

INTERMITTENT FASTING AS POTENTIAL NON-
PHARMACOLOGICAL THERAPEUTIC TOOL IN
OVERWEIGHT AND OBESITY MANAGEMENT
AMONG MALAY ADULTS

BY

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ABSTRACT

Obesity and its associated metabolic consequences such as hypertension, type 2 diabetes mellitus and cardiovascular disease are global epidemic. Conventional treatment of obesity is daily calorie restriction but patients have adherence issue with it. Intermittent fasting specifically time-restricted feeding (TRF) is an emerging alternative but limited scientific evidence on TRF is available. Furthermore, there has been a great deal of confusion about the role of physical activity and exercise in overweight and obesity management. Therefore, the aims of this study were to investigate and compare the effects of brisk walking combined with time-restricted feeding of 16-hour fasting period daily for 5 days a week for 16 weeks, time-restricted feeding alone of 16-hour fasting period daily for 5 days a week for 16 weeks and control group (who maintain their lifestyle feeding ad libitum) for 16 weeks on body weight and metabolic health parameters in young overweight and obese adult subjects. Thirty-six (n=36) overweight and obese participants were enrolled equally into three different groups according to their preferences in this 16-week prospective experimental study; Group A (BW combined with TRF), Group B (TRF alone) and Group C (control group maintaining their lifestyle feeding ad libitum). The subjects were matched according to race, gender, age and body mass index (BMI). Physiological parameters such as body weight, BMI, body compositions (measured using OMRON Body Fat Analyser), blood pressures, waist and hip circumferences were measured in the beginning of the study and at the end of 16 weeks. The data were analysed using statistical methods paired t-test to compare means of dependent samples (non-parametric alternative Wilcoxon Signed Rank test), analysis of variance (One-way ANOVA) to compare the means of three independent groups (non-parametric alternative Kruskal-Wallis test) and Independent Sample t-test to compare the means of two independent groups (non-parametric alternative Mann-Whitney test). After 16 weeks of study, TRF alone (Group B) and BW combined with TRF (Group A) significantly reduced body weight (male= $-2.1 \pm 1.1 \text{ kg/m}^2$ vs. $-2.2 \pm 1.3 \text{ kg/m}^2$ vs. $0.7 \pm 0.4 \text{ kg/m}^2$, female= $-2.3 \pm 1.0 \text{ kg/m}^2$ vs. $-2.4 \pm 1.3 \text{ kg/m}^2$ vs. $0.5 \pm 0.5 \text{ kg/m}^2$), body fat percentage (male= $-1.5 \pm 1.5\%$ vs. $-2.6 \pm 2.2\%$ vs. $1.0 \pm 0.4\%$, female= $-1.9 \pm 1.7\%$ vs. $-2.2 \pm 1.4\%$ vs. $1.0 \pm 0.9\%$), systolic blood pressure (male= $-8 \pm 6 \text{ mmHg}$ vs. $-3 \pm 3 \text{ mmHg}$ vs. $9 \pm 5 \text{ mmHg}$, female= $-4 \pm 10 \text{ mmHg}$ vs. $-2 \pm 9 \text{ mmHg}$ vs. $9 \pm 5 \text{ mmHg}$), diastolic blood pressure [male= $-10 (10) \text{ mmHg}$ vs. $-9 (10) \text{ mmHg}$ vs. $4 (7) \text{ mmHg}$, female= $-3 \pm 9 \text{ mmHg}$ vs. $-3 \pm 3 \text{ mmHg}$ vs. $7 \pm 5 \text{ mmHg}$] and serum TNF- α concentration [male= $-70.7 (109.9) \text{ pg/ml}$ vs. $-142.8 (204.4) \text{ pg/ml}$ vs. $3.15 (17.3) \text{ pg/ml}$] (all $p < 0.05$) compared to control group respectively in young overweight and obese adults. In conclusion, TRF alone or BW combined with TRF has the potential to be utilized as therapeutic tool in overweight and obesity management in young overweight and obese adults. TRF alone is equally effective to BW combined with TRF in reducing body weight and body fat compositions in young overweight and obese adults.

البحث خلاصة

تعتبر السمنة وما يرتبط بها من عواقب التمثيل الايضي مثل ارتفاع ضغط الدم ومرض السكري من النوع الثاني وأمراض القلب والأوعية الدموية وباءً عالمياً. تقلص استهلاك السعرات الحرارية يومياً هو العلاج التقليدي للسمنة ولكن المرضى يعانون من مشكلة الالتزام بهذا النوع من العلاج. ولذلك يعد الصيام المتقطع على وجه التحديد بديلاً مستجد، ولكن هناك القليل من الأدلة العلمية على كفاءة هذا النظام. علاوة على ذلك، هناك قدر كبير من الالتباس حول دور النشاط البدني وممارسة الرياضة في علاج زيادة الوزن والسمنة. لذلك، هدف هذه الدراسة هي التحقيق ومقارنة آثار المشي السريع جنباً إلى جنب مع التغذية المقيدة بوقت من فترة صيام لمدة 16 ساعة يومياً لخمسة أيام في الأسبوع لمدة 16 أسبوعاً، والتغذية المقيدة بالوقت وحدها من فترة صيام 16 ساعة يومياً لخمسة أيام في الأسبوع لمدة 16 أسبوعاً والمجموعة الضابطة (الذين يحافظون على نمط حياتهم من التغذية بحسب الرغبة) لمدة 16 أسبوعاً على وزن الجسم ومعايير الصحة الأيضية في الأشخاص البالغين الذين يعانون من زيادة الوزن والسمنة. تم تسجيل ستة وثلاثين (n=36) مشاركاً يعانون من زيادة الوزن والسمنة بالتساوي في ثلاث مجموعات مختلفة وفقاً لتفضيلاتهم في هذه الدراسة التجريبية التي استمرت 16 أسبوعاً؛ المجموعة الأولى A (المشي السريع جنباً إلى جنب مع تغذية محددة الوقت)، المجموعة الثانية B (تغذية محددة الوقت وحدها) والمجموعة C (مجموعة المراقبة المحافظة على التغذية ونمط الحياة المعتاد والخاصة بهم). تمت مطابقة المستهدفين وفقاً للعرق والجنس والعمر ومؤشر كتلة الجسم (BMI). تم قياس العوامل الفسيولوجية مثل وزن الجسم ومؤشر كتلة الجسم وتكوين الجسم (تم قياسها باستخدام محلل الدهون في الجسم OMRON) وضغط الدم ومحيط الخصر والورك في بداية الدراسة وفي نهاية 16 أسبوعاً. تم تحليل البيانات باستخدام طرق إحصائية مقترنة باختبار t لمقارنة المتوسط في العينات التابعة (اختبار اشارات الرتب Wilcoxon البديل غير المعياري)، وتحليل التباين (أحادي الاتجاه ANOVA) لمقارنة المتوسط من الثلاث مجموعات المستقلة (بديل غير معلمي اختبار Kruskal-Wallis) واختبار t للعينات المستقلة لمقارنة المتوسط للمجموعتين المستقلة (اختبار Mann-Whitney البديل غير المعياري). بعد 16 أسبوعاً من الدراسة، خفضت تغذية محددة الوقت وحدها (المجموعة B) و المشي السريع جنباً إلى جنب مع تغذية محددة الوقت (المجموعة A) وزن الجسم بشكل ملحوظ (الذكور = 1.1 ± 2.1 كجم / م مقابل 1.3 ± 2.2 كجم / م مقابل 0.4 ± 0.7 كجم / م / 2، أنثى = 2.3 ± 1.0 كجم / م مقابل 1.3 ± 2.4 كجم / م مقابل 0.5 ± 0.5 كجم / م / 2)، نسبة الدهون في الجسم (الذكور = 1.5 ± 1.5% مقابل 2.2 ± 2.6% مقابل 0.4 ± 1.0%، أنثى = 1.7 ± 1.9% مقابل 2.2 ± 1.4% مقابل 0.9 ± 1.0%)، ضغط الدم الانقباضي (الذكور = 6 ± 8 مم زئبق مقابل 3 ± 3 مم زئبق مقابل 9 ± 5 مم زئبق، أنثى = 4 ± 10 مم زئبق مقابل 2 ± 9 مم زئبق)، ضغط الدم الانبساطي [الذكور = 10 ± 10 مم زئبق مقابل 9 ± 10 مم زئبق مقابل 4 ± 7 مم زئبق، أنثى = 3 ± 9 مم زئبق مقابل 3 ± 3 مم زئبق مقابل 5 ± 7 مم زئبق] وتركيز مصل TNF-a [الذكور = 70.7 (109.9) بيكوغرام/مل مقابل 142.8 (204.4) بيكوغرام/مل مقابل 3.15 (17.3) بيكوغرام/مل] (الكل <math>p<0.05</math>) مقارنة بمجموعة التحكم على التوالي في الشباب الذين يعانون من زيادة الوزن والسمنة. في الختام، يمكن استخدام تغذية محددة الوقت وحده أو المشي السريع جنباً إلى جنب مع تغذية محددة الوقت كأداة علاجية في معالجة زيادة الوزن والسمنة لدى الشباب البالغين الذين يعانون من زيادة الوزن والسمنة. يعتبر تغذية محددة الوقت وحده فعالاً بنفس القدر بالنسبة إلى المشي السريع مع تغذية محددة الوقت في تقليل وزن الجسم وتكوين الدهون في الجسم لدى الشباب البالغين الذين يعانون من زيادة الوزن والسمنة.

APPROVAL PAGE

I certify that I have supervised and read this study and that in my opinion, it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a thesis for the degree of Master of Science in Pharmacy

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DECLARATION

I hereby declare that this thesis is the result of my own investigation, except where otherwise stated. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at IIUM or other institutions.

Nik Ahmad Fawwaz bin Fadhali

Signature.....

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CHAPTER ONE

INTRODUCTION

Overweight (pre-obese) and obesity are defined as abnormal excessive fat accumulation that presents a risk to health (Mohamad Nor et al., 2018; Seidell & Halberstadt, 2015; Mohd Zaher et al., 2009). Obesity is caused by excessive calorie consumption beyond the body energy expenditure (VanPutte et al., 2019). World Health Organization (WHO) marked overweight by body mass index (BMI) of 25.0kg/m^2 until 29.9kg/m^2 and obesity by BMI 30.0kg/m^2 and above (Mohamad Nor et al., 2018; Seidell & Halberstadt, 2015; Mohd Zaher et al., 2009). However, overweight and obesity are better marked by 23kg/m^2 and 27kg/m^2 respectively in Malaysian communities (Lim, 2016) as WHO noted that the Asian populations may have a different body fat composition profile compared to the Caucasian populations (Seidell & Halberstadt, 2015) given that Asians are reported to be having higher body fat percentage, lower lean muscle mass percentage (Wulan et al., 2014) and higher health risks in comparison to Caucasians of same BMI (Lim, 2016). Overweight and obesity as major risk factors and are linked to a range of diseases including diabetes mellitus, cardiovascular disease, cancer and premature death (Chan et al., 2017; Seidell & Halberstadt, 2015; Kelly et al., 2008). Obesity and its associated metabolic consequences such as hypertension, type 2 diabetes mellitus and cardiovascular disease are global epidemic (Ríos-Hoyo & Gutiérrez-Salmeán, 2016; Chan et al., 2015; Seidell & Halberstadt, 2015; Williams et al., 2015). Furthermore, Malaysian Adults Nutrition Survey (MANS) and National Health and Morbidity Survey (NHMS)