

## Editorial

# Weight Loss Supplements: Boon or Bane?

Reshma Mohamed ANSARI, Norfaizatul Shalida OMAR

Faculty of Medicine, Cyberjaya University College of Medical Sciences,  
No: 3410, Jalan Teknokrat 3, Cyber 4, 63000 Selangor, Malaysia

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## Abstract

Dietary health supplements for weight loss seem to be the future nowadays. However, this industry is plagued by lack of regulations and ignorance regarding the constituents of the supplements. Of all the supplements consumed, the ones for weight loss are most commonly found in the market. Reports of liver failure, kidney impairment and worsening of chronic ailments in patients who consume these supplements are surfacing recently which make us question the credibility of these products. The safety of these products lie in the clear stating of the ingredients by the manufacturer, well informed patient, knowledgeable physician and tight regulations from the regulatory board.

**Keywords:** dietary supplements, weight loss, green tea, toxicity, liver failure

## Introduction

The Dietary Supplement Health and Education Act (DSHEA) defines a dietary supplement as ‘a product (other than tobacco) that is intended to supplement the diet, and that bears or contains one or more of the following dietary ingredients: a vitamin, a mineral, a herb or other botanical, an amino acid, a dietary substance for use by man to supplement the diet by increasing the total daily intake; or a

concentrate, metabolite, constituent, extract or combinations of these ingredients (1). In the year 2000, over half of the US population was known to have consumed at least one dietary supplement (1). Health supplements, being ‘herbal’ in nature, are categorised as food products where pre-marketing approval is not as stringent as allopathic medications; (2) are widely available in the market, and can be purchased without any prescription (3). The majority of herbal users do not feel that it is necessary to inform their physicians about the

consumption of these supplements, (4) even during pre-operative assessment, (1) and most physicians overlook this fact and seldom enquire their patients (1).

## Supplements for Weight Management

Supplements can either be used for body-building or non-body building purposes. Among the supplements used for non-body building purposes, weight loss stands as the most important reason to consume these supplements (5). The constant rise in obesity rates has triggered the weight loss supplement industry to boom as a billion-dollar industry. End-users of these supplements view them as an alternative method, and deem them to be safe for consumption (5). In comparison to body-building supplements, consumers of weight loss supplements were almost twice as affected due to adverse drug reactions (5).

## Reports of Toxicities Encountered with Weight Loss Supplements

The United States Drug-Induced Liver Injury Network (DILIN) reported a dramatic increase in cases of liver injury during the past 10 years, which is attributed to supplement intake (5). Felix Stickel (3) in his editorial reports two cases of liver injury post intake of Herbalife supplements. There exists multiple studies that are in line with Felix Stickel's report on Herbalife (6, 7).

Hydroxycut weight loss products caused death due to cardiac and cerebrovascular accidents in young, otherwise healthy patients. Ephedra, a component of this supplement, was identified as the culprit (3). Ephedra can cause serious circulatory and nervous system effects such as increased blood pressure and increased heart rate, leading to risk of arrhythmias and potent vasospasm (1). It is also known to cause nephrolithiasis (kidney stones). Upon investigation, the stones were found to be composed of ephedrine, norephedrine and pseudoephedrine (8). The prime components of Hydroxycut were revealed to be *Camellia sinensis* and *Garcinia cambogia* (5).

Green tea (*Camellia sinensis*), although widely known for its antioxidant properties and weight loss potential (9), is also known to be hepatotoxic (5, 10, 11, 12). Green tea extract is richer in polyphenols compared to black tea, which is further composed of

catechins and flavanols. Catechins boast of anti-oxidant benefits, but were also found to cause cytotoxicity by damaging the mitochondrial membrane and initiation of reactive oxygen species (ROS) formation (5). Another interesting point is that the catechins cause more damage while consumers are fasting compared to when they have already eaten. Since people who intend to lose weight also undergo a strict diet regimen, the adverse effects of catechins might be profound on them (5). Exolise, a weight loss supplement whose prime ingredient is *Camellia sinensis*, was withdrawn from the market in France and Spain due to the varied reports received linking it to liver toxicity (2, 9).

Another ingredient referred to as *Garcinia cambogia* is known for its ability to prevent the conversion of carbohydrates to fat. This has been widely linked to oxidative stress, hepatic fibrosis and inflammation (9, 13). OxyELITE Pro™ (OEP) supplements contain a compound aegeline with anti-adipogenic features which was known to cause hepatocellular patterns of injury in consumers (5). Chinese herbal supplements for weight loss contain Aristolochic acid, which is notorious for causing urothelial carcinoma, renal intestinal fibrosis and loss of cortical nephrons (4, 8). In patients with cardiovascular diseases, garlic, ginger, grapefruit juice and green tea, which are used for weight loss, are known to decrease the effects of warfarin, and cause hypotension and liver toxicity respectively (14). Chromium picolinate (CP) is widely used for its lipid lowering and weight loss properties, and is known to produce acute kidney failure due to acute tubular necrosis warranting haemodialysis (8). Patients with known conditions such as diabetes, hypertension or coronary artery disease might develop renal disease due to these supplements (4).

## Possible Reasons for Toxicity Encountered with Weight Loss Supplements

Herbal supplements might contain substances which may interact with drugs already taken by the patient. Since most of the patients do not reveal the fact that they consume supplements, risk of drug interaction is notably high (1). Contamination of herbal products with hepatotoxic *Bacillus cereus* is also considered as a risk factor to develop liver injury. The emetic toxin of *Bacillus cereus*, a heat resistant cyclic peptide, causes liver

failure, probably due to mitochondrial toxicity. Mitochondrial fatty acid metabolism is inhibited, which is indicated by microvesicular steatosis in the liver (15, 16). Moreover, additives in the form of preservatives and flavour enhancers might be contaminated to produce serious side effects (3). The unintentional contamination by pesticides, fertilizers and heavy metals may also cause untoward liver toxicity in consumers (2). A variation of constituents from batch-to-batch also caused varied reactions among consumers (4). The frightening aspect of these products is that the constituents are often not characterised, not included in labels and clear beneficial effects or their side effects are not stated. Moreover, they are advertised immensely to lure the lay consumers who fall prey despite the lack of scientific information (3).

### What Needs to be Done?

Most cases of supplement-induced toxicities tend to go unnoticed due to the lack of enforcement, scientific evidence, knowledge among health-care providers and patients (14). In spite of all the reports of toxicity, companies that manufacture these supplements refuse to disclose the prime ingredients and detailed composition of their products (2, 3). Hence, consumers are urged to be well-informed about the ingredients of their supplements and possible interactions with their regular medication to prevent untoward incidents. Moreover, physicians are recommended to come up with a working knowledge of herbal products, their claims of efficacy, life-threatening toxicities and drug interactions, in order to avoid undesirable reactions in patients (5). This would also enable them to counsel the patients accordingly (5). The regulatory board is urged to practise tight regulations against herbal products to avoid any unwarranted episodes of supplement-induced toxicity in future (2).

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 Final approval of the article: RMA  
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### Correspondence

Dr Reshma Mohamed Ansari  
 MBBS (MGR Medical University, India), DFM (Apollo Hospitals & RCGP, UK), MMedSc (International Islamic University, Malaysia)  
 Faculty of Medicine,  
 Cyberjaya University College of Medical Sciences,  
 No: 3410, Jalan Teknokrat 3, Cyber 4,  
 63000 Selangor, Malaysia  
 Tel: 03 83137170, 016 4980485  
 Fax: 03 83137001  
 E-mail: reshmaansari77@gmail.com

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