

## Short Communication

# Effect of *Tai Chi* exercise on intestine microbiology count in practitioners

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***Tai Chi* exercise has been proven to be beneficial among practicers. The purpose of this study was to evaluate the effects of the *Tai Chi* exercise on useful intestine microbiology (enterobacteriaceae, enterococcus, lactobacillus and bifidobacterium) in *Tai Chi* practitioners. Results showed that long-term *Tai Chi* practitioners exhibit larger increases in intestine microbiology count (enterobacteriaceae, enterococcus, lactobacillus and bifidobacterium). In conclusion, *Tai Chi* may be an effective and safe form of exercise for some individuals with stomach or intestinal trouble.**

**Key words:** *Tai Chi* exercise, intestine microbiology, bifidobacterium.

## INTRODUCTION

Regular physical activity is an important factor in the prevention of illness and promotion of physical and mental wellbeing (United States Department of Health and Human Services, 2000; Yu et al, 2009; Niu et al, 2008; Jiang et al, 2009). Encouraged by supportive research, a large number of people initiate a physical exercise regimen, but the drop-out rate within the first few months frequently exceeds 50% (Dishman and Buckworth, 1997). *Tai Chi* exercise, a traditional Chinese martial art, has been shown to have a positive impact on both physical and psychological function, and on the prevention of falls among the elderly (Verhagen et al., 2004; Wang et al., 2004; Wolf et al., 2003). While Chen, Yang, Sun and Wu are the most popular styles of *Tai Chi*, each with its own unique set of circular movements, all styles share the same essential principles of the practice (Li et al., 2001). This study was therefore designed to investigate the change of useful intestine microbiology (enterobacteriaceae, enterococcus, lactobacillus and bifidobacterium) in *Tai Chi* practitioners, to determine whether or not *Tai Chi* has beneficial effects on some

individuals with stomach or intestinal trouble.

## METHODS

### Participants

Ninety-two individuals (25 men and 67 women) with a mean age of 39.5 years (SD 13) were recruited from introductory *Tai Chi* courses in Guangzhou city, China.

### *Tai Chi* training

The *Tai Chi* sessions took place daily between 1.30 and 2.00 p.m. from Monday to Friday over a 4-months period.

### Intestine microbiology count

Fresh fecal samples (about 1 g, precisely weighted) from the participants were collected monthly. The specimens were analyzed by the method for the Direct Microscopic Clump Count (DMC) (Grange and Nelson, 1961).

### Statistics

All data are presented as means  $\pm$  SE. The results were calculated statistically using 1-way analysis of variance (ANOVA) and the

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**Table 1.** Effect of *Tai Chi* exercise on intestine enterobacteriaceae count (log CFU /g,  $x \pm s$ ,  $n = 5$ ).

	0	1	2	3	4
Enterobacteriaceae	7.42 ± 0.17	7.49 ± 0.26	7.89 ± 0.11 <sup>a</sup>	8.24 ± 0.18 <sup>b</sup>	8.34 ± 0.30 <sup>b</sup>

<sup>a</sup>P < 0.05, <sup>b</sup>P < 0.01, compared with control (0 month).

**Table 2.** Effect of *Tai Chi* exercise on intestine enterococcus count (log CFU /g,  $x \pm s$ ,  $n = 5$ ).

	0	1	2	3	4
Enterococcus	7.92 ± 0.12	7.89 ± 0.09	7.99 ± 0.11	8.93 ± 0.17 <sup>b</sup>	9.16 ± 0.23 <sup>b</sup>

<sup>b</sup>P < 0.01, compared with control (0 month).

**Table 3.** Effect of *Tai Chi* exercise on intestine lactobacillus count (log CFU /g,  $x \pm s$ ,  $n = 5$ ).

	0	1	2	3	4
lactobacillus	8.04 ± 0.32	8.09 ± 0.21	8.94 ± 0.24 <sup>a</sup>	9.78 ± 0.43 <sup>b</sup>	10.07 ± 1.05 <sup>b</sup>

<sup>a</sup>P < 0.05, <sup>b</sup>P < 0.01, compared with control (0 month).

**Table 4.** Effect of *Tai Chi* exercise on intestine bifidobacterium count (log CFU /g,  $x \pm s$ ,  $n = 5$ ).

	0	1	2	3	4
bifidobacterium	6.42 ± 0.21	6.48 ± 0.33	6.82 ± 0.25	7.89 ± 0.47 <sup>b</sup>	8.37 ± 0.27 <sup>b</sup>

<sup>b</sup>P < 0.01, compared with control (0 month).

Duncan multiple range test. Differences were considered to be significant at P < 0.05.

## RESULT

### Effect of *Tai Chi* exercise on intestine enterobacteriaceae count

A significantly (P < 0.05, P < 0.01) increased intestine enterobacteriaceae count was observed in the *Tai Chi* participants. Compared with the control group (0 group), *Tai Chi* exercise significantly (P < 0.05, P < 0.01) affected the intestine enterobacteriaceae count in participants (Table 1).

### Effect of *Tai Chi* exercise on intestine enterococcus count

Intestine enterococcus count remained unaffected (P > 0.01) after 2 months of *Tai Chi* exercise, whereas the count was significantly (P < 0.01) increased after 2 months of *Tai Chi* exercise (Table 2).

### Effect of *Tai Chi* exercise on intestine lactobacillus count

As shown in Table 3, *Tai Chi* exercise markedly (P < 0.05,

P < 0.01) increased intestine lactobacillus count. The effect increased with increasing exercise period (Table 3).

### Effect of *Tai Chi* exercise on intestine bifidobacterium count

The *Tai Chi* participants exhibited higher intestine bifidobacterium count at the end of the experiment; this increase was significantly (P < 0.05, P < 0.01) ameliorated by the *Tai Chi* exercise period (Table 4).

## DISCUSSION

Human neonates are exposed to a bacterial environment, and their gastrointestinal tracts are usually colonized by facultative anaerobic (referred to as aerobic hereinafter) bacterial species such as *Staphylococci*, *Escherichia coli* and its related species, enterococci and lactobacilli, followed approximately one or a few days later by bifidobacteria, clostridia and bacteroides (Lundequist et al., 1985; Mitsuoka et al., 1973; Romiti and Duerden, 1981; Yoshioka et al., 1983; Alim et al., 2009; Saritha Kumari et al., 2009). In addition to bifidobacteria, bacteroides that ferment GOSs (Hidaka et al., 1986; Ohtsuka et al., 1989; Suzuki et al., 1999) and are important components of neonatal bowel microflora

(Lundequist et al., 1985; Mitsuoka et al., 1973; Romiti and Duerden, 1981; Yoshioka et al., 1983) would also have effects on balance of the intestinal microflora and also on nutrition in neonates.

This study has several limitations including small sample size and a short duration of training. Longer training may increase the benefit from Tai Chi. This is supported by the fact that long-term *Tai Chi* practitioners exhibit larger increases in intestine microbiology count (enterobacteriaceae, enterococcus, lactobacillus and bifidobacterium), an effect not seen in individuals who had practiced *Tai Chi* for only 1 and 2 months.

To conclude, the results suggest that *Tai Chi* may be an effective and safe form of exercise for some individuals with stomach or intestinal trouble.

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