %
1	Dynamic strength	Prone push-ups (2 sets × 8 counts)	16	80.00	4	20.00
2		Leg raise on stall bars (2 sets × 8 counts)	13	65.00	7	35.00
3	Static strength	Legs apart, straight-leg support hold (2 sets × 8 counts)	17	85.00	3	15.00
4		Side plank/support (2 sets × 8 counts)	17	85.00	3	15.00
5		Front split (2 sets × 8 counts)	12	60.00	8	40.00
6		Side split (2 sets × 8 counts)	13	65.00	7	35.00
7	Jumping and turning	180° jump turn with knee tuck (1 set × 8 counts per movement)	16	80.00	4	20.00
8		Jump with front leg kick (1 set × 8 counts per movement)	18	90.00	2	10.00
9		Jump with front-back leg split (1 set × 8 counts per movement)	17	85.00	3	15.00
10		Jump with side leg split (1 set × 8 counts per movement)	18	90.00	2	10.00
11		360° jump turn with straight legs (1 set × 8 counts per movement)	17	85.00	3	15.00
12		360° turn on one leg (1 set × 8 counts per movement)	17	85.00	3	15.00
13	Balance	Back balance (1 set × 8 counts per movement)	18	90.00	2	10.00
14	Movement and running	Lateral formation movement (4 sets × 8 counts)	18	90.00	2	10.00
15		Longitudinal formation movement (4 sets × 8 counts)	18	90.00	2	10.00
16		Diagonal formation movement (4 sets × 8 counts)	18	90.00	2	10.00

17	Leg-swing movements	Jump with front leg swing (3 sets × 8 counts per movement)	17	85.00	3	15.00
18		Jump with side leg swing (3 sets × 8 counts per movement)	16	80.00	4	20.00
19		Jump combined with front and side leg swings (3 sets × 8 counts per movement)	17	85.00	3	15.00
20	Muscle stretching	Front split stretch (5 sets × 8 counts per movement)	15	75.00	5	25.00
21		Side split stretch (5 sets × 8 counts per movement)	16	80.00	4	20.00
22		Deep stretch (5 sets × 8 counts per movement)	16	80.00	4	20.00
23	Flexibility movements	Back bridge (2 sets × 8 counts per movement)	18	90.00	2	10.00
24		Split combined with trunk flexion (2 sets × 8 counts per movement)	17	85.00	3	15.00
25	Coordinated movements	Arm coordination (5 sets × 8 counts per movement)	16	80.00	4	20.00
26		Leg coordination (5 sets × 8 counts per movement)	17	85.00	3	15.00
27		Whole-body coordination (5 sets × 8 counts per movement)	16	80.00	4	20.00

Table 1 shows that, according to the interview principle, only exercises receiving 70% or more approval were selected to improve physical fitness among female students at Khanh Hoa University. Accordingly, 24 exercises were selected. The remaining exercises, whose approval rates were below 70% of the total interview responses, were eliminated. Thus, through interviews, the study selected 24 aerobic exercises to develop physical fitness among female students at Khanh Hoa University.

2. Application of aerobic exercises to improve physical fitness among female students at Khanh Hoa University

2.1 Experimental organization

2.1.1 Experimental method

The experimental process used the parallel comparative experimental method.

2.1.2 Experimental duration

The pedagogical experiment was conducted over 10 months, from August 2023 to June 2024, corresponding to one academic year, with the experimental subjects.

The experimental subjects included 217 female students at Khanh Hoa University, divided into two groups by random drawing:

2.1.3 Experimental group

105 first-year students from Classes 1 and 3. This group trained according to the system of aerobic exercises selected and developed by the study during regular curricular physical education classes at the university.

2.1.4 Control group

112 first-year students from Classes 2 and 4. This group trained according to the old exercises commonly used in regular curricular physical education classes at the university.

The experimental content consisted of the aerobic exercises for developing physical fitness among female students at Khanh Hoa University who had been selected by the study.

2.1.5 Experimental location

The experiment was conducted at Khanh Hoa University over one academic year, consisting of two modules; each module had 30 periods, with three periods per week.

2.2 Evaluation of the effectiveness of aerobic exercises in developing physical fitness among female students at Khanh Hoa University

In August 2023, before conducting the experiment, the study tested the physical fitness levels of the experimental and control groups using six tests in accordance with Decision No. 53/2008/QD-BGDDT dated September 18, 2008, of the Ministry of Education and Training. The results are presented in Table 2.

Table 2: Comparison of physical fitness levels of the experimental and control groups before the experiment

No.	Test	A ± δ (Control group)	B ± δ (Experimental group)	t-calculated	P
1	Dominant hand grip strength (kg)	27.12±2.23	27.09±2.18	1.56	>0.05
2	Sit-ups (repetitions/30 seconds)	15.68±1.07	15.63±1.09	1.35	>0.05
3	Standing long jump (cm)	155.23±10.25	155.28±10.03	1.67	>0.05
4	30 m run from high start (seconds)	6.72±0.41	6.75±0.44	1.89	>0.05
5	4 × 10 m shuttle run (seconds)	12.98±1.03	13.02±1.10	1.45	>0.05
6	5-minute run at self-selected pace (m)	873.27±56.27	875.29±54.87	1.67	>0.05

Table 2 shows that, before the experiment, all six tests for both the experimental and control groups produced t-calculated values lower than the t-table at the probability threshold $P > 0.05$. This means that the difference in physical fitness test results between the control and experimental groups was not statistically significant at $P > 0.05$; in other words, before the experiment, the physical fitness levels of the two groups were equivalent.

After one academic year of experimentation, the study tested the physical fitness levels of the two groups using the same six tests as before the experiment, then calculated the growth rate and compared the two observed means based on the test results. The results are presented in Tables 3 and 4.

Table 3: Comparison of physical fitness test results of the experimental and control groups after one academic year of experimentation

No.	Test	A ± δ (Control group)	B ± δ (Experimental group)	t-calculated	P
1	Dominant hand grip strength (kg)	28.45±2.51	28.97±2.53	2.81	<0.01
2	Sit-ups (repetitions/30 seconds)	16.41±1.42	16.58±1.39	2.86	<0.01
3	Standing long jump (cm)	161.12±10.36	163.35±10.21	2.85	<0.01
4	30 m run from high start (seconds)	6.51±0.45	6.41±0.47	2.68	<0.01
5	4 × 10 m shuttle run (seconds)	12.43±1.08	12.37±1.05	2.63	<0.01
6	5-minute run at self-selected pace (m)	911.12±65.27	935.45±62.23	2.64	<0.01

Table 3 shows that, after one academic year of experimentation, all six tests assessing the physical fitness levels of female students at Khanh Hoa University produced t-calculated values greater than t-table at the probability threshold $P < 0.01$. In other words, the differences were statistically significant at $P < 0.01$. Thus, the physical fitness levels of the experimental group and the control group differed clearly after one academic year of experimentation.

The study calculated the growth rate of the indices between the two groups. The results are presented in Table 4.

Table 4: Comparison of growth rates in physical fitness levels of the control and experimental groups after one academic year of experimentation

No.	Test	W control (%)	W experimental (%)	Difference
1	Dominant hand grip strength (kg)	4.79	6.71	1.92
2	Sit-ups (repetitions/30 seconds)	4.55	5.90	1.35
3	Standing long jump (cm)	3.72	5.07	1.34
4	30 m run from high start (seconds)	3.17	5.17	1.99
5	4 × 10 m shuttle run (seconds)	4.33	5.12	0.79
6	5-minute run at self-selected pace (m)	4.24	6.64	2.40

Table 4 shows that, after one academic year of experimentation, both groups achieved good growth rates in physical fitness levels. However, the experimental group had higher growth rates than the control group by 0.79–2.40%.

The growth levels of the physical fitness indices of the control and experimental groups can be seen clearly in Chart 2.

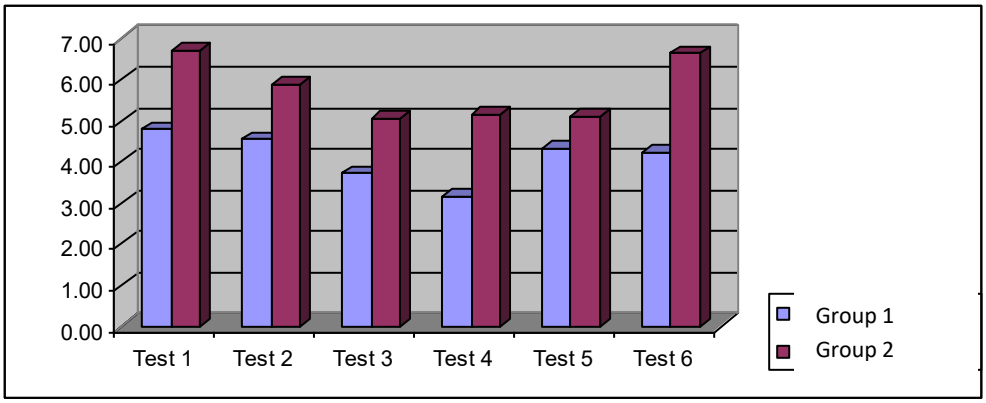

Chart 2: Growth rates in physical fitness levels of the control and experimental groups after one academic year of experimentation

Thus, after one academic year of applying the aerobic exercises selected by the study, the physical fitness level of the experimental group was better than that of the control group. This demonstrates that the selected exercises were highly effective for the research participants.

3. Conclusion

The study selected 24 aerobic exercises to develop physical fitness levels among female students at Khanh Hoa University. The selected aerobic exercises were initially applied in practice, and their effectiveness was evaluated. The results showed that these exercises were clearly more effective than the old aerobic exercises commonly used at the university in improving physical fitness levels among female students at Khanh Hoa University.

Conflict of Interest Statement
The authors declare no conflicts of interest.

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