Efficacy of a Motorized Mechanical Oscillator in Abdominal Fat, Weight, and Waist Circumference Reduction – Two Case Studies
動力化機械擺動瘦身器在減少腹部脂肪、體重和腰圍的效力 - 二個專題研究

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Abstract

The importance of reducing health risk associated with high abdominal fat is frequently emphasized. Consequently, in Singapore, we have witnessed good sales on motorized mechanical oscillators touted to induce slimming based on the principles of acupressure. However, to date, no study has been done to evaluate the efficacy of such equipment. This pilot study aims to examine the efficacy of motorized mechanical oscillators in reducing waist circumference, weight and abdominal fat percentage over 4 weeks as well as augment the data on acupressure for weight reduction. Two male subjects, one mildly overweight and the other severely overweight, were recruited. They were required to keep to their existing lifestyles and dietary habits and were instructed to wear the oscillator belt for 30 minutes each time, twice a day, as per instructions given in the manual. The machine was operated using the automatic mode. The results show a slight decrease in total body fat % ascertained by DEXA scans. There was also a reduction in waist circumference and an increase in lean mass in the trunk area in both subjects. Specifically, one participant (mildly overweight) lost 1.2% of total body fat, and 0.7cm on the waist girth but gained 1 kg of lean trunk mass. The other participant (severely overweight), although having lost only 0.2% of total body fat and 1.3cm on the waist girth, lost 1.7 kg in total body weight. He also gained in trunk lean mass that resulted in trunk fat reduction of 0.4 %. There appears to be some success in such treatment modality particularly with regard to reducing abdominal fat. Certainly, more work needs to be done and future studies are being considered that will involve bigger sample sizes.

摘 要

調查顯示腹部脂肪的累積能引起健康危害，因此減少腹部脂肪的重要性需要廣泛重視的。在新加坡，瘦身產品如動力化的機械擺動瘦身帶都獲得非常好的銷售額。 此瘦身帶是以穴位理療原理為依據而設計開發的。可是至今，這類產品的瘦身效果還沒得到科學證明。這項中間試驗的目的是研究在超過4個星期的時間裏，這類瘦身帶對減少腰圍，體重和腹部脂肪的百分數效果；同時也希望增添用穴位理療原理在減肥方面的資料。在二位男性患者當中，一位屬於輕微超重，而另一位屬於嚴重超重。在這項中間試驗調查中，二位患者接受了為期四周的治療療程。療程包括每日使用本瘦身帶二次，一次療程三十分鐘。除此以外，患者需要保持原本的生活方式和飲食習慣。並遵循指導手冊方法操作。此瘦身帶的操作是採用自動化的方法。由DEXA結果顯示二位元患者的脂肪都有顯微的下降，腰圍也有所減小，並且腹部的肌肉有明顯的增加。其中一位患者（輕微肥胖者）的脂肪減少了1.2%， 腰圍減少了0.7公分，而肌肉增加了1公斤。第二位患者的身體脂肪減少了0.2%，腰圍減少了1.3公分，體重也減輕了1.7公斤。同時肌肉也增加了，這使到他的腹部的脂肪減少了0.4%。由此可見，這類瘦身方法對減少腹部脂肪似乎有效。所以，這方面的調查和研究需要更多的工作。接下來希望進行更廣泛，更大規模的研究。

Introduction

According to Abernethy, Hanrahan, Kippers, Mackinnon, & Pandy (2005), being obese or overweight will increase one's chances of health problems such as hypertension, cardiovascular disease, cancer, osteoarthritis, and type II diabetes. As a consequence, it is not surprising that the slimming industry is big business (Economist, 1997). In a survey done by Egger, Stanton, and Cameron-smith (2003), up to 72% of men and 85% of women in some countries are trying to lose or not gain weight. Less than 30% of those trying to lose and 20% of those trying not to gain, report using 'traditional' treatments to do so. 'Alternative' treatments seem to be more popular, although their effectiveness has not been established. Complimentary and alternative medicines are terms used to describe approaches to health care that are outside the realm of conventional medicine (NCCAM, 2006). An example of a non-ingestible alternative treatment for weight loss is the current motorized mechanical oscillator. These devices generally perform three functions that are essential to health maintenance, namely slimming, detoxifying, and massaging. For the purpose of this study, the latter two functions will not be discussed.

The slimming function of the mechanical oscillator can be achieved by using high and varying oscillating speeds to stimulate acupressure points on the abdomen known to have slimming and digestion effects (Lu, Cui, & Shi, 1988). Its principle mechanism is to break down body fats, before detaching fats from the fatty tissues and drain them off from the body through the lymphatic system. The massaging also helps the lymphatic system to carry waste and toxins to the lymph nodes where they are filtered and passed into the blood stream.

In the principle of acupuncture/acupressure, life force or 'Qi' is thought to circulate within energy pathways or 'meridians' longitudinally throughout the body. Acupuncture points are specific locations on the body considered to be connected to these energy meridians (Lacey, Tershakovec, & Foster, 2003). During illness Qi is thought to be out of balance, and stimulation of acupuncture points corrects this imbalance. Theoretically, an 'excess' or 'deficiency' of Qi can be 'normalized' by the specific manner of point stimulation (Lacey et al, 2003). Overweight or obesity is also regarded as a kind of illness, and therefore treatment for obesity involves stimulation of various acupuncture points to regulate and correct the imbalance of Qi. Both acupuncture and acupressure work on the principles mentioned above but the methods of administration are slightly different. Acupuncture uses needles on the specific points for stimulation while acupressure is the method where the thumb is used to press on a point using either the method of pressing and rubbing, or thrusting and rolling. Both methods cause stimulation to the point and may achieve results.

According to Egger et al (2003), acupuncture and acupressure are frequently cited as strategies to curb appetite and lower body weight. Studies using accupuncture techniques have reported ambivalent results. However, there is a dearth of research using acupressure techniques for weight loss. Sun and Xu (1993) reported the use of auricular acupressure and acupuncture treatment combinations compared to controls given herbal supplement. The auricular acupressure was administered three times a day and the body acupuncture was administered once in every three to five days. However, the duration of treatment was not specified. The control group was asked to take herbal supplement twice a day. After twelve weeks of intervention, they reported significant weight loss in the treatment group. Since the subjects were advised to limit their intake of sweet and fried food and exercise was encouraged, it is possible that the weight loss was due to the reduced intake of sweet and fried food combined with more exercise, rather than to the accupressure technique. In another study, Allison, et. al. (1995) reported no significant weight loss in the treatment group using an auricular acupressure device over a period of twelve weeks. The treatment group used the device everyday for two to three minutes upon awakening, before each meal and snack, and before bed for twelve weeks, totaling 1,512 minutes.

In Singapore, more men fall in the overweight category compared to the women (National Health Survey, 2004). In an attempt to lose or maintain weight, many have turned to alternative treatments; ingestible such as diet pills and non-ingestible such as the motorized mechanical oscillators. These mechanical oscillators work on the principles of acupressure by stimulating the specific points known to suppress appetite, improve digestion and fat loss. They target at weight reduction around the waist area. To date, there is no study done on weight reduction using acupressure technique in the abdominal area. This has prompted the present case studies.

In general, the risk of developing complications increases with the level of obesity. However, not only does the amount of excess fat need to be considered but where in the body it is distributed may also be of importance (Mayo, Grantham, & Balaksekaran, 2003). Upper-body fat, and in particular that carried within the abdomen (intra-abdominal), may carry a greater health risk than stored elsewhere in the body (Hardman et. al., 2005). Thus, Mayo, et. al. (2003) suggested that preferential reductions in abdominal fat during weight loss would seem necessary to reduce the health risk associated with obesity. Abdominal fat stores are accepted as more dangerous than fat stored elsewhere. Suggestions have been made that treatments designed to reduce obesity and related diseases should ideally be associated with substantial reductions in abdominal fat (Ross and Janssen, 1999). This also provides the impetus for our current research.

Hence, the purpose of these case studies was to examine if the motorized mechanical oscillator would be effective in reducing abdominal fat, weight, and waist circumference over four weeks of treatment.

Methods

Participants

The participants were two healthy sedentary males aged 25 and 31. Their physical activity patterns did not include vigorous exercises more than twice a week for more than thirty minutes each time.

Procedures

The OTO Trimax TX908 was used for this study. The volunteers were familiarized with the use of the device through instructions in a manual and a product demonstration. They were instructed to wear the device, at the waist according to the instructions given in the manual, for 2 sessions of 30 minutes everyday for 4 weeks. They were also given instructions on keeping a log of their dietary intake and physical activity and advised not to alter their eating habits and physical activity level during this period. Pre-test measurements of weight, waist circumference, and DEXA scan were taken. At the end of four weeks, post-test measurements of their weight, waist circumference, and DEXA scan were taken.

Results

Table 1. Pre- and Post-test Measurements.

Participant A	Trunk fat (kg)	Trunk lean mass (kg)	Total trunk mass (kg)	Total body mass (kg)	% Trunk fat	% Body fat	Waist circumference (cm)
Pre test	9.154	22.336	32.159	69.037	28.5	24.5	89.0
Post test	8.857	23.363	32.880	70.130	26.9	23.3	88.3
Change (post – pre)	-0.296	1.027	0.721	1.093	-1.6	-1.2	-0.7
Participant B	Trunk fat (kg)	Trunk lean mass (kg)	Total trunk mass (kg)	Total body mass (kg)	% Trunk fat	% Body fat	Waist circumference (cm)
Pre test	20.869	34.346	56,155	116.146	37.2	33.3	119.3
Post test	20.901	34.961	56.774	114.399	36.8	33.1	118.0
Change (post – pre)	0.032	0.615	0.619	-1.747	-0.4	-0.2	-1.3

"-" denotes loss

The total fat percent for participant A decreased by 1.2% from 24.5% to 23.3%. The waist circumference reduced by only 0.7 cm, from 89.0 cm to 88.3 cm. There was a decrease in trunk fat from about 9.2 kg to 8.9 kg, resulting in a trunk fat percentage reduction of 1.6%, from 28.5% to 26.9%. However, total trunk mass increased from 32.2 kg to 32.9 kg. Lean mass in the trunk also increased from 22.3 kg to 23.4 kg. Overall total body mass of participant A increased from 69 kg to 70 kg.

For participant B, the total body mass decreased from 116.1 kg to 114.4 kg. The total body fat percent decreased only 0.2%, from 33.3% to 33.1%. The waist circumference reduced from 119.3 cm to 118.0 cm. However, there was a very marginal increase in trunk fat of 0.03 kg. Lean trunk mass, however, increased by 0.6 kg from 34.3 kg to 34.9 kg, and total trunk mass from 56.1 kg to 56.8 kg. Despite the small increase trunk fat, the greater increase in lean trunk mass resulted in an overall slight decrease in trunk fat of 0.4 %.

Discussion

The participants were asked to keep a record of their daily diet intake and the type of physical activities they engaged in during the four weeks of treatment. The food and exercise record was to make sure that they do not deliberately change their existing lifestyle behavior and thus minimize potential hawthorn effects. During the period of treatment, we observed no major changes in their diet. There were neither also no major festivals nor public holidays during this period to influence their lifestyle habits. There was also no evidence to suggest that the participants may have changed their exercise routine. For weight or body fat reduction to happen, diet and physical activity play important and complementary roles. Weight loss happens when energy expenditure is greater than energy intake and energy expenditure is achieved by engaging in physical activities. When diet and exercise regimes are kept normal, any change in weight or percent body fat can be safely attributed to an external factor or treatment administered. In this case, we attribute the reduction in trunk and total body fat in both participants to the sustained use of the OTO Trimax TX908 mechanical oscillator.

Looking particularly at the trunk area, there is a reduction in total body fat % and trunk fat %. There was also an increase in lean mass for both participants in the trunk. Reduction in fat mass is encouraged as it implies health benefits. Generally, the risks for diabetes, hypertension and cardiovascular disease increase with increasing body weight. In Traditional Chinese Medicine, acupressure and acupuncture are commonly used techniques to treat illnesses and diseases. Treatments using such technique are usually administered by physicians in clinical or hospital settings. The mechanical oscillator, using the principle of acupressure on the acupressure points in the abdominal region appears to have potential health benefits in reducing total body and abdominal fat, at least in the short term based on the two case studies. This augurs well for the device as it would mean that weight loss enthusiasts may consider the use of this device for potential health benefits without having to refer to a clinical setting. It is not known, however, if the long term usage of the belt may bring about continued or greater reduction of fat in the targeted area. Future studies will need to investigate the effectiveness of the belt for a larger cohort and for a longer duration.

Weight and abdominal fat reduction should not be just a consideration for obese or overweight adults. Obese or overweight children should deserve equal, if not more, attention where weight and abdominal fat reduction is concerned. In Singapore, the prevalence of obesity in the year 2000 was 10.8% in children aged 6-7 years, 14.7% in children aged 12-13 years and 13.1% in those aged 15-16 years. The significance of childhood and adolescent obesity arises from data which indicates that childhood obesity tends to predict adult obesity, and overweight children are more likely to become obese adults (Loke, 2002). In an effort to reduce childhood obesity and, hopefully, the risk of adult obesity, the Trim and Fit (TAF) scheme was introduced to all the schools in Singapore (Ministry of Education, Singapore). Overweight students participate in 1½ hours of physical activity per week, in addition to their weekly physical education sessions. Some schools let children play games; others help them learn a sport. Some schools organize the activities during recess, while others set time aside before or after school. The scheme aims to improve physical fitness and reduce levels of overweight among school children. In 2002, this successful program reduced the rate of obesity among schoolchildren to 9.8% (Lim, 2003). However, such school based programs carry some harmful effects such as labeling, coercion and stigma. Many students did not want others

to know they were participating in a weight-loss program for fear of being teased or embarrassed (Story, 1999). For the mildly obese kids who just 'made it' in to the TAF program, we can expect problems of self-confidence and self-esteem when they are being 'labeled'. Since the belt can be used anywhere, even at home, the child will not face the problem of being 'different from the rest' and can carry out activities as normal children do during recess or outside school hours. Certainly, future work can also be done on the effectiveness of the mechanical oscillator in school children as another mean of reducing abdominal fat to help fight the problems related to obesity without having them being stigmatized.

Conclusions

To summarize, both participants experienced a decrease in the waist circumference, and percent total body fat after four weeks of treatment. They also increased in lean body mass in the abdominal region.

From the results obtained from these two subjects, it would suggest that the device can induce reductions in waist girth, total body and trunk fat as well as increase trunk lean mass. Future studies would include more subjects so that the results obtained will be statistically significant and meaningful. Future work should also consider its effectiveness on school children as a possible way to help reduce abdominal fat of those in the TAF program.

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Appendix 1. Sample of log sheet

1. Subject description

Name
Age
Height (cm)

	Weight (Kg)	BMI (Kg.m2)	Waist measurement(cm)	Dexa scan
Week 0				
Week 4				

2. Physical Acctivity Log
(Source : My health workbook, Health Promotion Board)

Name :		
Date	Type of activity	Duration (Mins)

3. Dietary Intake Log
(Source: My health workbook, Health Promotion Board)

Name :				
Date	Breakfast	Lunch	Dinner	Snacks

Appendix 2. Questionnaire

Name: _____

DOB: _____

Contact Number: _____

Email address: _____

Are you experiencing any pain/discomfort/injury at the moment?

(Yes / No) please circle your answer.

If yes, please elaborate.

State the location and type of pain/discomfort/injury _____

_____

How long have you been experiencing this pain/discomfort/injury? _____

_____

Briefly describe the type of physical activity (and duration) you engage in on a regular basis

_____

_____

Do you suffer from any other ailments: Eg. Constipation, restlessness during sleep etc

_____

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