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They say coconut oil can aid weight loss, but can it really?

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Conflict of interest.

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Abstract

There has in recent years, been much media speculation and consumer interest in the beneficial satiating properties of consuming coconut oil and it's potential to aid weight loss. However the media has primarily cited studies using MCT oil. The current perspective looks at the research that is available on coconut oil. It examines if and how MCT related research can be applied to coconut oil and if there is potential for coconut oil to aid weight loss. The current report indicates a lack of consistent evidence on the topic of coconut oil, satiety and weight loss. Given both the publicity and the increased consumption of coconut oil further research, particularly long term clinical trials, in this area are warranted.

Coconut oil has gained considerable popularity in recent years with coconut oil in food and beverages accounting for 26% of food and drink new product launches in 2012, this is an increase from 15% in 2008 (1). Coconut oil exports across Asia have also grown 3.3% annually over the past five years, according to the Asian Pacific Coconut Community (2). This is not surprising given the numerous ways that coconut oil has been identified by the media, to potentially improve our lives. Articles are wide ranging promoting adding it to stir-fries, baking with it and even adding it to coffee (3, 4). Many media articles promote the consumption of coconut oil for weight loss, advocating similar health benefits to that of medium chain triglycerides (MCT). This has contributed to an increase in intake of coconut oil in recent years (5). Coconut oil is said to aid weight loss through a combination of increased energy expenditure and satiety induced by MCT. MCT are dietary triglycerides with fatty acids chains that are 6 to 12 carbon atoms in length (6). MCT have a smaller molecular weight than long chain triglycerides. This allows them to be more rapidly and completely hydrolysed, and absorbed when there are decreased intraluminal concentrations of pancreatic enzymes and bile salts (7). During digestion, MCT are converted to medium-chain fatty acids (MCFA) and transported directly in the portal venous system to the liver, as opposed to being transported as chylomicrons in the lymphatic system like LCT (8). MCT therefore bypass peripheral tissues, including adipose tissue, which makes them less likely to be deposited into the adipose tissue via the actions of hormone-sensitive lipase (6). Finally, MCFA can cross the mitochondrial membrane of the liver and muscle independently of the acylcarnitine transfer system, this makes them a more readily available energy source that is likely to be utilised more rapidly (9).

It has been proposed that MCT can affect satiety via a number of mechanisms; however a lot is still unknown. Potential mechanisms include the production of ketones due to the increased acetyl-CoA influx which is necessary to oxidize fatty acids (10). Furthermore, Van Wymelbeke et al (11) and Rolls et al (12) indicate that the increase in satiety maybe due to the rapid rate of absorption of MCT. Where LCT result in two peaks during absorption; the

initial peak at the point of ingestion and a second delayed peak at the beginning of the next meal, MCT are fully absorbed at the point of ingestion (13). Hence, MCT may contribute to satiation due to complete absorption mechanism.

The evidence for both increases in diet induced thermogenesis (14-24) and reduced food intake (11, 12, 25-29) following the consumption of MCT has been well documented, with interventions using MCT oil indicating that there is potential for it to help aid weight loss (10, 30-33) (Table 1). However it needs to be emphasised that MCT oil and coconut oil are not the same thing. Lauric acid (carbon chain length 12) is found in much larger quantities in coconut oil, making up 47.7 % of the total fat, where no lauric acid is found in MCT oil. Other MCFA in coconut oil are capric acid (C10– 5.5%), caprylic acid (C8-7.6%) and caproic acid (C6 – 0.52%) (34). There is some debate as to whether lauric acid is a MCT or not and this is demonstrated in how it is utilized in the body. Unlike with pure MCT oil containing fatty acids of shorter carbon length (C6-C10), only twenty to thirty percent of lauric acid is taken directly to the liver to be used as energy via the portal vein (35). This means that in total only ~23.16% of the coconut oil contains MCTs that is absorbed and metabolised in the same way as pure MCT oil.

Studies on satiety and MCT have shown that 3g is not sufficient to have an effect on satiety (26, 27). However this is in contrast to a study by Rolls et al (12) that showed a dose as low as 2.9g (100kcal containing 24% MCT) reduced food intake in dieters but had no effect in non-dieters. This obviously has practical implications as it is dieters that are most likely to want to see the satiating effects. The other studies that have shown an effect have used much higher doses of ~25g (11, 25, 29). Studies looking at energy expenditure have shown doses of 5g have the ability to increase postprandial thermogenesis (18). However, similar to satiety the majority of other studies tended to use much larger doses of greater than 20g (17, 21, 36). For weight loss, similarly doses of 5g of MCT for 12 week resulted in significant decreases in body fat, subcutaneous and visceral fat (31).

This shows that doses as low as 5g and perhaps 3g may have an effect on satiety and body weight; however the majority of the research has used MCT amounts much higher than this. Nonetheless, if a dose as low of 5g MCT per day is sufficient to have beneficial effects on weight management then 21.6g of coconut oil would be required to obtain sufficient amounts of MCFA. Current UK guidelines limit the intake of saturated to a maximum of just 21g in females and 31g in males (19-64 years) (37). Hence at the lowest dose of coconut oil known to have an effect on body weight, people will have reached or almost reached their total saturated fat intake for the day.

Two studies examining the effects of coconut oil compared to LCTs reported no increase in satiety and no effect on food intake (38, 39) (Table 2). Poppit et al (39) found no difference in visual analogue scale ratings of satiety or differences in ad libitum food intake at lunch following the consumption of either coconut oil (containing 10g MCT), high short chain triglyceride (3g SCT, 7g MCT) (from soft fraction milk fat) or long chain triglycerides (from tallow). Rizzo et al (38) found that in a dinner meal following ice-cream with varying quantities of coconut oil there was trend towards reduced consumption with the coconut oil, however this was compensated for later when there was a significant increase in snack consumption resulting in no overall difference between the ice-creams. The amounts of coconut oil used here are 7.5g coconut oil (high dose) consisting of only ~4.8 g MCT (carbons 6-12). This study should be commended on giving the coconut in a realistic form (ice-cream) and amount. However compared to the amounts seen in the many of the MCT studies the dose is very low. The authors conclude that the differences and trends observed may reflect the differences in the absorption and metabolism of the two ice-creams. A third study published across three papers providing 14 days of coconut oil, found no effect on total energy expenditure or thermic effect of feeding. However they did find an increase in basal metabolic rate after 7 days but not 14 days and an increase in endogenous long chain

saturated fatty acid oxidation after 14 days (19, 20, 24). In this study, caprylic and capric acid made up 7.9% of the energy intake of the diet and lauric acid made up 17.7%.

Currently there appears to be a lack of research in this area and to the best of the author's knowledge there are no studies looking at the effect of coconut oil on weight loss and none comparing it to MCT oil. Further work is needed in this area to confirm these preliminary calculations however indications would suggest that the use of coconut oil as a practical means of increasing satiety are not credible. The research available on the use of coconut oil on satiety and energy expenditure is limited and particularly there have been no long term clinical trials looking at the effects on weight loss. Given both the publicity and the increased consumption of coconut oil further research in this area is warranted.

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