Use of condiments to increase oral food intake of older patients

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ABSTRACT

Background. This pilot study aimed to determine whether adding condiment to typical hospital meals could increase oral food intake of older patients.

Methods. Consecutive older patients who attended a geriatric day hospital between October and December 2015 and were able to self-feed and not on a low-salt diet were invited to participate. Oral food intake of each participant was assessed at the first attendance or its nearest day (lunch without condiment) and the nearest day to the first assessment as possible (lunch with condiment). Sweet soy sauce was used as the condiment. The energy, protein, and sodium intake was estimated according to the hospital’s Dietetics and Catering Management System.

Results. 100 older patients were included in the analysis; 51 were female. The mean age was 81 years; the mean body weight and body mass index were 55 kg and 22.8 kg/m², respectively. 12 were underweight and 47 were sarcopenic. The mean time between two food intake assessments was 6.8 days. The percentage of patients with inadequate oral food intake decreased from 68% to 57% after adding condiment. Compared with lunch without condiment, lunch with condiment resulted in an increase in intake of food, energy, protein, and sodium by 8%, 10%, 9%, and 53%, respectively in all patients, and by 13%, 19%, 17%, and 67%, respectively in patients with inadequate oral food intake. 74% of participants considered the flavour of the lunch was adequate, and 51% would continue to use the condiment if available.

Conclusion. Use of condiments may be an economical and effective means to increase energy and protein intake in older adults, especially those with inadequate oral food intake.

INTRODUCTION

Older adults are prone to inadequate food intake. Food intake declines by 30% in males and 20% in females during their lifespan.1 In a meta-analysis of over 5000 subjects, older adults consumed less than younger adults by up to 18% in males and 16% in females.2 Diminished taste and olfaction, poor dentition, delayed gastric emptying, depression, and polypharmacy are common causes of anorexia of ageing.3 In addition, older adults are often prescribed restrictive diets due to various health conditions.
although this may increase the risk of malnutrition. Malnutrition is an independent risk factor for progressive health decline, deteriorated physical and cognitive status, and morbidity and mortality. It also increases the length of hospital stay and readmission rate, and thus healthcare resource utilisation.

In a local convalescent and rehabilitation hospital, the prevalence of malnutrition among older patients has been reported to be 16.7%, and malnutrition was associated with a higher mortality. In local institutionalised older adults, the prevalence of malnutrition was 21.6%.

In Hong Kong, geriatric day hospitals (GDHs) provide rehabilitation for community-dwelling older adults using a multidisciplinary approach. The GDH of Pok Oi Hospital consists of a team of geriatricians, nurses, physiotherapists, occupational therapists, prosthetist-orthotists, medical social workers, clinical psychologists, speech therapists, and dietitians. Medically stable older adults are trained at the GDH once or twice weekly to optimise their mobility and activities of daily living, and consume lunch. This pilot study aimed to determine whether adding condiments to a typical hospital meal could increase the oral food intake of older patients.

METHODS

Consecutive older patients (>65 years) who attended the GDH of Pok Oi Hospital between October and December 2015 and were able to self-feed and not on low-salt diet were invited to participate. Informed verbal consent was obtained from all participants. A pre-post design was used. The oral food intake of each participant was assessed at the first attendance or its nearest day (lunch without condiment) and the nearest day possible to the first assessment (lunch with condiment). The interval could not be standardised because different patients had different schedules. A typical lunch consisted of a bowl of rice or congee, a small plate of vegetables, and a small plate of entrée. In some situations, all were served in one container. Whenever possible, intakes of starch, vegetable, and entrée were assessed separately. The average nutritional content was 550 kcal, 30 g protein, and 860 mg (37 mmol) sodium. Food weight was measured before and after consumption. The energy, protein, and sodium intakes were estimated according to the hospital’s Dietetics and Catering Management System. A questionnaire was administered to collect patient opinion of hospital meals and acceptance of condiment use.

Sweet soy sauce (Lee Kum Kee, Hong Kong) was used as the condiment. Spiced soy sauce has shown to enhance the oral food intake of older Chinese in-patients. A small sachet (8 ml) of sweet soy sauce contains 10 kcal, 2 g sugar, and 328 mg (14 mmol) sodium.

Appendicular skeletal muscle mass was assessed by bioelectrical impedance analysis of the trunk, arms, and legs at 6 different frequencies (1, 5, 50, 250, 500, and 1000 kHz) using a tetrapolar 8-point tactile electrode system (InBodyS10; InBody, Seoul, Korea).

Participants were dichotomised into adequate or inadequate oral food intake using an estimated energy requirement of 23 kcal/kg body weight. Inadequate oral food intake was defined as the energy intake from lunch being <1/3 of the estimated energy requirement.

The pre- and post-test results were compared using the paired samples t test or Wilcoxon signed rank test based on data normality. A p value of <0.05 was considered statistically significant.

RESULTS

Of 119 consecutive older patients invited to participate, 7 refused to add condiment to their meals and 12 changed their diet or were discharged early. The remaining 100 older patients were invited in the analysis (Table 1). The mean age was 81 years; the mean body weight and body mass index were 55 kg and 22.8 kg/m², respectively. 12 were underweight and 47 were sarcopenic according to the Asian Working Group for Sarcopenia. The mean time between the two food intake assessments was 6.8 (standard deviation, 2.7; range, 3-17) days.

The mean energy density of meals (kcal/g) was lower in the lunch with condiment than in the lunch without condiment. The percentage of patients with inadequate oral food intake decreased from 68% to
57% after adding condiment.

Compared with lunch without condiment, lunch with condiment resulted in an increase in intake of food, energy, protein, and sodium by 8% (p<0.05), 10% (p<0.01), 9% (p<0.01), and 53% (p<0.01), respectively in all patients, and by 13% (p<0.01), 19% (p<0.01), 17% (p<0.01), and 67% (p<0.01), respectively in those with inadequate oral food intake (Table 2).

74% of participants considered the flavour of the lunch was adequate, and 51% would continue to use the condiment if available.

### Table 1
Demographics of patients (n=100)

<table>
<thead>
<tr>
<th>Demographic</th>
<th>Value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>81±7.5</td>
</tr>
<tr>
<td>Female</td>
<td>51</td>
</tr>
<tr>
<td>Body weight (kg)</td>
<td>55±10</td>
</tr>
<tr>
<td>Height (m)</td>
<td>1.55±0.09</td>
</tr>
<tr>
<td>Body mass index (kg/m²)</td>
<td>22.8±3.8</td>
</tr>
<tr>
<td>Estimated energy requirement of 23 kcal/kg body weight/day (kcal/day)</td>
<td>1264±240</td>
</tr>
<tr>
<td>One third of energy requirement (kcal/day)</td>
<td>421±80</td>
</tr>
<tr>
<td>Appendicular skeletal muscle mass/height² (kg/m²)</td>
<td>7.3±1.3</td>
</tr>
<tr>
<td>Female</td>
<td>5.7±1.2</td>
</tr>
<tr>
<td>Sarcopenic (appendicular skeletal muscle mass/height² of &lt;7.0 kg/m² for male and &lt;5.7 kg/m² for female)†</td>
<td>47</td>
</tr>
<tr>
<td>Male</td>
<td>45</td>
</tr>
<tr>
<td>Female</td>
<td>55</td>
</tr>
<tr>
<td>Underweight (body mass index of &lt;18.5 kg/m²)</td>
<td>12</td>
</tr>
</tbody>
</table>

* Data are presented as mean±SD or % of participants
† Data from one male participant were unavailable

### Table 2
Food consumption before and after adding sweet soy sauce

<table>
<thead>
<tr>
<th>Variable</th>
<th>All patients (n=100)</th>
<th>Patients with inadequate oral food intake (n=68)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lunch without sweet soy sauce*</td>
<td>Lunch with sweet soy sauce*</td>
</tr>
<tr>
<td>Energy/gram food (kcal/g)</td>
<td>1.01±0.15</td>
<td>0.99±0.14</td>
</tr>
<tr>
<td>Protein/gram food (g/g)</td>
<td>0.055±0.010</td>
<td>0.054±0.098</td>
</tr>
<tr>
<td>Sodium/gram food (mg/g)</td>
<td>1.68±0.49</td>
<td>1.93±0.53</td>
</tr>
<tr>
<td>Food intake (g)</td>
<td>341±125</td>
<td>367±112</td>
</tr>
<tr>
<td>Energy intake (kcal)</td>
<td>354±126</td>
<td>390±129</td>
</tr>
<tr>
<td>Protein intake (g)</td>
<td>18.4±7.6</td>
<td>19.9±7.5</td>
</tr>
<tr>
<td>Sodium intake (mg)</td>
<td>519±282</td>
<td>796.3±312</td>
</tr>
</tbody>
</table>

* Data are presented as mean±SD
DISCUSSION

In a 5-day trial of 14 older Chinese in-patients, culturally acceptable natural flavours (such as ginger and rice wine, sesame oil, spiced soy sauce, ginger and garlic, oyster sauce, and soya bean paste) have been reported to enhance oral food intake, with an increase in energy intake from 13% to 26%. Despite such a significant increase, energy intake remained lower than the estimated requirement. In a study of six odour-based flavour enhancers (that contained no sodium chloride or monosodium glutamate) in 39 retirement home residents, no significant increase in energy or protein intake was noted after 3 weeks. Selection of flavour enhancers is essential.

In addition to flavour enhancement, increase in energy density while keeping the food weight unchanged has been used to improve low food consumption in older adults. A common approach is to replace water with fat during food preparation. In our study, the energy density of the lunch with condiment was lower than that in the lunch without condiment. The effect of flavour enhancement by condiments might have compensated the effect of decreased energy density.

One concern about adding condiment was the increase in sodium intake. The Expert Consensus Document on Hypertension in the Elderly recommends a sodium intake of no more than 2400 mg (100 mmol) per day. In the Dietary Approaches to Stop Hypertension study, a reduction in dietary sodium enhanced the blood pressure-lowering effect of the diet. Nonetheless, the mean age of participants was 47±10 years. In the Trial of Nonpharmacologic Interventions in the Elderly, reduced sodium intake (40 mmol per day) significantly improved blood pressure in older adults in general, but not in those aged 70-80 years. In a meta-analysis, both low (<115 mmol per day) and excessive (>215 mmol per day) sodium intake were associated with increased mortality. It was unclear whether a low sodium diet was absolutely beneficial to older adults; it might contribute to reduced food intake and malnutrition. Older patients aged >75 years with a therapeutic diet (such as low salt, low cholesterol, or diabetic diets) are at increased risk of undernutrition. The Academy of Nutrition and Dietetics suggests a least restrictive diet for frail older adults. Given the limited evidence on the benefit of lower dietary sodium and the increased risk of undernutrition associated with restrictive diets in older adults, use of condiments in moderation is justified, especially among those who are frail and have inadequate food intake.

In our study, the prevalence of sarcopenia was 45% in men and 55% in women. In Hong Kong Chinese aged >70 years regardless of health conditions, the prevalence of sarcopenia has been reported to be 12.3% in men and 7.6% in women. In local geriatric patients with hip fracture, the prevalence of sarcopenia was 73.6% in men and 67.7% in women. Differences in prevalence might be due to different measuring methods, cut-off values, and health conditions of the participants.

In a cohort of 4000 older Chinese, the age-associated percentage loss of appendicular skeletal muscle mass in 4 years was reported to be -1.59% in men and -2.02% in women. The incidence of sarcopenia accelerates with age; nonetheless, sarcopenia is a potentially reversible condition. In 361 (out of 4000) participants with sarcopenia, 18.8% of them were no longer sarcopenic over a 4-year period. Screening and prompt treatment of sarcopenia should be provided because of its potential reversibility and detrimental effects on ageing. Nutrition therapy for muscle wasting is recommended. The evidence to support protein supplementation for sarcopenia, either alone or in combination with resistance exercise, has increased. In the PROVIDE study, participants who received 13 weeks of leucine-enriched whey protein supplementation performed better than controls in the chair-stand test. A 24-week protein supplementation programme (15 g twice per day) without concurrent exercise training has been shown to improve the Short Physical Performance Battery score. A protein-enriched diet (1.3 g/kg body weight/day) using lean red meat (80 g twice per day) combined with progressive resistance exercise has been shown to increase muscle strength and lean body mass in older women. The PROT-AGE study group recommends a daily protein intake of at least 1.0-1.2 g/kg body weight for healthy older adults, and an even higher intake (1.2-1.5 g/kg body weight per day) for those with acute or chronic illnesses.
Our participants consumed more protein simply by eating more food when sweet soy sauce was added; adding condiments may be an effective means to increase the protein intake of older adults.

A major limitation to this study was the lack of a control group and only single meal assessment. Nonetheless, weighed food consumption provided an accurate account of actual food intake. Future studies with a larger sample size, longer duration, and multiple-meal assessments are required to confirm our findings.

CONCLUSION

Use of condiments may be an economical and effective means to increase energy and protein intake in older adults, especially in those with inadequate oral food intake.

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