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Original article

# Multimodal-lifestyle intervention produces reduction of the fat mass rather than body weight loss in men with obesity: A prospective cohort study

*Une intervention multimodale portant sur le mode de vie permet d'obtenir une baisse de masse grasse plus importante que la baisse de poids total chez les hommes obèses : résultats d'une étude de cohorte prospective*

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## Abstract

**Background and the objective.** – Body composition changes throughout the multimodal-lifestyle intervention of obesity is underinvestigated. This study evaluated the effectiveness of the multimodal-lifestyle intervention in reduction of fat mass together with preservation of fat free mass.

**Methods.** – Adult male subjects with overweightness or obesity ( $n = 99$ ) were enrolled in a prospective cohort study for 12 months. Patients were educated about healthy diet, physical activity, and some behavioral changes. Anthropometric measurements and body composition analysis by bioelectric impedance analysis (InBody-720) were reported before, during and after the study period.

**Results.** – Concerning adherent subjects, the mean  $\pm$  standard error of the mean (SEM) of percent weight loss, percent fat mass loss, percent fat free mass and total body water changes after 6 months were  $7.24 \pm 0.98$ ,  $16.28 \pm 2.35$ ,  $0.76 \pm 0.64$  and  $0.82 \pm 0.65$ , respectively, and after 1 year they were  $10.14 \pm 0.78$ ,  $25.22 \pm 3.59$ ,  $1.22 \pm 1.06$  and  $1.27 \pm 1.07$ , respectively. There were significant changes between before- and after-measurements of weight, BMI, waist circumference, fat mass and percent body fat ( $P < 0.05$ ) for all studied intervals.

**Conclusions.** – Multimodal-lifestyle intervention might be effective in loss of fat mass rather than reduction of the total body weight together with preservation of the lean body mass.

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**Keywords:** Multimodal-lifestyle intervention; Obesity; Bioimpedance; Fat mass; Three-pyramid program

## Résumé

**Introduction et objectif.** – Les modifications de composition corporelle induites par la prise en charge multimodale lors de l'obésité sont peu décrites. L'objectif de l'étude était d'évaluer l'efficacité de cette intervention portant sur les modes de vie pour réduire la masse grasse de patients obèses, par rapport à la masse maigre.

**Patients et méthodes.** – Quatre-vingt-dix-neuf hommes adultes en surpoids ou obésité étaient suivis prospectivement durant 12 mois. Ils recevaient des informations quant à l'alimentation santé, l'intérêt de l'activité physique et de certaines modifications comportementales. Des mesures anthropométriques et des analyses de composition corporelle par impédancemétrie (InBody-720) étaient pratiquées avant, durant et à la fin de la période de suivi.

**Résultats.** – Pour les patients compliants, après 6 mois, les pourcentages de perte de poids (moyenne  $\pm$  SEM), de perte de masse grasse, de perte de masse maigre et de perte d'eau totale étaient respectivement de  $7,24 \pm 0,98$  %,  $16,28 \pm 0,35$  %,  $0,76 \pm 0,64$  % et  $0,82 \pm 0,65$  %. Après un an,

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ils étaient respectivement de  $10,14 \pm 0,78 \%$ ,  $25,22 \pm 3,59 \%$ ,  $1,22 \pm 1,06 \%$  et  $1,27 \pm 1,07 \%$ . Les variations avant/après étaient significatives ( $p < 0,05$ ) pour le poids, l'indice de masse corporelle (IMC), le tour de taille, la masse grasse et le pourcentage de masse grasse, pour tous les intervalles étudiés.

**Conclusion.** – L'étude suggère que l'intervention multimodale portant sur le mode de vie permet d'obtenir une baisse de masse grasse plus importante que la baisse de poids total, et préserve la masse maigre des patients.

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**Mots clés :** Intervention de style de vie de Multimodal ; Obésité ; Bioimpédance ; La grosse masse ; Programme de trois-pyramide

## 1. Introduction

Obesity is a highly prevalent metabolic disorder that is characterized by excessive body fat mass, which in turn produces many adipokines that are strongly associated with many preventable comorbidities especially type 2 diabetes and metabolic syndrome [1]. Strategies to combat obesity and to prevent its comorbidities usually starts with proper dietary modification, increase of physical activity level or both of them [2]. The responsibility of obesity-managing healthcare professionals is to inform and educate patients about obesity treatment options [3]. Although the recent recommendations for the management of adult obesity provide evidence-based guidance regarding proper implementation of lifestyle, pharmacological, and surgical interventions [4], healthcare professionals usually shift to the apparently more effective surgical solutions, making the awareness about specific evidence-based information that supports individualized clinical application of nonsurgical therapies mandatory [3]. By using a patient-centered medical model, clinicians should provide more proactive and effective treatments in assisting their patients with weight loss. All patients should be counseled on evidence-based lifestyle approaches that include diet, physical activity and behavior change therapies or the multimodal-lifestyle intervention [4]. Three pyramids fat loss program is a multimodal-lifestyle intervention for obesity management. These three pyramids stands for:

- the food guide pyramid [5];
- the physical activity pyramid [6];
- the pyramid-like model of behavioral change progression to reach a healthier lifestyle [7,8].

By definition, obesity is an excess of body fat beyond normal range. So losing fat during obesity management therapies is the optimal goal rather than loss of lean body mass or total body weight [9]. Study of the body compositional changes during weight loss process is essential to indicate which body compartment(s) was/were reduced [10]. Bioelectrical impedance achieved good performance in prediction and identifying excess body fatness associated with overweight/obesity in both genders, and many age groups with good specificity rather than sensitivity [11,12]. Accordingly, this study aimed to evaluate the effectiveness of a multimodal-lifestyle intervention in reduction of the body fat mass in a cohort of men with obesity or overweightness.

## 2. Methods

### 2.1. Study subjects

All subjects were cases with overweightness or obesity from weight reduction clinic in college of applied medical sciences (CAMS), male sector, King Saud University. The sample size was calculated based on expected percent of weight loss about 10.8% [13], with a statistical power (1-beta, % chance of detecting) of 80% and Two-sided significance level (1-alpha) of 95%. The estimated sample size was 82 participants [14] but it was increased by 20% to account for potential dropouts. Ninety-nine male subjects aged 20–60 years were enrolled in a prospective cohort study for 12 months between September 2014 and December 2015. Once enrolled, all participants were thoroughly assessed (the basal assessment). Anthropometric and bioimpedance parameters were reported. According to body mass index, the study participants were divided into an overweightness and an obesity groups, then they were given biweekly appointments for the first six months and monthly appointments for the second six months to attend to the clinic for follow-up and frequent measurements. Hot line (mobile and WhatsApp) contact for any-time consultation was given to all participants. All adherent participants were re-assessed during each visit, while those measurements at the end of first-, sixth- and twelfth-months were reported and used for analysis. All study population were with simple obesity without known history of obesity-related comorbidities such as diabetes or dyslipidemia. Their fasting blood glucose and lipid panel were checked by using a digital glucometer (Accu-check active, Roche Diagnostics, USA), and the CardioChek device (CardioChek PTS Inc, USA) respectively, according to Omboni et al. [15]. Subjects with edema, dehydration, metal implant or having pacemaker, diabetes, cancer, severe disability, or severe psychiatric disturbance were excluded. Informed consent was obtained from each participant before enrollment. The CAMS research ethics committee approved the study protocol.

### 2.2. Three-pyramid program (3PP)

All study participants were interviewed for 40 min in the start day and a detailed history about the diet, physical activity and lifestyle were used to tailor a patient-centred 3PP with the following common criteria:

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