

The Effects of Green Tea on Weight Loss in Obese Individuals

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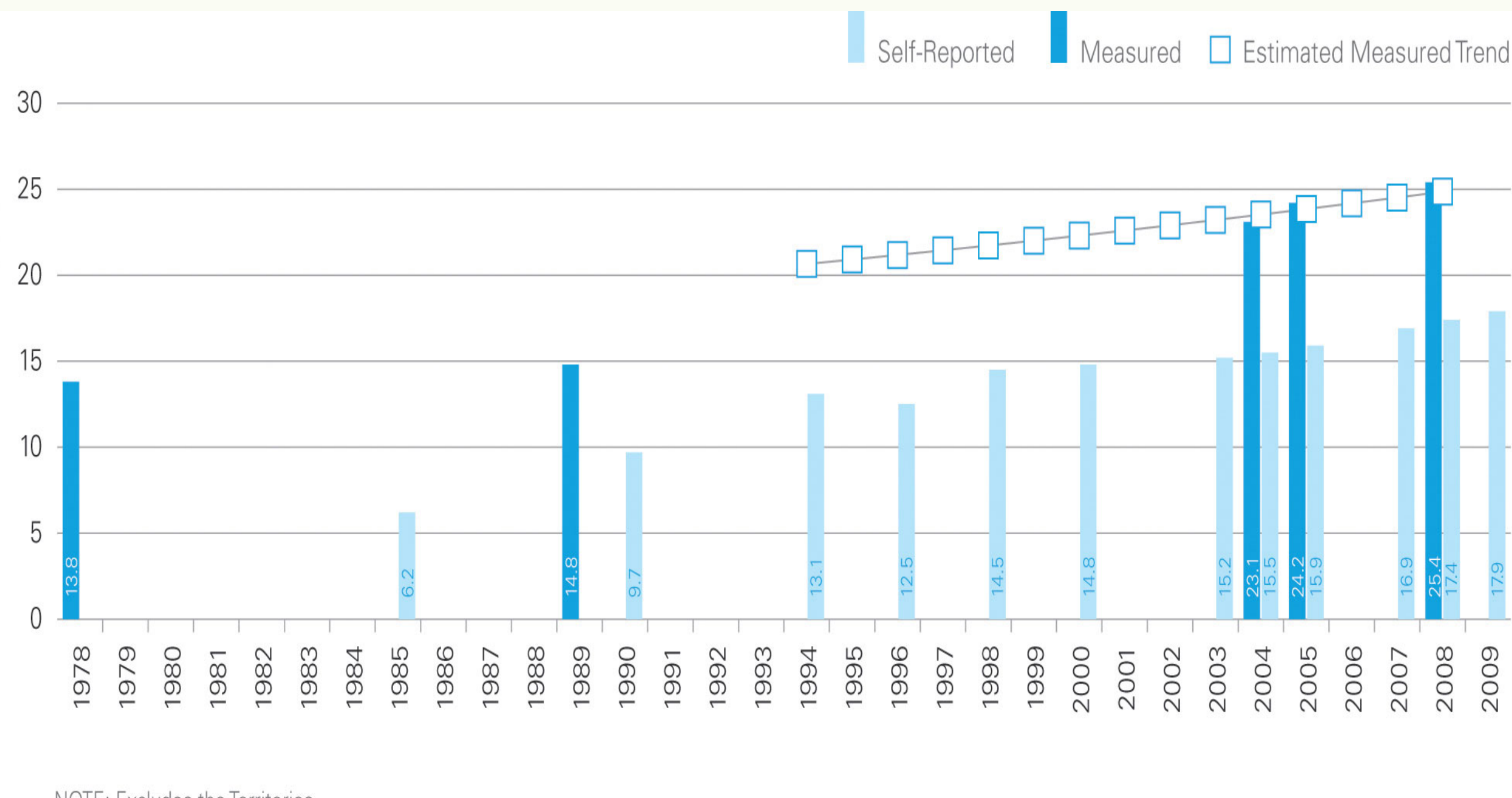
Abstract

As the rate of obesity has gone up, the use of dietary supplements has also seen a rise in popularity and has been the big rage over the past couple of years as people attempt to discover the secret to easy weight loss. In most dietary supplements found on the market, there are traces of green tea extract due to the perceived health benefits it offers as well as the increased weight loss that is associated with it. For the purpose of this project, we reviewed the literature in order to assess the evidence available to determine whether or not a correlation truly exists between weight loss and the consumption of green tea catechins extract. The literature review was conducted using the University of Ottawa's library database as well as PubMed, Scopus and Google Scholar. We used the following key words to facilitate the search for relevant peer-reviewed articles: green tea, green tea extract, weight loss, obesity, health and benefits. Throughout the research process we have found evidence that the use of green tea extract supplements and other products formulated with it do, in fact have positive effects on obese individuals whose goals are to increase weight loss, increase fat oxidation, decrease appetite as well as disrupt nutrient absorption within the body. Future research on the subject is still needed, as there are still existing gaps that remain in the current literature.

Introduction

Illness and disease have been transitioning as society has progressed. This transition has led to the separation of history into three epidemiological time periods: the "age of pestilence and famine," "the age of receding pandemics," and the time period society currently finds itself in, the "age of degenerative and man-made diseases" (Harper; Arnelagos, 2010)

As the Public Health Agency of Canada has identified, between 1981 and 2009, the obesity rates in Canada doubled for both men and women and obesity is now a problem affecting approximately one in four Canadian adults (PHAC, 2011).



NOTE: Excludes the Territories.
SOURCE: Analysis of 1978/79 Canada Health Survey; 1989 Canadian Heart Health Survey (ages 18-74); 1985 and 1990 Health Promotion Surveys; 1994/95, 1996/97 and 1998/99 National Population Health Surveys; and 2000/01, 2003, 2004, 2005, 2007, 2008, and 2009 Canadian Community Health Surveys, Statistics Canada and CANSIM Table 105-0501.

With this identifiable increase in obesity levels, people are putting a much greater focus on weight loss and the pursuit of a healthier lifestyle.

Hence the aim of this study was to perform a literature review of available studies, which have examined the effects of green tea derived supplements on weight loss in obese people in comparison to those not using supplements. This was done in order to establish whether or not there are substantial benefits to the consumption of green tea supplements over the course of a weight loss regimen.

Methods

Identification of Relevant Studies

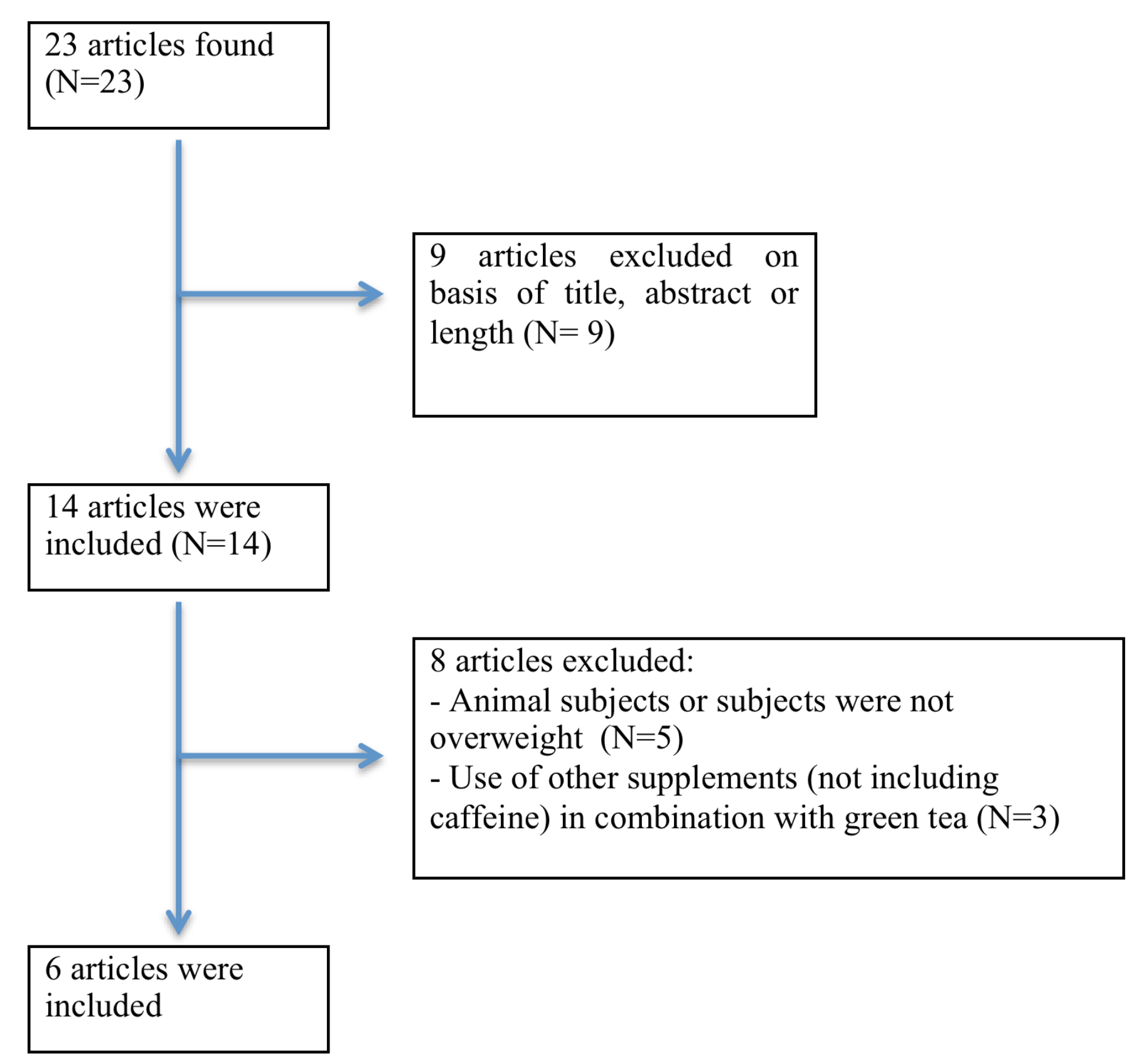
A variety of databases were consulted to obtain a wide range of credible peer reviewed articles. Databases included in the research process are the following: PubMed, Scopus, Google Scholar and finally the University of Ottawa Library Database. To further refine the search, the following keywords were used: weight loss, weight management, obesity, green tea, green tea extract, green tea catechin, weight supplement, health benefits and metabolic effects.

Inclusion and Exclusion Criteria

A study was valid for inclusion in the literature review if (a) the articles were published after 1990 (b) studies involved an experiment or were a meta-analysis or review of some sort (c) only green tea derived products were prescribed as medication (d) participants in the studies were overweight and a minimum age of 16. Articles were excluded based on the following criteria (a) the language of publication was not in English or French (b) study participants were not obese or there was usage of other dietary supplements (c) articles were too long (d) the study was not related to the developed research question. It is important to note that the inclusion and exclusion criteria previously enumerated were agreed upon by each member of the research team in order to obtain pertinent peer reviewed articles for this review.

Results

Flow Chart



A meta-analysis of 11 studies involving weight loss and weight management was conducted. Taken together, this meta-analysis has shown that green tea derived products do in fact have a positive effect on weight loss and that subjects in the treatment groups on average lost 1.31kg more weight than those in the control groups over the course of the 12 week experiment (Hursel et al, 2009).

Table 1 Characteristics of all included articles

Author	Year	Duration (weeks)	Sample Size (n)	BMI (kg/m ²)	Gender	Age (years)	Dosage (mg per day)	Regular caffeine intake (mg per day)	Ethnicity	Outcome
Kovacs et al. ¹⁹	2004	13	GT = 51 PL = 53	25-35	M/F	18-60	GT = 573 PL = 0	>300	Caucasian	No weight maintenance
Westerterp-Plantenga et al. ²⁰	2005	13	GT = 19 PL = 19	25-35	M/F	18-60	GT = 270 PL = 0	>300	Caucasian	Weight maintenance
Westerterp-Plantenga et al. ²⁰	2005	13	GT = 19 PL = 19	25-35	M/F	18-60	GT = 270 PL = 0	>300	Caucasian	No weight maintenance
Diepvens et al. ¹⁴	2005	12	GT = 23 PL = 23	25-31	F	19-57	GT = 1207 PL = 0	>300	Caucasian	No weight loss
Hase et al. ¹⁴	2001	12	GT = 12 PL = 11	18.5-30	M	27-47	GT = 483 PL = 119	<300	Japanese	Weight loss
Nagao et al. ¹¹	2001	12	GT = 13 PL = 12	24.3-34.6	M	24-49	GT = 541 PL = 130	<300	Japanese	Weight loss
Tsuchida et al. ¹¹	2002	12	GT = 39 PL = 41	24-30	M/F	30-65	GT = 588 PL = 126	<300	Japanese	Weight loss
Kozuma et al. ¹⁰	2005	12	GT = 53 PL = 64	25-35	F	20-65	GT = 540 PL = 0	<300	Japanese	Weight loss
Kozuma et al. ¹⁰	2005	12	GT = 54 PL = 55	25-35	M	20-65	GT = 540 PL = 0	<300	Japanese	Weight loss
Nagao et al. ¹¹	2007	12	GT = 123 PL = 117	24-30	M/F	25-55	GT = 583 PL = 96	<300	Japanese	Weight loss
Auvichayapat et al. ²³	2008	12	GT = 30 PL = 30	>25	M/F	40-60	GT = 750 PL = 0	<300	Thai	Weight loss
Hsu et al. ¹⁶	2008	12	GT = 41 PL = 37	>27	F	16-60	GT = 491 PL = 0	<300	Taiwanese	No weight loss
Wang et al. ¹⁷	2008	12	GT = 49 PL = 43	≥24 <35	M/F	18-50	GT = 440 PL = 0	<300	Chinese	No weight loss
Wang et al. ¹⁷	2008	12	GT = 47 PL = 43	≥24 <35	M/F	18-50	GT = 468 PL = 0	<300	Chinese	No weight loss
Wang et al. ¹⁷	2008	12	GT = 45 PL = 43	≥24 <35	M/F	18-50	GT = 880 PL = 0	<300	Chinese	Weight loss

Abbreviations: BMI, body mass index; F, female; GT, EGCG-caffeine mixture group; M, male; PL, placebo group.

A review of 10 studies involving the effects of green tea on energy expenditure and weight loss was conducted (Rains et al, 2010). Taken together, this review has shown that green tea catechins can alter fat metabolism by promoting lipolysis in fat depots with the abdominal ones being the most responsive. Moreover, it was determined that these catechins may also reduce glucose absorption by inhibiting certain digestive enzymes found in the body as well as modify fat absorption by disrupting various critical steps in the digestion and transport of lipids (Rains et al, 2010).

In a review conducted by Westerterp-Plantega (2010) treatments with green tea extract resulted in significant increases in 24-hour energy expenditure, fat oxidation and increased thermogenesis, which can lead to weight loss. Taken together, most of the studies mentioned that the consumption of green tea products was significantly attributed to weight loss as well as preventing weight regain.

A mini-review of experimental and clinical studies was conducted to determine the effects of green tea supplements on thermogenesis in the body and the resultant effect on weight loss. All of the reported studies suggested that green tea extract is an effective mediator of thermogenesis and a natural substance for the management of obesity (Shixian et al, 2006).

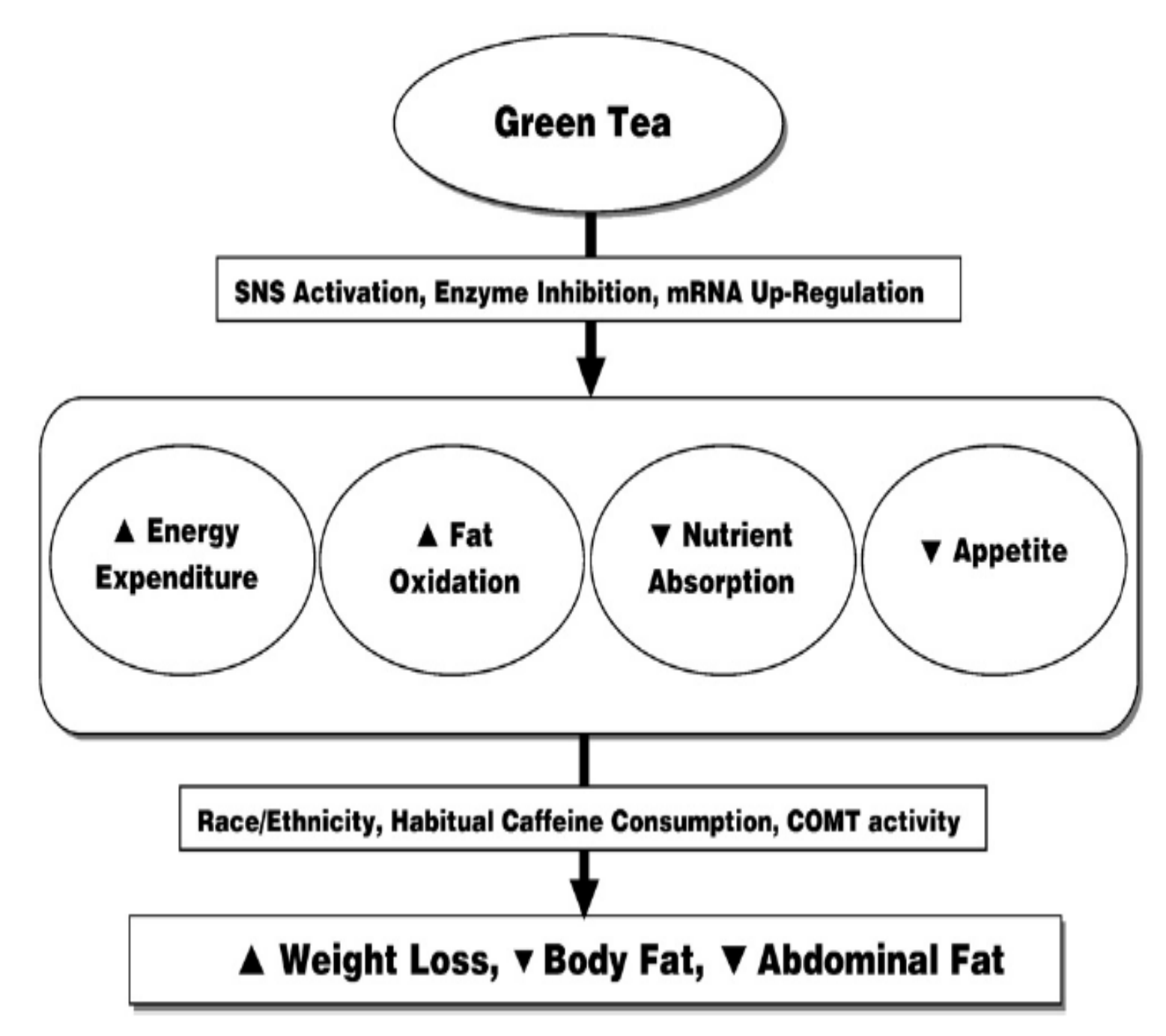


Fig. 1. Proposed antiobesity mechanisms of green tea.¹

¹These are factors for which there are data or strong theoretical reasons to believe that they are important in the antiobesity activity of green tea. There are insufficient data to systematically evaluate other factors such as the role of gender or physical activity on outcomes such as weight loss and body composition.

Hsu et al (2008) demonstrated in a randomized, double-blind, placebo-controlled clinical trial that green tea consumption showed no statistical difference in the reduction in body weight and body-mass index (BMI) between the experimental group and the placebo groups. In comparison to a different randomized controlled trial involving 60 obese subjects where all subject were blind to the aim of the study, it was concluded that over a 12-week period, green tea capsules do in fact increase energy expenditure and fat oxidation in obese individuals (Auvichayapat et al, 2007).

Discussion

In the study conducted by Hsu et al (2008) there was no significant reduction in body weight amongst the members of the experimental group, which counters the results obtained in other studies. However, upon further analysis, it was determined that only women had been involved which may have affected the results. Although there was no statistically significant reduction in weight, there were significant improvements in other factors contributing to an individuals health, which may validate the use of green tea derived products as not only a weight loss supplement but also a general health supplement.

In contrast to this, the remainder of the articles demonstrated a positive correlation between weight loss and the consumption of green tea products.

However, this positive association may only be the result of the body adapting to the absorption of a new product as none of the studies obtained had lasted longer than 12 weeks. Therefore, there is a gap in the current knowledge regarding green tea and weight loss since to the knowledge of the research team, there has been no experiments conducted for a period longer than 12 weeks in order to determine the long-term implications.

Moreover, the majority of studies conducted were done so using a sample of individuals primarily comprised of individuals of Asian decent. As Hursel et al (2009) suggest in their meta-analysis, individuals of Asian decent are more receptive to the intervention and expressed greater amounts of weight loss in comparison to their Caucasian counterparts.

Potential bias' to consider: confounding, foreign language bias, ease of access bias and confirmation bias.

Conclusion

The aim of this study was to perform a literature review of available studies examining the effects of green tea derived supplements on weight loss in obese people in comparison to those not using supplements in order to establish whether or not there are substantial benefits to the consumption of green tea supplements over the course of a weight loss regimen. Upon consultation of the literature it can be concluded that in the short term, the use of green tea products do in fact lead to increases in weight loss. However, future research is still needed in order to identify the long-term effects of such an intervention. All of the retrieved studies in this review were conducted over the course of 12 weeks. Therefore, it would be of importance to this field of research to pursue a study with the goal of identifying these long-term effects as it may offer greater insight into the efficiency of green tea supplements in weight loss and maintenance. Moreover, it would be interesting to see whether or not results vary between men and women as well as exploring the ethnic differences between Asian and Caucasian individuals in order to determine whether confounders or other bias' played a part in the weight loss interventions. Although there are gaps in current knowledge, statistically, there is a proven correlation between the consumption of green tea products and weight loss.