A pilot study of a Mediterranean-type diet intervention in female patients with rheumatoid arthritis living in areas of social deprivation in Glasgow


Background: A Mediterranean-type diet rich in fish, fruit and vegetables and low in saturated fats has been associated with health benefits, including improved cardiovascular profile and benefit in RA.

Objective: To overcome obstacles to healthy eating by a community-based intervention promoting a Mediterranean-type diet in patients with RA living in socially deprived areas of Glasgow.

Methods: 130 female patients with RA aged 30–70 years (median 55), disease duration 8 years were recruited from three hospital sites. The intervention group (n = 75) attended weekly 2-hour sessions for 6 weeks in the local community, including hands-on cooking classes backed up with written information. The control group (n = 55) were given dietary written information only. Both groups completed food frequency questionnaires (FFQs), and clinical and laboratory measures were assessed at baseline, 3 and 6 months.

Results: Significant benefit was shown in the intervention group compared with controls for patient global assessment at 6 months (p = 0.002), pain score at 3 and 6 months (p = 0.011 and 0.049), early morning stiffness at 6 months (p = 0.041) and Health Assessment Questionnaire score at 3 months (p = 0.03). Analysis of the FFQs showed significant increases in weekly total fruit, vegetable and legume consumption and improvement in the ratio of monounsaturated:saturated fat intake and systolic BP in the intervention group only. The cooking classes were positively received by patients and tutors; cost/patient for the 6 week course was £84 (€124).

Conclusions: Results demonstrate that a 6 week intervention can improve consumption of healthier foods. If implemented more widely it may prove a popular, inexpensive and useful adjunct to other RA treatment.
In this study we wished to explore the feasibility of introducing a Mediterranean-type diet to our female patients with RA living in areas of social deprivation and to assess change, if any, in lifestyle, disease activity and cardiovascular risk.

METHODS

One hundred and thirty female patients with RA aged 30–70 years were recruited over 9 months from three hospital sites—we aimed at recruiting residents from within any of the Social Inclusion Partnership areas in Glasgow, which are areas of social deprivation.

**Intervention group**

Patients in the intervention group (n = 75) attended a 6 week cookery course (with emphasis on a Mediterranean-type diet) organised by Greater Glasgow Health Board’s Health Promotion Department (GGHBHPD) and delivered by nutritionists and teaching staff from local colleges. Occupational therapy staff advised about provision of aids for food preparation. The patients attended a weekly 2 hour cookery class, with a maximum of 10 participants in each session. Participants received a folder with written information on a Mediterranean-type diet, healthy eating and recipes which promoted the increased consumption of fruits, vegetables and legumes, along with the substitution of saturated fat with monounsaturated fat in the form of olive oil or spreads containing olive oil. In addition to “hands-on” food preparation, cooking and tasting, the participants received information about food hygiene, nutrition and local accessibility of affordable ingredients.

**Control group**

Control patients (n = 55) received readily available written information on healthy eating only.

**Allocation**

We originally intended to allocate patients randomly to intervention and control groups. However, a limiting factor proved to be the availability of a cookery course in a venue close to the patient’s home at a time suitable to them. A more pragmatic approach was necessary, resulting in those able to attend on certain dates being allocated to the intervention group and those unavailable on dates of programmed courses becoming the control group.

**Patient assessment**

Patients in both groups were assessed at baseline, 3 and 6 months.

**Clinical features**

Tender and swollen joint count, patient global pain score, duration of early morning stiffness (EMS), DAS28, HAQ score, erythrocyte sedimentation rate, C reactive protein, and interleukin 6 (IL6) were measured. IL6 is a proinflammatory cytokine and acts as a mediator in the acute phase response (higher levels of IL6 are present in more active disease).

**Cardiovascular risk**

Assessment included documentation of smoking habits, systolic and diastolic blood pressure, total and high-density lipoprotein cholesterol, glutathione and body mass index. Glutathione has important roles in preventing oxidative stress, metabolising nutrients and regulating cellular events. A deficiency of glutathione contributes to oxidative stress and can be implicated in the pathogenesis of heart disease.

**Dietary assessment**

Dietary data were collected using a previously validated food frequency questionnaire (FFQ), which was completed by participants at the clinical assessment visits. The Mediterranean diet is rich in fruits, vegetables and legumes, which are good sources of the antioxidant vitamins A, C and E. If the intervention were successful in promoting dietary change, we would expect to see increases in intake of these food groups as well as the associated nutrients. A composite score of the weekly total number of servings of the three food groups was calculated. Additional questions about fruit intake were included in the FFQ as the DietQ FFQ collects only limited data on fruit consumption. These questions were analysed separately using the diet 5 computer package, and the nutrient data added to the data estimated by DietQ to calculate the daily intake of vitamins A, C and E.

**Deprivation**

The Carstairs grouping for each patient was noted (derived from postcode, based on male employment, overcrowding, car ownership and social class).

**Statistical analysis**

A Wilcoxon matched-pairs signed-ranks test was used for within-group analyses and a Mann–Whitney U test for comparison between intervention and control groups.

**Ethics**

Local ethics committee approval was given before starting this study.
RESULTS
Table 1 shows that age, disease duration and body mass index were similar in both intervention and control groups.

As expected by the design of the study, the patients in the intervention group were more likely to be in the most deprived social classes 6 and 7, living in a Social Inclusion Partnership area (fig 1). Baseline cardiovascular risk based on blood pressure, age and smoking status was calculated for all patients using readily available and validated graphs; none of the recruited patients had diabetes mellitus. Sixty per cent had a calculated cardiovascular disease risk of 10–20% and 10% a risk of 10% over the next 10 years; 30% a risk of 10–20% and 10% a >20% risk.

Consumption of fruit, vegetables and legumes was below the recommended minimum of five portions a day, in both groups at baseline. By 3 months this had improved significantly in the intervention group who were attending cooking classes (table 2).

At the same time, this group also had a significant improvement in the ratio of monounsaturated:saturated fats consumed. Alcohol consumption was low in both groups with a mean consumption of 1.5 units/week in the intervention group and 1.9 units/week in the control group. We reviewed disease modifying antirheumatic drug (DMARD) treatment, examining any escalation of dose or addition of extra DMARD over the study period. Within the 6 months, 21.3% of the intervention group and 23.6% of the control group had such a change in their treatment.

Clinical assessments showed a significant benefit in the intervention group compared with the control group for patient global assessment at 6 months (p = 0.002), pain score at 3 and 6 months (p = 0.011 and 0.049), EMS at 6 months (p = 0.041) and HAQ at 3 months (p = 0.03)—Mann–Whitney calculations (table 3).

Evaluation of cardiovascular risk factors showed a significant drop in systolic blood pressure by an average of 4 mm Hg in the intervention group (p = 0.016), while the control group showed no change. No significant change in cholesterol or glutathione levels was found with this intervention (table 4).

The cost per patient for the 6 week cookery course was £84 (€124) (met by the GGHBHPD).

DISCUSSION
In this study we sought to assess whether we could modify dietary lifestyle, disease activity and cardiovascular risk in female patients with RA living in areas of social deprivation by introducing them to a Mediterranean-type diet. Cookery classes to provide “hands-on” experience of a Mediterranean-type diet were an essential element in increasing knowledge and confidence in the participants.

This study shows that this intervention was achievable and well received by patients. Intake of fruit, vegetables and legumes increased significantly over 3 months in the intervention group and the use of monounsaturated compared with saturated fats improved. The majority of the participants felt that the recipes were straightforward to make and affordable. Only three stated they were unable to purchase the necessary ingredients, either because they were too costly or were unavailable in their local shops. There were also wider social benefits in that most felt they had learnt new skills in food use and preparation. Some women also noted an improvement in confidence and self-esteem as they were now able to contribute more to cooking for themselves and their families at home.

We failed to see a significant improvement in the intake of the antioxidant vitamins A, C and E. Possibly, the FFQ was not sufficiently sensitive to detect changes in the actual nutrient intake. The FFQ was originally developed to assess the intake of total energy and macronutrients—protein, fat and carbohydrate—at a time when antioxidants were not the focus of interest. The number of fruits and vegetables represented in the FFQ is relatively limited and it is possible that participants increased their intake with items not listed on the FFQ. A more accurate assessment of nutrient intake might have been possible with a more comprehensive dietary assessment tool.
achieved by using 7-day weighed or estimated food diaries. However, this method places a heavy burden on the participant, which we did not think was appropriate given the age and health of our subjects. In addition, they are costly and time-consuming to analyse: we did not have the funds to employ the specialist skills required to code and analyse food diaries.

We, like previous investigators, have shown a modest improvement in a number of measures of disease activity. Pain score was significantly better in the Mediterranean diet group than in the controls at 3 and 6 months. Patient global assessment and reported EMS were significantly better at 6 months. Patient function, as assessed by the HAQ score, was also better in the intervention group at 3 months. Overall the DAS28 score remained unchanged in both groups, but despite this, patients in the intervention group clearly felt better. The reasons for this are likely to be multifactorial and may, in part, reflect increased confidence and self-esteem as well as dietary intervention. As it is impossible to conduct this type of study in a double-blind fashion, we cannot entirely exclude the possibility of a placebo response, but this seems less likely as the same trend was seen over a number of measurements and was sustained.

Patients with RA are at increased risk of cardiovascular events13–15 and we also aimed to assess if we could modify this tendency in our patients. The intervention group lost weight (median 0.9 kg over the 6 month period), whereas the control group showed a weight gain (median 3 kg). However, this difference was not statistically significant. Cholesterol levels (at baseline and 6 months) did not differ between the two groups. We noted a small (mean 4 mm Hg) but significant reduction in systolic blood pressure in the intervention group. This was not attributable to the prescription of, or changes to, anti-hypertensive treatment. However, the magnitude of the change noted is perhaps what we might achieve with the introduction of a mild anti-hypertensive agent in routine practice. The benefit to patients is that this was achieved without an addition to their drugs.

This study has shown that female patients with RA following a Mediterranean-type diet derive modest benefits across a range of areas, suggesting that this type of intervention may be a useful therapeutic adjunct to conventional DMARDs, feasible in routine clinical practice and popular with patients.

The initial objectives when designing this study were to assess if lifestyle, disease activity or cardiovascular risk might be altered by this type of intervention. The results show that this is indeed achievable at low cost and is acceptable to patients with RA.

To act on and implement these findings we have approached local and national (Scottish) public health authorities to inform them of the results and discuss the potential impact of assessment in a larger population.

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Authors’ affiliations

G McKellar, R Hampson, A Tierney, H A Capell, Centre for Rheumatic Diseases, Glasgow Royal Infirmary, Glasgow, UK

E Morrison, Rheumatology Department, Southern General Hospital, Glasgow, UK

A McEntegart, G Mackle, Rheumatology Department, Stobhill Hospital, Glasgow, UK

J Scoular, Health Promotion Department, Greater Glasgow & Clyde Health Board, Glasgow, UK

J A Scott, Human Nutrition Department, University of Glasgow, Glasgow, UK

References


Table 4 Cardiovascular risk factors at baseline, 3 and 6 months

<table>
<thead>
<tr>
<th>Risk factors</th>
<th>Intervention [n = 75]</th>
<th>Control [n = 55]</th>
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<tbody>
<tr>
<td></td>
<td>0</td>
<td>3 Months</td>
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<tr>
<td>Ever smoker (%)</td>
<td>64</td>
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<tr>
<td>Systolic BP (mm Hg)</td>
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<td>130</td>
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<tr>
<td>Diastolic BP (mm Hg)</td>
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<td>Total cholesterol (mmol/l)</td>
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<td>HDL (mmol/l)</td>
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<td>TC:HD ratio</td>
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<tr>
<td>Glutathione (nmol/ml)</td>
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<td>Weight (kg)</td>
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<td>BMI (kg/m²)</td>
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<td>25</td>
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BP, blood pressure; TC, total cholesterol; HDL, high-density lipoprotein; BMI, body mass index; NS, not significant.
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