

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

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18 **Conflict of interest.**

19 The author declares no conflict of interest.

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29 **Abstract**

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

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

79

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

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

88

89 The evidence for both increases in diet induced thermogenesis (14-24) and reduced food
90 intake (11, 12, 25-29) following the consumption of MCT has been well documented, with
91 interventions using MCT oil indicating that there is potential for it to help aid weight loss (10,
92 30-33) (Table 1). However it needs to be emphasised that MCT oil and coconut oil are not
93 the same thing. Lauric acid (carbon chain length 12) is found in much larger quantities in
94 coconut oil, making up 47.7 % of the total fat, where no lauric acid is found in MCT oil. Other
95 MCFA in coconut oil are capric acid (C10– 5.5%), caprylic acid (C8-7.6%) and caproic acid
96 (C6 – 0.52%) (34). There is some debate as to whether lauric acid is a MCT or not and this
97 is demonstrated in how it is utilized in the body. Unlike with pure MCT oil containing fatty
98 acids of shorter carbon length (C6-C10), only twenty to thirty percent of lauric acid is taken
99 directly to the liver to be used as energy via the portal vein (35). This means that in total only
100 ~23.16% of the coconut oil contains MCTs that is absorbed and metabolised in the same
101 way as pure MCT oil.

102

103 Studies on satiety and MCT have shown that 3g is not sufficient to have an effect on satiety
104 (26, 27). However this is in contrast to a study by Rolls et al (12) that showed a dose as low
105 as 2.9g (100kcal containing 24% MCT) reduced food intake in dieters but had no effect in
106 non-dieters. This obviously has practical implications as it is dieters that are most likely to
107 want to see the satiating effects. The other studies that have shown an effect have used
108 much higher doses of ~25g (11, 25, 29). Studies looking at energy expenditure have shown
109 doses of 5g have the ability to increase postprandial thermogenesis (18). However, similar to
110 satiety the majority of other studies tended to use much larger doses of greater than 20g (17,
111 21, 36). For weight loss, similarly doses of 5g of MCT for 12 week resulted in significant
112 decreases in body fat, subcutaneous and visceral fat (31).

113

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

122

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

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

142
143 Currently there appears to be a lack of research in this area and to the best of the author's
144 knowledge there are no studies looking at the effect of coconut oil on weight loss and none
145 comparing it to MCT oil. Further work is needed in this area to confirm these preliminary
146 calculations however indications would suggest that the use of coconut oil as a practical
147 means of increasing satiety are not credible. The research available on the use of coconut
148 oil on satiety and energy expenditure is limited and particularly there have been no long term
149 clinical trials looking at the effects on weight loss. Given both the publicity and the increased
150 consumption of coconut oil further research in this area is warranted.

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