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The Effects of a Buqi Program on Postural Control and Self-Rated Health in French Middle-Aged Participants: A Pilot Randomized Controlled Trial

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Abstract

Background: This research aimed at exploring the effects of a short-term Buqi intervention on postural control and self-rated health in a French sample of middle-aged participants.

Methods: Twenty volunteering adults aged 31-65 were randomized into a 3 weeks long Buqi training group, or a wait-list group. Parameters regarding postural control and health-related quality of life were collected in both groups before and after the intervention.

Results: Postural stability (reflected by decreased CoP displacements) slightly improved pre- to post-training in the "Buqi" group. On the other hand, important positive changes in self-rated mental health occurred for Buqi participants (effect size >1). These positive changes were not found for participants in the control group.

Conclusions: Within the limitations of our design, it can be concluded that Buqi can be used to increase one's perceived mental health status in middle-aged French participants. Whether this effect is mediated by pain alleviation remains to be elucidated.

Keywords: Buqi; Postural control; Health-related quality of life

Introduction

In middle-aged people, quality of life is particularly important since it has been found to represent a powerful and consistent predictor of subsequent healthcare utilization and health outcomes including mobility, morbidity, and mortality [1,2]. An important factor which can detract from one's quality of life is chronic, recurrent, or acute pain. Chronic pain of moderate to severe intensity occurs in 19% of adult Europeans [3]. Haggerty et al. [4] found that chronic pelvic pain is associated with reduced physical and mental self-rated health in a cohort of 547 women. Pain may result from an initial trauma or past injuries, but many people suffer chronic pain in the absence of any evidence of body damage. Actually, poor body postures have been identified as an ongoing cause of pain such as back pain, neck pain, headaches, tendinitis, etc., essentially because it creates extra stress on the spine [5]. What adds to the problem is the fact that unpleasant emotions produced by pain may act as an aggravating factor since marked postural disruptions have been found to be associated with unpleasant emotional states [6].

As a first-line therapy for posture-related pain, physical exercises are usually prescribed that serve to build strength in affected musculature and train the body in new postural patterns. With regard to such therapeutic exercises, some authors postulated that static exercises should be prioritized since postural muscles respond best and strengthen fastest when contracted for long periods of time without rest [7]. Buqi training, which is derived from static Qigong, is a Chinese meditative practice that precisely includes such static exercises. It usually consists in maintaining a certain posture or stance for a prolonged period of time (10 to 45 minutes) while letting the mind roam free. Although the practitioner seems to be "fixed" in space, the physical and mental effort required to keep the posture is hypothesized to result in positive effects on "qi" ("qi" is defined as a form of internal feeling mixing elements of calm and energy [8]).

Much research using Qigong for health maintenance or improvement has been done in the last two decades [9] and has provided scientific support for the efficacy of this practice as an adjunctive therapy for various diseases [9] including mental disorders such as anxiety and depression [10,11]. However only dynamic forms of Qigong training (choreographed movements and gestures) have been studied to date and research samples mainly included Asian participants (Chinese, Vietnamese, Korean, [10,11]).

Consequently, the present study aims at exploring the impact of a three-week long static form of Qigong training programme (Buqi) on subjective quality of life (QOL) in a sample of non-Asian participants. Given the rationale provided above, it is hypothesized that participants receiving this intervention will improve their postural balance and stability, which should be associated with reduced pain and increased psychological well-being.

Methods

Participants and procedure

Twenty middle-aged participants (mean age: 46.6 ± 5.9 years old) took part in this study, with 60% of them being female. Among these 20 participants, 16 were white Caucasians (80%), 3 were of Maghrebian origin (15%) and one was from equatorial Africa (5%). A written consent form was obtained from each of these participants. They were then randomly allocated to one of two treatment groups: i/three weeks of Buqi (n=10) ii/no treatment (control group, n=10).

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These patients were physically generally active (they reported a median duration of walking of 2 hours/week over the preceding year) but none had any experience in strength or regular exercise training. Exclusion criteria were: i/recent surgery or recent traumatism (e.g., car accident, serious fall), ii/ glasses or orthopedic insole replacement during the study, iii/pregnancy, iv/orthodontic treatment, v/neurological or musculoskeletal condition, and vi/psychiatric disability.

Participants who received the Buqi treatment were taken into one weekly 1-hr session of Buqi for 3 weeks in a row, thus totalising 4 training sessions. Each of these training sessions were divided into the following three stages: a warm-up period (10 min including slow walking and exercises for major muscle groups), a special Buqi postural exercise period (the Wuxistand position; 40 min), and a stretching/cool-down period (10 min of stretching exercises). The Wuxistand position was performed using the following technique: participants were asked to stand with their head high; feet shoulder-width apart; weight of the body slightly forward; knees in semi-flexion; chest and back relaxed; arms outstretched in front of the body; palms up, open and flat; and outspread fingers. They were also asked to make as if to smile, to allow their eyes remain closed, and to calm down. In case participants failed to maintain the Wuxistand posture for the whole length of the training session, the Buqi instructor helped them to reproduce the posture, and they were encouraged to go on. Subjects in the control group did not have any supervised exercise treatment.

All the participants were told to continue their pre-study physical activities as usual, but they were asked not to perform the Buqi postural exercise apart from the weekly training sessions. Both groups were assessed on two separate days during the week preceding and following the intervention.

Assessment of postural control

The postural stability of each participant was assessed individually during 50 s in two testing conditions (eyes open and eyes closed) by means of a dynamometric platform (PF SS, Techno Concept, France). From information provided by the sensors, the computer recorded the position of the pressure centre of the feet at 40 Hz frequency. This device has been popularized recently by Rey et al. [12] for purposes of postural control assessment. Research in quiet standing has traditionally used the center of pressure (CoP) from a single force platform as the outcome measure [13] and recently, the methodology of CoP analysis has been precisely described [14].

In our study, the following variables were analysed: i/the CoP excursions (the surface of CoP (mm^2) was calculated so that 90% of the instantaneous positions of the CoP were inside an ellipsoid), ii/the displacement of CoP (mm), iii/the mean value of anterior-posterior sways (mm) (Mvy), and iv/the mean value of medial-lateral body sways (mm) (Mvx). Medial-lateral sways reflect the ability to distribute body weight between the two lower limbs, whereas anterior-posterior sway reflects variations in the activities of the ankle flexor muscles, which control CoP displacement in the sagittal plane. The CoP displacements represent a collective outcome of the postural control system and the force of gravity.

Assessment of self-rated health: The SF-36 questionnaire

This self-rating scale has been validated in French language [15] and includes 36 items for evaluating health-related quality of life. A score is obtained for the following life areas: physical functioning, physical role, pain, general health, vitality, role-emotional, mental health, and social function. Scores range from 0 to 100, with 0 as the worst health condition, and 100 as the best.

Two summary measures – the physical component summary (PCS) and the mental component summary (MCS) – have been derived from the eight domains described above. These have been standardized based on the French population so as to have a mean of 50 and a standard deviation of 10. Higher scores on the scales indicate better health-related quality of life. Using PCS and MCS instead of individual subscales mean scores is recommended since it eliminates the problem of floor and ceiling effects sometimes observed in some of the SF-36 subscales [16].

Data analysis

We conducted two parallel analyses of the data. To determine whether postural changes occured pre-to-post intervention, a doubly multivariate analysis of variance (MANOVA) was first performed in which the between factor was treatment (Buqi participants vs. control group), the repeated measures factors were testing condition (eyes closed vs. eyes open) and moment of assessment (before vs .after the Buqi program), and the multiple dependent variables (DV's) were the four postural control measures (CoP displacement, CoP excursions, Mvx and Mvy). Significant interactions were followed-up with univariate ANOVAs and eventually with an examination of simple effects using t-tests and Bonferroni's correction for multiple comparisons.

As a second step, the physical and mental scores from the SF-36 questionnaire were subjected to a 2 (group: Buqi vs. control)×2 (time of assessment: baseline vs. post intervention) mixed ANOVA with repeated measures on the last factor in order to assess change over time in quality of life. Any significant interaction and main effects revealed by the omnibus ANOVAs were further analyzed on the individual variables with t-tests applying Bonferroni's corrections for multiple comparisons.

For both these analyses, effect sizes (ES), Cohen's d=(Mi–Mj)/SDpooled, were computed where possible to assess the magnitude of the differences in mean scores that were statistically significant (we corrected for dependance among means by taking into account the correlation between the two means ; see [17]). On the basis of Norman, Sloan and Wyrwich's recommendations [18], an effect size of 0.5 or higher was considered of clinical significance.

Results

Participants of both groups completed the study, and no training-related complication (tiredness, muscular pain, back ache, joint pain) was observed during the study. The groups were compared at baseline: no statistically significant differences were found in initial recordings (CoP displacement, CoP excursions, Mvx, Mvy, SF-36 physical summary component, and SF-36 mental summary component).

In Table 1, the sample means (± standard deviations) for scores on the four measures of postural control are presented as a function of time and testing condition. Mean values (± standard deviations) for the physical and mental summary components of the SF-36 questionnaire are given in Table 2.

The multivariate test revealed a main effect of testing condition (eyes closed vs. eyes open), $F(4,15)=5.04$, $p<0.01$, Wilk's $\lambda=0.43$, and an interaction effect involving treatment and moment of assessment, $F(4,15)=6.93$, $p<0.005$, Wilk's $\lambda=0.35$. The follow-up univariate tests of the interaction between treatment and moment of assessment indicated significant interactions for Mvx, $F(1,18)=9.41$, $p<0.01$, $\eta p^2=0.22$, and CoP displacement, $F(1,18)=13.80$, $p<0.005$, $\eta p^2=0.34$. Our data suggest that pre-to-post changes in Mvx and CoP displacement were

	Baseline (Pre-intervention)				Post-intervention			
	Eyes open		Eyes closed		Eyes open		Eyes closed	
	Buqi (n=10)	Control (n=10)	Buqi (n=10)	Control (n=10)	Buqi (n=10)	Control (n=10)	Buqi (n=10)	Control (n=10)
	M (± SD)	M (± SD)	M (± SD)	M (± SD)	M (± SD)	M (± SD)	M (± SD)	M (± SD)
Mvx (mm)	-1.2 ± 7.4	2.1 ± 4.8	-1.2 ± 9.8	2.7 ± 4.1	1.6 ± 8.7	-1.1 ± 5.8	1.7 ± 9.8	0.2 ± 6.4
Mvy (mm)	10.8 ± 13.4	12.3 ± 12.7	7.8 ± 10.8	11.5 ± 8.5	14.2 ± 10.0	12.53 ± 16.26	11.2 ± 8.7	12.2 ± 12.1
CoP_E[a](mm²)	246.6 ± 252.9	126.10 ± 52.9	566.6 ± 754.6	174.9 ± 157.1	198.6 ± 149.7	162.78 ± 106.0	233.9 ± 224.1	201.2 ± 117.8
CoP_D[b](mm²)	532.5 ± 199.3	413.5 ± 112.2	702.9 ± 337.0	501.2 ± 155.3	431.8 ± 131.2	480.1 ± 133.0	548.8 ± 192.3	596.2 ± 162.8

[a]: CoP excursions
[b]: CoP displacement

Table 1: Pre- and post-intervention mean scores and standard deviations of body balance measures as a function of group and testing condition.

	Baseline (Pre-intervention)		Post-intervention	
	Buqi (n=10)	Control (n=10)	Buqi (n=10)	Control (n=10)
	M (± SD)	M (± SD)	M (± SD)	M (± SD)
physical component	51.03 ± 10.95	47.29 ± 10.97	49.71 ± 7.84	47.85 ± 7.87
mental component	32.18 ± 9.58	37.24 ± 9.61	46.17 ± 11.64	36.26 ± 11.66

Table 2: Pre-and post-intervention mean scores and standard deviations of SF-36 physical and mental summary ratings as a function of group.

not identical for the Buqi and the control participants. Specifically, dependent samples t-tests were conducted to evaluate possible differences between pre- vs. post-intervention recorded values in each experimental group. In both testing conditions (i.e., eyes open vs. eyes closed), it appeared that the Buqi participants reported statistically significant increased values for Mvx ($t(9)=-2.26$, $p=0.05$, $ES=0.31$ and $t(9)=-2.45$, $p<0.05$, $ES=0.39$ respectively), as well as decreased values for CoP displacement ($t(9)=2.32$, $p<0.05$, $ES=-0.25$ and $t(9)=2.81$, $p<0.05$, $ES=-0.37$ respectively) whereas control participants did not. However, the clinical importance of these changes appeared minimal (effect sizes<0.5), with both anterior-posterior and medial-lateral postural changes of less than 3 mm (Table 1).

Second, a 2 (group: Buqi vs. control)×2 (time of assessment: baseline vs. post intervention) mixed ANOVA was performed with repeated measures on the last factor for each of the SF-36 summary score (i.e., physical and mental). As far as self-rated physical health is concerned, no statistically significant change occurred pre- to post-intervention for neither group. On the other hand, there was a significant group×time effect indicating that self-rated mental health changes from baseline to post-intervention were not identical in the Buqi and the control groups, $F(1,18)=18.71$, $p<0.001$, $\eta p^2=.51$). Specifically, it appeared that the mean score significantly increased pre- to post-intervention in participants who received the Buqi program ($t(9)=-4.11$, $p<0.001$, $ES=1.03$; mean score improvement=43.4%), but not in those from the control group ($t(9)=1.50$, $p=0.18$).

Discussion

The goal of this study was to assess the effects of a 3 week-long static form of Qigong training program (Buqi) on postural balance and self-rated quality of life in middle-aged osteopathic patients. We hypothesized that this exercise program would: i/ modify participants' postural control by shaping directly an unusual body position; which in turn would ii/ impact on mental/emotional well-being. These hypotheses were partially confirmed as our data revealed a significant – albeit clinically trivial – improvement in stability (decreased CoP displacements) as well as an important improvement in mental/emotional well-being (effect size>1) among Buqi participants, but not among control participants. This is quite in line with a recent study by Tüzün et al. [19] who showed that Yoga training significantly improved balance and quality of life in older women with postmenauposal osteoporosis. Like Buqi, Yoga mainly consists of postural and static exercises.

However, our findings should be interpreted in the context of several limitations. First, the sample size of the current investigation is quite small. A major limitation of studies with small sample sizes is that they can produce false-positive results or overestimate an association [20]. Therefore, the present study should be replicated with a larger sample size to ensure that we have not reported spurious effects. Second, the duration of Buqi training was certainly too short to result in significant changes in participants' postural control since a minimum of 6-8 weeks of exercise training are usually required to produce long-term physiological/biomechanical adaptations [21]. Finally, we did not measure change in pain level or pain perception. Consequently, at this stage of our investigations, we cannot say that postural control improvement caused the observed positive changes in perceived mental/emotional condition because of pain alleviation. Many other explanations are possible. In particular, during many Buqi training sessions, we noted that some participants had a variety of physical and emotional behaviours including crying, laughing, and shouting that often led to a sensation of deep peace and relaxation afterwards. So, it's not untenable that standing in a Wuxistand posture created internal conditions that have allowed these behaviours to develop, which may have contributed to the releasing of psychological stress and, thus, to enhance perception of mental/emotional well-being. This mechanism is very similar to the one involved in contemporary forms of psychotherapy (e.g., intensive short-term dynamic psychotherapy, ITSDP; [22]) in which clients are driven to experience an intense emotion (e.g., rageful feelings), which usually triggers a tremendous relief. By provoking intense emotional experiences, Buqi sessions might have promoted corrective emotional experiences or the positive reenactment of past conflictual relationships. Future research efforts are needed to isolate and define the mechanisms through which the Wuxistand position promotes such intense emotional and cathartic behaviours.

Conclusion

This pilot study confirms our main hypothesis that attending a 3 week long program of Buqi therapy is associated with a clinically significant improvement in emotional/mental well-being. Therefore, just as has been the case for Yoga and dynamic Qigong exercises for a dozen years, our results suggest that Buqi training may constitute an acceptable method for health promotion purposes. However, future research is required that will: i/use a refined experimental device allowing for a direct testing of the hypothesized role of pain reduction in the relationship between postural balance and emotional well-being, and ii/include relevant psychophysiological measurements (electromyogram, skin conductance, heart rate) in order to provide an in-depth picture of responses that occur while maintaining a Wuxistand position.

Competing Interests

The authors have declared that no competing interests exist

Authors' Contributions

The authors listed on the paper have a substantive intellectual contribution to the published work:

• contributed to the conception and design of the study OR to the acquisition, analysis and interpretation of data

• drafted the manuscript or revised it critically for content

• given final approval to the manuscript version submitted for publication

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