ORIGINAL RESEARCH

Symptom Relief and Weight Loss From Adherence to a Meal Replacement–enhanced, Low-calorie Detoxification Diet

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Abstract

Context: Recently, detoxification (detox) diets have achieved notoriety in the popular press due to celebrity endorsements and marketing that suggest quick and easy weight loss. Although researchers have done studies to evaluate the weight-loss outcomes of popular diet programs such as Weight Watchers, Atkins, and others, they have performed no outcomes studies to support the weight-loss results that detox diets claim.

Objective: This study intended to evaluate the changes in weight and medical-symptoms scores in participants who adhered to a 4-week, meal replacement–enhanced, low-calorie detox diet.

Design: The research team performed a retrospective chart review.

Setting: Office of the first author, New York, New York.

Participants: The participants were 31 (13 M, 18 F) patients the first author saw consecutively in his private practice. Their ages ranged from 23 to 77, their preintervention weights from 134 lbs to 275 lbs, and their preintervention body mass indexes (BMIs) from 23.2 to 38.4.

Intervention: The participants followed a meal replacement–enhanced, low-calorie detox diet for approximately 4 weeks.

Outcome Measures: The research team examined participants' preintervention-to-postintervention (pre-to-post) changes in scores on the Detox Questionnaire, which measures medical symptoms, and its 15 scales; pre-to-post changes in weight; and pre-to-post changes in BMI.

Results: On each of 15 toxicity scales (medical symptoms) from the questionnaire, the study showed a statistically significant pre-to-post decline. The overall score, containing all 71 items from the 15 scales, also showed a significant decline, from a median of 53 at preintervention to 17 at postintervention, $P < .001$. Additionally, the average pre-to-post weight loss equaled approximately 9 lbs, $P < .001$, and a significant reduction in BMI occurred, from an average of 29.2 to 27.8, $P < .001$. No significant relationship existed, however, between the amount of the decline in symptoms scores and the amount of weight lost.

Discussion: This meal replacement–enhanced, low calorie detox diet appears to be a viable option for both weight loss and a reduction in chronic health symptoms.

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The incidence of obesity in the United States has risen to an alarming level, resulting in tremendous strain on our health-care system. Chronic and comorbid medical conditions like diabetes, hypertension, high cholesterol, stroke, cancer, arthritis, and heart disease are all more prevalent in obese individuals.[1,2] Additionally, obese individuals are more likely to die from diabetes, cardiovascular disease, and kidney disease.[2] The most recent data that the National Health and Nutrition Examination Survey collected from 2007 to 2008, showed that the age-adjusted prevalence of obesity (body mass index [BMI] > 30) was 33.8% overall, 32.2% among men, and 35.5% among women. Moreover, Flegal et al estimated that the combined overall prevalence in the US population of being overweight or obese (BMI > 25) was 68.0%.[3]

Given these statistics, it is not surprising that the commercial sector has developed numerous diet programs to help people with weight loss. Conventional, structured weight-loss strategies usually involve limiting total calories[4] or a major macronutrient, such as protein, fat, or carbohydrates, to achieve weight-loss success.[5,6] Meal replacement programs are also effective for weight loss and compare favorably with conventional structured diets.[7-9] Most recently, detoxification (detox) diets have begun to gain a great deal of attention as a novel approach to losing weight.

Detox diets have gone by the name of elimination diets, rotary diversified diets, the Master Cleanse, and many other names. People use them with the expected effect of ridding the body of toxins, cleansing the colon, or improving liver detoxification. The primary outcome that individuals hope to achieve is eventually to feel better. Studies have indicated that these programs can be effective for improving symptoms.[10-12] The current research team, however, was unable to find a study on detox diets to substantiate their weight-loss claims.

In this study, the primary objectives were to examine the effects of a meal replacement–enhanced, low-calorie detox diet supplying from 800 kcal to 1200 kcal per day on symptoms scores and weight loss to clarify the amount of success to be expected from these measures for individuals following this version of a detox diet.

DESIGN AND METHODS

Participants and Methods

For this retrospective chart review, the research team selected 31 individuals from patients that the first author saw consecutively in his private practice. In brief, after the participants provided a medical history and received a physical evaluation, the team allowed them to participate in the detox program as long as they were (1) over the age of 18, (2) were not pregnant or nursing, and (3) did not have any serious illness that would contraindicate participation in a meal replacement–enhanced, low-calorie, detox-diet program. While the selected participants did not suffer from any serious illnesses, they did suffer from chronic health complaints such as fatigue, difficulty concentrating, flatulence and bloating, muscle and joint aches, and/or difficulty losing weight.

The research team asked each participant whether he or she would like to address his or her health-care problems by following a meal replacement–enhanced detox diet for 4 weeks. Each participant expressed interest in following the program, and the team gave participants both verbal and written instructions, emphasizing the necessity of close follow-up during the program. The team provided participants with a handout that comprehensively listed the foods to avoid and include (Tables 1 and 2), and participants obtained the meal-replacement shakes from the first author's office.

Table 1. Foods to Include and Avoid in Detoxification Diet

Include Daily	Include Morning Only	Foods to Avoid	Beverages to Avoid
1-2 L water	Fruit (grapefruit, berries, kiwi, apples, papaya, melon, pears)	Bananas	Coffee
Vegetables: steamed, grilled, or raw		Grapes	Soda
Olive oil		Oranges	Alcohol
Lemon juice		Tomato	
Spices		Potato	
Green tea		Eggplant	
Once a day: 4 oz-6 oz of chicken, turkey, fish (tilapia, red snapper, Alaskan salmon [fresh or canned], sardines, shrimp, catfish, blue crab), organic eggs		Milk/dairy	
		Soy	
		Peppers	
		Raw fish	
		Grains	
		Corn	

Table 2. Vegetable Suggestions for Inclusion in Detoxification Diet

For All Participants: Nonstarchy and mildly starchy vegetables: asparagus, avocado, beans (green/wax), beets and beet greens, bok choy, broccoli, brussels sprouts, cabbage, cauliflower, celery, chard, chicory, collard greens, crookneck squash, cucumber, dandelion, endive, escarole, kale, kohlrabi, leek, mushrooms, mustard greens, okra, onion, parsley, parsnip, radish, romaine lettuce, rutabaga, scallion, spinach, summer squash, swiss chard, sprouts, turnip, watercress, and zucchini

Sea vegetables: arame, dulse, hijiki, kelp, laver, nori, wakame

For Participants Without Weight Loss As a Goal: Starchy vegetables: artichoke, carrot, delicate squash, potato (sweet, yam), pumpkin, and winter squash

At the first visit and again after about a month, the research team examined each participant to obtain height, weight, and other physical measures. Additionally, on the first visit, each participant completed a Detox Questionnaire (Table 3) to assess his or her medical symptoms from the previous week. This questionnaire was identical to the Metabolic Screening Questionnaire that Jeffrey Bland, PhD created.[10,12] Bland designed his questionnaire to be a succinct form of the Cornell Medical Index, concentrating on symptoms that might be related to toxicity.[13] The questionnaire considers a score of 0 to 14 to represent low toxicity, a score between 15 and 49 moderate toxicity, and a score of >50 high toxicity. Table 4 shows the characteristics of the 31 participants (13 M, 18 F) prior to treatment.

Participants included in this study followed this program until their follow-up appointments, which occurred between 3 and 5 weeks after their initial visit. The research team assessed participants' progress at this second appointment by recording their weights and having them complete the Detox Questionnaire again, rating their symptoms over the past week.

A few of the patients remarked that they noticed an increase in their symptoms when they first started the program, but the symptoms quickly subsided within 3 to 5 days. All 31 participants successfully completed the plan.

The Diet

The meal replacement was a combination of 2 scoops of Daily Detox Powder, 2 tbsp of lecithin, and 1 tbsp of Daily Fiber that the participants added to 8 oz of pure water. Metagenics (San Clemente, California) manufactured the Daily Detox Powder and Daily Fiber, and Douglas Laboratories (Pittsburgh, Pennsylvania) manufactured the lecithin for Daily Nutritionals, Inc (New York, New York). Participants could mix the shake by hand, mix it in a container, or blend it with ice cubes. The detox powder consisted of rice-based protein powder, and the Daily Fiber consisted of a nongluten fiber from rice bran, apple pectin, and plantain (Table 5).

The research team instructed participants to have (1) a shake for breakfast, (2) an approved fruit for a snack between breakfast and lunch, (3) a shake and approved vegetables for lunch, (4) vegetables as a snack between lunch and dinner, and (5) 4 to 6 oz of acceptable protein with vegetables for dinner (Table 6). The research team did not require participants to monitor consumed calories strictly, allowing participants flexibility in making healthful choices within the guidelines of the program. The research team retrospectively determined through self-reports that participants generally consumed between 850 to 1000 kcal daily. The daily minimal amount of macronutrients consumed while adhering to the diet was 45 g to 60 g of protein, 22 g to 25 g of fat, and 60 g to 70 g of carbohydrates.

RESULTS

To analyze the study's data, the research team used SPSS 17.0

Table 3. Detoxification Questionnaire

DETOXIFICATION QUESTIONNAIRE

Patient Name: _____ **Date:** _____

Rate each of the following symptoms based on your typical health profile for the specified duration:

☐ Past month ☐ Past week ☐ Past 48 hours

Point Scale: **0**—*Never or almost never* have the symptom **1**—*Occasionally* have it, effect is *not severe* **2**—*Occasionally* have it, effect is *severe*
3—*Frequently* have it, effect is *not severe* **4**—*Frequently* have it, effect is *severe*

I. Medical Symptoms Questionnaire (MSQ)

HEAD	_____	Headaches	
	_____	Faintness	
	_____	Dizziness	
	_____	Insomnia	**TOTAL**_____
EYES	_____	Watery or itchy eyes	
	_____	Swollen, reddened or sticky eyelids	
	_____	Bags or dark circles under eyes	
	_____	Blurred or tunnel vision	**TOTAL**_____
EARS	_____	Itchy ears	
	_____	Earaches, ear infections	
	_____	Drainage from ear	
	_____	Ringing in ears, hearing loss	**TOTAL**_____
NOSE	_____	Stuffy nose	
	_____	Sinus problems	
	_____	Hay fever	
	_____	Sneezing attacks	
	_____	Excessive mucus formation	**TOTAL**_____
MOUTH/ THROAT	_____	Chronic coughing	
	_____	Gagging, frequent need to clear throat	
	_____	Sore throat, hoarseness, loss of voice	
	_____	Swollen or discolored tongue, gums, lips	
	_____	Canker sores	**TOTAL**_____
SKIN	_____	Acne	
	_____	Hives, rashes, dry skin	
	_____	Hair loss	
	_____	Flushing, hot flashes	
	_____	Excessive sweating	**TOTAL**_____
HEART	_____	Chest pain	
	_____	Irregular or skipped heartbeat	
	_____	Rapid or pounding heartbeat	**TOTAL**_____
LUNGS	_____	Chest congestion	
	_____	Asthma, bronchitis	
	_____	Shortness of breath	
	_____	Difficulty breathing	**TOTAL**_____
DIGESTIVE TRACT	_____	Nausea, vomiting	
	_____	Diarrhea	
	_____	Constipation	
	_____	Bloated feeling	
	_____	Belching, passing gas	
	_____	Heartburn	
	_____	Intestinal/stomach pain	**TOTAL** _____
JOINTS/ MUSCLE	_____	Pain or aches in joints	
	_____	Arthritis	
	_____	Stiffness or limitation of movement	
	_____	Feeling of weakness or tiredness	
	_____	Pain or aches in muscles	**TOTAL**_____
WEIGHT	_____	Binge eating/drinking	
	_____	Craving certain foods	
	_____	Excessive weight	
	_____	Water retention	
	_____	Underweight	
	_____	Compulsive eating	**TOTAL**_____
ENERGY/ ACTIVITY	_____	Fatigue, sluggishness	
	_____	Apathy, lethargy	
	_____	Hyperactivity	
	_____	Restlessness	**TOTAL**_____
MIND	_____	Poor memory	
	_____	Confusion, poor comprehension	
	_____	Difficulty in making decisions	
	_____	Stuttering or stammering	
	_____	Slurred speech	
	_____	Learning disabilities	
	_____	Poor concentration	
	_____	Poor physical coordination	**TOTAL**_____
EMOTIONS	_____	Mood swings	
	_____	Anxiety, fear, nervousness	
	_____	Anger, irritability, aggressiveness	
	_____	Depression	**TOTAL**_____
OTHER	_____	Frequent illness	
	_____	Frequent or urgent urination	
	_____	Genital itch or discharge	**TOTAL**_____
GRAND TOTAL			**TOTAL**_____

(SPSS, Inc, Chicago, Illinois), examining the changes occurring from preintervention to postintervention (pre-to-post) in participants' medical symptoms and weights. For the Detox Questionnaire, the team summed the scores for the items in each of the 15 scales to compute the scale scores and also summed the 15 scale scores to compute the total score for each participant. The individual scales had a possible range of 0 to 32 (4 times the number of items in the scale). Note that a lower number on each of these scales represents lower toxicity. Table 7 shows that the median dropped from pre-to-post for 11 scales (the other four were already 0 at preintervention) and for the overall total. The nonparametric Wilcoxon signed rank test showed that a statistically significant pre-to-post decline occurred in the detox-symptom scale scores for all 15 scales and for the overall totals, representing a decline in toxicity as measured by medical symptoms.

Furthermore, from pre-to-post, the overall total for the detox scale score declined an average of 66.3% across participants (standard deviation [SD] = 18.7), from a mean preintervention of 58.1 to a mean postintervention of 18.9. The median decline was 67.6%, and the range of the decline across subjects was 0% to 95.7%, again showing a large pre-to-post decline in the medical symptoms of toxicity.

Table 4. Questionnaire Scores for Participants' Baseline (Preintervention) Ages, Weights, and Detoxification Symptoms

	Age, y	Weight, lbs	Body Mass Index	Detoxification Questionnaire Score
Mean	41.9	186.9	29.2	58.1
Standard Deviation	11.4	34.8	4.3	27.9
Range	23-77	134-275	23.2-38.4	13-141

Table 5. Macronutrient Composition of One Meal Replacement Shake

Total calories	253
Fat	10.8 g
Fat from soy lecithin	9 g
Carbohydrates	25.5 g
Dietary fiber	3.5 g
Protein	15.5 g
Sodium	76 mg
Potassium	485 mg

Participants lost an average of about 9 lbs from pre-to-post, as Table 8 shows. Twenty-nine participants lost weight and two gained over the approximately 4-week period. A paired samples t-test showed a highly significant weight loss, $t(30) = 8.085$, $P < .001$. Average BMI also declined significantly, from 29.2 at preintervention to 27.8 at postintervention (Table 8), with a paired samples t-test showing $t(30) = 8.701$, $P < .001$.

Finally, the research team calculated Pearson correlations to determine whether a relationship existed between participants' amount of weight loss and the amount of decline in their overall detox score. The number of lbs lost correlated only very minimally with the percentage change in overall detox score ($r = 0.199$) and with the pre-to-post difference (obtained by subtraction) in the detox questionnaire scores ($r = –0.290$), and neither relationship was statistically significant. The change in BMI (post minus pre) also correlated minimally with these detox outcomes, $r = –0.283$ and $r = 0.216$, respectively. Thus, while participants' scores declined significantly on toxicity as measured by all 15 detox scales and by the overall total detox scale for medical symptoms and while participants showed a statistically significant weight loss, the research team found no relationship between the amount of weight lost and the amount of change in toxicity.

The Figure is a visual representation of the relationship between weight loss and change in detox symptoms score. It shows the relationship with the Pearson correlation of 0.199 discussed above. Each circle in the scatterplot represents one participant's weight loss and change in detox symptom scores. If the circles fell into a linear shape, the scatterplot would show a strong relationship between weight loss and change in toxicity symptoms. The fact that the scatterplot has very little pattern (is a "blob") shows that virtually no relationship exists between the amount of decline in toxicity symptoms as measured by the questionnaire and the number of pounds lost.

DISCUSSION

The objective of this retrospective chart review was to clarify the amount of weight loss and symptom reduction to be expected from following a low-calorie, meal replacement-enhanced detox diet. While this diet generally provides between 800 kcal to 1200 kcal per day, with adjustments to provide more as described below, the participants in the current study consumed between 850 kcal to 1000 kcal per day. The results achieved during the 4-week period compared favorably with the weight loss and improved symptoms scores that researchers have seen with other diets.

The study showed a significant amount of weight loss in participants who followed the detox diet. Participants lost an average of

Table 6. Sample Meal Plan

Breakfast	Snack	Lunch	Snack	Dinner	Snack
Detoxification shake	1/2 c organic blueberries, green tea unsweetened or with stevia	Detoxification shake and small leafy green salad with olive oil and lemon	Steamed broccoli with garlic, salt, and pepper	4-6 oz baked salmon with steamed spinach drizzled in olive oil	Raw carrots and celery

Table 7. Preintervention-to-postintervention Change in Symptom Detoxification Scales

Scale	Items in Scale	Preintervention		Postintervention		Wilcoxon Signed Rank	
		Median	Range	Median	Range	*z*	*P*-value
Head	4	3	0-9	1	0-6	–4.00	<.001
Eyes	4	3	0-9	1	0-5	–4.26	<.001
Ears	4	0	0-7	0	0-3	–3.06	.002
Nose	5	3	0-17	1	0-10	–4.11	<.001
Mouth/throat	5	1	0-17	0	0-8	–2.80	.005
Skin	5	2	0-13	1	0-5	–3.73	<.001
Heart	3	0	0-11	0	0-2	–3.08	.002
Lungs	4	0	0-8	0	0-4	–2.71	.007
Digestive tract	7	5	0-18	2	0-10	–4.72	<.001
Joints/muscle	5	3	0-12	1	0-13	–3.62	<.001
Weight	6	8	1-16	1	0-7	–4.79	<.001
Energy/activity	4	5	0-16	1	0-7	–4.66	<.001
Mind	8	5	0-19	1	0-8	–4.01	<.001
Emotions	4	5	0-16	2	0-7	–4.53	<.001
Other	3	0	0-8	0	0-5	–2.28	.023
Overall total	71	53	13-141	17	2-52	–4.78	<.001

Table 8. Preintervention-to-postintervention (Pre-to-post) Change in Weight and Body Mass Index (BMI)

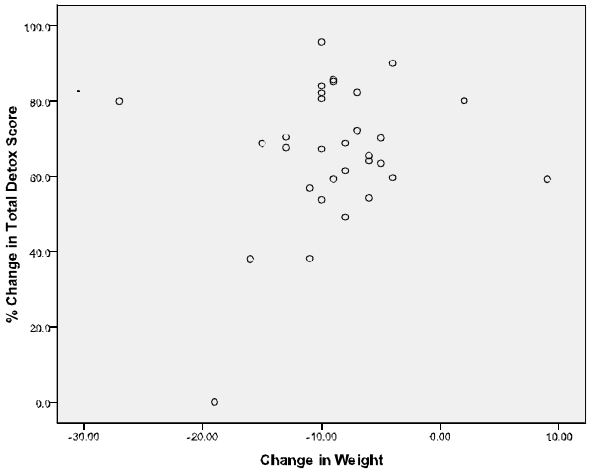
	Lbs			BMI		
	Pre	Post	Pre-to-post Change	Pre	Post	Pre-to-post Change
Mean	186.9	178.0	–8.87	29.2	27.8	–1.40
Median	188.0	180.0	–9.00	28.9	27.2	–1.36
SD	34.8	33.8	6.11	4.3	4.2	0.90
Range	134-275	118-256	–27 to +9	23.2-38.4	20.9-36.0	–3.8 to +1.2

Abbreviations: Post, postintervention; pre, preintervention; SD, standard deviation.

8.9 lbs at 4 weeks, which compared favorably with conventional weight-loss plans at 4 weeks: a mean weight loss of 9.7 lbs for the Atkins Diet, 6.3 lbs for Weight Watchers, and 5.9 lbs for Slim-Fast (as published in the British Broadcasting Corporation diet trials).[5] Given these results, the current study has shown that a detox diet plan can be a reasonable alternative to high-protein and conventional diets and that vegans potentially can use it for a weight-loss solution.

Additionally, from the initial visit to the follow-up visit 3 to 5 weeks later, all 15 symptoms had statistically significant levels of improvement, and the overall total of the detox symptoms scores declined an average of 66.3% across participants. These results compare favorably with symptoms scores in other detox studies using the same questionnaire, which showed improvement of 47% at 1 week[12] and 52% at 10 weeks.[10] The research team postulates that these changes come from improvements in phase 1 and phase 2 detoxification pathways as the result of consuming nutrient-dense foods as previously suggested by Bland.[13] Another possible explanation for improvement is that participants eliminated inflammatory substances—allergenic foods or toxic elements—from their diets and thereby decreased systemic inflammation, allowing for more effective detoxification. This improvement in symptoms is

Figure. Each Participant's Percentage Change in Total Score for Detoxification Symptoms Questionnaire vs Change in Weight



important because numerous individuals with a constellation of seemingly unrelated symptoms could consider using a detox diet in their treatment strategies to improve symptom control. Also important to note is that no significant increase in symptoms occurred from adhering to the detox diet, so the diet appears to be safe for patients of doctors in a general medical practice.

Furthermore, the study found no relationship between the amount of weight loss and the amount of change in detoxification symptom scores, which is important for participants who would like to participate in a detox diet but do not want to lose weight. One way to ensure that an individual will not lose weight on this plan is to add more starchy vegetables from Table 3 to the diet.

Detoxification diets possibly work by eliminating a particular food or toxin from a person's body. Therefore, if the underlying cause of an individual's symptoms is not the food in his or her diet or a toxin but rather some other cause, weight loss will not necessarily result. For example, if the patient has an undiagnosed underactive thyroid, the medical practitioner should identify and correct the problem to ensure proper metabolic function. If the doctor can find no such underlying cause and a person's weight and symptoms return when he or she resumes the pre-detox diet routine, some food or lifestyle habit may be playing a role in the person's health.

Finally, it is important to recognize possible placebo effects for the outcomes reported. Because the study is a retrospective chart review, the potential for selection bias existed. Also, the individuals who participated may have been highly motivated to achieve a successful outcome, which may not be reproducible in other practice situations. Additionally, the research team followed participants only for up to 5 weeks, and it is uncertain whether individuals can maintain the results over a longer duration of time.

The results confirm the hypothesis that a low-calorie, meal replacement–enhanced detox diet does help individuals lose a significant amount of weight and does improve symptom scores significantly. A controlled trial with a larger number of subjects and long-term follow-up would be useful in determining any differences due to gender as well as the capacity for individuals to maintain their weight loss and to continue to improve their symptoms. To determine whether participants are able to maintain the benefits described in this article, researchers should perform studies to clarify whether or not metabolic risk factors will improve with a meal replacement–enhanced detox diet.

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