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**School of Health and Biomedical Sciences**

**Discipline of Chinese Medicine**

**Clinical trial protocol**

**The clinical evaluation of electroacupuncture combined with mindfulness meditation in the weight management: a randomised sham-controlled clinical trial**

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**Background**

Obesity or overweight are defined excessive accumulation of fat in the body, which links to serious health impairments (World Health Organization, 2017). Body Mass Index is an indicative tool to estimate the amount of fat deposit in the body, individuals who has Body Mass Index (BMI) ≥ 25 is classified as overweight and obese if BMI ≥ 30 (Yumuk et al., 2015).

The prevalence of obesity has almost been doubled since 1980. In 2016, the global prevalence of adult being overweight was estimated to be 39% and 13 % of which are obese (World Health Organization, 2017). The prevalence is even more alarming in Australia, which is estimated to have 63.4% of Australian adult being overweight or obese in 2014 (Australian Bureau of Statistics, 2015).

The cause of obesity is the imbalance between energy intake and expenditure, which results in excessive amount of fat being deposited in the body. Research has found that the cause of obesity also involved multiple factors, including genetic, physiological, behavioural, sociocultural and psychological factors.

The health consequences that are associated with being obesity are profound. Research has shown that obesity is linked to cardiovascular diseases, type II diabetes, hypertension, various types of cancers, gynaecological issues and osteoarthritis. Furthermore, the likelihood of suffering from different types of pain is higher in obese individuals, especially back pain and knee pain. On the other hand, the impact of obesity is not limited to physiological effects. The psychosocial issues associated with obesity are also critical. Due to social stigmatisation on obesity, this leads to body dissatisfaction, anxiety, depression, lowered self-esteem, disordered eating behaviours. All of these impacts often lead to premature deaths, requirement of counselling, long-term care, and also lowered quality of life.

Obesity has created a significant economic burden to our society. It includes direct cost to the health care system, and also indirect costs such as loss of work productivities and increase in government welfare expenditure. The total economic burden of obesity was estimated to be almost 60 billion Australian dollars in 2008 (Access Economics, 2008).

Current management of obesity includes pharmacotherapy, dietary changes, physical exercise, bariatric surgery and behavioural changes. The Australian clinical practice guidelines for management of overweight and obesity suggests multicomponent of life style intervention for the management of obesity, which includes diet changes, increase physical activities and behaviour changes to adopt a healthy lifestyle. Moreover, it is recommended that individual or group-based psychological interventions may improve the success of weight management programs. (Health & Council, 2013)

Dietary changes include low-caloric diet which aimed to decrease energy intake to facilitate weight loss. On the other hand, physical exercise increases energy expenditure which can results in weight reduction. However, decrease food intake can cause increase hunger sensation and decreased satiety. Increased in the level of physical exercises also induce muscle pain. Both of these factors may contribute to psychological distress and decrease the tendency to sustain these changes.

Long term consumption of pharmacological obesity treatment increases risk of side effects such as hypertension or hyperlipidaemia. Bariatric surgeries can significantly decrease body weight, however, it may lead to death or complications, such as acid reflux, malnutrition, and bleeding.

Acupuncture is considered as one of the complementary medicine, it is an important part of the traditional Chinese medicine (TCM) system which has been used for treating various conditions for more than 3000 years. The traditional manual acupuncture treatment involves inserting fine needles into specific acupuncture points on human body to restore the inner balance according to TCM theory. EA is one of the variant of acupuncture, which involves connecting two needling sites to electro-stimulator to allow a predefined intensity of current to passing through the body in a constant pattern, therefore it is a reproducible stimulation that can be applied different clinical settings.(Mayor, 2013; Napadow et al., 2005)

Some evidence has suggested that electroacupuncture may induce more weight loss than diet restriction (Cabioglu, Ergene, & Tan, 2007), and maybe more effective than exercise (Hsu et al., 2005; Kim, Trinh, Krawczyk, & Ho, 2016). Guo et al. (2014) suggested that EA in combination with diet restriction may produce more weight loss than diet alone. Three other studies have found that EA plus diet and exercise may reduce more BMI than diet and exercise alone(Gao et al., 2010; Yang et al., 2010; Zhao et al., 2010). Several studies also found that EA may reduce weight and BMI in comparing to sham EA(Cabioglu et al., 2007; Zhang et al., 2012; Y. Zhao et al., 2011). Moreover, Li et al. (2015) suggested that acupuncture together with diet therapy can be more effective than diet therapy alone.

10 systematic reviews on acupuncture for obesity have commented that acupuncture is effective in improving weight and BMI. Two in which systematic review also suggested that acupuncture can have a positive effect on waist and hip circumference (R.-Q. Zhang et al., 2017; R. Q. Zhang et al., 2017) .Kim et al. (2016) has reported that acupuncture may be more effective than physical exercise for obesity. Chen et al. (2016) and Li et al. (2015) have suggested that the mechanism of acupuncture for obesity may be due to reducing excessive appetite and increase metabolism. Park et al. (2017) also suggested that acupuncture may lower serum leptin levels. Even though there are increasing evidence supporting the use of acupuncture for obesity, the current Australian clinical guidelines for obesity does not includes acupuncture as a modality for treatment. Therefore, further investigations are needed to provide more evidence to assist clinical decision.

Mindfulness meditation (MM) is a relatively new psychotherapy which is increasingly popular to be used as weight management. The term mindfulness is a concept that originated from the Buddhist traditions. It is a practice that cultivating one’s mind to end personal suffering (Bishop, 2004). Mindfulness is defined as the awareness of paying attention to the current moment without judgment to the thought (Kabat-Zinn, 2003). Bishop (2004) have further defined that mindfulness also involves in sustaining attention through self-regulation, while Shapiro et al. (2006) also added that the current moment should be experienced with an acceptance attitude.

A recent systematic review suggested that MM can be effective in improving eating behaviour such as emotional eating and binge eating, and can be used in conjunction with other intervention for weight loss treatment (Katterman et al., 2014). Mantzios and Giannou (2014) suggest that MM can reduce body weight regardless of whether participants were practising MM in group settings or in individual settings. A recent clinical trial has suggested that better weight loss outcome and eating behaviours have been achieved by adding MM to a standard behaviour weight loss program. This also supports the comment of Katterman et al. (2014) that MM may enhance the outcome of weight loss programs.

There are some evidence supports that EA may be better than diet and exercise for weight loss, and MM can enhance the weight management outcome by improving eating behaviour. However, the combination of EA and MM has never been investigated.

The aim of this clinical trial is to assess the effectiveness and safety of the combination of EA and mindfulness meditation, and also evaluate the effectiveness of EA in the management of weight loss.

## Aims and Objectives

We hypothesise that:

1. The cause of obesity involves multiple factors, and multidisciplinary approach would be more effective in weight management.
2. Acupuncture may reduce BMI and body weight and improve quality of life.
3. Adding psychological intervention may enhance the weight loss outcome
4. MM can enhance weight loss outcome by improving eating behaviour.
5. The combination of Acupuncture and MM can induce a synergistic effect in promoting weight loss.

**Methods / Design**

## Study design

 This is a sham controlled; three-arm randomised clinical trial.

## Setting

This clinical trial will be held at RMIT University Chinese Medicine Research Laboratory.

## Participants

#### Inclusion criteria

Eligible participants must fulfil the following criteria:

* Being overweight (BMI ≥ 25)
* Adult, with age between 18 and 60.
* Be available during the period of this clinical trial

#### Exclusion criteria

Participants will be excluded if they have one or more of the following conditions:

* Serious chronic medical conditions, such as cardiovascular diseases, cancer, HIV, epilepsy
* Pregnancy or lactation.
* Drug induced secondary obesity
* Medical conditions which are known to link with obesity, such as uncontrolled high blood pressure, polycystic ovary syndrome, hypothyroidism, Cushing syndrome, Hashimoto’s Disease
* Mental conditions such as clinical depression, anxiety, PTSD, psychosis
* Participants who are not willing to be treated by acupuncture or to practice meditation.
* Difficulties with understanding and reading English
* Taking blood thinning medications
* Auditory impairment who cannot listen to audio records
* Participants who received treatment for obesity in the past 3 months, including medical treatment or participated in weight loss programs.

## Interventions

### Electroacupuncture (EA)

The intervention consist of 12 weekly sessions, each session includes EA treatment with 30 mins needles retention EA point selection includes Zusanli (ST36), Sanyinjiao (SP6), Tianshu (ST25), Zhongwan (CV12), Fenglong (ST40), Guanyuan (CV4), Qihai (CV6), Yinlingquan (SP9). The location of the acupuncture points will follow the standard point location in western pacific region published by WHO (World Health Organization, 2008).

Stainless steel single use disposable needles (Huato, Suzhou Medical Instrument Factory, China) will be used and the needles are sterilised, individually packed with length of 40 mm. Skin sterilisation will be performed by applying 70% isopropyl alcohol swab to the area. All acupuncture points will be needled perpendicularly with guide tube. Insertion depth will be approximately 25 mm, depending on the location of individual points. Each point will be connected to an electro-stimulator continuous wave at frequency of 30 Hz. All needles will be removed after 30 minutes of electro-stimulation.

The acupuncturist who is providing acupuncture treatment in this trial is registered under AHPRA (Australian Health Practitioner Regulation Agency) as qualified acupuncturist for more than 3 years of experience.

### Sham Electroacupuncture (SEA)

The SEA also consist of 12 weekly sessions, this is penetrating sham acupuncture on non-acupuncture points (1 cm away from acupuncture point and meridian). The same type of acupuncture needles will be used for SEA with the exact skin sterilisation method. All acupuncture points will be needled perpendicularly with guide tube. Insertion depth will be approximately 25mm, depending on the location of individual points. Each point will be connected to a sham electro-stimulator (showing a continuous wave at frequency of 30 Hz but without actual stimulation). All needles will be removed after 30 minutes of electro-stimulation.

### Mindfulness Meditation

The mindfulness meditation (MM) intervention involved practising a 10-minutes pre-recorded mindfulness meditation during 12 weekly sessions. The MM adapted from MB-EAT program which developed by Jean Kristeller (Kristeller & Hallett, 1999). It is a sitting meditation to be practiced in individual settings, which requires participants to focus on their awareness through breathing.

At the initial session, a copy of the pre-recorded MM audio file will be sent to participants’ email for daily self-practice. The participants will also receive a copy of the mindfulness meditation information and instruction booklet, which explains the procedure of practising mindfulness meditation. Participants will need to practice daily at home for 10 minutes, a log-book will be provided to record the frequency and duration of each MM self-practice. The participant will then follow the instruction by listening to the playback of MM audio file.

## Group Design

This is a three-arm clinical trial, which consist of the EA plus MM group (EAM), SEA plus MM group (SAM) and EA only group (EAO). The description of each groups are listed below:

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| Group | Description |
| Electro Acupuncture + MM (EAM) | This group consists of the combination of EA and mindfulness meditation interventions. Participants will be given the abovementioned EA treatment. They will then be prompted to follow the 10 minutes pre-recorded MM instruction. They will be instructed to practice MM daily.  |
| Sham Acupuncture + MM(SAM) | This group consists of the combination of EA and mindfulness meditation interventions. Participants will be given the abovementioned sham EA treatment. They will then be prompted to follow the 10 minutes pre-recorded MM instruction. They will be instructed to practice MM daily. |
| Electro Acupunucture(EAO) | This group consists of the above mentioned electroacupuncture treatment only.  |

## Recruitment

Participants will be recruited through advertisement through the following methods:

* Emails to students who are listed in the RMIT SHBS candidature network
* RMIT University approved social medias
* Poster
* Flyers
* Brochures
* Community notices
* Local newspapers and newsletters

All advertisement includes a brief description of the clinical trial, including the aim and description of the trial, and contact details so that interested individuals may contact the research team via email or phone. A QR code image will also be placed in the advertisement which links to the research team email for the convenience of contacting the research team. Flyers and posters are to be placed at RMIT University teaching clinic and RMIT University campus, sports centres and local libraries. All prospective participants from the recruitment will be going through a screening interview to assess the eligibility. Participants who meet the inclusion and exclusion criteria will be recruited for this clinical trial. A written consent will be obtained from all participants before randomisation.

## Randomisation

## Participants will be randomised into three groups. An independent statistician will be responsible for generating randomisation code by using a computer program. The code will be placed in individually sealed opaque envelopes, which contains the information about the allocated treatment group. All participants will select their envelope from the available envelopes and hand over to the researcher. The researcher will ensure that the envelope will not be opened until the name of the allocated participants is written on the envelope. Group assignments will not be changed after the allocation has made.

## Blinding

Acupuncturist and the researcher who is responsible for playing pre-recorded mindfulness meditation audio record will not be blinded. A research assistant who is responsible for recording outcome measurements are blinded to treatment allocation. The treatment allocation will be blinded to an individual data manager, who is responsible for manually entering information to a securely stored database. To ensure allocation concealment, any discussion between the treatment provider and the participant are required to be kept minimal.

# Outcome Measurements

## Primary outcome

### Weight and Body Mass Index (BMI)

The primary focus of the outcome measurements is on the effectiveness of the interventions on reducing the severity of overweight or obesity. It includes change in body weight in Kg, and BMI. Body Mass Index (BMI) is a commonly used tool for assessing the risk of overweight and obesity for individuals.(World Health Organization, 2017) It is calculated by using the following equation:

BMI = $\frac{Mass (Kg)}{(Height\left(m\right))^{2}}$

### Waist and hip ratio (WHR)

WHR is another commonly used tool to measure abdominal obesity, which it will be used as one of the outcome measurements. It is calculated as:

WHR = $\frac{Waist Circumference (cm)}{Hip Circumference (cm)}$

Participants are required to wear similar types of clothing to avoid the influence of clothing to the measured weight and the circumferences.

## Secondary outcomes

### Weight-related symptom measure (WRSM) and obesity and weight loss quality of life (OWL-QOL)

WRSM and OWL-QOL are two qualitative instruments to evaluate weight-related quality of life and symptoms. WRSM is a 20 item questionnaire which evaluates the weight-related symptoms such as tiredness and increased appetite. The respond will be recorded in a 0 to 6 points scale, where 0 indicate not at all and 6 indicate a very great deal. The higher the total score indicates more weight-related symptoms which affect the participants’ well-being. The OWL-QOL is a 17 item questionnaire which measures participants’ weight-related feelings. Participants will respond to questions similar to “Because of my weight, I try to wear clothes that hide my shape” or “I feel ugly because of my weight”. The respond will be recorded in a 0 – 6 point scales, where 0 indicates not at all and 6 indicate a very great deal. The higher the total scare indicates the quality of life is being affected by obesity.

### Power of food Scale

PSF is a 15 item scale, which the measures of psychological influence to food intake, particularly in an environment where palatable food are highly abundant. Participants will respond to questions similar to “I think I enjoy food than many other people” or “I cannot help myself thinking about food”. The respond will be recorded in a 1 to 5 points scale, where 1 indicates totally disagree and 5 indicates strongly agree. The higher the total score indicates a higher food intake due to psychological influence.

### Frequency of practising MM

The frequency of self-practice MM will also be recorded to assess the correlation between the frequency of practice with other measured outcomes. A logbook will be given to participants who are allocated to EAM and SAM group. Participants may also choose to submit a photo of their logbook via email.

### Chinese Medicine differential diagnosis questionnaire

The Chinese medicine differential diagnosis questionnaire will be used during the baseline measurement. The questionnaire will differentiate participants’ symptoms into 5 different patterns according to Chinese Medicine theory. The patterns will be used for data analysis on whether acupuncture treatment for obesity is in favour of particular Chinese medicine differential patterns.

The abovementioned outcome measurements will be assessed at the end points of 3, 6, 9, 12, 14 and 16 week.

## Adverse events

All adverse events will be documented, including the description, severity, duration, and the required treatment. All cases of serious adverse events will be immediately reported to the chief investigator for appropriate action.

## Attendance and Drop-out

Participants will be informed that they are free to withdraw from the clinical trials at any time. The attendance to the treatment will be recorded for participant adherence. The reason for withdrawal will also be following up and documented.

## Sample size calculation

Based on the study by Gugel et al. (2012) comparing the acupuncture group with the sham acupuncture BMI after treatment, the effect size estimate was 0.56. The sample required to achieve 80 percent power at a significance level of 5% is 55 per group.

## Statistical analysis

Statistical analysis will be performed using Statistical Package for Social Science (SPSS) at the Discipline of Chinese Medicine, School of Health and Biomedical Science, RMIT University. Intention to Treat (ITT) analysis will also be perform for participants who are randomised and participated for at least 1 treatment session. Continuous variables will be summarised by using the mean, standard deviation, and 95% confidence intervals (CIs), while quantitative variables will be presented by using the maximum and minimum values. Baseline data and clinical characteristics will be used for comparing the baseline data between intervention groups. Analysis of covariance (ANCOVA) will be performed on BMI and WHR to determine the mean difference between groups.

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