Osteoarthritis: Is more attention to nutritional health required?

Amanda Foley, Jennifer Keogh, Michelle Miller, Julie Halbert and Maria Crotty

Objective: To describe the nutritional health of a sample of older adults with osteoarthritis, and to determine whether the sample had received or were interested in formal nutrition advice.

Design: Descriptive cross-sectional study. Participants completed the Australian Nutrition Screening Initiative (ANSI) tool. Body weight and knee height were measured and a questionnaire, consisting of three questions on procurement of food, interest in and access to nutrition resources, was completed.

Subjects: One hundred and five participants aged 50 years and above with osteoarthritis who were assessed as suitable to commence an exercise program within the Repatriation General Hospital, Adelaide, South Australia.

Setting: Participants were recruited from outpatient clinics, surgical waiting lists and from the community.

Main outcome measures: Body mass index (BMI), nutritional risk assessed with ANSI tool, previous nutrition counselling, interest in nutrition advice.

Statistical analysis: Descriptive statistics were used to summarise the data.

Results: The mean BMI of the sample was 30.9 ± 5.2 kg/m². Of the total sample, 55 (52.9%) of the participants were defined as obese. Using the ANSI checklist, 45 (42.9%) subjects were assessed as being at high nutritional risk. Only eight (7.6%) subjects had received formal nutrition advice regarding their osteoarthritis, while 83 (79%) expressed an interest in receiving such advice.

Conclusion: Patients with osteoarthritis may be at risk of poor nutritional health despite being overweight or obese. There is presently no specialised dietetic service for this patient group in our setting and medical referral patterns to dietetics do not reflect the dietetic needs of this group of patients.

Key words: nutrition, osteoarthritis, obesity, body mass index
obesity contributed to the development of osteoarthritis. Recent prospective longitudinal studies have demonstrated that being overweight or obese precedes the development of osteoarthritis of the knee (10,11) and in one of these studies, the risk was 18 times higher in persons with a higher BMI versus those with a lower BMI (10).

Since osteoarthritis primarily affects adults over the age of 50 years and there is evidence that increased body weight can cause and accelerate the development of the disease, the prevalence of osteoarthritis is likely to increase in the overweight, aging Australian population.

Weight loss is indicated for prevention and management of osteoarthritis, and is recommended prior to joint replacement surgery (12). Weight loss of five to ten percent can decrease the risk of developing osteoarthritis and can decrease symptoms and disease progression among patients already diagnosed (12–14).

A small number of studies have investigated nutritional intervention in combination with other types of interventions to reduce body weight and body fat in patients with osteoarthritis. All of these studies have demonstrated positive outcomes (15–19) (see Table 1). A reduction in body weight or body fat produces significant benefits in the symptoms of pain and in physical function for overweight and obese older adults with osteoarthritis of the knee. However, conclusive evidence regarding the amount of weight loss required for clinical benefit and the best method to achieve this is presently unknown (15).

Currently, there is no specific dietetic service for arthritis patients within our hospital. In the rheumatology clinics the rheumatologists may refer the patients to a dietitian or inform their patient’s general practitioner by letter that the patient would benefit from counselling with a dietitian. However, there is no formal team approach that involves dietetics as a part of the early management of patients with osteoarthritis as funding is not available for a specialised dietetic service.

As excess body weight predisposes to the development of osteoarthritis of the knee, and there is increasing evidence that weight loss reduces the symptoms, this study was conducted to determine the nutritional health of a sample of patients with osteoarthritis, whether or not these patients had received nutritional information as a part of their treatment for this condition and whether they considered the information to be a beneficial part of their management.

Methods

Participants

Data were collected from 105 older adults assessed as suitable to commence an exercise program within the Repatriation General Hospital, South Australia. Participants were recruited from outpatient clinics within the hospital, orthopaedic surgery waiting lists at the hospital and at the Flinders Medical Centre and from the community via advertising in publications directed at the general community, veterans, older adults and arthritis sufferers. The participants met the following criteria: radiological diagnosis of osteoarthritis of the hip and/or knee, disease onset after age 18, ability to independently read, write and speak English, provide written consent to participate in the exercise program and aged 50 years or older. Participants were excluded: if they could not obtain transport to and from the hospital three times per week; if they were already currently exercising; if they had a joint replacement in the past 12 months; or if they had a pre-existing medical condition that prevented safe participation in an exercise program. The Repatriation General Hospital Research and Ethics Committee approved the study protocol.

Setting

The study was conducted at the Repatriation General Hospital, a 250-bed, acute, teaching hospital affiliated with Flinders University of South Australia and the University of South Australia.

Measures

All measurements were taken before the commencement of the exercise program. Participants were given a series of questionnaires to complete at home prior to the assessment. The questionnaires included a nutritional health checklist and questions regarding access to dietetic services and effect of osteoarthritis on procurement of food. The assessment included anthropometric measurements, conducted within seven days of the participant receiving the questionnaire.

Participant survey

At the time of assessment demographic data (age, gender, living situation) were documented by the same investigator (AF) and the previously completed questionnaire checked and any missing data collected directly from the participant. The osteoarthritis and nutrition survey contained the following questions:

1. Does your osteoarthritis interfere with your ability to shop, prepare or consume food and if yes, how?
2. Have you received formal nutrition advice regarding your osteoarthritis and if yes, what or who was the source of this information?
3. Are you interested in receiving formal nutrition advice regarding your osteoarthritis and if yes, what sources of information would you find most useful?

(Categories provided as in Figure 1.)

![Figure 1. Preferred form of nutritional advice—the sections indicate the proportions of patients](image-url)
Table 1. Summary of nutrition intervention studies

<table>
<thead>
<tr>
<th>Study</th>
<th>Methodology</th>
<th>Subjects</th>
<th>Intervention</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Martin et al. 2001 (15)</td>
<td>Uncontrolled pilot study</td>
<td>n = 48 Overweight (BMI 25–29.9) and obese (BMI ≥ 30) postmenopausal women with knee osteoarthritis</td>
<td>Weekly nutrition classes and a walking program over 6 months.</td>
<td>Average weight loss of 5.6 ± 4.0 kg. Significant improvements in measures of physical function and VO₂max. Improvements in self-reported pain and function scores were found only in the women who were classed as obese at baseline.</td>
</tr>
<tr>
<td>Messier et al. 2000 (16)</td>
<td>Randomised pilot study</td>
<td>n = 24 Obese adults (BMI ≥ 28) 60 years or over with knee osteoarthritis</td>
<td>Exercise: weight training and walking for 1 hour, 3 times a week. Diet: weekly sessions with a nutritionist. Intervention over 6 month period. Group 1 (E &amp; D): Exercise and diet, Group 2 (E): Exercise alone</td>
<td>E &amp; D group lost a mean of 8.5 kg. E group lost a mean of 1.8 kg. Both groups improved pain, disability and physical performance, no difference between groups. Only the E &amp; D group significantly improved gait variables.</td>
</tr>
<tr>
<td>Huang et al. 2000 (17)</td>
<td>Controlled trial</td>
<td>n = 126 Obese patients (BMI &gt; 25 for males and &gt; 30 for females) with bilateral knee osteoarthritis</td>
<td>Weight reduction treatment: diet counselling, aerobic exercise, acupuncture. Group (A) Weight reduction treatment Group (B) Weight reduction and electrotherapy Group (C) Electrotherapy</td>
<td>Pain reduction, weight loss, walk speed and changes of Lequesne’s index greater in groups A and B. Significant pain relief with weight loss of &gt; 15% and increased function with weight loss of &gt; 12% of baseline body weight.</td>
</tr>
<tr>
<td>Toda et al. 1998 (18)</td>
<td>Quasi-randomised trial</td>
<td>n = 40 Knee osteoarthritis patients with a BMI &gt; 26.4</td>
<td>Group (A) Low caloric diet, appetite suppressant, nonsteroidal anti-inflammatory drugs, and instructions to follow a walking program for 6 weeks (n = 22). Group (B) Nonsteroidal anti-inflammatory drugs and walking program (n = 18).</td>
<td>Decrease in percentage body fat was more strongly associated with reduction in osteoarthritis symptoms than body weight.</td>
</tr>
<tr>
<td>Muncie 1986 (19)</td>
<td>Evaluation study</td>
<td>n = 77 Patients with osteoarthritis of any joint</td>
<td>Multidisciplinary treatment of patients with osteoarthritis over 12-week period (6 visits, 1 per fortnight) including medication use, exercise instruction, dietary counselling and psychosocial interventions.</td>
<td>Results support the view that a team approach to management of osteoarthritis can significantly reduce disability and pain as 80% of patients had improvement in osteoarthritis symptoms and 71% increased activities of daily living.</td>
</tr>
</tbody>
</table>
Nutrition tools and measurements
The same investigator (AF) administered the Australian Nutrition Screening Initiative (ANSI) tool, and took all anthropometric measurements. The ANSI tool is a validated, self-report checklist, that provides information on the nutritional risk of community living older Australians (20). The 12 questions are totalled to provide information on whether the participant is at high nutritional risk (score ≥ 6), moderate nutritional risk (score 4 to 5) or low nutritional risk (score 0 to 3).

Body mass was measured (to the nearest 0.1 kg) on calibrated electronic scales (Tanita BWB-600 Wedderburn Scales, Tokyo), with shoes removed and in light clothing. Knee height was measured to the nearest 0.1 cm with a Ross knee height caliper using the recommended technique (21). The participants’ knee height was used to estimate stature using age-, gender- and race-specific equations. The equations were developed from national surveys of healthy, normal individuals and reflect normal patterns of growth and development (22). Body mass and estimated stature were used to calculate BMI (23). Nutritional health was determined by a combination of anthropometric measurements and scores on the ANSI risk screening tool.

Statistical analysis
Data were analysed using SPSS Windows (SPSS Inc, Chicago, SPSS for Windows, version 10.0 2000). Descriptive statistics were used to summarise the data. Data are expressed as means and standard deviations unless otherwise specified. To identify significant differences between variables, independent samples t-tests were used for continuous data and chi-square tests of significance for categorical data. For all statistical tests, a significance level of \( P < 0.05 \) was selected.

Results
Recruitment
Recruitment commenced on 1 April 2001 and was completed by 25 March 2002. A total of 429 patients were contacted, of which 264 (61.5%) failed to meet the eligibility criteria. The consent rate of eligible people was 63.6%. The main reasons for ineligibility and failure to participate included: inability to attend exercise sessions (34.1%); already participating in regular exercise (10.6%); co-morbidity preventing regular exercise (10.6%); recent joint replacement surgery (17.8%); and lack of formal diagnosis of osteoarthritis (12.5%). Recruitment ceased when 105 subjects were recruited.

Participants
Descriptive characteristics are shown in Table 2. Approximately 70 percent of study participants were recruited from outpatient clinics (rheumatology, physiotherapy and orthopaedic surgery waiting lists) within the two hospitals and the remainder from the general community (29.5%). Of the 105 study participants, 53 (50.5%) were males. The mean age was 70.9 ± 8.8 years (range: 50 to 88 years) with no significant difference between males and females (\( P = 0.757 \)). All study participants lived in the community. Thirty-four (32.4%) lived alone and 71 (67.6%) lived with another. There was no significant difference between males and females for accommodation status (\( P = 0.367 \)).

Nutrition tools and measurements
All 105 participants completed the ANSI checklist. Forty-five (42.9%) participants were assessed by the ANSI checklist as being at high nutritional risk, 34 (32.4%) participants at moderate nutritional risk, and 26 (24.8%) at
low nutritional risk (see Figure 2). There was no difference in the number of males and females in each ANSI category ($P = 0.668$). Figure 3 shows the prevalence of each nutritional risk factor assessed by the ANSI tool. The most common ANSI risk factors were: ‘three or more different medications daily’ (n = 76; 72.4%), ‘eating alone’ (n = 32; 30.5%), ‘illness or condition that affects dietary intake’ (n = 31; 29.5%), ‘unintentional weight change’ (n = 29; 27.6%), and ‘daily alcohol consumption’ (n = 22; 21.0%). The least common risk factors were ‘not always having enough money to buy food’ (n = 1; 1.0%) and ‘no fruit or vegetables on most days’ (n = 2; 1.9%).

The mean BMI of the sample was 30.9 ± 5.2 with no difference (see Table 2) between males and females (P = 0.991). Fifty-five (52.9%) of the participants had a BMI greater than or equal to 30.0, indicating over half of the sample were obese (1); 41 (39.4%) had a BMI between 25.0 and 29.9, indicating overweight (1); only two (3.8%) subjects were in the underweight category with a BMI less than 20.0; and five (4.8%) subjects were in the desirable BMI category (20.0 to 24.9) (24).

Table 2. Sample descriptors and BMI data of the 105 study participants. Values represent number and percentage of participants, unless otherwise stated.

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Males (n = 53)</th>
<th>Females (n = 52)</th>
<th>Sample (n = 105)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean ± SD</td>
<td>70.6 ± 8.3</td>
<td>71.1 ± 9.4</td>
<td>70.9 ± 8.8</td>
</tr>
<tr>
<td>Range</td>
<td>51–88</td>
<td>50–88</td>
<td>50–88</td>
</tr>
<tr>
<td>Accommodation status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Living alone</td>
<td>15 (28.3%)</td>
<td>19 (36.5%)</td>
<td>34 (32.4%)</td>
</tr>
<tr>
<td>Living with other</td>
<td>38 (71.7%)</td>
<td>33 (63.5%)</td>
<td>71 (67.6%)</td>
</tr>
<tr>
<td>Joints affected by osteoarthritis</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hips</td>
<td>24 (22.6%)</td>
<td>27 (26.0%)</td>
<td>51 (24.3%)</td>
</tr>
<tr>
<td>Knees</td>
<td>68 (64.2%)</td>
<td>58 (55.8%)</td>
<td>126 (60.0%)</td>
</tr>
<tr>
<td>Body mass index (kg/m^2)^{(a)(b)}</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean ± SD</td>
<td>30.9 ± 4.8</td>
<td>30.9 ± 5.6</td>
<td>30.9 ± 5.2</td>
</tr>
<tr>
<td>&lt; 20.0</td>
<td>0 (0.0%)</td>
<td>2 (3.8%)</td>
<td>2 (1.9%)</td>
</tr>
<tr>
<td>20.0 – 24.9</td>
<td>3 (5.7%)</td>
<td>2 (3.8%)</td>
<td>5 (4.8%)</td>
</tr>
<tr>
<td>25 – 29.9</td>
<td>21 (39.6%)</td>
<td>20 (38.5%)</td>
<td>41 (39.4%)</td>
</tr>
<tr>
<td>≥ 30</td>
<td>28 (52.8%)</td>
<td>27 (51.9%)</td>
<td>55 (52.9%)</td>
</tr>
</tbody>
</table>

(a) BMI data (n = 104).
(b) BMI categories: underweight < 20.0, desirable 20.0–24.9 (24), overweight 25.0–29.9, obese ≥ 30.0 (1).

Discussion

We found that in a sample of 105 older adults suffering from osteoarthritis, more than 50% were obese as defined by a BMI > 30 (1). Over 75% of the sample were at moderate (32.4%) to high (42.9%) nutritional risk using the ANSI tool. Approximately one third of participants reported eating alone, having a condition affecting their dietary intake or unintentional weight change of greater than 5 kg over the last six months. Moreover, more than one quarter of participants reported that osteoarthritis interfered with shopping, preparing and consuming food.

While a large percentage of participants were overweight, obese, at high nutritional risk, and/or expressed interest in dietary advice only eight had been referred to a dietitian, either within the hospital system or a private practitioner, for individual advice and ongoing support.

These results suggest that obesity and high risk of poor nutritional health is common among our sample of older adults with osteoarthritis of the hip and/or knee. Despite there being evidence that moderate weight loss is of benefit to overweight patients with this particular arthritic condition (15–19) nutritional advice is not regularly offered to or accessed by this sample based in Adelaide. Of the study sample, 70.5% were recruited from outpatient clinics within the hospital, (having seen a rheumatologist or orthopaedic surgeon, or having been referred to the physiotherapy department for treatment) yet very few of these patients were referred to a dietitian.

More than half of the study participants had a BMI greater than 30, i.e. were obese, with mean BMI 30.9 (SD 5.2). Other Australian studies that have investigated older adults (mean age range = 63.1 ± 10.6 to 73.7 ± 7.5 years) with osteoarthritis of the hip or knee have consistently reported high BMIs (25,26). In a study investigating patella
resurfacing in total knee arthroplasty, the mean BMI of 221 patients with osteoarthritis of the knee was 28.5 (SD 4.2) (26). Wluka et al. reported 43.1% of participants had a BMI between 25.0 and 29.9 and 33.3% a BMI greater than 30 (mean BMI = 28.7 SD 5.1) in a study of 123 subjects with osteoarthritis of the knee (25). Halbert et al. reported a mean BMI of 27.80 (SD 3.95) in a sample of 69 community-dwelling older adults with osteoarthritis of the hip or knee (27) and Fransen et al. in a sample of 126 community-dwelling patients with knee osteoarthritis reported a mean BMI of 29.4 (SD 5.0) (28). Although the mean BMI of these study samples is not as high as the present sample, each mean BMI is greater than 25.0 indicating that overweight is common among Australians with osteoarthritis. The BMI of our sample may be higher because our sample was a more sedentary group with individuals already participating in regular or structured exercise excluded, and many patients were nearing end-stage osteoarthritis as approximately half were on the waiting list for joint replacement.

The finding of a high risk of poor nutritional health among our sample is of concern. The number of participants at high nutritional risk in the current study is higher (42.9% versus 30%) compared with a sample of healthy community-dwelling older adults (20) and comparable to a sample of older adults at risk of falling (45%) (29). Over one quarter of subjects reported at least one risk factor (eating alone, a condition affecting dietary intake, and unintentional weight change) known to affect nutritional intake. While our study did not assess dietary intake, suboptimal dietary intakes have been found previously in American patients with osteoarthritis (30,31).

Only 7.6% of participants had received some form of nutritional advice regarding their osteoarthritis but 79% deemed nutritional information to be important and were interested in obtaining advice. Possible barriers for referral to dietetic services in this group of patients may include a lack of knowledge among health professionals regarding the importance of nutrition advice for this group and/or the inadequate funding for a specialised dietetic service.

Our study has limitations in its design in that many participants (> 40%) were at end-stage osteoarthritis on a waiting list for joint replacement and thus may not be a representative sample of the population with osteoarthritis. Further, our sample excluded subjects who could not travel to and from the hospital three times a week and those who were unsuitable to participate in an exercise program. In terms of the measures used, the ANSI tool detects risk factors for under-nutrition (inadequate nutrient intake) (32) and provides a score for further intervention. In our sample, however, the ANSI tool was used to assist in identifying the specific areas of nutritional risk that may be of greater importance than the overall ANSI score for this patient group.

In conclusion, patients with osteoarthritis may be at risk of poor nutritional health despite being overweight or obese. Obesity may mask this nutritional risk. There is good evidence that weight loss can ameliorate the symptoms of osteoarthritis and slow disease progression. Nutritional intervention may benefit these patients. This intervention should be supervised by a qualified health professional to prevent further increases in nutritional risk. There is presently very limited provision of dietetic services to this patient group in our setting. A more cohesive multidisciplinary approach to the care of patients with osteoarthritis, that includes routine nutritional assessment and dietary advice not dependent on unpredictable referral patterns of clinicians is necessary. Further research is required to determine the amount of weight loss necessary for clinical benefit and to find the most effective way of achieving this weight loss without increasing nutritional risk.

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