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Introduction

It is no secret that eating a low-calorie, balanced diet can lead to a longer and healthier life. Aside from the psychosocial benefits of losing weight, eating healthy has been shown to aid in the prevention and treatment of numerous medical conditions including cardiovascular disease, type-2 diabetes mellitus, certain types of cancer, and osteoarthritis (1,2,3). Why is it then that over 50% of adults (an estimated 97 million) in the US are overweight or obese (3). The answer, in a word, is compliance.

In order for a person to comply with an order to eat healthy, there are three steps that must be accomplished. The first is to understand what it means to "eat healthy" and what exactly a healthy diet encompasses. The second is to plan out the logistics of exactly how one will go about eating healthy. The last step is to implement the plan. (4).

It stands to reason that any methods of dieting that can improve or enhance the execution of these three steps will, in effect, improve compliance. Based on this premise, current data shows that prepared meal plans do indeed improve patient compliance, most likely through facilitation of the second and third steps.

Is Compliance Really the Problem?

Data over the past three decades suggests 'yes'. Patient compliance, or lack thereof, is a problem that health care providers face daily, not only with diet regimens, but virtually every form of treatment, including medications, vaccinations, exercise regimens and physical therapy (5,6). There is overwhelming scientific evidence that modifications in diet result in reduced body weight and Body Mass Index (BMI) as well as reduced risk of several medical conditions, including cardiovascular disease, which remains the leading cause of death in the U.S. affecting over 60 million Americans today (7,8).

Given this body of evidence, it is clear that the ineffectiveness of diet modification evidenced in the general population is not inherent in the "treatment" itself, but rather the "administration" of that treatment. Since administration is contingent upon the patient, the use of the term compliance is appropriate.

Step 1: The Learning Stage

In terms of compliance stages, it is unlikely that the problem of non-compliance lies in the understanding of a healthy diet. The benefits of eating healthy are widely known and understood by people of almost all ages. From childhood we are taught about the benefits of eating a balanced combination of healthy foods such as whole grain breads, fresh fruits, and vegetables. Nutrition education programs are implemented in schools all across the U.S., such as the Georgia Dept. of Education's Nutrition Education & Management Training (NEMT) Program (9). Outside of school, the media bombards the public with warnings against excessive fat, cholesterol, and sodium in our diets. Although the guidelines that determine a healthy diet are for the most part clear, determining how to develop a healthy menu is another story.

Step 2: The Planning Stage

With the volume of data regarding the role of diet in disease growing at an exponential rate, it is no wonder that today's society is obsessed with eating healthy and staying fit. However, this obsession has manifested itself through an overwhelming amount of information, guidelines, books, websites, and products regarding diet and health. In the UCLA library catalogue alone, the keyword "diet" occurs 2,545 times. More overwhelmingly, a webpage search on Alta Vista using the keyword "diet" yields an astounding 2,641,425 webpages. From the American Heart Association's Step I and II diets to the Atkins' diet to Weight Watchers®, the options for diet programs are nearly endless. Considering the sheer magnitude of resources available to the average American, determining exactly how to "eat healthy" can be a rather daunting task in and of itself.

Step 3: Implementing the Plan

This is where most diet plans fall apart. It might seem reasonable that once the plan has been determined, the remainder of the job is easy, just do it. This, however, is not the case. "Just doing it" is harder than it appears. Several factors contribute to the difficulty of implementing a diet plan. For one thing, obtaining a healthy meal can be time consuming and expensive. Due to the lack of fast food establishments serving healthy foods, dieters are forced to either prepare meals themselves, which can be burdensome and time consuming, or dine at restaurants, which can get very pricey, especially over the long term. Another obstacle is that in the case of dieting, the goal of treatment is control, rather than cure. In most cases of primary disease prevention, patients are asymptomatic, so the motivation for adherence is not always strongly present (7). Then there is the issue of "food addiction". The literature is still unclear on whether or not "food addiction" per se even exists (10). But for our purposes, it is fair to say that food cravings may pose a significant obstacle to implementing a diet plan.

How Does One Evaluate Compliance?

Compliance studies in general are extremely complex in terms of measurement and quantification making them difficult to execute. In the past, studies have generally used two methods to determine compliance: direct measurements such as biochemical levels of nutrients measured in blood or urine, and indirect measures such as weight loss, food records, and patient interview. Due to the large number of confounding variables, one should be wary of indirect measures. Emphasis should be placed on direct measurements, which are controlled and less subjective, although these measurements may also be compromised by confounding factors as well as laboratory error. Note that indirect data should not be disregarded altogether since several studies have shown that when conducted properly, patient interviews can provide a practical and valid method of assessing compliance. (7).

Prepared Meal Plans vs. Self-Prepared Meals: Examining the Data

Clinical data regarding the efficacy of prepared meal plans and compliance have been virtually non-existent prior to 1994, and current data is relatively sparse. However, the studies that have been published all seem to point to the same conclusion: people are significantly more adherent to prepared meal plans than self-selected meal plans.

So what exactly qualifies as a "prepared meal plan"? In the context of this paper, a prepared meal plan is a diet regimen that provides nutritionally complete and convenient food products that have been prepared and packaged by a commercial source. Such foods can be in the form of frozen meals, freshly prepared meals, canned foods or liquids, packaged snack products, and powdered meals. Current commercial prepared meal programs include patient monitored programs such as Weight Watchers®, Nutri/System®, and Jenny Craig®, as well as do it yourself programs such as Healthy Choice® and Ultra Slimfast®. The majority of data regarding compliance and prepared meal plans has been focused on diet regimens composed mainly of frozen or freshly prepared meals.

In 1997, Metz, et al. reported in the American Journal of Clinical Nutrition the results of a study evaluating dietary compliance and cardiovascular risk reduction with a prepared meal plan compared with a self-selected diet. Fundamental dietary guidelines were similar in both groups indicating a diet that followed the AHA's Step I and II diet recommendations and providing 15-20% of energy from fat, 55-60% from carbohydrate, and 15-20% from protein. Participants in both groups received uniform counseling from trained nutritionists at week 0 and 2. From this we can assume that diet plans or "treatments" in both groups were comparable. (11).

At the end of the 10-week treatment period, it was determined that compliance was significantly greater for participants assigned to the prepared meal plan than for participants assigned to the self-selected diet in terms of following energy, fat, and AHA Step I and II recommendations. Dietary compliance was assessed from 3-day food records by evaluating the ability of participants to meet the specified dietary criteria. (11).

A 1999 study evaluating prepared meal plans in patients with type-2 diabetes mellitus yielded similar results to those of Metz's study. This study found that patients assigned to a prepared meal plan had significantly greater decreases in the percentage of calories consumed as total and saturated fat, as well as significantly greater improvements in fiber and sodium intake than patients assigned to the self-selected diet plan (12).

Why Are Patients More Compliant with Prepared Meal Plans?

In 1996, Hatton, et al. touched upon a potential answer to this question in the American Journal of Clinical Nutrition. Hatton and his colleagues found that over a 10-week period, patients with cardiovascular disease who underwent a prepared meal program experienced greater improvement in quality of life than patients who underwent a self-selected diet, based on a standardized questionnaire administered at weeks -4, 0, 4, and 10. Although both groups experienced significant improvements in nutritional health perceptions and affect, as well as reduced risk factors for cardiovascular disease, the

group randomized to the prepared meal plan experienced additional significant improvements in mental health, general perceived health, daily activities, work performance, and reductions in nutrition hassles. The category of nutrition hassles was further subdivided into the following categories: social hassles, nutritional dysphoria, control of diet, monitoring nutrients, vigilance, planning and preparation of meals, and complexities of diet. The patients assigned to the prepared meal plan group had clinically significant reductions in hassles related to the latter five categories. The self-selected diet group had a significant improvement in control of diet only. Between-group statistical analysis showed significant differences for planning and preparation, and complexities. (4).

Examination of the study's results reveals strong support for the idea that prepared meal programs improve dietary compliance through facilitation of planning and implementation. The results were self-evident in that patients in the prepared meal plan group showed a significantly greater reduction in hassles related to planning and preparation of meals. These results may be explained by the fact that self-selecting and preparing a meal is time consuming and involves several complex and difficult tasks including calculation of the nutrient content of the foods, determination of the correct balance of foods that provide the appropriate combination of nutrients, determination of appropriate portion sizes, and determination of food preparation. Prepared meals on the other hand, require none of these tasks. Further improvements in monitoring nutrients, vigilance, and complexities of diet also suggest that prepared meal plans increase compliance by lessening burdens associated with diet plan implementation. (4).

Further Experimental Evidence in Support of Prepared Meal Plans

In September 2000, an article in the American Journal of Medicine reported the results of the first long-term, multi-center, randomized trial evaluating the largest provider of commercial weight-loss services in the U.S., Weight Watchers® International. In this study, subjects were either randomized to a self-help group, where they received an overabundance of resources as well as two 20-minute consultations with a dietician, or to a treatment group, where they were enrolled in the Weight Watchers® program (program coordinators were blinded to study participant status). After 26 weeks, the study found that the 174 subjects assigned to the treatment group lost significantly more weight (4.0 kg more, 95% CI) than the 172 enrolled in the self-help group. (13).

In addition to frozen and fresh meal plans, liquid meal replacement programs have also been a topic of study. In 1994, a study conducted at UCLA by Heber, et. al. evaluated the efficacy of Ultra Slim-Fast® in weight loss. The group reported that after 12 weeks of treatment with Ultra Slim Fast®, patients observed a significant weight loss (approximately 10% of body weight). It should be noted that the manufacturers of Slim-Fast sponsored this study®, thereby posing a conflict of interest. However, non-commercial funding of studies such as this is extremely rare making commercial sponsorship essential for this type of research to take place. (14).

Conclusion

Although the current data strongly supports the idea that prepared meal plans enhance patient compliance, the body of evidence is still not overwhelmingly convincing. For one thing, the number of studies regarding the topic is relatively scarce. Investigators and health professionals tend to avoid the topic of dietary compliance due to its complex and elusive nature. Furthermore, commercial corporations that market these very programs and products often sponsor investigators that do study the topic of prepared meal plans. This casts a shadow of doubt upon the objectiveness of the investigators and the viability of their data. Although the current evidence is strongly in support of the idea that prepared meal plans increase compliance, the presence of conflicting interests warrants the need for further unbiased investigation.

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