



Original Article

Dumbbells and ankle-wrist weight training leads to changes in body composition and anthropometric parameters with potential cardiovascular disease risk reduction



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المخلص

أهداف البحث: يُعد دعم النشاط البدني أحد الاستراتيجيات العالمية لخفض عبء أمراض القلب والأوعية الدموية. تهدف هذه الدراسة إلى تحديد ومقارنة أثر تمارين المقاومة الخفيفة باستخدام أثقال الدميل أو أوزان الكاحل والمعصم على معالم القياسات البشرية وتركيب الجسم، بين البالغين في مقاطعة "كلانتان" بدولة ماليزيا.

طرق البحث: أجري هذا البحث المجتمعي العشوائي بمقاطعة كلانتان بدولة ماليزيا من شهر مارس إلى شهر أغسطس ٢٠١٢م. تم تقسيم البالغين ممن زاد مؤشر كتلة الوزن لديهم عن ٢٣ كغم/م^٢ بشكل عشوائي إلى مجموعتين، أثقال الدميل (عدددهم ٦٩) وأوزان الكاحل والمعصم (عدددهم ٦٩). قامت مجموعة أثقال الدميل بتمارين جماعية منظمة ثلاث مرات أسبوعياً باستخدام زوج من الدميل، وزن كل منهما كيلوجرام واحد. وأعطيت مجموعة أوزان الكاحل والمعصم زوجاً من أوزان الكاحل، وزن كل منهما نصف كيلوجرام، وزوجاً من أوزان المعصم وزن كل منهما نصف كيلوجرام يتم ارتداؤها خلال الأنشطة اليومية ثلاثة أيام أسبوعياً، لمدة لا تقل عن عشرين دقيقة يومياً. تم قياس كل من مؤشر كتلة الجسم، ومحيط الخصر، ونسبة الخصر إلى الورك، ونسبة الدهون في الجسم ونسبة العضلات في الجسم ابتداءً، وبعد ستة أسابيع، وثلاثة أشهر وستة أشهر من بداية الدراسة.

النتائج: أكملت التجربة ٨٩ مشاركاً. كانت هناك انخفاضات ملموسة في مؤشر كتلة الجسم في الأسبوع السادس فقط لمجموعة أثقال الدميل. ولم تُلاحظ أي

تغيرات ذات قيمة في مؤشر كتلة الجسم بالنسبة لمجموعة أوزان الكاحل والمعصم. كما لوحظ تحسن ملموس في كل من محيط الخصر ونسبة الخصر، إلى الورك ونسبة الدهون في الجسم ونسبة العضلات في الجسم بعد ستة أسابيع، وثلاثة أشهر وستة أشهر مقارنة مع بداية الدراسة.

الاستنتاجات: أحدثت تمارين المقاومة باستخدام أثقال الدميل أو أوزان الكاحل والمعصم تحسناً ملموساً في عناصر معينة من مركبات الجسم ومعالم القياسات البشرية.

الكلمات المفتاحية: تمارين المقاومة الخفيفة؛ أثقال الدميل؛ أوزان الكاحل والمعصم؛ الخطورة على القلب والأوعية الدموية

Abstract

Objectives: Promoting physical activity is a global strategy to reduce the burden of cardiovascular disease. This study aimed to determine and compare the effect of light resistance training using either dumbbells or ankle-wrist weights on the anthropometric parameters and body composition of adults in Kelantan, Malaysia.

Methods: This randomized community trial was conducted in Kelantan, Malaysia, from March through August 2012. Adults with a body mass index (BMI) of more than 23 kg/m² were randomized into dumbbell (N = 69) and ankle-wrist (N = 69) weight groups. Participants in the dumbbell group performed structured group exercises three times per week using a pair of one-kilogram dumbbells. Participants in the ankle-wrist weight group were given one pair of 500 gm ankle

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weights and one pair of 500 gm wrist weights to be worn during the activities of daily living three days per week for at least 20 min. BMI, waist circumference (WC), waist-to-hip ratio (WHR), body fat percentage (BF%) and skeletal muscle percentage (SM%) were measured at baseline, week 6, month 3 and month 6.

Results: Eighty-nine participants completed this study. There were significant reductions in BMI only at week six for the dumbbell group. No significant BMI changes were observed for the ankle-wrist weight group. Significant improvements of WC, WHR, BF%, and SM% were observed in both intervention groups from baseline at week 6, month 3, and month 6.

Conclusion: Resistance exercise using either dumbbells or ankle-wrist weights produced significant improvements in certain components of body composition and anthropometric parameters.

Keywords: Ankle-wrist weights; Cardiovascular risk; Dumbbells; Light resistance training

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Introduction

Cardiovascular diseases (CVDs) are a group of disorders of the heart and blood vessels that includes coronary heart disease, cerebrovascular disease, peripheral artery disease, rheumatic heart disease, congenital heart disease, deep vein thrombosis and pulmonary embolism.^{1,2} In 2010, the number of deaths caused by CVDs was 18.1 million. By 2030 it is predicted that 55 million people will die because of NCDs, with 23.3 million annual deaths caused by CVDs (primarily heart disease and stroke).²

Obesity and overweight are defined as an abnormal or excessive accumulation of fat that presents health risks, specifically the risk of CVDs.³ WHO defines overweight as a body mass index (BMI) of greater than or equal to 25; people with a BMI greater than or equal to 30 are considered obese.³ In the Asian population, it has been observed that health risks increase below the BMI cut-off point of 25 kg/m². For this reason, a lower cut-off point for overweight (≥ 23.0 kg/m²) has been proposed for use in these populations.⁴

Physical inactivity or a lack of physical activity is one of the most important public health challenges in the 21st century; it might even be the most important.⁵ It has been identified as the fourth-highest risk factor for global mortality (6% of all deaths globally) and was estimated to be the main cause of approximately 21–25% of breast and colon cancers, 27% of diabetes cases, and 30% of ischemic heart disease burden.⁶

The importance of resistance exercise in promoting health and preventing chronic diseases has become increasingly

recognized^{7,8} because it has great potential not just to improve skeletal muscle strength, endurance, power, and neuromuscular function⁹ but also to contribute to the prevention and management of atherosclerotic coronary heart disease, hypertension, diabetes, overweight, and obesity.^{10,11} However, traditional resistance training using weight machines is resource intensive, potentially resulting in lower adherence.¹² To improve adherence, a simpler and easier method of resistance training should be an integral component of any training program that aims to reduce obesity, CVD risk and overall health, especially at the community level. Resistance training using lighter weights, such as light dumbbells, does not require many resources and has proven beneficial in improving overall health.^{13–15} This study was conducted to compare the effect of light resistance training using dumbbells and ankle-wrist weights on body composition and anthropometric measurements.

Materials and Methods

Study design

This randomized community trial was conducted in Tumpat District, Kelantan (which is situated on the East Coast of Peninsular Malaysia), from March 2012 through August 2012. The calculation for the required sample size was performed using STATA software (sample size calculation of means with repeated measures), with a type I error of 5% and type II error of 20%. The sample size obtained was 66 participants per group (after 40% dropout), resulting in 132 participants overall. Participants aged 18 to 60 years old who volunteered to participate with a body mass index (BMI) equal to or greater than 23.0 kg/m² were included in this study. Those who were pregnant, who were on any weight management treatment/program, who had existing joint pain that restricted physical movements, or who had existing cardiac conditions (NYHA Functional capacity class II, III and IV) were excluded. All of the participants were randomized into two equal-sized groups using block randomization: a light resistance training group using dumbbells and a light resistance-training group using ankle-wrist weights. The randomization sequence was concealed using sealed envelopes.

Light resistance training protocol

Dumbbell exercise

A dumbbell exercise was performed with a pair of commercially available lightweight (1 kg) soft dumbbells for at least 15 min per day, three days per week using a dumbbell exercise method invented by Professor Suzuki Masashige (Bull Inst. Health & Sport Science, University of Tsukuba).¹⁶ Each exercise session was preceded by a five-minute stretching routine. The dumbbell exercise consisted of 12 movements that targeted both the upper and lower body large muscle groups. The 12 exercise movements were the standing shoulder press, bent dumbbell row, squat, upper body twist, butterfly, bent lateral raise, simultaneous curl, concentration curl, one hand draw up, kick back, front dumbbell raise, and triceps extension. Soft dumbbells were used, enabling participants to have a firm grasp on the

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