

Summer Meeting, 15–18 July 2013, Nutrition and healthy ageing

The use of sauce for increasing protein and energy intakes: Possible carry over effects to the next meal?

K. M. Appleton

Bournemouth University, Poole, Dorset, BH12 5BB, UK

Current estimates suggest that approx. 20% of the UK older population suffer from protein-specific under-nutrition, at considerable detriment to the individual^(1,2). This under-nutrition is thought to result partly from under-eating, due to decreases in appetite, impairments in senses, and poor dentition⁽²⁾. Behavioural research suggests that eating can be strongly affected by a number of characteristics related to the food consumed, such as palatability and familiarity^(3,4). The palatability and familiarity of foods can be increased on an everyday basis by the use of condiments and sauces, such as gravy and tomato ketchup⁽⁴⁾. Previous research of ours demonstrates a benefit of sauce for protein intakes in a single meal^(5,6). Subsequent reduction in intakes in the next meal however may negate these benefits, resulting in limited effects in the long term. This study investigated the impact of sauces on food intakes over a whole day.

The study used a repeated measures design, where twenty five community-dwelling older adults (65 years plus) received two main meals, one with sauce and one without sauce on separate occasions at lunch. Main meals consisted of chicken, carrots, sweetcorn and mashed potatoes, and on one occasion, gravy, tomato ketchup and mayonnaise were also provided; on the other occasion, no sauce was provided. Four hours later, participants were presented with a cold buffet meal. Participants could consume as little or as much as they wished from both meals, and intakes were measured. Appetite before each meal and pleasantness, tastiness and familiarity of each meal were also assessed.

Analysing only the consistent components of the meal (chicken, carrots, sweetcorn, mashed potatoes), significant increases in energy, protein and fat intakes were found for the meal with sauce ($M \pm s.d. = 1863 \pm 484$ kJ energy, 44 ± 16 g protein, 10 ± 3 g fat) compared to the meal with no sauce ($M \pm s.d. = 1638 \pm 566$ kJ energy, 37 ± 15 g protein, 9 ± 3 g fat) (smallest $t(24) = 2.18$, $p = 0.04$). No differences were found in intakes in the subsequent meal (largest $t(24) = 0.86$, $p = 0.40$), but significant effects from lunch were also not maintained over the whole day (largest $t(24) = 1.38$, $p = 0.18$). Pre-meal appetite and post-meal pleasantness, tastiness and familiarity ratings also did not differ significantly between conditions (largest $t(24) = 1.63$, $p = 0.13$).

These findings suggest that the addition of sauce to a single meal can result in increases in energy, protein and fat intakes at that one meal, but that these effects may be negated by an adjustment of subsequent intakes. Increased intakes following the addition of sauce have been previously demonstrated^(5,6). Adjustment to intakes at a subsequent meal to result in a reduction of effect, however, suggests that these benefits may be short lived and consequently may be unlikely to translate into longer term benefits or benefits for protein status. Further work is needed to verify this result in larger samples. Work however, is also needed to investigate the mechanisms behind the demonstrated effect^(3,4), as ratings of pleasantness, tastiness and familiarity did not change.

1. Cowan *et al.* (2004) Nutritional status of older people in long term care settings: current status and future directions. *International Journal of Nursing Studies*, **41**, 225–237.
2. Donini *et al.* (2003) Eating habits and appetite control in the elderly: The anorexia of aging. *International Psychogeriatrics*, **15**, 73–87.
3. Yeomans (1996) Palatability and the micro-structure of feeding in humans. *Appetite*, **27**, 119–133.
4. Pliner & Stallberg-White (2000) 'Pass the ketchup please': familiar flavours increase children's willingness to taste novel foods. *Appetite*, **34**, 95–103.
5. Appleton (2009) Increases in energy, protein and fat intake following the addition of sauce to an older person's meal. *Appetite*, **52**, 161–165.
6. Best & Appleton (2011) Comparable increases in energy, protein and fat intakes following the addition of seasonings and sauces to an older person's meal. *Appetite*, **56**, 179–182.