



Research Article

ISSN : 0975-7384
CODEN(USA) : JCPRC5

Experimental research of applying the core strength training to the football elective course teaching in civil aviation universities

Huichao Li

Physical Education Department, Civil Aviation University of China, Tianjin, China

ABSTRACT

According to the special features of civil aviation majors and the professional career employees of the physical quality requirements, this paper uses the literature material method, experimental method and mathematical statistics method, in order to put our school football courses teaching as the breakthrough point, tries to explore the feasibility and necessity of application of core strength training in the sports teaching in civil aviation universities. Through the analysis of the control and experimental groups and the test data before and after the experiment, we can see that after the experiment, the four special physical qualities of the experimental group are higher compared with the control group, and the core strength level index exists significant differences between the experimental group and control group on the performances ($P < 0.001$). This shows that core strength has remarkable effect on improving the physical qualities of civil aviation students.

Key words: Fitness indicators, physiological functions, core strength training, football experiment

INTRODUCTION

Core strength training first emerged in Europe, also called functional training or core stability training, through which the muscle of the core of the body may well be improved. As to the core parts of the body, Paul J. Goodman thinks rectus, external oblique, internal oblique, transverse abdominals, thoracolumbar fascia, lumbar side muscle, iliac poses muscle, gluteus maximums, gluteus mediums and erector spine muscles of the LpH (lumbo-pelvic-hip), all together 29, are core muscles, from the middle of the chest to mid-thigh, including the front, sides and back which can regulate the body center of gravity and maintain trunk balance stable collectively [1]. A book, Sports Biomechanics, published in 2000, holds that one defines the core part of human body through the center of gravity [2]. Body weight varies with changes in the body posture of the larger range of motion changes, sometimes out of the body. The core strength means strength of all the muscles and ligaments attached to the core area of the contraction in the innervations generated power, with stable core parts of the body, controlling the center of gravity movement, playing the role of passing on lower extremity strength. The core strength is strength parallel to that of upper extremity and lower extremity, the strength ability classified by parts of the human anatomy. In recent years, the core strength becomes a means of training exercise and rehabilitation, which has a positive effect of maintaining good body posture and resisting fatigue. China's civil aviation institutions undertake the task of cultivating specific training aviation professionals [3-8]. Civil aviation industry is a unique professional, essential for the survival and development of the industry features, providing power and maintaining the characteristics of that part of the profession. As to the institutions, the specific civil aviation industry refers to the unique core of professional technical and management which has a direct intrinsically link and provides theoretical support for professionals, in particular, mainly related to the three professionals: air traffic control, flight, maintenance areas [9, 10]. After the graduates go to work to face more heavy work, for example, pilots, flight cabin crew and security personnel are engaged in long high-altitude flight. Air traffic controller's work under high-intensity, Maintenance workers work long time into the night. They can easily suffer fatigue syndrome and diseases. Through the core strength training,

one can effectively avoid the above situation [3].

Students at the school have a prime time of the core strength training. Not only can they improve core strength level, they can also learn new training methods and benefit for life, and Physical Education will play a specific role on this link [4]. At present, in China's civil aviation colleges sports teaching are elective classes, students choose classes according to their wishes. Among them, the football elective classes have strong representation of footballer power quality and speed requirements of very high quality, with particular emphasis on having a strong power and the ability to move fast. Football Class members are air control and maintenance majors. Almost all of the boys have a good football tradition and a strong collective sense of honor. During the school football sport can shape their courage, indomitable style and good attitude, which is an experience for them after graduation to help a lot to undertake competent onerous tasks and more hostile work environment. Thus, in the football elective classes in aviation colleges, scientifically added core strength training has a practical significance when the contents of the core strength training rapidly increase students' physical ability.

EXPERIMENTAL SECTION

Literature Analysis: For the research, the author has accessed a wealth of information and learned from the websites domestic and abroad and searched the database of China Journal Net with the key words: core strength training, football special fitness, strength training, college student's physical fitness and other words. Meanwhile the author conducted a result from the data of the library and the library collection of relevant data which all provides a theoretical basis for this writing topic.

Experiments: In this study, experimental intervention methods are used in order to obtain a better conclusion under strict controls.

Subjects of experiments: The subjects are 40 students from CAUC who choose the men's soccer elective class; in addition, all of them have the background of civil aviation. The subjects are equally divided into two groups, experimental group and control group. Due to the relatively small sample size, a special fitness and core strength level test is firstly conducted before the grouping, according to the test results, students are separated by the average level.

Methods of experiments: There are 8 weeks divided into two cycles (four weeks into a cycle) for the experimental group and the control group to practice, and the two groups have an hour to practice at afternoon every Monday, Wednesday and Friday. There are 6 items in each cycle (totally 12 items). A strict control of practice time, the group number and practice load for the two groups should be performed in order to ensure the consistency of physical activity and exercise intensity for the two groups [5].

Practice content of the control group:

- 30kg barbell bench press, 8×2 .
- Sit-ups 15×2 .
- Shoulder 40kg barbell squat 10×2 .
- 10kg barbell 15 times supine birds $\times 2$.
- Leapfrog 10×2 .
- Shoulder 40kg barbell mention ankle 15×2 .
- 20kg barbell prone pulling.
- 10kg barbell prone birds 15×2 .
- Prone to stand 10 times $\times 2$.
- 15kg barbell 10 times faster jerks $\times 2$.
- Supine knees hanging leg spin around 10 times $\times 2$.
- Body weight squats $10 \pm 5\text{kg} \times 2$.

Practice content of the experimental group:

- Prone three-point support. 2 groups of 20 seconds.
- Lateral elbow brace. 2 groups, one in each direction around groups of 20 seconds.
- The lateral side of the hand held flat leg brace. 4 groups, each direction around 2 groups of 20 seconds.
- Provide a support leg. 4 groups, each direction around 2 groups of 20 seconds.
- Supine hands to support. Group 2, n = 20 seconds.
- Supine straight leg from the hi. 2 groups of 25 times.
- The prone 2:00 support. 2 groups of 20 seconds or so hands and feet exchange.

- Foot pressure balance ball sit cross- legged. 2 groups of 20 seconds, the left leg exchange. Bridge on the back leg raise.
 - Balance ball. 2 groups of 20 times around the legs.
 - Kneeling before pushing balance ball. 2 groups of 20 times. Supine leg rise.
 - Balance ball. 2 groups of 20 times.
 - Clip football spin hip knees. Group 2, n = 20, left and right legs each time.
- An internationally accepted level of "elbow, said eight pontoon" test method is used to access the core strength; this method can be used as a method to practice, but also as a means of testing.

Mathematical statistics: Finish the experiment data with the mathematical analysis software SPSS 10.0.

- To have a comparison and analysis on the traditional strength training and core muscles training method.
- To compare the results of the experiment with the method of variance analysis.

RESULTS

The comparison between the experimental control group and the experimental group: In the test, the people in the control group and the experimental group were trained to complete the same general course content for better implementing and controlling the variables. Before the test, the overall quality of students was fully considered in the experimental group objects.

Table 1: Result of variance comparison of each test between experimental group and control group before experiments

	20 Meter Shuttle Run(s)	standing long jump(m)	5-25 Meter Reentry Run(s)	Throw-in on site(m)	core strength tests(s)
The experimental group	31.94±1.349	255.±3.94	33.90±0.992	15.54±1.396	57.73±3.738
The control group	31.42±2.01	259.±5.82	34.42±1.294	15.34±1.139	57.09±3.854
T	0.926	-2.011	-1.390	0.364	0.528
Sig	0.374	0.070	0.192	0.723	0.608
<i>P > 0.05</i>					

In Table 1, SPSS10.0 software was used to analysis the physical fitness and the core strength test of the two groups. The result of the analysis showed both of the groups' test indicators ($P > 0.05$) had no significant difference. The indicators in the control group and the experimental group are consistent.

The comparison between the experimental group and control group after the experiment:

Table 2: Result of variance comparison of each test between experimental group and control group after experiments

	20 Meter Shuttle Run (s)	standing long jump (m)	5-25Meter Reentry Run(s)	Throw-in on site (m)	core strength tests (s)
The experimental group	30.91±1.33	262±4.97	33.80±1.35	15.66±1.15	63.93±5.74
The control group	31.95±1.33	256.1±3.58	33.94±0.925	15.50±1.39	57.76±4.22
T	1.952	-3.795	0.37	-0.284	-5.784
Sig.	0.077	0.003	0.719	0.781	0
	$P > 0.05$	$P < 0.01$	$P > 0.05$	$P > 0.05$	$P < 0.001$

In Table 2, the core strength tests' results of the two groups have significant difference after 8-weeks-experiments.

Table 3: Comparison result of test data of control group before and after experiments

	20 Meter Shuttle Run(s)	standing long jump (m)	5-25 Meter Reentry Run (s)	Throw-in on site (m)	core strength tests(s)
Before the test	31.94±1.349	255.±3.94	33.90±0.992	15.54±1.396	57.73±3.738
After the test	31.95±1.33	256.±3.58	33.94±0.925	15.50±1.39	57.76±4.22
T	-0.534	-1.483	-0.969	1.239	-0.091
Sig.	0.604	0.166	0.353	0.214	0.929
	$P > 0.05$	$P > 0.05$	$P > 0.05$	$P > 0.05$	$P > 0.05$

In Table 3, after 8-week-training, some special physical qualities of the control group have little improvements. But they are not enough. There's no significant difference in the core strength test's results.

Table 4: Comparison result of test data of experimental group before and after experiments

	20 Meter Shuttle Run(s)	standing long jump (m)	5-25 Meter Reentry Run (s)	Throw-in on site (m)	core strength tests(s)
Before the test	31.42±2.01	259.3±5.82	34.42±1.294	15.34±1.139	57.09±3.854
After the test	30.91±1.33	262±4.97	33.80±1.35	15.66±1.15	63.93±5.74
T	7.046	-5.933	8.109	-8.204	-5.599
Sig.	0.000	0.000	0.000	0.000	0.000
	P < 0.001	P < 0.001	P < 0.001	P < 0.001	P < 0.001

In Table 4, after experienced 8-week-long core strength training, the Football fitness and core strength level all have highly significant improvement.

ANALYSIS AND DISCUSSION

Characteristic analysis of core strength training method: Core strength training method is unique, and its principle is to create an unstable state similar to some sports in training, through exercise the core muscles can change this unstable state under the regulation of nerve, compared with the traditional strength training, the core strength training plays a very significant role in the core parts of the body muscle and ligament strength strengthening. Core strength training can effectively enhance the contraction force of the core parts of the body muscles and ligaments under the innervations, small body deep muscle groups of fixed, stability and transmission of energy function is strengthened, nerve to muscle at the mercy of the ability gets further improvement and promote the energy transmission, improve the efficiency of the muscles to do work. Core strength training pays attention to the coordination development of the corresponding muscle, especially in the group of abdomen, the back muscle training, increases the power level of practitioners faster; it makes the body power of local practice and whole practice combine, the development of large muscle strength training and development of the small muscles training also combine, so as to improve the overall strength coordination of human body, can enhance the stability of the spine and hip, help practitioners to maintain good body posture, and prevent from fatigue caused by neck, shoulder, waist and back pain and other symptoms.

The analysis for the influence of core strength training for football special physical quality: Traditional strength training method is a method of lineage, it emphasizes the big muscles strength increase, for improving the quality of the football body, effect is not obvious, because the football sports focus on the whole body's coordination strength, ability of start rapidly, sensitive quality, stop turning ability and other special requirements, and the traditional strength training is lacking in the above aspects, the reason is that the traditional strength training methods make practitioners relying too much on big muscle group to complete the practice content, exercise is unobvious for the deep core muscles and ligament of human body, and that is the important link we neglected in the teaching practice of the past. Core strength training, as a new way of practice, solves the above problems effectively, through fully mobilizing the motor cells of deep small muscle grope, strengthening the weak link, the overall strength of the core parts is strengthened, the transmission capacity of general body power increases significantly. In the combination of Core strength training and traditional strength training science, the special physical quality of football can be effectively improved. This, other sports fields can also be used as a reference in the sports teaching.

CONCLUSION

From the comparison data of the experimental group, the 4 tests (the pole 20m shuttle run , standing long jump,5-25m shuttle run and throw in situ) indicators that reflect the football physical qualities in this paper have changed significantly through the core strength training. The results of level-8 pontoon core strength test have changed a lot. From the comparison data of the control group, only a few students have improved through traditional strength training, but the results of the 4 special fitness tests and level-8 pontoon have changed little. From the comparison data of between the two groups, the experimental group result of 4 special fitness tests is higher than the other group, where the long jump indicators ($P < 0.01$) and core power level indicators ($P < 0.001$) have significant difference which means the core strength training has a significant effect on the students who have the professional background of civil aviation.

In civil aviation colleges core strength exercises may be appropriate to add in normal football elective courses and design reasonable solutions of core strength exercises. Core strength training program should be carried out from many angles to ensure the improvement of students' core strength. Regular training time and appropriate training strength are also considered. Mind that mainly to improve the strength endurance, then to increase the power, and not too much breath exercises. PE teachers of civil aviation colleges should combine the advantages of each project, the students' physical characteristics and the purpose of training to develop a core strength training program which

can enhance the body quality the students in civil aviation colleges.

Acknowledgment

Authors are thankful to Tianjin Municipal Science Education "125" planning project (Sports) (HE4102) for funding the project.

REFERENCES

- [1] Paul J.. *NACA'S Performance Training Journal*, **2004**, 3(6), 10-14.
- [2] Hong hai-Zhao. *China's civil aviation*, **2011**, 5.
- [3] Wei xing-Wang. *Beijing Sports University*, **2007**, 8.
- [4] Yong ming-Li. *Sport Science*, **2008**, 28 (4), 19 -29.
- [5] Zhang B.. *Int. J. Appl. Math. Stat.*, **2013**, 44(14), 422-430.
- [6] Pan Li. *Journal of nanjing institute of physical education(natural science)*. **2004**, 19(1), 54-55.
- [7] Li Yu-he, Ling Wen-tao. *Journal of Guangzhou Physical Education Institute*. **1997**,17(3), 27-31.
- [8] Xu Guo-qin. *Journal Of Hebei Institute Of Physical Education*. **2008**, 22 (2), 70-72.
- [9] Chen Qing-hong. *China Sport Science and Technology*. **1990**. 21(10), 63-65
- [10] Tian Jun-ning. *Journal of Nanjing Institute of Physical Education*. **2000**, 14(4), 149-150.