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Using inulin fiber supplementation with MyPlate recommendations promotes greater weight loss in obese women

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Summary. Obesity is a major public health problem in developed countries. The obesogenic environments we live in today create unfavorable conditions to normalize body weights. *Methods:* The study was a simple randomized intervention study with twelve obese women (mean ± SD, aged 22.6 ± 3.6 y), and BMI ≥30 kg/m^2. Participants were randomly assigned to either recommendation (R) only group (n=6), or recommendations with fiber (R-ITF) group (n=6). The guide contained recommendations on how to lose weight based on the United States Department of Agriculture's (USDA) MyPlate published recommendations. The R-ITF group received a six-week supply of ITF along with the printed guide, while the R group received only the guide. Each participant receiving the supplement was instructed to consume 7g of inulin-type fructant fiber (ITF) three times a day before meals (21 g/d in total). Pre and post intervention measurements of weight, height, BMI and a 24 h dietary recall were collected. *Results:* The R-ITF lost significant weight compared to pre-intervention weight (89.2 ± 10.2 kg vs. 87.4 ± 9.9 kg, $p<0.05$), while the R group did not see a significant change (91.5 ± 12.5 vs 90.9 ± 12.3, $p>0.05$). The R-ITF group consumed significantly less energy compared to its pre-intervention energy intake from 1947 ± 129 kcal to 1742 ± 109 kcal, $p<0.05$, this difference was not seen in the R group. *Conclusion:* supplementation with ITF appears to improve weight loss with when used alongside MyPlate recommendations over a short period in obese women. Decreased energy consumption is likely to explain the weight loss in the supplemented group.

Key words: obesity, inulin, fructans, weight loss, MyPlate, fiber, USDA

Introduction

Obesity is a public health problem globally, with over 33% of the world's adult population overweight or obese (1), and higher estimates for the states that make up the Gulf Countries Council (GCC) namely, Kuwait, Saudi Arabia, Bahrain, United Arab Emirates, and Qatar (2). The obesity epidemic is linked to excessive energy intake; and therefor a need for adaptable dietary approaches to combat over consumption is of high importance. Specifically, dietary recommendations and supplements that reduce the urge to eat and enhance satiety can promote more attainable weight loss among obese individuals in the current obesogenic environments.

Weight reduction is achieved by sustained adherence to a hypocaloric diet with tools that promote portion control, and better food choices. One such tool is the United States Department of Agriculture's (USDA) MyPlate, which replaced MyPyramid in 2011 as the USDA'a healthy eating communication initiative. MyPlate recommendations include educational material on healthy eating practices and strategies that promote weight loss. The tool describes appropriate portion sizes for typical foods, emphasizes reduced consumption of sugar, salt, processed foods, and processed grains, while increasing whole grain consumption. However, no studies to date, within the GCC, have looked at the effectiveness of incorporating these strategies on weight loss. In our study, My-

Plate based recommendations were used as a guide to promote weight loss in free living obese females attempting to lose weight.

Many studies have identified the positive effects that increasing fiber intake has on a host of health conditions, including obesity, due to its prebiotic effect. Timberly et al. reported a direct impact of diet-microbiota on various aspects of metabolism via epigenetic programing of multiple tissues such as liver tissue (3). In fact, for years, metabolites of ITF fermentation have been shown to induce many effects in the body (4-7). Some studies point to a potential for using prebiotic fibers to promote weight reduction (8) via changes in appetite related hormones and peptides (4,9). In a study with 21g of inulin for 12 weeks, significant reduction in energy intake and weight loss was noted in overweight and obese individuals (9) likely due to lower energy intake when ITF is consumed (10). Overall, long term studies (3-4 months) in overweight and obese individuals potentiate a benefit to ITF supplementation on weight changes (9,11,12).

The objective of this study was to determine the impact of using MyPlate based weight loss recommendations in free living obese women on weight loss with and without ITF fiber over a short time frame (six-week period).

Materials and methods

A total of seventy women were screened for the study, and twelve (BMI ≥30 kg m^2) met the inclusion/exclusion criteria and completed the study. Participants were simply randomized into either a recommendation (R) only group, or a recommendation and fiber group (R-ITF). Inclusion criteria were BMI ≥30 kg m^2, and interest in weight loss. Exclusion criteria were pregnancy, following specific dietary plans to lose weight, scheduled surgical procedures during the study period, and use of antibiotics. All participants received oral and written information of the study protocol, including potential benefits and anticipated discomforts. The study protocol was initiated after obtaining the necessary ethical approvals from the Kuwait University Research Sector, and it was conducted in full accordance with the World Medical Association Declaration of Helsinki.

A day before the study began; all participants received a one-on-one interview to go through the printed MyPlate based recommendations guide. In addition, the R-ITF group received 21 g of inulin-type fructant (ITF) fiber for daily use in the form of 3 equal dosages, and was instructed to consume the ITF before meals. Paired *t* tests were used to compare intra and inter group differences. Differences were considered statistically significant at P<.05. Data are presented as mean ± standard deviation.

MyPlate based guide

Information on weight loss was obtained directly from the www.ChooseMyPlate.gov website and developed into a translated booklet for distribution to study participants. The guide included information on the appropriate portions of different food groups and a list of foods high in fat and sugar that should be avoided and replaced with healthier alternatives. The dietary guidelines also focused on reducing portion sizes, substituting energy dense foods and snacks with less energy dense options, replacing juices with fruits, and full fat with reduced-fat or skim fat options. The booklet contained several examples and visual aids that explained portion sizes. Study participants received the booklet a day before randomization in a one-on-one informational session by trained study staff. Study participants had the opportunity to ask questions and reflect on the material prior to beginning the protocol.

Anthropometrics

Weight and height were measured at baseline and at the end of the study. Measurements were carried out by trained study staff according to standardized operating procedures. Weight was measured to the nearest 100 g using an electronic scale (DETECTO® Model 750, DETECTO USA), and height was measured using the attached DETECTO height unit to the nearest 0.1 cm.

ITF supplementation

The fiber used was Frutafit® IQ and was purchased from (SENSUS®, Netherlands). Participants in the R-ITF group received a total of 126 individually packaged sachets containing, 7g of ITF Fiber with instructions that the fiber should be consumed three times a day before meals.

Dietary recall and energy analysis

A 24 hour dietary recall was carried out by a single trained study administrator. Participants were asked to recall the food and beverages consumed first thing in the morning of the previous day, and were probed to list and recall all foods and beverages consumed until mid-night of the previous day. Dietary and energy analysis was carried out using Food Processor Nutrition Analysis Software (Food Processor® 11.2, ESHA Research, OR, USA).

Symptoms and compliance

Symptoms were monitored throughout the study by contacting the participants weekly. All symptoms and any adverse events were recorded and compiled at the end of the study. A questionnaire at the end of the study helped determine compliance with the guided recommendations. In addition, the R-ITF group was asked about their compliance with the supplementation and was verified by counting the unused portion of the supplement sachets.

Results

Subjects characteristics

Age of the enrolled participants was 22.8 ± 3.6 y, with a BMI of 35.5 ± 4.2 kg/m^2, n=12. There was no difference in age, weight, or BMI after randomization (Table 1).

Weight and BMI changes

Over a six week period, the R-ITF group lost 1.8 kg compared to baseline weights ($p<0.05$), while the R only group did not reach a significant weight loss. The changes in BMI in the R-ITF group approached significance decreasing from 35.2 ± 3.4 to 34.4 ± 3.0 kg/m^2, $p=0.06$) (Table 1).

Energy intake

In this sample, 8 participants completed the 24 hour recall. Using the 24 hour dietary recall, both groups had similar energy intake pre-intervention, but energy intake post-intervention was significantly different across study arms (Figure 1). Looking at within group differences, the R-ITF group reported a significant decline in energy intake of 21% ($p<0.05$), but there were no intra-group differences in the R only group.

Table 1. Participants weight and body mass index changes

	R only	R-ITF
Age (y)	22.8 ± 3.9	22.8 ± 3.5
Pre-intervention weight (kg)	91.5 ± 12.5	89.2 ± 10.2
Post-Intervention weight (kg)	90.9 ± 12.3	87.4 ± 9.9 [a, b]
Pre-intervention BMI (kg/m^2)	35.9 ± 5.1	35.2 ± 3.4
Post-Intervention BMI (kg/m^2)	35.6 ± 4.9	34.4 ± 3.0

R: recommendations only. R-ITF: recommendations and fiber. *. BMI: Body Mass Index. [a]Significant difference across groups < 0.05. [b]Significant difference within group pre and post intervention $p<0.05$. Data presented as mean ± SD.

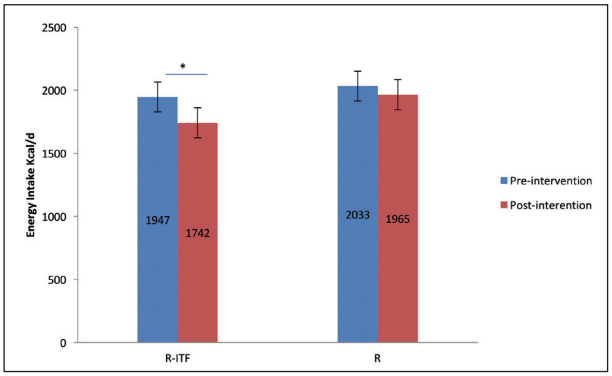

Figure 1. Energy intake changes from pre-intervention period. R: recommendations only. R-ITF: recommendations and fiber.*Significant difference across groups pre-and post-interventions $p<0.05$.

Symptoms and compliance

The R+ITF group had a 20% increase in all-type symptoms frequency compared to the R group. Symptoms included bloating, flatulence, and stomach disturbances.

When asked about the adherence to the recommendations, all participants in both groups stated yes to adherence to the guided recommendations. Daily fiber consumption increased in the R-ITF group significantly from 15.5 ± 5.5 g/d to 26 ± 5 g/d ($p<0.05$), with 76% ITF compliance or 16 ± 4 g/d.

Discussion

Results from the limited number of studies looking at the impact of ITF on weight change have been

inconclusive. However, meta-analysis results suggest that long-term supplementation with ITF may contribute to weight reduction (13). Short-term studies in normal and overweight participants show no significant impact for ITF supplementation (14-17). However, long term studies looking at the impact of ITF in overweight and obese individuals show a significant impact on body weight (BW) and BMI (9,11), or BW alone (12), the latter is consistent with our results. We found participants receiving R-ITF lost 1.8 kg over six weeks without significant changes in BMI (35.2 ± 3.4 kg/m^2 to 34.4 ± 3.0 kg/m^2, p=0.06).

We hypothesized that use of dietary recommendations alone, in free living individuals over a short period, is not likely to induce significant weight loss, but when coupled with ITF supplementation, a significant weight loss can be achieved. Our results supported this; as only the supplemented group achieved a statistically significant weight loss of 1.8 kg ($p<0.05$). This significant reduction in weight may be explained, at least partly, by reduced energy consumption. Utilizing 24 hour recall data, the supplement group reported a significant drop in its energy consumption compared to baseline energy mean from 1945 ± 210 kcal to 1587 ± 191 kcal, $p<0.05$, whereas the R only group did not see any difference in energy intake (2054 ± 301 kcal to 2031 ± 297 kcal, $p>0.5$) . This is consistent with previous studies reporting reduced energy consumption in women ingesting ITF (10). The reported increase in symptoms could have been lessened with gradual introduction of ITF to allow for adaptation.

The observed changes cannot be attributed to the guided recommendations alone because the R only group did not see a statistical change in weight from baseline. It is also impossible to determine the extent to which the ITF supplementations contributed to the weight loss seen in the R-ITF group because we did not have an ITF only group. This was a weakness of our study. We speculate however that both recommendations and the ITF supplementation were important for inducing weight loss. Moreover, studies looking at ITF supplementation alone, but for longer periods, show results that practically similar to what we reported in our six-week study (9). Such observation suggests that the guided recommendation combined with the ITF fiber may have been a more effective intervention than either one alone indicating an interaction benefit.

Conclusion

Supplementation with ITF appears to improve effectiveness of weight loss recommendations over a short period in obese women attempting to lose weight. The weight loss is likely due to decreased energy consumption evidenced by a 10.5% decrease in the R-ITF group. We believe that ITF supplementation provide an added therapeutic effect that can enhance weight loss if used in conjunction with appropriate dietary recommendations.

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Conflicts of interest and source of funding

The author declares no conflict of interest

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