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Australian patients with coronary heart disease achieve high adherence to 6-month Mediterranean diet intervention: preliminary results of the AUSMED Heart Trial

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ABSTRACT

Objective: It is unclear whether the cardioprotective Mediterranean diet (MedDiet) can be adhered to in non-Mediterranean populations. The aim of this study was to report preliminary results on adherence to a 6-mo ad libitum MedDiet intervention in multiethnic Australian patients with coronary heart disease, including maintenance at 12 mo.

Methods: Participants (62 ± 9 y of age, 83% men) were randomized to the MedDiet (n = 34) or a low-fat diet (n = 31). Dietitian-led appointments occurred at 0, 3, and 6 mo with a follow-up phone review at 12 mo. Dietary intake was assessed via 7-d food diaries analyzed in FoodWorks8, and MedDiet adherence was measured by a validated 14-item questionnaire.

Results: In the pooled cohort, the MedDiet adherence score was low at baseline (5.2 ± 2.1 of 14), with only 6.2% achieving a high score (≥9). MedDiet participants significantly improved the MedDiet adherence score compared with low-fat diet participants after 6 mo (+4.8 ± 2.7 versus +1.2 ± 2 points, respectively; $P < 0.001$). MedDiet participants significantly increased intake of olive oil, nuts, tomato, yogurt, legumes, and seafood and decreased intake of processed meats and added sugars compared with low-fat diet participants ($P < 0.05$). Maintenance of the MedDiet at 12 mo was high with 78% of MedDiet participants maintaining an adherence score ≥9; however, mean adherence score decreased by 1 ± 1.9 point ($P = 0.01$) between 6 and 12 mo.

Conclusions: The MedDiet intervention in this pilot trial of Australian patients with coronary heart disease was well adhered to, improved diet quality, and could therefore provide a feasible alternative to a low-fat diet. Notably, improvement in adherence to the MedDiet was achieved through dietitian-led intervention and cross-cultural translation of dietary principles.

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Introduction

Coronary heart disease (CHD) refers to the development of atherosclerotic plaque in the coronary arteries [1] and is the most common form of cardiovascular disease (CVD) throughout the world [2]. CHD has two major clinical presentations: acute myocardial infarction (AMI) and unstable angina, which constitute acute coronary syndrome (ACS) [1]. In Australia, ~65 000 adults experience an ACS event each year [3], and CHD accounts for ~13% of all deaths [4].

There is a substantial amount of evidence to support that secondary prevention of ACS events cannot be achieved through medical therapy alone and that management should be multifaceted, including adopting lifestyle modifications [5,6]. Lifestyle interventions, including the promotion of a healthy diet and increased

exercise, are inexpensive and less burdensome than other therapies and affect multiple systems improving overall health [7]. Nonetheless, despite the well-known benefits of making healthier lifestyle choices, patients with ACS do not often follow the recommended lifestyle advice long-term [8]. These patients often can find maintaining changes in daily life extremely difficult, and a key challenge is to identify sustainable public health strategies for continuous motivation, and in particular to prescribe dietary patterns that modify long-standing unhealthful habits [5].

In Australia, a low-fat diet has been recommended as part of standard care for secondary prevention of CHD for years [9]. Although there is good evidence that low-fat diets influence CVD risk markers such as low-density lipoprotein cholesterol, there is a lack of evidence supporting the effect of a low-fat diet on cardiovascular events and mortality [10–12]. In light of this, the American 2015 Dietary Guidelines Advisory Committee concluded that diets focused on lowering fat intake have limited benefit for cardiovascular health and emphasized the importance of healthful, food-based diet patterns, such as the Mediterranean diet (MedDiet) [13]. In 2017, the National Heart Foundation of Australia released a position statement that promotes dietary patterns for overall heart health [14]. The MedDiet has the strongest evidence base for reducing risk for CHD and adverse cardiovascular events in both primary and secondary prevention settings [12,15]. A recent cohort study conducted in >15 000 patients with CHD across 39 countries demonstrated that a 1-point increase in MedDiet adherence score was associated with a 5% reduced risk for major adverse cardiovascular events [16]. There are many nutrients and bioactive compounds with anti-inflammatory and antioxidant potential contained within the foods and wine commonly consumed in the MedDiet [17]. These include monounsaturated fatty acids (MUFAs), ω-3 polyunsaturated fatty acids (PUFAs), dietary fiber, polyphenols (including flavonoids), and other antioxidants such as vitamins E and C. The MedDiet is also considered safe, palatable, and sustainable, in part because of its high healthy fat content [18] and predominantly being plant-based [19].

The majority of studies evaluating the effect of the MedDiet have been conducted in Mediterranean countries [20]. There is limited evidence that a similar beneficial effect on CHD risk factors and outcomes will occur in a non-Mediterranean population, which explains the reluctance to endorse this particular dietary pattern for CHD in the multiethnic Australian setting [21]. Although it was recently shown that the MedDiet can be adopted in healthy older Australians [22], this has not been demonstrated in patients with CHD in Australia. The aims of this study were to assess the following in a multiethnic cohort of patients with CHD:

1. baseline adherence to the MedDiet pattern
2. compliance to a 6-mo ad libitum MedDiet intervention, including maintenance of adherence to this diet at 12-mo follow-up, and
3. the effect of the MedDiet intervention on the nutritional quality of the diet.

We hypothesized that a MedDiet could be well adhered to and improve diet quality, and therefore provide a feasible alternative to a low-fat diet in the management of CHD in the Australian setting.

Methods

Study design

The AUSMED (AUStralian MEDiterranean Diet) Heart Trial is a multicenter, parallel-design, randomized controlled trial (RCT) for the secondary prevention of CHD in a multiethnic Australian population. The trial involves a 6-mo intervention with a MedDiet versus a low-fat diet and a 12-mo follow-up to assess the primary outcome of aggregate cardiovascular events, with a total recruitment target of 1032 patients [23]. The present study investigated the effect of a 6-mo MedDiet versus low-fat diet intervention on dietary intake parameters and adherence to the MedDiet at 12 mo in a pilot trial of patients who had experienced an ACS event.

Patient cohort

Patients were recruited from two teaching hospitals in Melbourne, Australia between 2014 and 2016. The study was conducted in accordance with the Declaration of Helsinki [24] and the CONSORT guidelines [25]. All procedures involving patients were approved by the Human Research Ethics Committees of St Vincent's Hospital Melbourne (HREC-A; 016/13), the Northern Hospital (HREC/16/Austin/500), and La Trobe University (FHEC13/159), with written informed consent obtained from all enrolled participants. All were blinded for peer review.

Patients were approached at outpatient, rehabilitation, or cardiac inpatient settings. Eligible patients were adults with CHD who were able to read and write in English and had experienced at least one of the following: AMI, angina pectoris with documented coronary artery disease on imaging, coronary artery bypass grafting, or percutaneous coronary intervention. Exclusion criteria included malignant tumor; symptomatic chronic heart failure (New York Heart Association functional classification II, III, or IV [26]); chronic inflammatory disease requiring anti-inflammatory or immunomodulating medications; chronic kidney disease stage ≥3 [27]; decompensated liver disease; pregnancy or breastfeeding; or current participation in a lifestyle program, drug, or supplement trial.

Participant randomization and interventions

Figure 1 demonstrates the flow of participant study involvement. Eligible and interested participants attended a prebaseline appointment where the study was explained in detail, forms and equipment were provided, consent was obtained, and randomization was conducted. Enrolled participants were randomly assigned in a 1:1 ratio to the MedDiet group or the low-fat diet group. Randomization tables were developed by the trial statistician using a computer-generated stratified approach based on age (<55, 55–65, and >65 y), sex (male or female), and history of AMI (yes or no). Baseline, 3-mo, and 6-mo face-to-face appointments with the dietitian were conducted to obtain dietary data and for counseling. Five phone reviews for follow-up dietary counseling with the dietitian also occurred across 6 mo at weeks 3, 6, and 9 and months 4 and 5. Consultation frequency and data collection time points were consistent across the two groups, and different dietitians worked with the two groups to prevent contamination. All participants continued to receive standard medical care provided at their respective hospital or primary care settings; however, they were instructed not to engage in any nutritional interventions, including cardiac rehabilitation or other research trials for the duration of this study. At 12 mo a follow-up phone call was conducted with all participants for assessment of medical history, study feedback, and continued diet adherence.

In both study groups, the dietary advice was tailored to each individual through client-centered counseling and goal setting with the dietitian [28,29]. Both diets were prescribed ad libitum with no specific recommendations on energy restriction. Nutrient and core food group estimated daily intake profiles of both prescribed diets are presented in Supplementary Table 1.

Mediterranean diet

The rationale and development of the MedDiet intervention has been explained in detail elsewhere [30]. It was designed based on the principles of the traditional Cretan MedDiet [31], including information from the Hellenic dietary guidelines [32] and intervention trials [12,33–35]. The diet was modeled via a 2-wk meal plan that incorporated key dietary components of a MedDiet and a mix of traditional and modified recipes considered to be realistic options in the multiethnic Australian setting. Target macronutrient intakes were 42% total fat (of which ≥50% was from MUFA and 25% from PUFA), <10% saturated fatty acids, 15% protein, 35% carbohydrates, and ≤5% alcohol as contribution to total energy consumption.

Participants were provided with a MedDiet resource kit, published by George et al. [30], which included the 2-wk model meal plan and an associated recipe book, *The Mediterranean Diet* by Itsiopoulos, and a shopping list. Other resources included label reading information, a food pyramid, and weekly food intake checklist. Food group recommendations included daily intake of extra virgin olive oil (EVOO; 60–80 mL), six to eight servings of whole grain cereals, six servings of vegetables (including tomato and leafy greens), three servings of fruit, 30 g of nuts, regular intake of fish and seafood (≥3/wk), legumes (≥2/wk), and yogurt (most days), and limited intake of red or processed meat (≤1/wk) and sweets or pastries (≤3/wk, mostly homemade). Poultry, eggs, and feta cheese were recommended in moderation. For participants choosing to consume alcohol, red wine was suggested in moderation (one to two standard glasses daily) with meals. To facilitate dietary compliance and to encourage intake of staple Mediterranean foods less familiar to this population, a hamper was provided to participants at baseline and 3 mo. Each hamper included 6 L EVOO (to achieve 60–80 mL/d) and 1.2 kg unsalted nuts (almonds, walnuts, and hazelnuts to achieve 30g/d) as well as samples of canned legumes, Greek yogurt, and tinned tuna and salmon.

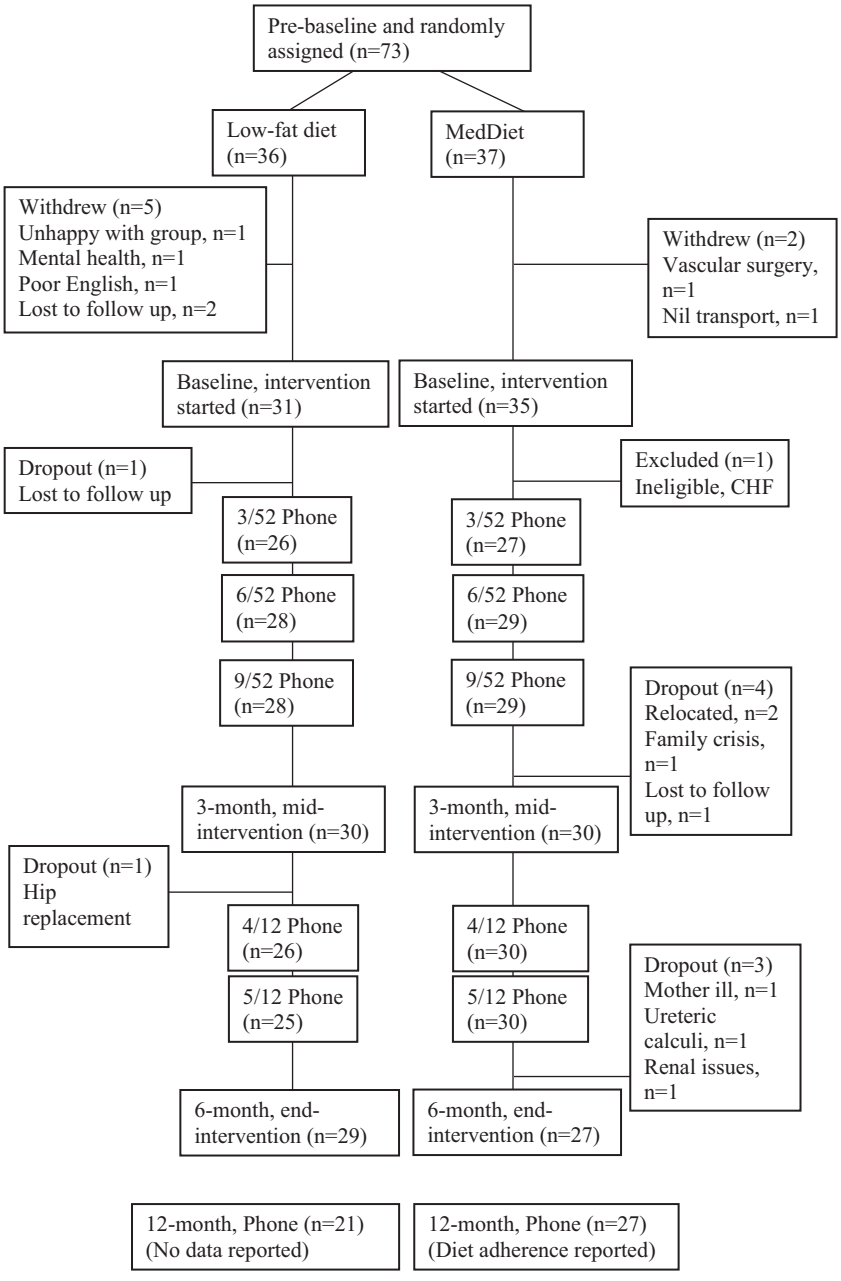

Fig. 1. Study flow diagram. Participant appointments and phone reviews with indication of dropouts. CHF, congestive heart failure.

Low-fat diet

Participants in the low-fat diet group were instructed to follow the standard diet recommendations provided to cardiac patients in Australia in 2014, when this study was developed, with a consistent appointment schedule to that of the MedDiet group. Recommendations from the Australian National Heart Foundation [9] and dietary guidelines [36,37] were consulted for design of the low-fat diet. Target macronutrient intakes were <30% total fat, <7% saturated fat, <1% trans fat, 45% to 65% carbohydrate, 15% to 25% protein, and ≤5% alcohol as contribution to total energy consumption. Food group recommendations included daily intake of grains and cereals (mostly whole grains, five to seven servings), vegetables (five to six servings), lean meats and alternatives (two to three servings), fruit (two servings), and low-fat dairy foods (two servings) [36]. Based on macronutrient and food group targets, a 1-wk meal plan was created to model a comparative nutrient profile for this diet and to generate a resource for participants. Resources for label reading, low-fat cooking, and recommended daily food group serves also were provided. Participants were provided with a supermarket voucher at their three face-to-face appointments (total value 60 AUD [~$47 USD]) to aid compliance and encourage continuation in the trial.

Measurements

This study reports on dietary intake data measurements across all study appointments as well as 12-mo follow-up in the MedDiet group. Medical conditions related to eligibility were collected during the screening process using hospital records and by questionnaire at the prebaseline appointment. Sociodemographic and clinical characteristics were collected through a self-report survey completed at baseline. Based on country of birth, participants were categorized according to regions of birth and whether they were born in a Mediterranean country. Trained research personnel measured height and weight after an 8-h fast, using international standards for anthropometric assessment [38]. Using a wall-mounted stadiometer, height was measured to the nearest 0.1 cm, with the participant barefoot. Body weight was measured to the nearest 0.1 kg using calibrated digital scales, while the participant was barefoot and had removed heavy jewelry, outer layers of clothing, and pocket contents. Body mass index was calculated as weight (kg)/[height (m)]^2 and overweight was classified as >25 kg/m^2 [39].

Table 1
Study participant baseline characteristics in the diet study groups

Characteristic	Low-fat diet (n = 31)	MedDiet (n = 34)	
	n (%), mean ± SD or median (IQR)*		*P*-value
Sex (male)	27 (87.1)	27 (79.4)	0.62
Age (y)	61.8 ± 9.5	61.8 ± 9.2	0.99
Region of birth			
Australia	18 (58.1)	20 (58.8)	1.00
Other	13 (41.9)	14 (41.2)	0.83
Europe	5 (16.1)	5 (14.7)	
United Kingdom	2 (6.5)	1 (2.9)	
Asia	4 (12.9)	7 (20.6)	
Africa	1 (3.2)	1 (2.9)	
North America	1 (3.2)		
Mediterranean country	7 (22.6)	5 (14.7)	0.76
Time since migration (y)	44.1 ± 12	45.8 ± 14.4	
Highest education level			0.63
Primary school	1 (3.2)	3 (9.1)	
Secondary school	7 (22.6)	7 (21.2)	
Trade/University	23 (74.2)	23 (69.7)	
Work status			0.72
Paid job	15 (48.4)	19 (55.9)	
No paid job	16 (51.6)	15 (44.1)	
Smoking			
>100 cigarettes in lifetime	18 (58.1)	20 (58.8)	1.00
Current	3 (9.7)	6 (18.2)	0.48
BMI (kg/m^2)	29.1 ± 5.3	30.7 ± 5	0.20
Overweight or obese (BMI ≥25 kg/m^2)	25 (80.6)	30 (88.2)	0.50
MEDAS (score out of 14)	4.8 ± 1.8	5.6 ± 2.2	0.12
Cardiac rehabilitation program	26 (83.9)	25 (73.5)	0.48
Time since completion (mo)*	0.8 (2.9)	1.6 (18)	0.06
Dietitian (individual consult)	10 (32.3)	11 (32.4)	1.00
Time since most recent (mo)	35.3 ± 35.1	25.2 ± 19.3	0.44
Acute coronary syndrome history			
AMI	22 (71)	23 (67.6)	0.72
PCI	25 (80.6)	25 (73.5)	0.70
CABG	8 (25.8)	7 (20.6)	0.84
Time since event (mo)*	4.5 (6.5)	5.1 (15.2)	0.65
Type 2 diabetes mellitus	9 (29)	10 (29.4)	1.00

AMI, acute myocardial infarction; BMI, body mass index; CABG, coronary artery bypass grafting; IQR, interquartile range; MEDAS, Mediterranean diet adherence screener; PCI, percutaneous coronary intervention; SD, standard deviation.
*Non-parametric, continuous variable presented as median (IQR).

Dietary assessment

Methods of dietary assessment have been reported in detail elsewhere [40]. Briefly, participants completed a 7-d food diary in household measures the week before the baseline and at 3-mo and at 6-mo appointments. All food diaries were entered into FoodWorks (Version 8, Xyris Software Australia Pty Ltd, Spring Hill, Queensland, Australia) for nutrient intake analyses and food group intake data [41]. Olive oil and wine are not included as individual food items in the FoodWorks database; intake of these items in grams per day was estimated from the original food diaries. The 14-point Mediterranean Diet Adherence Screener (MEDAS) questionnaire, generated and validated for the PREDIMED study [42] (Supplementary Table 2), was measured at baseline, 3 mo, and 6 mo for each participant. A higher score is reflective of better adherence to a traditional MedDiet pattern, with a score of ≥9 out of 14 considered an acceptable adherence criterion [43]. Dietitians assisted participants in completing the MEDAS during consults for the MedDiet group and calculated the score retrospectively for the low-fat diet group using 7-d food diary data to avoid contamination with the MedDiet principles. The MEDAS was also collected during the 12-mo phone review for the MedDiet group only (the only 12-mo data reported in this study). Intake of flavonoids (flavan-3-ol, flavones, flavonols, flavonones, anthocyanidins, and isoflavones) at baseline and 6 mo was estimated using the U.S. Department of Agriculture Databases for the Flavonoid Content of Selected Foods (Release 3.2, November 2015) and Isoflavone Content of Selected Foods (Release 2.0, September 2008). Participants were asked by the dietitian if they had experienced any harmful side effects or adverse events associated with the dietary intervention at their appointments.

Statistical analyses

As this study represented a preliminary analysis of a pilot trial, a power calculation was not performed [44]. Data are presented as means ± standard deviation (SD) or standard error (SEM), medians (interquartile range [IQR]), or n (%) as appropriate. All statistical analyses were conducted in SPSS statistical package version 23 (IBM, Armonk, NY, USA). Statistical significance was set at $P < 0.05$. The Kolmogorov–Smirnov test was applied to assess the normality of continuous variables. According to this, an independent Student's *t* test or non-parametric Mann–Whitney U test was used to compare continuous variables. Categorical variables were compared using the χ^2 test. McNemar's test assessed the differences in percentage adherence to each component of the MEDAS between time points within each study group.

Dietary change analyses were based on intention to treat. Missing data were imputed by bringing baseline or 3-mo observations forward, assuming no change. This was a conservative method used to analyze all participants regardless of study completion [45].

Repeated measures between-within analysis of variance (ANOVA) assessed changes in continuous variables from baseline to 3 and 6 mo. Measures that were non-parametric in at least two of three time points were transformed (based on log, square root, or inverse) to improve their distribution. The main ANOVA results assessed for effect were as follows:

- group (significant change in one study group compared with the other);
- time (significant change in pooled study groups); and
- time × group (interaction effect).

Post hoc tests were performed to determine within-group changes (paired samples *t* tests) and between-group differences (independent *t* tests). For assessment of the maintenance of MedDiet adherence at 12 mo, total MEDAS score and percentage adherence to its components were compared at baseline and 6 and 12 mo in participants who completed that intervention arm.

Results

Participants

Figure 1 demonstrates the randomization to diet study groups and completion of study visits. Of the 36 participants randomized to the low-fat diet group, 31 commenced and 29 completed the intervention. Of the 37 participants randomized to the MedDiet group, 35 commenced (of which 1 participant was later determined as ineligible and therefore excluded) and 27 completed the intervention and participated in the 12 mo phone review. Participants were lost to follow-up or dropped out for medical or family related issues. Two of the nine participant dropouts (one from each of the diet groups) were women. Compared with completers and regardless of diet allocation, the dropouts had no significant differences for sociodemographic or clinical characteristics and had similar intakes for most dietary intake variables; however, they had a significantly lower baseline median intake of fiber (19.5 [3.4] versus 24.9 [15.5] g/d; $P = 0.01$) and whole grains and cereals (1.1 [1.3)] versus 2.3 [2.7] servings/d; $P = 0.02$).

Sociodemographic, medical, and lifestyle characteristics between the diet study groups at baseline are reported in Table 1. Overall, the participants represented a middle- to older-aged adult (mean age 62 ± 9 y), mostly male group, who were from a variety of ethnic backgrounds. The majority had experienced an AMI (69%) and previously attended a cardiac rehabilitation program (78%). Comorbidities, use of medications and supplements, and activity levels have been reported elsewhere [40,46]. There were no significant differences between the study groups for any of the reported characteristics, medical history parameters, or activity levels at baseline.

Baseline adherence to the MedDiet pattern

Overall, the pooled cohort of participants had low baseline adherence to the MedDiet pattern, with a mean MEDAS score of 5.2 ± 2.1 out of 14 and with only 6.2% meeting the acceptable adherence criterion (≥9 out of 14; Supplementary Table 3). Intake of olive oil, vegetables, fruit, wine, legumes and use of sofrito (sauce made with tomato and onion, leek, or garlic, simmered with olive oil) were the score components that were adhered to the least (by ≤20% of the cohort). Adherence to other score components was ~40% of participants for fish or seafood and nuts and 50% of participants for red or processed meat, preference of white meat, commercial sweets, and use of olive oil as the main fat. The components that were well adhered to by most of the participants were low consumption of dairy (butter or cream) spreads and sugar-sweetened drinks. There were no significant differences in MedDiet adherence at baseline between men and women, current versus non-smokers, or between participants who had in the past seen a dietitian or completed cardiac rehabilitation and those who had not. Participants who were born in a Mediterranean country had a significantly higher rate of adherence than those not born in this region for intake of legumes (41.7 versus 9.4%; $P = 0.01$) and consumption of sofrito sauce (50 versus 13.2%; $P = 0.01$), but did not have a significantly different mean total score (Supplementary Table 3).

Baseline to 6-mo adherence to the MedDiet pattern

Total MEDAS scores at baseline and 3 and 6 mo in the MedDiet and low-fat diet groups are presented in Figure 2. There was no significant difference between groups at baseline. In the MedDiet group there was a significant increase in score between baseline and 3 mo (by 4.3 ± 2.8 points; $P < 0.001$), which was maintained at 6 mo (by 4.8 ± 2.7 points from baseline; $P < 0.001$; 95% confidence interval [CI], 3.9–5.6). In the low-fat diet group there was a small significant increase in score between baseline and 6 mo (by 1.2 ± 2 points; $P = 0.009$; 95% CI, 0.30–2) and between 3 and 6 mo (by 0.7 ± 1.8 points; $P = 0.01$). Overall, there was a significantly greater 6-mo increase in score in the MedDiet than in the low-fat diet group (main effect for group; $P < 0.001$). Within the MedDiet group there was a similar change in MEDAS score after 6 mo between current and non-smokers (+4.2 ± 2.9 versus +4.9 ± 2.7 points; $P = 0.56$).

The proportion of participants adhering to each individual MEDAS component at baseline and 3 and 6 mo within the two study groups is presented in Supplementary Table 4. In the MedDiet group, the proportion of participants adhering to each of the score components significantly improved ($P < 0.05$), except for sugar-sweetened beverages and wine, between baseline and 6 mo. In the low-fat diet group, the only components in the MEDAS score where adherence rates significantly improved at 6 mo compared with baseline were for intake of vegetables and reduced use of butter or cream ($P < 0.05$). No participants reported harmful side effects or adverse events directly related to the dietary interventions. Some participants (across both study groups) did, however, comment on dissatisfaction with there being no focus on weight loss.

Nutrient intake

Intake of energy, macronutrients (as percent contribution to total energy intake), and micronutrients at baseline, 3 mo, and 6 mo are presented in Table 2. There were no significant differences between the study groups at baseline; however, there were a number of significant findings for within or between groups at 3 and 6 mo. Reported here are mean changes only where a significant main effect (or trend) for group was found. The low-fat diet group tended to decrease energy intake compared with a mean increase in the MedDiet group over 6 mo. There was a significantly greater mean reduction in intake of carbohydrates in the MedDiet group than in the low-fat diet group after 6 mo, which corresponded to a significant reduction in added sugars in the MedDiet group only. The MedDiet group also significantly increased intake of total fat compared with the small mean reduction in the low-fat diet group after 6 mo. There was a significant increase in intake of both MUFA and PUFA in the MedDiet group compared with the small reduction and increase for these variables in the low-fat diet group after 6 mo. There was a significant overall increase in linoleic acid in the MedDiet group compared with the small decrease in the low-fat diet group. There was a trend for greater reduction in the MedDiet group for trans fats. Intake of vitamin E significantly increased in the MedDiet group compared with the small decrease in the low-fat diet group after 6 mo. Finally, alcohol intake decreased in the low-fat diet group compared with the MedDiet group, who tended to increase intake at 3 mo, followed by a return to baseline intake at 6 mo.

Food group intake

Intake of food groups (reported as servings/d or /wk) at baseline, 3 mo, and 6 mo are reported in Table 3. At baseline, the low-fat diet participants had a significantly higher median intake of fruit than the MedDiet group. No other differences in food group intake at baseline were observed. In the pooled study groups, there was a trend for reduction in refined grains and a significant increase in dark green vegetables after 6 mo, with no significant differences between groups for these variables. There was a significant increase in tomato intake in the MedDiet group compared with the smaller increase in the low-fat diet group after 6 mo. In the MedDiet group only, there was a significant reduction in milk and increase in yogurt intake between baseline and both 3 and 6 mo. Within the MedDiet group, there was a significant reduction in intake of both red and processed meats and increased intake of legumes at 6 mo. For intake of nuts, the MedDiet group significantly increased intake from baseline to 3 and 6 mo; however there was a significant decline from 3 to 6 mo. Intake of seafood increased significantly from baseline to 6 mo in the MedDiet group compared with no change in the low-fat diet group. In the pooled study groups, there was a significant reduction in use of saturated fats and increase in unsaturated oils or spreads. Specifically, intake of olive oil significantly increased in the MedDiet compared with the low-fat diet group. Finally, the MedDiet group had a large increase in wine intake at 3 mo that was not sustained at 6 mo compared with the low-fat diet group, which decreased intake. The MedDiet group also had a significantly higher intake of wine at baseline.

Flavonoid intake

Median intake of flavonoids at baseline and 6 mo are reported in Supplementary Table 5. Regarding significant changes, the MedDiet group increased intake of flavones ($P = 0.046$), both study groups increased intake of anthocyanidins ($P = 0.001$), and the low-fat diet group decreased intake of isoflavones after 6 mo ($P = 0.04$). There were no significant within- or between-group changes for intake of flavan-3-ols, flavonols, or flavonones.

MedDiet adherence at 12-mo follow-up in the MedDiet group

For the 27 participants who completed the MedDiet intervention, the total mean MEDAS score decreased from 10.9 ± 1.6 at 6-mo follow-up, to 9.9 ± 2.1 at 12-mo follow-up (−1 ± 1.9 points;

Table 2
Intake of energy and nutrients across intervention time points in the diet study groups

Intake variable	Baseline	3 mo	6 mo	Group	Time	Time × group
Per day		Mean ± SD			*P*-value*	
Energy (kJ)						
Low-fat	8049 ± 2195	7662 ± 2503	7531 ± 2265	0.16	0.62	0.06
MedDiet	8156 ± 1798	8697 ± 2089	8427 ± 1929			
Protein (%E)						
Low-fat	20.5 ± 3.6	21.2 ± 4.6	21.8 ± 5.8	0.29	0.54	0.007*
MedDiet	21.5 ± 4.4	19.6 ± 3.9[a]	19.4 ± 4.2[b]			
CHO (%E)						
Low-fat	43.1 ± 7.9[d]	43.1 ± 7.2[d]	42.5 ± 7.1[d]	<0.001*	0.002*	0.003*
MedDiet	37.9 ± 6.5	32.6 ± 7.4[a]	34.8 ± 7.2[bc]			
Added sugars (%E)						
Low-fat	5.7 ± 4.1[d]	6.1± 5.7[d]	5.4 ± 7.1	0.07	0.04*	0.02*
MedDiet	5.4 ± 4.4	3 ± 2.6[a]	3.4 ± 2.9[b]			
Total fat (%E)						
Low-fat	31 ± 7.7	29.8 ± 6.6[d]	30.3 ± 7.2[d]	<0.001	0.004*	<0.001*
MedDiet	34.1 ± 6.2	40.6 ± 8.7[a]	38.7 ± 7.9[bc]	*		
SFA (%E)						
Low-fat	10.1 ± 3.4	10.2 ± 3.1	10.3 ± 3.5	0.83	0.013*	0.002*
MedDiet	11.5 ± 3.2	10 ± 2.3[a]	9.5 ± 2.4[b]			
TFA (%E)						
Low-fat	0.46 ± 0.24	0.50 ± 0.21[d]	0.46 ±0.19 [d]	0.06	<0.001*	<0.001*
MedDiet	0.52 ± 0.21	0.35 ± 0.15[a]	0.32 ± 0.14[b]			
MUFA (%E)†						
Low-fat	14 ± 5	13.1 ± 4.1[d]	12.8 ± 3.8[d]	<0.001*	<0.001*	<0.001*
MedDiet	15.2 ± 3.8	21.5 ± 6.9[a]	20.7 ± 6.2[b]			
PUFA (%E)†						
Low-fat	5.9 ± 2.6	5.3 ± 1.6[d]	6.1 ± 2.9[cd]	0.001*	0.02*	<0.001*
MedDiet	6.2 ± 2.2	8.3 ± 3.7[a]	7.6 ± 2.9[b]			
LCN3FA (g)†						
Low-fat	0.558 ± 0.55	0.574 ± 0.66	0.460 ± 0.49[d]	0.14	0.71	0.40
MedDiet	0.556 ± 0.57	0.720 ± 0.86	0.728 ± 0.81			
ALA (g)†						
Low-fat	1.38 ± 0.80	1.12 ± 0.59[ad]	1.46 ± 0.77[c]	0.06	0.14	0.001*
MedDiet	1.34 ± 0.60	1.86 ± 1.35[a]	1.72 ± 0.98[b]			
Linoleic acid (g)†						
Low-fat	9.7 ± 6.4	8.2 ± 4.5[d]	9.5 ± 6.6[d]	0.001*	0.05	<0.001*
MedDiet	10.3 ± 4.7	15.6 ± 9.1[a]	13.6 ± 6.7[bc]			
Cholesterol (mg)						
Low-fat	318.3 ± 146.8	277.7 ± 94.6[a]	301.1 ± 149.7	0.99	0.02*	0.60
MedDiet	325.1 ± 118	288 ±113.3	285.3 ±104			
Alcohol (%E)†						
Low-fat	1.4 ± 3.1	1.4 ± 2.8	1.1 ± 2.4[d]	0.02*	0.53	0.58
MedDiet	3 ± 4.9	3.4 ± 4.5	3 ± 4.1			
Fiber (g)						
Low-fat	28.9 ± 11.7	27.9 ± 11.1	27.6 ± 8.9	0.90	0.15	0.005*
MedDiet	24.8 ± 10.6	29.2 ± 10.9[a]	29.6 ±11.3[b]			
Sodium (mg)†						
Low-fat	2182 ± 797	2212 ± 867	2101 ± 782	0.94	0.007*	0.04*
MedDiet	2424 ± 839	2028 ± 690[a]	1970 ± 584[b]			
Potassium (mg)†						
Low-fat	3103 ± 894	3136 ± 946	3097 ± 859	0.21	0.22	0.34
MedDiet	3224 ± 999	3466 ± 898[a]	3367 ± 910			
Magnesium (mg)†						
Low-fat	356.7 ± 128	338.4 ± 118.3[d]	335.5 ± 112.3	0.13	0.17	0.001*
MedDiet	346.7 ±103.4	401.1 ± 107.8[a]	376.1 ± 94.1[b]			
Iron (mg)†						
Low-fat	11.9 ± 4	11.8 ± 4	11.3 ± 3.5	0.64	0.57	0.68
MedDiet	11.8 ± 3.3	12.1 ± 3.3	11.8 ± 3.2			
Calcium (mg)						
Low-fat	795.7 ± 361.3	768.9 ± 353	799.3 ± 326.7	0.43	0.97	0.74
MedDiet	827.2 ± 258	844.7 ± 239	829.4 ± 226			
Zinc (mg)						
Low-fat	11.5 ± 4.5	10.7 ± 2.9	10.8 ± 2.9	0.57	0.04*	0.70
MedDiet	11.4 ± 3.4	10.4 ± 2.1	10.1 ± 2.4			
Vitamin A (μg)†						
Low-fat	819.2 ± 401.2	928.4 ± 579.1	894.8 ± 396.4	0.41	0.57	0.85
MedDiet	942.5 ± 724.1	990.9 ± 535.7	973.3 ± 529.8			
β-carotene (μg)†						
Low-fat	3623 ± 2260	4432 ± 3339	4149 ± 2203	0.59	0.03*	0.55
MedDiet	4059 ± 4359	4904 ± 3291[a]	4760 ± 3154[b]			

(*continued*)

Table 2 (*Continued*)

Intake variable	Baseline	3 mo	6 mo	Group	Time	Time × group
Per day		Mean ± SD			*P*-value*	
Vitamin C (mg)†						
Low-fat	137.4 ± 87.9	128.2 ± 72.7	111.2 ± 70.2	0.55	0.32	0.17
MedDiet	106.7 ± 61.2	121.9 ± 69	116.1 ± 78.2			
Vitamin E (mg)†						
Low-fat	12.3 ± 7.3	10.9 ± 6.1[d]	11.1 ± 5.8[d]	<0.001	<0.001	<0.001
MedDiet	12.0 ± 4.8	21.1 ± 9[a]	19.3 ± 6.8[b]	*	*	*
Folate (μg)†						
Low-fat	657.9 ± 183.5	625.7 ± 196.6	640.6 ± 212.6	0.27	0.43	0.93
MedDiet	628 ± 270.9	594.8 ± 231.2	594.5 ± 218.6			
Vitamin B_{12} (μg)†						
Low-fat	4.26 ± 2.18[d]	4.09 ± 1.59	4.29 ± 1.69	0.18	0.07	0.03*
MedDiet	5.71 ± 3.91	4.24 ± 1.31[a]	4.34 ± 2[b]			

%E, percentage contribution to total energy intake; ALA, α-linolenic acid; CHO, carbohydrate; LCN3FA, long-chain ω-3 fatty acids; MedDiet, Mediterranean diet; MUFA, monounsaturated fatty acid; PUFA, polyunsaturated fatty acid; SD, standard deviation; SFA, saturated fatty acid; TFA, trans-fatty acid.
All variables represent N = 64 because 1 participant who dropped out had no usable dietary intake data at baseline.
*Significant ($P < 0.05$) for main effect of group, time, or time × group interaction. Superscript letters represent differences between baseline and [a]3 mo; [b]6 mo; [c]3 and 6 mo; and [d]between study groups for that time point.
†Non-parametric, analyses based on transformed variable.

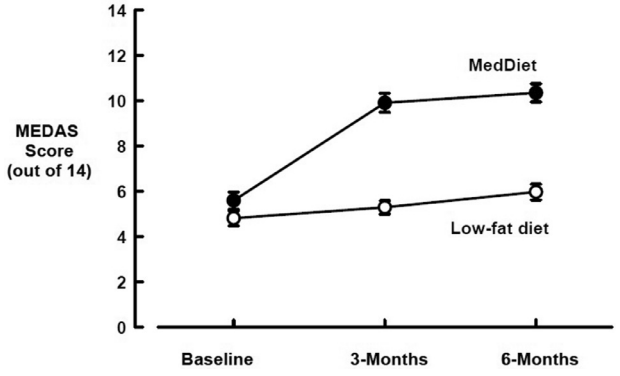

Fig. 2. Mediterranean diet (MedDiet) adherence across intervention time points by study group. Mean Mediterranean Diet Adherence Screener (MEDAS) score in the low-fat diet (n = 31) and MedDiet (n = 34) groups. Data are mean ± SEM.

$P = 0.01$; 95% CI, −1.8 to −0.25). However, the adherence level remained high with 78% of those participants achieving a high adherence score of ≥9 out of 14 at 12 mo, compared with 11.1% at baseline and 92.6% at 6 mo. The MedDiet completers who were current smokers (n = 5) had an improved mean MEDAS score from 6 to 12 mo (+0.6 ± 1.5). Continued adherence to each of the MEDAS components are presented in Figure 3. There was a significant reduction in adherence between 6 and 12 mo for legumes only ($P = 0.02$). The proportion of participants adhering to each of more fruit, lower sugary drinks, and use of sofrito sauce was maintained or increased, whereas as all other components slightly decreased (between 3.7 and 18.5% of participants). Compared with baseline, all MEDAS components were better adhered to at 12 mo. At 12 mo, these participants were asked whether they had continued to follow the MedDiet in the previous 6 mo; all participants responded with "yes" (41%) or "somewhat" (59%).

Discussion

The present pilot study found that an Australian cohort of patients with CHD achieved high adherence to the MedDiet after a 6-mo dietitian-led intervention. Furthermore, these patients sustained high adherence to the MedDiet at the 12-mo follow-up, an additional 6 mo after the intervention had ceased. We also demonstrated that this ad libitum MedDiet intervention achieved significant improvements in diet quality compared with a low-fat diet.

In the present cohort, at study commencement, adherence to the MedDiet was low, with a mean MEDAS score of 5.2 of 14, and only 6% of the participants were classified as high adherers. In comparison, it has been demonstrated in a Spanish cohort with CHD (N = 110; 80% men) that the mean MEDAS score was 8.9 out of 14 and 60% of the participants had high adherence to the diet [43]. In the AUSMED cohort, there was no significant difference in mean MEDAS score between participants born in a Mediterranean country and those born elsewhere. However, participants of Mediterranean background were significantly more likely to adhere to the components for intake of legumes and sofrito sauce (a recipe of Spanish origin) and they tended to consume more olive oil. These traditional MedDiet components differ from the typical Australian diet and are not necessarily included in Australia's nutrition recommendations for management of CHD [9]. The baseline results, therefore, suggest that Australians have a large scope for improvement in adherence to a MedDiet, but this requires cross-cultural translation of its dietary principles and cuisine. Importantly, we had equal numbers of participants born in the Mediterranean region in each of the diet study groups.

The longitudinal data demonstrated that intervention with an ad libitum MedDiet significantly improved adherence score after 3 mo, which was sustained at 6 mo (mean MEDAS score increased by 5 points up to 11 out of 14). In comparison, the Spanish participants in the PREDIMED trial increased their mean MEDAS score by only 2 points to achieve 11 out of 14 after 1 y of MedDiet intervention [18]. In non-Mediterranean cultures, a more significant improvement in adherence to the diet could result in a greater magnitude of clinical benefit over time. We also found that high adherence to the diet could be maintained 6 mo after the intervention had ceased. However, between 6 and 12 mo, there was a small decline in MEDAS score and adherence to the component for legumes was significantly reduced. This suggests that longer-term continuation of dietary counseling and other strategies, such as easily accessible foods, meals, and recipes that align with MedDiet principles, would be beneficial for maintenance of the MedDiet pattern.

The MedDiet group increased intake of olive oil, fruit, tomatoes, yogurt, and plant-based protein and decreased animal-based protein (nuts and legumes increased, and red and processed meat decreased). These food group changes resulted in a significant reduction in cholesterol, added sugars, saturated and trans fats, and increased intake of unsaturated fats, fiber, sodium, vitamin E,

Table 3
Intake of food groups across intervention time points in the diet study groups

Intake variable	Baseline	3 mo	6 mo	Group	Time	Time × group
Servings/d[†]		Mean ± SD			*P*-value[*]	
Refined grains						
Low-fat	3.6 ± 3.1	3 ± 2.4	3.1 ± 2.3	0.76	0.06	0.99
MedDiet	3.4 ± 1.8	2.9 ± 1.5	3 ± 2			
Whole grains[†]						
Low-fat	2.8 ± 2.5	2.7 ± 2.3	2.6 ± 1.8	0.34	0.83	0.50
MedDiet	1.9 ± 1.2	2.1 ± 1.5	2.2 ± 1.5			
Fruit[†]						
Low-fat	2.0 ± 1.3[d]	1.8 ± 1.1	1.7 ± 1.1	0.06	0.77	0.02[*]
MedDiet	1.1 ± 1	1.4 ± 0.9[a]	1.5 ± 1.1[b]			
Vegetable total[†,‡]						
Low-fat	3.3 ± 1.2	3.5 ± 1.7	3.6 ± 1.9	0.08	0.54	0.77
MedDiet	4 ± 2.2	4.3 ± 1.9	4.2 ± 2.1			
Vegetable, dark green[†]						
Low-fat	0.21 ± 0.22	0.26 ± 0.24	0.30 ± 0.35	0.12	0.048[*]	0.33
MedDiet	0.26 ± 0.29	0.44 ± 0.46[a]	0.31 ± 0.25			
Vegetable, tomato[†]						
Low-fat	0.32 ± 0.25	0.36 ± 0.43[d]	0.37 ± 0.32[d]	0.006[*]	0.08	0.27
MedDiet	0.47 ± 0.49	0.62 ± 0.1	0.63 ± 0.40[b]			
Dairy total[†]						
Low-fat	1.4 ± 0.9	1.4 ± 1	1.5 ± 1	0.62	0.68	0.08
MedDiet	1.6 ± 0.8	1.4 ± 0.7	1.4 ± 0.7			
Milk[†]						
Low-fat	0.82 ± 0.69	0.84 ± 0.77	0.87 ± 0.81	0.90	0.01[*]	0.005[*]
MedDiet	1.00 ± 0.77	0.70 ± 0.59[a]	0.76 ± 0.62[b]			
Cheese (wk)[†]						
Low-fat	3 ± 4	2.6 ± 3.1	2.9 ± 2.9	0.51	0.52	0.62
MedDiet	2.9 ± 2.2	2.7 ± 2.5	2.6 ± 2.2			
Yogurt (wk)[†]						
Low-fat	0.8 ± 1.4	1.6 ± 2.2	1.4 ± 1.9[d]	0.048[*]	<0.001[*]	0.41
MedDiet	1.2 ± 1.7	2.3 ± 2.1[a]	2.2 ± 2.1[b]			
Red meat (wk)[†]						
Low-fat	4.8 ± 4.8	4.3 ± 2.6	4.3 ± 3.6	0.50	0.12	0.14
MedDiet	5.2 ± 5.6	2.9 ± 2.1[a]	2.6 ± 1.8[b]			
Nuts (wk)[†]						
Low-fat	4.4 ± 6.1	3.4 ± 4[d]	3.6 ± 5.9[d]	0.13	0.003[*]	<0.001[*]
MedDiet	2.8 ± 4	7.4 ± 7.2[a]	5.2 ± 4.9[bc]			
Legumes (wk)[†]						
Low-fat	1.8 ± 5.5	2.2 ± 5.7	1.3 ± 2.3[d]	0.17	0.002[*]	0.01[*]
MedDiet	0.8 ± 1.3	2.4 ± 3[a]	2.6 ± 2.9[b]			
Processed meat (wk)[†]						
Low-fat	1.3 ± 1.6	1.9 ± 2.3	1.5 ± 1.4[cd]	0.34	0.03[*]	<0.001[*]
MedDiet	1.8 ± 1.3	0.8 ± 1.1[a]	0.6 ± 0.8[bc]			
Seafood[†]						
Low-fat	3.1 ± 2.9	3.1 ± 3.3[d]	3.1 ± 2.3[d]	0.001[*]	0.11	0.54
MedDiet	4.7 ± 4.4	6.1 ± 4.4	6.2 ± 4.8[b]			
Saturated oils (tsp)[†]						
Low-fat	7 ± 4.6	7 ± 4	6.5 ± 3.4	0.63	<0.001[*]	<0.001[*]
MedDiet	8.1 ± 3.4	5.2 ± 2.4[a]	4.9 ± 2.3[b]			
Unsaturated oils (tsp)[†]						
Low-fat	7.6 ± 4.8	6.3 ± 3.7[d]	6.9 ± 4.5[d]	<0.001[*]	0.001[*]	<0.001[*]
MedDiet	7.9 ± 3.5	15.6 ± 8.1[a]	14.3 ± 6.7[b]			
Olive oil (tsp)[†]						
Low-fat	0.6 ± 1.1	0.6 ± 1.1[d]	0.5 ± 0.8[d]	<0.001[*]	<0.001[*]	<0.001[*]
MedDiet	1.4 ± 1.9	7.2 ± 5.6[a]	7.1 ± 5.1[b]			
Wine (100 mL/wk)[†]						
Low-fat	1.3 ± 3.9[d]	1.3 ± 3.8[d]	0.8 ± 2.5[d]	0.006	0.25	0.35
MedDiet	3.4 ± 6.9	5.2 ± 7.6[a]	3.6 ± 6[c]			

MedDiet, Mediterranean diet; SD, standard deviation.
All food group variables represent N = 64 as 1 participant who dropped out had no usable dietary intake data at baseline.
[*]Non-parametric, analyses based on transformed variable. Significant ($P < 0.05$) for main effect of group, time or time x group interaction. Superscript letters represent differences between baseline and [a]3 mo; [b]6 mo; [c]3 and 6 mo; and [d]between study groups for that time point.
[†]Food groups are reported as servings/d unless specified as per week.
[‡]Vegetables do not include legumes.

β-carotene, magnesium, flavones, and anthocyanidins. In comparison, the low-fat diet group achieved few significant changes in dietary intake. The low-fat diet group did not significantly reduce its intake of total or saturated fats, which suggests that recommendations for reduced fat intake are difficult to achieve. Nonetheless, most of the participants had received low-fat diet advice previously as part of the dietary education received after a cardiac event, and many participants possibly had already reduced their fat intake, specifically saturated fats, before the study intervention. MedDiet participants also had greater improvement in intake of foods that

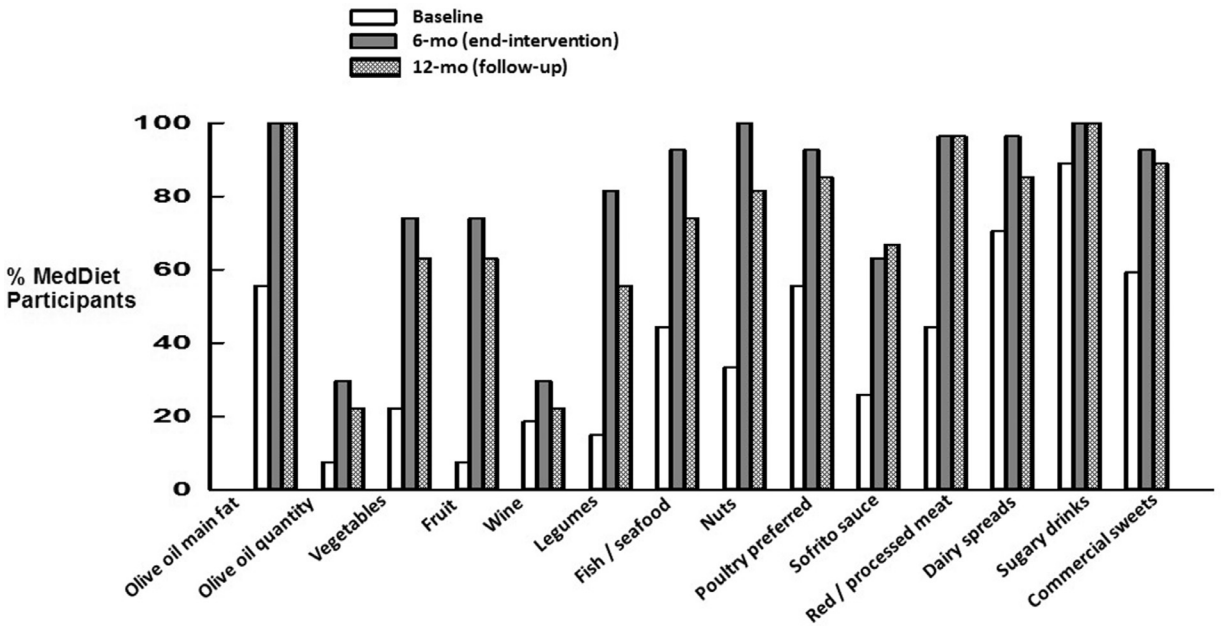

Fig. 3. Maintainence of adherence to MedDiet. The proportion of participants who completed the MedDiet intervention (N = 27) adhering to each of the Mediterranean Diet Adherence Screener score components at baseline, after 6-mo intervention, and at 12-mo follow-up.

were promoted in both the MedDiet and low-fat diets, such as inclusion of fruits and whole grains and reducing processed meats. The greater improvements in diet quality of the participants in the MedDiet group may be facilitated by its high level of palatability, which in part is related to its high fat content [18,47]. The MedDiet also placed greater emphasis on advising participants about what they can include in their diets rather than the restriction of isolated nutrients or unhealthy foods.

The high magnitude of improvement in dietary adherence to the MedDiet pattern in this AUSMED cohort is an important finding in the multiethnic Australian setting. With close to half the participants being born overseas, cross-cultural translation of the dietary principles was achieved. Other small-scale studies have demonstrated that a MedDiet intervention can be adhered to in Australia. Recently, the MedLey study [48], a MedDiet intervention trial conducted in elderly Australian adults without CVD, demonstrated significantly improved adherence to the MedDiet pattern after 4 mo. Assessed by a validated scoring tool [49], mean improvement was 4.2 to 6.2 out of 10 in the MedDiet arm (n = 70) [22]. It was also previously demonstrated that Australian-born patients with type 2 diabetes mellitus (n = 27) had very good compliance to 12-wk traditional Cretan MedDiet intervention; key dietary changes were increased intake of olive oil and plant-based foods (especially whole grain bread, tomatoes, leafy greens, and legumes) [34]. In this latter study, the majority of foods (70%) of the intervention diet were provided, which significantly aided compliance. In the present study, participants in the MedDiet group received complimentary EVOO and nuts for the duration of the 6-mo intervention. This would have facilitated compliance to these key aspects of the diet and increased intake of associated nutrients such as vitamin E, magnesium, and fiber; flavones; and anthocyanidins. The 12-mo follow-up data demonstrated, however, that participants generally sustained their intake of these key foods after the provision of these foods had ceased. In addition, the MedDiet participants did not report any harmful side effects or adverse events associated with these significant dietary changes.

Evidence supports that the MedDiet is more effective than a low-fat diet for improving cardiovascular risk factors and events [12,15,50]. The MedDiet is currently not being wholly implemented for prevention of CHD in Australia, which in part is due to a lack of intervention trials to demonstrate these benefits in our own population [21]. The present findings indicate that patients would be able to improve their diet quality if the MedDiet pattern was better integrated into nutrition recommendations. Key differences in food group recommendations compared with current diet recommendations [9,14] would include promotion of EVOO, nuts (including high ω-3 sources such as walnuts), plant-based protein sources (especially legumes), fermented dairy sources, specific vegetables (leafy greens, tomatoes, and onion), herbs and spices, and wine with meals.

Importantly, the significant improvement in adherence to MedDiet principles in the current study was achieved through interventions delivered by a dietitian and involved counseling techniques, provision of detailed dietary resources, and methods for translating principles to other cultural cuisines. Other studies that demonstrated high adherence to ad libitum MedDiet interventions have reported using similar techniques in both Australian [22,51] and Mediterranean [18] settings. Successful implementation of the MedDiet in patients with CHD would require greater use of dietitians long-term to provide the individualized advice required to achieve and sustain high adherence to this style of diet [52]. The present study did not capture data specifically on barriers and enablers to the dietary interventions for the participants involved. This information is, however, being captured in another RCT investigating these same diet protocols in patients with fatty liver disease [53].

There were a number of strengths regarding how the present study was conducted. The MedDiet intervention was based on traditional principles of the diet, with a focus on cuisine and food combinations. This differed to the other small-scale secondary prevention trials conducted outside the Mediterranean region [54–56]. The control diet was based on current nutritional recommendations but with matched counseling intensity to the MedDiet group. Our participants' nutrient and food intake data were collected via 7-d food diaries and data was verified with the participant by a dietitian, which allowed for in-depth analyses. Intention-to-treat analyses based on a conservative method for data imputation were performed, which meant that

dropouts were taken into account; nonetheless, this method may have underestimated continued dietary changes for the dropouts.

It is also important to consider some limitations of this pilot study and associated future recommendations. We had a small sample size and the cohort is representative of patients with CHD, of which the majority were men and had previously engaged in lifestyle counseling. The present results were potentially affected by inadequate statistical power and are not necessarily applicable to healthy individuals, other disease populations, or women. Furthermore, as the study appointments were conducted at a university, some potential participants did not enroll in the trial owing to travel inconvenience. It is recommended that the broader AUSMED trial target recruitment to include a greater proportion of women and patients who have not engaged in cardiac rehabilitation and that the appointments be conducted at the recruiting clinical sites. In addition, we have learned that it is important not to advertise the trial to potential participants as an investigation of the MedDiet, but rather as a broader dietary intervention trial. This will reduce any expectancy bias or resentful demoralization based on group allocation. It is also important that potential patients are made clearly aware of the focus on diet quality and not on weight loss. No objective biomarkers of dietary intake were measured; hence the self-reported improvements in dietary intake cannot be confirmed. Blood and urine samples have been collected for measurement of relevant dietary biomarkers, such carotenoids, polyphenols, and fatty acids, in future AUSMED analyses. Our assessment for flavonoid intake was estimated using databases from the United States, which may not accurately reflect Australian food composition.

Conclusion

This study confirmed that an ad libitum MedDiet could be successfully adhered to in a multiethnic Australian cohort of patients with CHD, in contrast to generally poor adherence to a low-fat diet. The MedDiet pattern led to greater improvement in diet quality, as demonstrated by positive changes in food groups, macro- and micronutrient intakes, and overall MEDAS score. Improvement in adherence to the MedDiet was achieved through dietitian-led intervention and cross-cultural translation of dietary principles. The majority of participants sustained a high MedDiet adherence score 6 mo after cessation of the intervention; however, there was a small decline in mean MEDAS score and reduced intake of legumes. Future research is needed to confirm whether improved adherence to the MedDiet pattern in patients with CHD leads to reduced risk for cardiometabolic risk markers and secondary cardiac events.

Acknowledgments

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Supplementary materials

Supplementary material associated with this article can be found in the online version at doi:10.1016/j.nut.2018.10.027.

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