

Full Length Research Paper

Effect of healthy Qigong “WuQinXi” exercise on peripheral blood T-cell subgroups in middle-aged subjects

Niu Ai-jun^{1,2}, Wang Yan-qun^{3*} and Li Jin-long⁴

¹Wushu Department, Guangzhou Sport University, Guangzhou 510500, PR China.

²Department of History, Fudan University, Shanghai, PR China.

³School of Sport Science, Linyi Normal University, Shandong, 276600, PR China.

⁴P.E. Department of Shanxi University, Taiyuan 030006, Shanxi, PR China.

Accepted 8 April, 2010

“WuQinXi” is becoming a popular exercise among elders. This study measured the peripheral blood T-cell subgroups in elderly “WuQinXi” practitioners. Fifty healthy Chinese people (male 15, female 35), aged between 50 and 69, attended a 135 min Tai Chi practice session four times a week for three months. The results showed significant ($P < 0.05$, $P < 0.01$) differences in peripheral blood T-cell subgroups between before and after exercise. The improvement noted in the “WuQinXi” practitioners may reflect increased ratio of CD4⁺ to CD8⁺. Moreover, the effect was better in female practitioners than male ones. This data suggest that “WuQinXi” exercise may improve immunity function of elderly practitioners.

Key words: “WuQinXi”, exercise, immunity.

INTRODUCTION

The use of complementary and alternative medicine in our society has increased substantially (Eisenberg et al., 1998). Qigong is part of traditional Chinese medicine and follows the principles of regulating the “qi” (energy), which is assumed to harmonize mind and body and so might reduce pain (Johansson et al., 2008). According to recent estimates, about 5% of China's population practice qigong (Lee, 2000; Jiang et al., 2009; Yu et al., 2009). It has been practiced for over 2000 years and was often used to cure and prevent diseases. There are over 3,000 styles of qigong being practiced today. Many of these styles are adaptations of ancient practices. “WuQinXi”, a type of healthy Qigong, is one of the most popular and also oldest among the ones currently practiced and its creator is Hua Tuo, the grandfather of traditional Chinese medicine like Hippocrates in Western culture. The exercise use the specific movements and breathings of 5 animals, the crane, bear, monkey, tiger and deer and this is often used in the West (Liu, 2008; Niu et al., 2008). “WuQinXi” exercise makes the practitioners more

harmonious and balanced so that they really feel moving and living (Si, 2006).

To our knowledge, there are few studies evaluating the effects of “WuQinXi” on elderly people. However, they included only patients until the age of 60. The aim of our study was to evaluate effect of “WuQinXi” exercise on peripheral blood T-cell Subgroups in middle-aged subjects aged between 50-69 years.

MATERIALS AND METHODS

Monoclonal antibodies

Anti-human CD3, CD8 PerCP phycoerythrin (PE)-conjugated monoclonal antibodies were obtained from Becton Dickinson Immunocytometry Systems (San Jose, Calif.). Anti-human CD4 fluorescein isothiocyanate (FITC) were obtained from Beijing Yuanpinghao Biotech Co., Ltd. (Beijing, China).

Participants

Fifty healthy Chinese people (male 15, female 35), aged between 50 and 69 were recruited through local communities (Shanghai, China) (Table 1). After completing a questionnaire on health condition, diet, medical history, lifestyle and menstrual status,

*Corresponding author. E-mail: wangyanqun@lytu.edu.cn. Tel: +86-539-8766386.

Table 1. Subjects parameters used for the study.

Male	Female	Age (year)	Height (cm)	Body weight (kg)
15	35	59.2 ± 3.0	159.8 ± 7.5	62.1 ± 9.1

Table 2. Effect of “WuQinXi” exercise on blood CD3⁺, CD4⁺, CD8⁺ and CD4⁺/CD8⁺ in all experimental subjects.

Timing	CD3 ⁺ (%)	CD4 ⁺ (%)	CD8 ⁺ (%)	CD4 ⁺ /CD8 ⁺
Before exercise	45.19 ± 14.47	30.08 ± 6.50	39.67 ± 7.40	0.79 ± 0.25
After exercise	44.86 ± 11.68	32.79 ± 5.99 ^b	37.39 ± 7.05 ^a	0.91 ± 0.23 ^b

^a P < 0.05, ^b P < 0.01, compared with the values before exercise.

Table 3. Effect of “WuQinXi” exercise on blood CD3⁺, CD4⁺, CD8⁺ and CD4⁺/CD8⁺ in female and male subjects.

Blood parameters	Male		Female	
	Before exercise	After exercise	Before exercise	After exercise
CD3 ⁺ (%)	48.28 ± 14.49	48.94 ± 9.63	44.29 ± 14.65	43.66 ± 12.13
CD4 ⁺ (%)	28.96 ± 8.35	32.16 ± 7.77 ^a	30.40 ± 6.04	32.97 ± 5.56 ^a
CD8 ⁺ (%)	42.36 ± 9.40	40.14 ± 6.54	38.88 ± 6.74	36.59 ± 7.12
CD4 ⁺ /CD8 ⁺	0.73 ± 0.29	0.84 ± 0.28 ^a	0.81 ± 0.24	0.93 ± 0.22 ^b

^a P < 0.05, ^b P < 0.01, compared with the values before exercise.

participants were led by an experienced tai chi chuan (TCC) instructor. Participants performed 10 min of warm-up stretching and basic Chi Kung (stationary TCC fundamentals). The participants then attended a 135-min Tai Chi practice session four times a week for three months. During the last 10 min of each session, participants were instructed in regulatory breathing, imagery and meditation in order to enhance their TCC skills and provide an exercise cool-down. All participants were asked to continue their normal living routines without restricting their diets or altering their eating habits. After 3 months (when subjects had fasted for at least 8 h), blood was collected, centrifuged at 3500 rpm for 15 min at 4°C and supernatants were analysed.

Biochemical analysis

CD3⁺, CD4⁺ and CD8⁺ were measured in whole blood by three-color flow cytometry (merck-calbiochem kit) according to the literature (Trzonkowski et al., 2006).

Statistics

Experimental values obtained were subjected to analysis by using the Mann-Whitney U test to determine statistical significance. Values of P that were < 0.05 were considered to be statistically significant.

RESULTS

Effect of “WuQinXi” exercise on blood CD3⁺, CD4⁺, CD8⁺ and CD4⁺/CD8⁺ in all experimental subjects.

“WuQinXi” exercise resulted in significant (P < 0.01) increase in blood CD4⁺ (32.79 ± 5.99) compared to the

value (30.08 ± 6.50) before exercise (Table 2). In contrast, “WuQinXi” exercise resulted in significant (P < 0.05) decrease in blood CD8⁺ (37.39 ± 7.05) and CD3⁺ (44.86 ± 11.68) compared to the values (39.67 ± 7.40, 45.19 ± 14.47) before exercise (Table 2). As a result, ratio (0.91 ± 0.23) of CD4⁺ to CD8⁺ was significantly (P < 0.01) higher compared to the values (0.79 ± 0.25) before exercise (Table 2).

Effect of “WuQinXi” exercise on blood CD3⁺, CD4⁺, CD8⁺ and CD4⁺/CD8⁺ in female and male subjects

“WuQinXi” exercise resulted in increase in blood CD4⁺ and CD3⁺ of female and male subjects. There was significant (P < 0.05) difference in blood CD4⁺ of female and male subjects between before and after exercise (Table 3). In contrast, “WuQinXi” exercise resulted in decrease in blood CD8⁺ of female and male subjects (Table 3). As a result, ratio (0.84 ± 0.28, 0.93 ± 0.22) of CD4⁺ to CD8⁺ of female and male subjects was significantly (P < 0.05, P < 0.01) higher compared to the values (0.73 ± 0.29, 0.81 ± 0.24) before exercise (Table 3).

Effect of “WuQinXi” exercise on blood CD3⁺, CD4⁺, CD8⁺ and CD4⁺/CD8⁺ in experimental subjects of different age groups

“WuQinXi” exercise resulted in significant (P < 0.05) increase in blood CD4⁺ and decrease (P > 0.05) in blood CD8⁺ of all experimental subjects (Table 4). In addition,

Table 4. Effect of “WuQinXi” exercise on blood CD3⁺, CD4⁺, CD8⁺ and CD4⁺/CD8⁺ in experimental subjects of different age groups.

Blood parameters	50 - 59 old year		60 - 69 old year	
	Before exercise	After exercise	Before exercise	After exercise
CD ³⁺ (%)	48.69 ± 14.34	46.71 ± 11.17	41.91 ± 14.25	43.11 ± 12.24
CD ⁴⁺ (%)	30.77 ± 6.02	33.15 ± 6.19 ^a	29.42 ± 7.05	32.45 ± 5.98 ^a
CD ⁸⁺ (%)	40.14 ± 8.63	37.86 ± 6.63	39.23 ± 6.28	38.78 ± 5.25
CD ⁴⁺ /CD ⁸⁺	0.81 ± 0.25	0.90 ± 0.22 ^a	0.65 ± 0.62	0.92 ± 0.26 ^b

^a P < 0.05, ^b P < 0.01, compared with the values before exercise.

“WuQinXi” exercise resulted in decrease in blood CD3⁺ of subjects aged between 50-59 years and increase in blood CD3⁺ of subjects aged between 60-69 years. There was no significant (P > 0.05) difference in blood CD3⁺ between before and after exercise. As a result, ratio (0.90 ± 0.22, 0.92 ± 0.26) of CD4⁺ to CD8⁺ of subjects of two age groups was significantly (P < 0.05, P < 0.01) higher compared to the values (0.81 ± 0.25, 0.65 ± 0.62) before exercise (Table 4).

DISCUSSION

T cells belong to a group of white blood cells known as lymphocytes and play a central role in cell-mediated immunity. T cells are lymphocytes or cells of the lymphatic system. T cells are so called because they develop in the thymus, an organ located in the upper chest just above the heart. T cells are of two types: helper T cells (which have a marker on their cell surface called CD4) and killer T cells (which have the CD8 marker on their surface). Killer T cells (also called cytotoxic T lymphocytes or CTLs) directly attack body cells that are infected with a virus or malignant or abnormal tumor cells, cells that antibodies would never perceive. Helper T cells are the “generals” of the immune system, calling into play and directing the activity of killer T cells. The helper T cells are essential for an effective immune response since they activate other immune cells including most B cells to produce antibody. Individual T cells are targeted against the specific antigen signatures of viruses and bacteria and when helper T cells encounter their specific antigens, they become activated and quickly expand in number (van de Berg et al., 2008; Peralbo et al., 2007; Rakshit and Bhadoria, 2009; Salar and Suchitra, 2009).

“WuQinXi” practice encompasses several potentially therapeutic aspects. Also, there is an aspect of therapeutic relationship between researcher and participant. These findings were corroborated by feedback from participants during qualitative interviews. In the present study, we were able to demonstrate that “WuQinXi” exercise had a positive influence on peripheral blood T-cell subgroups in middle-aged subjects. As suggested (Pan, 2005), low-intensity mind–body activities such as “WuQinXi” may be better suited to the needs and abilities

of older adults. Our results show that age is positively associated with exercise. The improvement noted in the “WuQinXi” practitioners may reflect increased ratio of CD4⁺ to CD8⁺. Alternatively, the improvement may reflect improved body fitness, as “WuQinXi” exercise has been shown to reduce systolic blood pressure, total cholesterol, heart rate and low-density lipoprotein cholesterol levels after as little as 10 weeks (Lee, 2000). These data indicate that “WuQinXi” exercise may account for clinically meaningful improvements in psychosocial functioning.

This study has several limitations including small sample size and a short duration of training. Longer training may increase the benefit from “WuQinXi” exercise. This is supported by the fact that long-term “WuQinXi” practitioners exhibit smaller increases in the index of blood pressure of elderly practitioners and it has significant differences from the control, an effect not seen in individuals who had practiced “WuQinXi” for only 3 months (Pan, 2005).

To conclude, participants who practiced “WuQinXi” demonstrated improvements in immunity function. Although this study is limited by a relatively small sample size and short training duration, the results suggest that “WuQinXi” may be an effective and safe form of exercise for middle-aged subjects. Moreover, “WuQinXi” exercise can cause better effect in female practitioners than in male ones. The underlying mechanisms of these effects need to be elucidated in further studies.

REFERENCES

- Eisenberg DM, Davis RB, Ettner SL, Appel S, Wilkey S, Van Rompay M, Kessler RC (1998). Trends in alternative medicine use in the United States. Results of a follow-up national survey. *J. Am. Med. Ass.* 280: 1569–1575.
- Jiang J, Guo YJ, Niu AJ (2009). Extraction, characterization of *Angelica sinensis* polysaccharides and modulatory effect of the polysaccharides and Tai Chi exercise on oxidative injury in middle-aged women subjects. *Carbohydr Polym*, 77: 384-388.
- Johansson M, Hassmén P, Jouper J (2008). Acute Effects of Qigong Exercise on Mood and Anxiety. *Int. J. Stress Manage.* 15: 199-207.
- Lee S (2000). Chinese hypnosis can cause qigong induced mental disorders. *British Med. J.* 320: 803.
- Liu G (2008). Mechanism of health-promotion of “WuQinXi” exercise created in East Hai dynasty. *J. Henan Univ. Soc. Sci.* 5: 174-177.
- Niu A-J, Wu J-M, Yu D-H, Wang R (2008). Protective effect of *Lycium barbarum* polysaccharides on oxidative damage in skeletal muscle of

- exhaustive exercise rats. *Int. J. Biol. Macromol.* 42: 447-449.
- Pan L (2005). Healthy-protective effect of Traditional practice "WuQinXi". *Chin. J. Ethnomed. Ethnopharm.* 77: 233.
- Peralbo E, Alonso C, Solana R (2007). Invariant NKT and NKT-like lymphocytes: Two different T cell subsets that are differentially affected by ageing. *Exp. Gerontol.* 42: 703-708.
- Rakshit A, Bhadoria PS (2009). Influence of arbuscular mycorrhizal hyphal length on simulation of P influx with the mechanistic model. *Afr. J. Microbiol. Res.* 3 (1): 001-004.
- Salar RK, Suchitra (2009). Evaluation of antimicrobial potential of different extracts of *Solanum xanthocarpum* Schrad. and Wendl. *Afr J. Microbiol. Res.* 3(3): 097-100.
- Si HY (2006). Fitness qigong Wuqinxi for maintaining health. *Chin. J. Clin. Rehab.* 10: 145-147.
- Trzonkowski P, Szmit E, Myśliwska J, Myśliwski A (2006). CD4⁺CD25⁺ T regulatory cells inhibit cytotoxic activity of CTL and NK cells in humans—impact of immunosenescence. *Clin. Immunol.* 119: 307-316.
- van de Berg PJEJ, van Stijn A, ten Berge IJM, van Lier RAW (2008). A fingerprint left by cytomegalovirus infection in the human T cell compartment. *J. Clin. Virol.* 41: 213-217.
- Yu D-H, Wu J-M, Niu A-J (2009). Health-promoting effect of LBP and healthy Qigong exercise on physiological functions in old subjects. *Carbohydr. Polym.* 75: 312-316.