Short Communication: 
The effect of a one-hour Eastern stress management session on salivary cortisol

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Summary
The Eastern stress management techniques derived from the Body-Mind-Spirit (BMS) model by Chan (2001) have been applied to interventions for a variety of clienteles and the effectiveness has been supported by positive psychological outcomes. This study aims to complement these studies by evaluating the efficacy of a one-hour Eastern stress management session in reducing salivary cortisol levels in working adults in Hong Kong. Pre- and post-test salivary cortisol levels were measured and a significant drop after the session when compared with local normative data was evident. The efficacy of the stress management session, limitations of this study and suggestions for further research are discussed. Copyright © 2006 John Wiley & Sons, Ltd.

Key Words
Eastern; relaxation; salivary cortisol; stress management; mind-body medicine

Introduction
Stress is ubiquitous in daily life. Stressors can take forms in school exam, interpersonal conflicts, work distress, traumatic experience, and so on.

After a century of investigation, there is a bulk of evidence supporting the association between stress and susceptibilities to diseases including viral infections, hypertension, heart disease, cancer, and a number of psychiatric conditions (Biondi & Zannino, 1997; Orth-Gomer, Chesney, & Wenger, 1998; Tafet & Bernardini, 2003; Vanltallie, 2002). A variety of techniques has been developed or adopted for stress management, for example, physical exercise, hypnosis, progressive relaxation, cranial electrotherapy stimulation, Tai Chi, yoga, guided imagery, and mindfulness meditation. Such techniques have been demonstrated in reviews to be effective in fostering resistance and resilience to stress and

In Hong Kong, whereas the health care system is based on Western medicine, traditional Chinese medicine concepts are widely held in people’s belief systems. In view of this, Chan and colleagues have developed a culturally relevant model of health promotion, the eastern Body-Mind-Spirit (BMS) model (Chan, Ho, & Chow, 2002), which emphasizes the interconnectedness of body, mind, and spirit. It integrates fundamental concepts of traditional Chinese medicine and Eastern philosophies into Western medicine and psychotherapy. Derived from the BMS model, stress management techniques are featured with Eastern health practices such as meditation, martial arts (e.g. Tai Chi), and breathing exercises. A holistic BMS approach has been found to be more effective than single modal intervention (Chan & Palley, 2005).

The efficacy of these Eastern stress management techniques has been examined in studies with cancer patients (Chan, 2001; Chan et al., 2002; Chan, Law, & Leung, 2000; Ho & Chan, 2003) and divorced women (Chan, Chan, & Lou, 2001). Results have indicated positive effects in reducing anxiety and depression, and enhancing psychological well-being, and physical, mental, and spiritual energy levels. However, a self-reporting approach to outcome measures which characterizes these studies is, by its nature, subject to a number of limitations, such as placebo effect, faking, and socially desirable responses. Whereas it is common to tap mental health with self-reported measures, a physiological measure is warranted to lend converging support to the claim of therapeutic efficacy. Cortisol is commonly referred to as a key stress hormone, and its dysregulation has been shown to be related to stress and ill-health (Sapse, 1997). Due to the non-invasiveness and convenience of saliva sample collection, salivary cortisol has been employed in a number of psychophysiological studies as a physiological marker of stress (Cruess, Antoni, Kumar, & Schneiderman, 2000; Felt et al., 2000; Jin, 1989, 1992; Pawlow & Jones, 2002; Turner-Cobb, Sephton, Koopman, Blake-Mortimer, & Spiegel, 2000).

This study aims to obtain preliminary data on the immediate efficacy of an Eastern BMS stress management session on a group of working adults. It was hypothesized that mean level of salivary cortisol of the participants would be reduced by exposure to a one-hour session of BMS-related stress management.

Method

The subjects of this study were 66 Hong Kong Chinese adults at working age (23 males and 43 females). They were a convenient sample recruited voluntarily from local labour unions with informed consent. Their mean age was 47.4 years (standard deviation, SD = 6.9). They attended a one-hour-long BMS stress management session (from 15.00h to 16.00h) as previously described by (Chan, 2001; Chan et al., 2002; Chan et al., 2000; Ho & Chan, 2003), which consisted of a number of Eastern relaxation exercises, including simplified Tai Chi exercises (stretching exercise for the neck, shoulders, spinal cord, hips and legs), meditation, and a simplified qigong practice with instructions on conceptualization, body posture and breathing. Saliva samples were collected both before and after the session (i.e. 15.00h and 16.00h, respectively) by salivettes (Sarstadt Ltd., Leicester, UK). No smoking, eating, and drinking were allowed one hour prior to saliva collection. The salivettes collected were kept frozen at −20°C until assayed. Saliva samples were thawed and centrifuged at 3000rpm for 15 minutes at room temperature. An enzyme-linked immunoabsorbent assay kit (EIA) (Salimetrics, Inc., State College, PA, USA) was used to determined cortisol levels. The assay sensitivity for the kit was 0.007g/dl (i.e. 0.193nmol/l), and the intra-assay and inter-assay coefficients of variation was 3 per cent and 10 per cent respectively.

To evaluate the efficacy of the stress management session, repeated measures analysis of variance (ANOVA) with time as a within-subjects effect and gender as a between-subjects effect was performed. A normal diurnal pattern of salivary cortisol entails a continuous decline after the awakening period. However, cortisol profiles in the single hour of the afternoon as used in this protocol would be expected to be relatively flat in the absence of a significant intervention. Nevertheless, the opportunity was taken to also compare the results with recently obtained control data from a healthy local sample of 80 students and staff of two universities in Hong Kong (Lai et al., 2005). In Lai et al.’s study, saliva samples were collected at six collection times (awakening, 20 and 40 minutes following...
awakening, 11.00h, 16.00h, and 21.00h) for two consecutive days. The mean concentrations at 11.00h and 16.00h of the two days were extracted for the use in this study. For control purposes, a concentration at 15.00h was estimated by linear interpolation.

Results

The results of repeated measures (time × gender) ANOVA showed that time effect was significant \[ F(1, 64) = 14.30, p < 0.001 \]. Salivary cortisol dropped significantly from pre-test to post-test as indicated by repeated contrasts (\( p < 0.001 \)). The gender main effect \[ F(1, 64) = 0.00, p = 0.991 \] and the interaction between time and gender \[ F(1, 64) = 0.27, p = 0.605 \] were insignificant. Correlation analysis revealed that salivary cortisol levels (pre-test, post-test or pre-post difference) were not associated with age. The main hypothesis of the study was thus supported.

Discussion

Subjects’ salivary cortisol dropped significantly after the one-hour Eastern stress management session, thus confirming our hypothesis. Being aware of the possibility of a small diurnal rhythm related decline of salivary cortisol within the single hour of the study, comparison was made with a group of healthy local adults during the same period of the day. The baseline (pre-test) salivary cortisol level of the subjects of the present study was not different from that of the comparison sample, while the post-test level was significantly lower. It seems highly unlikely therefore that the significant decline seen in our participants could be attributed to effects of diurnal rhythm. This gives preliminary support to the immediate effect of Eastern stress management on a commonly used physiological index of stress.

The literature suggests that the central nervous system (CNS), especially the frontal/prefrontal and limbic brain structures, plays a role in complementary and alternative medicine (CAM) such as meditation, acupuncture and massage. In particular, positive affect and emotion-related memory processing accompanied by endocrinologic and autonomic functions that are regulated in these regions are suggested to be crucial components of CAM effects (Esch, Guarna, Bianchi, Zhu, & Stefano, 2004). In the present study, the intervention was shown to be effective in reducing cortisol. It is worth investigating in the future if the intervention works through mechanisms related to frontal/prefrontal and limbic brain structures, and regulates hormonal homeostasis.
at large to achieve its therapeutic effect (Ryu et al., 1996).

Comparison of pre- and post-test salivary cortisol has been employed as an indicator of the effectiveness of relaxation intervention in a number of studies (e.g. Cruess et al., 2000; Jin, 1992; Lee et al., 2001; Pawlow & Jones, 2002; Pawlow, O’Neil, & Malcolm, 2003). However, changes and differences in diurnal patterns of salivary cortisol are increasingly seen as interesting in their own right, and levels of the same person may differ from one day to another. Future studies, especially of longer term intervention effects could usefully use sampling that captures the cortisol awakening response and the rest of the day for two or three consecutive days. A possible limitation of our study lies in the characteristics of the comparison group (Lai et al., 2005) which comprised a more highly educated group than our intervention group. However, we cannot think of any obvious reason why, in the absence of intervention, the two groups might be expected to differ in any normal decline of cortisol within the hour of the afternoon chosen for the study. Nevertheless, cautions do have to be taken when interpreting the comparison. A randomized control design with comparable control subjects is advised for more rigorous testing of the efficacy of the Eastern stress management in further studies. Additional psychological and psychoneuroimmunological measures should also be included to provide more evidence on the efficacy of the stress management. As this study only showed that after intervention participants’ cortisol level changed from normal level to lower, it would add more value to the usefulness of the programme if it is shown to be effective in changing cortisol from stressed level to normal. Choosing participants with particularly high levels of stress or exposing participants to some stressor prior to intervention may be considered. Since effect of stress management may take a prolonged period of time to show, multiple stress management sessions and longer follow-up period are suggested to examine the long-term effect of this approach of stress management.

Our research team is conducting randomized controlled trials examining the efficacy of a BMS-based intervention programme for patients with breast cancer and colorectal cancer. Some pilot findings on salivary cortisol have been published (Ho & Chan, 2003), and more detailed long-term results are pending.

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References


Effect of Eastern stress management


