

*Full Length Research Paper*

# Effect of Tai Chi and Shaoling quan exercise on youngsters' body weight, height and beneficial flora in digestive tract

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Accepted 6 January, 2022

**Tai Chi has been widely practiced in China as a martial art and as a form of exercise. Shaoling quan can protect practitioners against others' aggression, and help practitioners' body remain more healthy and strong. In this study, 78 youngsters aged 10 years are divided into three groups: Control, Tai Chi and Shaoling quan. After 10 months of exercise, it could be found that Tai Chi and Shaoling quan are beneficial for youngsters' health.**

**Key words:** Tai Chi, Shailing quan, youngster.

## INTRODUCTION

Physical inactivity is a major public health problem. Regular physical activity confers many substantial health benefits for older adults (Department of Health, 2004) and is a key determinant of good health. However 40% of over 50 s in the UK report less physical activity than is recommended (Skelton et al., 1999). Among 55 to 64 year olds, 32% of men and 21% of women reach current physical activity recommendations (Department of Health, 2000). Sedentary behaviour is even more common among South Asians (Erens et al., 2001) and may contribute to their increased risk of coronary heart disease and stroke mortality, as well as a greater prevalence of diabetes (Department of Health, 2000; Ameyaw, 2009). At present, more attention is paid to old people. However, effect of physical exercise on youngsters' health is scarcely reported.

Tai Chi has been helpful in alleviating joint pain, increasing muscle strength, flexibility and balance without further deterioration to the joints in older patients with osteoarthritis (OA) (Lumsden et al., 1998, Xue and Niu, 2010). Tai Chi involves moving from a standing position through a series of postures like a choreographed dance. It has been widely practiced in China as a martial art and as a form of exercise. In Chinese, the words Tai Chi

Chuan mean "supreme ultimate fist," (Tsang et al., 2004; Docker, 2006). The series of postures are performed slowly in a sequence and are known as forms. The forms vary in the number of postures, with some involving as few as 18 postures and others more than 100. Shaoling quan is one of wushu or "GongFu", which have been practiced by Chinese for thousands of years. It can protect practitioners against others' aggression, and help practitioners' body remain more healthy and strong.

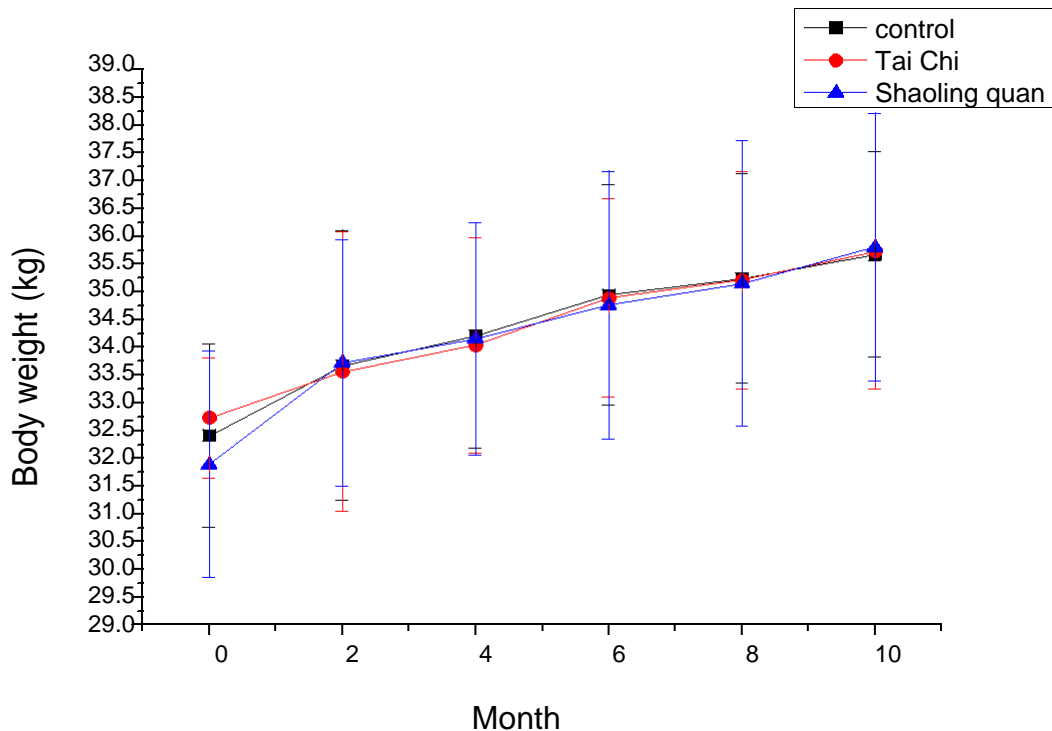
In this study, we selected 78 youngsters to exercise Tai Chi and Shaoling quan. Effect of Tai Chi and Shaoling quan on practitioners' body weight and height, beneficial flora in digestive tract were evaluated.

## METHOD

### Participants and procedures

Seventy-eight healthy participants were recruited from a local school in Guangzhou city, China. All participants included 47 boys aged 10 years and 31 girls aged 10 years. The school administration granted permission to carry out the study. The participants signed written consent forms before the study. The consent form included details about the benefits of joining the program and the nature of voluntary participation. They were randomly divided into 3 groups: Control, Tai chi-exercise group and shoaling quan-exercise group. Control group (n=25) keep their regular life style. Tai chi-exercise group (n=25) were required to exercise Tai Chi for 1 h every day. Shaoling quan-exercise group

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**Figure 1.** Variation of body weight in three groups.

(n=28) were required to exercise Shoaling quan for 1 h every day. The experiment lasted for 10 months. Body weight and height of every participants were measured at an interval of 2 months. Likewise, faeces were collected from every participants at an interval of 2 months. *Bacillus bifidus* and *Bacterium lacticum* in faeces were measured.

#### Bacterial growth and analysis

About 3 g fresh human faeces were transferred under sterile conditions and dispersed in 150 ml sterile nutrient broth containing 0.9% sodium chloride. After culturing under nitrogen at 37°C for 15 h, the broth was filtered through glass wool to remove undispersed material.

Serial dilutions were made in a quarter-strength Ringer's solution and 100 l were spread plated in duplicate on several media. Plate count agar was used to enumerate *Bacillus cereus* after 24 h incubation at 32°C under aerobic conditions and for counting spores on the same samples previously heated at 80°C for 10 min to kill vegetative cells. Viable cell numbers of *B. bifidus* and *B. lacticum* were obtained in MRS agar (Biokar) supplemented with 0.05% L-cysteine after anaerobic incubation for 48 h at 37°C. Results were expressed as the logarithm of colony forming units per ml ( $\log \text{cfu ml}^{-1}$ ).

#### Statistical analysis

Data were expressed as means  $\pm$  SEM. Statistical analysis was carried out by the Student "t" test. The calculations were performed using STA- TISTICA6.0 (for Windows, StatSoft Inc. software, Tulsa, OK, USA). A difference of  $p < 0.05$  was considered significant between groups.

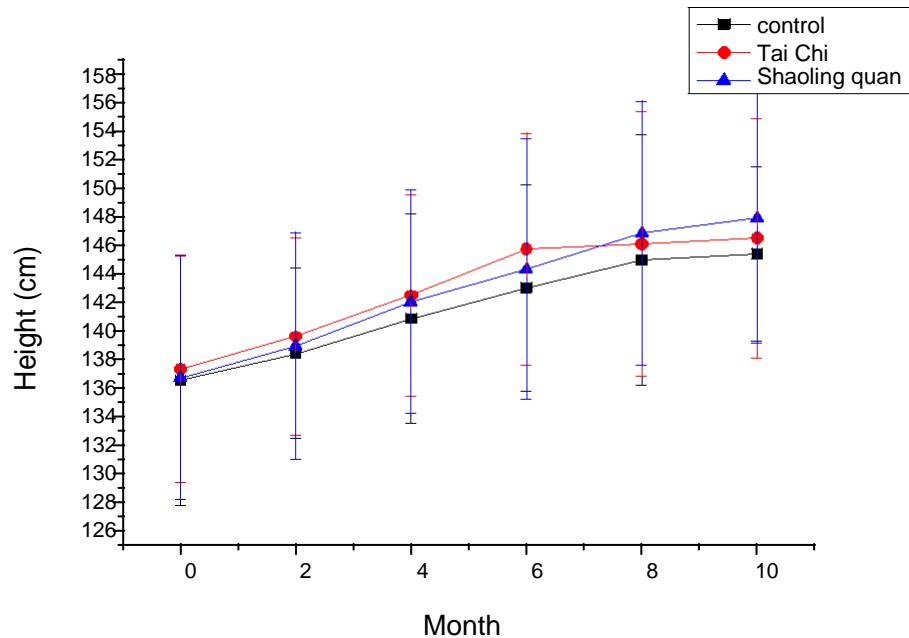
## RESULTS AND DISCUSSION

### Effects of Tai Chi and Shaoling quan exercise on youngster's body weight

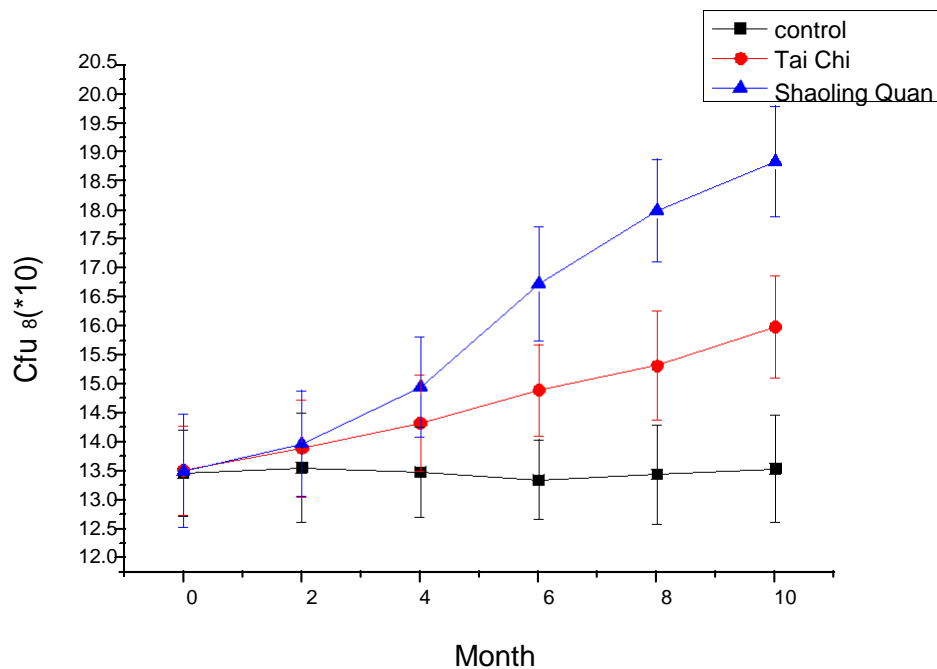
The effects of Tai Chi and Shaoling quan exercise on youngster's body weight was shown in Figure 1. As shown in Figure 1, body weight in three groups all increased from 2 to 10 months. However, there was no significant statistical difference between groups. This indicated that both Tai Chi and Shaoling quan exercise did not affect youngster's body weight.

### Effects of Tai Chi and Shaoling quan exercise on youngster's body height

The effects of Tai Chi and Shaoling quan exercise on youngster's body height was shown in Figure 2. These results show that Tai Chi and Shaoling quan exercise significantly affected youngster's body height in three groups. As shown in Figure 2, body height in three groups increased from 2 to 10 months. It could be found that body heights in Tai Chi and Shaoling quan groups was significantly higher than those in control group. Moreover, body heights in Shaoling quan group were markedly higher at all times than those in Tai Chi group. This indicated that Shaoling quan exercise is more beneficial for youngster's growth.



**Figure 2.** Variation of body height in three groups.

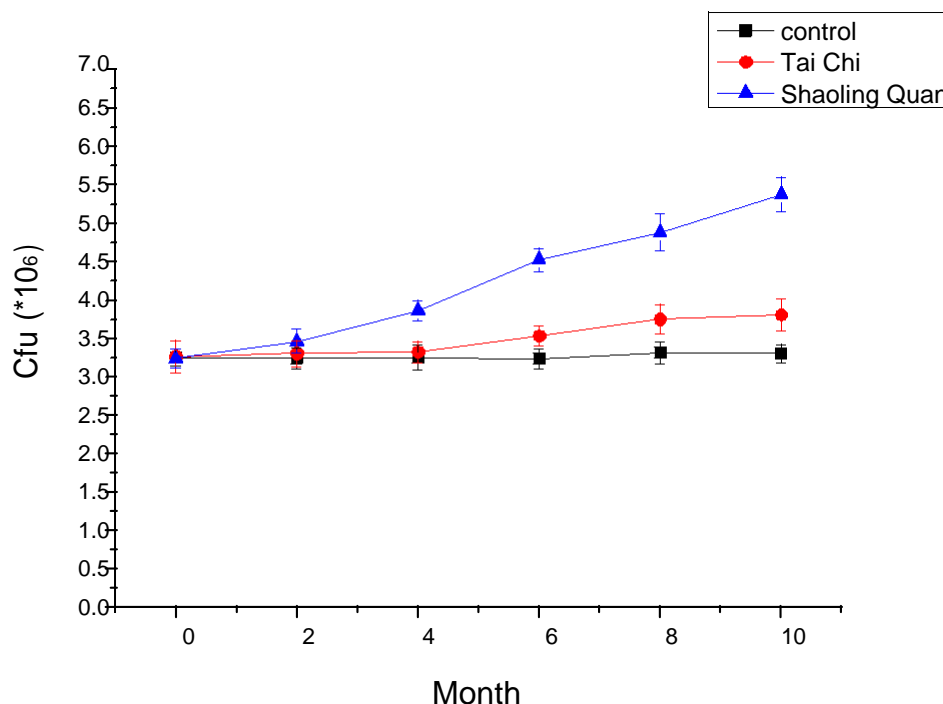


**Figure 3.** Number (cfu/g) of *B. bifidus* in three groups.

### Effects of Tai Chi and Shaoling quan exercise on number (cfu/g) of *B. bifidus* in youngsters's digestive tract

The number (cfu/g) of *B. bifidus* in digestive tract after 10 months of exercise were shown in Figure 3 for all

the groups examined. The baseline number (cfu/g) of *B. bifidus* in digestive tract before the experiment was not significantly different between the groups. In control group, number (cfu/g) of *B. bifidus* in digestive tract did not markedly vary throughout 10 months. In Tai Chi and Shaoling quan groups, number (cfu/g) of *B. bifidus* in



**Figure 4.** Number (cfu/g) of *B. lacticum* in three groups.

digestive tract continued to increase throughout 10 months of the exercise period. Compared with control group, number (cfu/g) of *B. bifidus* in digestive tract in Tai Chi and Shaoling quan groups were markedly higher. Likewise, number (cfu/g) of *B. bifidus* in digestive tract in Shaoling quan groups was significantly higher than those in Tai Chi group.

#### **Effects of Tai Chi and Shaoling quan exercise on number (cfu/g) of *B. lacticum* in youngsters's digestive tract**

Results in Figure 4 present the effects of Tai Chi and Shaoling quan exercise on number (cfu/g) of *B. lacticum* in youngster's digestive tract. There was no marked statistical difference between three groups before experiment. From the 2 to 10th months, number (cfu/g) of *B. lacticum* in youngster's digestive tract in control group did not markedly changed. However, number (cfu/g) of *B. lacticum* in youngster's digestive tract in Tai Chi and Shaoling quan groups continued to increase from the 2 to 10th months. Moreover, it could be found that Shaoling quan exercise could cause more effective effect on number (cfu/g) of *B. lacticum* in youngster's digestive tract than Tai Chi could.

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