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# Implementation of a Whole Food Plant Based Diet in a Food as Prevention Program in a Resource Constrained Environment

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**Background:** The efficacy of a Whole Food Plant-based (WFPB) diet has been shown in randomized controlled trials in diabetes, cardiovascular disease and obesity. However, it's effectiveness in routine clinical settings is less well documented. This study describes the implementation and outcomes of a "Food as Prevention" program run by a single clinician.

**Methods:** Participants were referred to a "Food as Prevention" program run by a single gastroenterologist at an academic teaching center. The program included 5 physician-led discussion and small group educational sessions. Data collected included demographics, weight and biochemical measurements before and after completion of the program. Statistical analysis included paired t-test and Pearson correlation coefficients were used to assess differences before and after WFPB implementation.

**Results:** A total of 17 participants (age 59 years; 59% female) with an average weight of 90.0 kg attended a median of 3 group sessions. Majority of patients had hyperlipidemia (71%) followed by hypertension (47%) and coronary artery disease (35%), fatty liver disease (35%) and diabetes mellitus (29%). Adoption of a WFPB diet led to significant decreases in weight (4.3 kg; $p < 0.01$), total cholesterol (0.72 mmol/L; $p = 0.046$), and triglycerides (0.53 mmol/L; $p = 0.005$) with an increase in high-density lipoprotein (HDL) (0.10 mmol/L; $p = 0.01$).

**Conclusions:** Implementation of the WFPB diet in this novel pilot program led to weight loss and improvement in biochemical markers of disease. Future studies are needed to implement this model on a larger scale.

**Key Words:** Diet-vegetarian, Obesity, Overweight, Risk factors, Treatment outcome

## INTRODUCTION

The therapeutic potential of a plant-based diet has been shown in randomized clinical trials (RCT) in numerous conditions including type 2 diabetes [1], obesity [2], and cardiovascular disease [3,4]. In the BROAD study RCT [4], a weight loss of 10.6 Kg was present after 6 months of a non calorie-restricted Whole Food Plant-based (WFPB) diet in obese subjects with cardiometabolic disease. Nonalcoholic fatty liver disease (NAFLD) is epidemic and currently estimated to affect almost a third of Americans [5] with a prev-

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alence in Asia of 30% (ranging from 22% in Japan to 33% in South Korea and 51% in Indonesia) [6]. In this context, the magnitude of weight loss in the BROAD study is highly significant as it may be associated with resolution of NASH and fibrosis regression in 80-90% of subjects [7-9] as well as improvement in steatosis and a reduction in hepatocellular lipid levels [10].

Although recognized as important by medical students [11], nutrition training is a frequently neglected area of medical education [12] averaging less than 20 hours in undergraduate US curricula with only 25% of US medical schools requiring a dedicated nutrition course [13]. This is a significant gap in knowledge, especially when physicians need to incorporate nutrition as part of the care for gastrointestinal diseases.

This paper reports the initial outcomes of a small-group based "Food as Prevention" program run by a single clinician (SCG) certified in Lifestyle Medicine (ABLM, 2019) with additional training in plant-based nutrition (Plant-Based Nutrition Certificate, Cornell University, 2018), and motivational interviewing at a tertiary care medical center (St Joseph's Healthcare, Hamilton, ON, Canada) to assist interested patients in adopting a WFPB diet. It is the aim of this paper to describe the implementation of this program, along with its preliminary outcomes with the goal of assisting other clinicians to implement similar programs.

## METHODS

### 1. Overview of the program and intervention

Patients were referred to a "Food as Prevention" program and were aware that the aim of the program was to assist them in adopting a low fat Whole Food Plant-based diet. The diet consisted of whole grains, legumes, vegetables, seeds, nuts and fruits with the avoidance of animal products (meat, fish, poultry, dairy products, eggs) [14]. Minimal use of highly processed foods and added oils was also encouraged [15,16]. Patients were encouraged to eat until satiated and no calorie or serving size restrictions were imposed.

All patients underwent an initial in person consultation consisting of: (1) A full history and physical exam (included eliciting the reason for the patients interest in a dietary approach to chronic disease prevention and treatment), (2) Explanation of the program, (3) Obtaining consents for email communication, online social media groups (if patient was interested) and (after the onset of COVID) web-based group meetings, (4) Review of a 3 day diet record (completed prior to the first and subsequent follow-up appointments) allowed the discussion of next steps to adopt a healthier more plant-based diet which was tailored to the patients' health condition with specific, personalized directions subsequently emailed to them.

In person follow-up visits (initially scheduled every 8-12 weeks) provided an opportunity to review results of dietary compliance (using the written 3 day diet record), laboratory investigations, and address any questions or concerns. During these visits, further personalized suggestions on diet implementation were made and subsequently emailed to the patient. Baseline and follow up testing included CBC, electrolytes, magnesium, zinc, TSH, vitamin B12, lipid profile, C reactive protein, glycosylated hemoglobin, 25 OH vitamin D, and liver function tests when appropriate.

Exclusion criteria for participation in the program included renal failure (creatinine > 200 umol/L), use of coumadin, and prior bariatric surgery. It was also explained to patients that any necessary adjustments to their medications (e.g. for diabetes, hypertension) would need to be made by the prescribing physician (a fax was sent to these physicians informing them of the possible need for changes to be made).

A dedicated closed online social media group was also available for interested patients. It could be used to ask general diet related questions, for posting recipes as well as photographs of recent meals made.

Written informed consent was obtained from all subjects; reporting of this data has been approved by the Hamilton Integrated Research Ethics Board (HIREB #14447-C).

### 2. Group visits

Group visits were initially held in person (6 weekly visits of 90 minutes) and subsequently (because of restrictions related to COVID) virtually using a secured virtual platform (5 weekly visits of 60 minutes) with the author (SCG) serving as the facilitator. Group size was 10-15 patients; partners or significant others were also encouraged to attend (especially if they were involved in meal preparation).

After the first group meeting participants were encouraged to bring healthy WFPB snacks to share with the group. During group visits the principles of motivational interviewing (e.g. use of open-ended questions, affirmations, reflections, and summary statements) were employed to ensure a non-coercive atmosphere which allowed each patient to progress at their own rate [17].

At the first group meeting the facilitator (SCG) shared a case study of the benefits of the adoption of a WFPB diet. Non-coercive elements of group meetings included a "no shaming" policy, and that anyone was free to speak or not speak. It was also made clear that it was not constructive to criticize other participants for non-compliance or backsliding.

After further meeting specific content (see Supplement Table 1 for details) was shared, the SMART approach to goal setting was explained so that participants could develop goals which were specific, measurable, attainable, relevant, and time-bound [18]. Participants then broke into pairs and were given 10 minutes to share with one another: (1) The steps they had taken so far in adopting a WFPB diet, (2) Setting their own personal goals to implement by the next meeting (using the SMART methodology), and (3) Possible obstacles which they might encounter. It was emphasized that these goals were personal and should be chosen so that each participant felt they were achievable; additionally, it was made clear to participants that they would not be asked to share their goals with the group facilitator or the group as a whole.

All presentations were interactive and allowed time for questions. Goal setting in pairs (as above) was also part of every meeting as was a request for participant feedback (done by completing a web-based feedback form immediately after each web session with the option of giving input and suggestions for future topics). A copy of all slides used in each meeting was made available to participants on a dedicated group page on the author's website which also contained numerous supporting articles and links to additional resources. The final (sixth) session of the in-person meetings was a group potluck where participants could bring a WFPB dish to share.

A community volunteer was also present at most of the sessions - these were individuals who had previously adopted a WFPB diet and worked under the close supervision of the facilitator (SCG). They were able to perform recipe demonstrations and answer general questions of a practical nature.

### 3. Statistical analysis

Clinical and laboratory values before and after the intervention were compared using the paired T test (2 tailed). Pearson correlation coefficients were also calculated.

## RESULTS

A total of 17 patients have participated in the program from inception in spring 2019 to fall 2021. Average age was 59 years (range 40-79; median 61) (Table 1) with 59% of subjects being female and an average weight of 90.0 Kg. The majority of patients (71%) had hyperlipidemia with almost half (47%) having hypertension and a third (35%) having coronary artery disease. A similar proportion had diabetes (29%; all NIDDM) and fatty liver disease (35%). Participants attended a median of 3 group visits (range 1-4).

Bloodwork and clinical parameters from before and after the dietary intervention are shown in Table 2. There was a significant decrease in total cholesterol (0.72 mmol/L; $p < 0.05$), triglycerides (0.53 mmol/L; $p < 0.01$) and borderline significant decreases in HbA1c (0.27%; $p = 0.07$) and LDL (0.68 mmol/L; $p = 0.07$) with a significant increase in HDL (0.10 mmol/L; $p = 0.01$). On average participants lost 4.3 kg (4.4%) of their baseline weight ($p < 0.01$) (range from gaining 1.8 kg to losing 17.5 kg; median loss of 3.45 kg). This weight loss did not correlate with the number of clinical or group visits. There were no significant changes in

**Table 1.** Patient characteristics of participants in food as medicine program

| Variable | N (%) | Range |
|---|---|---|
| Average age (yrs) | 58.8 | 40-79 |
| Women | 10 (59) | |
| Men | 7 (41) | |
| Weight (kg) | 90.0 | 50-130 |
| Hyperlipidemia | 12 (71) | |
| Coronary artery disease | 6 (35) | |
| Hypertension | 8 (47) | |
| Diabetes | 5 (29) | |
| Fatty liver disease (NAFLD) | 6 (35) | |
| Group visits (median) | 3 | 1-4 |

**Table 2.** Clinical variables before and after dietary intervention

| Variable | N | Pre | Post | Change | p-value |
|---|---|---|---|---|---|
| HBA1c (%) | 15 | 6.35 | 6.08 | −0.27 | 0.07* |
| Total Cholesterol (mmol/L) | 16 | 4.56 | 3.84 | −0.72 | 0.046 |
| LDL (mmol/L) | 14 | 2.69 | 2.01 | −0.68 | 0.07* |
| HDL (mmol/L) | 15 | 1.19 | 1.30 | 0.10 | 0.012 |
| Triglycerides (mmol/L) | 16 | 1.79 | 1.26 | −0.53 | 0.005 |
| C-reactive protein (mg/L) | 4 | 0.76 | 0.82 | −0.06 | 0.81 |
| Weight (kg) | 14 | 90.01 | 85.74 | −4.28 | 0.008 |
| AST (u/L) | 5 | 40.2 | 28.6 | 11.6 | 0.26 |
| ALT (u/L) | 6 | 50.8 | 31.0 | −19.8 | 0.07* |
| SBP (mmHg) | 12 | 126.5 | 126.9 | 0.4 | 0.91 |
| DBP (mmHg) | 11 | 81.0 | 82.4 | 1.4 | 0.88 |

*Borderline significance.

C reactive protein, blood pressure or AST. However, the drop of 20 u/L in ALT was of borderline significance ($p = 0.07$) and in one subject with fatty liver, there was normalization of transaminases. The results of the remaining blood tests were unremarkable.

Feedback from sessions (scale of 1 to 5 on how useful the sessions were) was 4.7 for in person and 4.6 for web sessions. No side-effects or complications of the intervention were noted.

## DISCUSSION

This study shows that it is possible to achieve meaningful improvements in multiple clinical parameters with a small-group based program run by a single clinician. The subjects had a mixture of cardiometabolic disorders and showed significant weight loss as well as improvements in total and HDL cholesterol and triglycerides. Borderline improvements were also noted in HbA1c and ALT.

Major advantages of this intervention are its numerous health benefits [1-4], as well as its safety and cost-effectiveness in terms of health resource utilization since patient group visits are covered by most Canadian provincial and US health plans.

Innovative aspects of this program include the use of small groups (allowing social comparison, facilitation, support and social learning [17]), and technology such as emails after each visit to patients with personalized instructions and individualized suggestions for next steps as well as group visits over the internet. Additionally, this program can be run by a single clinician although the assistance of a non-medical volunteer experienced in a WFPB is helpful. The availability of a dedicated group web page (on the author's website) as well as a closed online social media group and the utilization of non-coercive methods allowed a personalized approach tailored to each patient which allowed them to proceed with the adoption of a WFPB diet at their own pace; this is particularly important since there was a wide range of degree of adoption of a WFPB diet at the initial consultation visit.

Drawbacks to this type of intervention include the time to conduct group sessions and need for knowledge of a WFPB and its implementation on the part of the clinician. This was highlighted in a survey of North American gastroenterology trainees in which 70% had no inpatient nutrition rotation and 90% had no outpatient nutrition or obesity rotation [19]. Fortunately, additional training is readily available. One route to obtain the knowledge and many of the required skills (utilized by the author [SCG]) would be to obtain board certification in Lifestyle Medicine which is now available in most countries with the American College of Lifestyle Medicine or the International Board of Lifestyle Medicine and does not require participation in a dedicated residency program. Additionally, training in motivational interviewing and plant-based nutrition is useful and was undertaken by the author (SCG).

In conclusion, this pilot study demonstrated that a WFPB dietary intervention can be successfully implemented in in-

terested patients by a single appropriately trained clinician with minimal support. The program also highlights the impact nutrition changes can make on patient care and the need for adequate training in nutrition for gastroenterologists. In addition, preliminary results suggest health benefits including potential impact on NAFLD patients via weight reduction [2-4]. Larger cohorts in the future are needed to further support the findings of this pilot project.

## CONFLICTS OF INTERESTS

Guarantor of the article: Subhas C. Ganguli accepts full responsibility for the conduct of the study. Lindsey A. Russell received an educational grant from Baxter not in relation to this manuscript.

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