

## Should weight-loss supplements be used for pediatric obesity?

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### ABSTRACT

**QUESTION** In my clinic I have a large population of overweight and obese children. There is a range of weight-loss supplements marketed for the adult population. What natural health products for treatment of obesity are effective and can be used in children?

**ANSWER** Weight-loss supplements lack sufficient data supporting their efficacy and safety, even in adults. Most weight-loss supplements cannot be recommended at this time for children. Options for obese adolescents include increasing consumption of fibre with diet or using fibre supplements, such as glucomannan. Dietary fibres can also prevent side effects of orlistat, the only medication available for treatment of obese adolescents.

### RÉSUMÉ

**QUESTION** Une population nombreuse d'enfants obèses ou d'un poids excessif fréquente ma clinique. Il existe sur le marché divers suppléments pour perdre du poids à l'intention des adultes. Quels sont les produits de santé naturels efficaces pour le traitement de l'obésité et qui conviennent à des enfants?

**RÉPONSE** Les données prouvant l'efficacité et l'innocuité des suppléments pour perdre du poids sont insuffisantes, même chez l'adulte. À l'heure actuelle, on ne peut donc recommander aucun supplément pour la perte de poids chez l'enfant. Pour les adolescents obèses, on a l'option de recommander une plus grande consommation de fibres dans l'alimentation ou encore des suppléments de fibres comme le glucomannan. Les fibres alimentaires peuvent aussi prévenir les effets secondaires de l'orlistat, le seul médicament disponible pour le traitement de l'obésité chez l'adolescent.

Childhood obesity is one of the most important public health concerns. According to recent estimates from the 2004 Canadian Community Health Survey, 26% of Canadian children and adolescents aged 2 to 17 years are overweight or obese, compared with 15% in 1979,<sup>1</sup> and now it is the most common childhood disorder.

Options available for treatment of obesity in children include behavioural and dietary modifications, pharmacotherapy, and weight-loss supplements. Recommended behavioural and dietary modifications include promoting physical activity, limiting "screen time" (ie, watching television or playing video or computer games) to no more than 2 hours a day, and limiting consumption of energy-dense snack foods high in sugar and fat.<sup>2</sup> These methods, however, remain largely ineffective because family-oriented behavioural and dietary programs require a great deal of time and effort from the parents, which is not always possible for working families.

### Weight-loss supplements

No studies have examined the use of weight-loss supplements other than fibre supplements in children and adolescents. In the United States, however, 11% of adolescents aged 14 to 19 years have used weight-loss

supplements in their lifetimes,<sup>3</sup> which is comparable to adult use. Sales of weight-loss supplements, the fastest growing segment of the dietary supplement industry, increase at a rate of 10% to 20% per year.<sup>4</sup> Supplements are viewed by patients as being natural and are assumed to be safer than prescription drugs. In addition, they represent alternatives to failed attempts at weight loss with the use of more conventional approaches.

Most weight-loss supplements include multiple components, often more than 10. Common ingredients of weight-loss supplements categorized by mechanism of action are presented in **Table 1**.<sup>4</sup>

The majority of weight-loss supplements have not been clearly demonstrated to be either effective or safe, even in adults, and many have been associated with serious adverse events.<sup>5</sup> In addition, the multiple components in weight-loss supplements create possibility of interactions, either among ingredients or with concurrently taken medications. Furthermore, many components, such as herbal extracts, contain multiple potentially active ingredients. Even if individual components of a weight-loss product are demonstrated to be safe, the combination of them might not be.<sup>6</sup> Many supplements have been found to be contaminated with

**Table 1. Common ingredients of weight-loss supplements, categorized by mechanism of action**

MECHANISM OF ACTION	INGREDIENTS OF WEIGHT-LOSS SUPPLEMENTS
Stimulants, energy boosters, or thermogenic agents	Ephedrine or pseudoephedrine (from ephedra [ma huang] or country mallow [ <i>Sida cordifolia</i> ]) Caffeine, theophylline, or theobromine (from cola nut, guarana, or maté) Bitter orange ( <i>Citrus aurantium</i> ) Bladderwrack ( <i>Fucus vesiculosus</i> ) 7-keto-dehydroepiandrosterone (DHEA)
Fat and carbohydrate metabolism modulators	Chromium picolinate Conjugated linoleic acid Carnitine Green tea <i>Gymnema sylvestre</i> β-hydroxymethylbutyrate Pyruvate Hydroxycitric acid ( <i>Garcinia cambogia</i> ) Brindleberry
Appetite suppressants	Capsaicin
Agents that decrease stress- or depression-related eating	<i>Ginkgo biloba</i> St John's wort Yohimbe
Satiety promoters	Soluble fibres (eg, glucomannan, psyllium, methylcellulose, pectin)
Fat absorption blockers	Chitosan
Carbohydrate absorption blockers	Inosine Kidney bean extract ( <i>Phaseoli fructus</i> ) Mung bean extract Wheat extract
Laxatives	Buckthorn bark and berry Cascara sagrada bark Flaxseed Manna Psyllium seed husk Rhubarb root Senna leaf and pod

Data from Bartels and Miller.<sup>4</sup>

harmful ingredients<sup>7</sup> or mislabeled regarding actual ingredients of the supplement.

Weight-loss supplements are widely advertised and disseminated over the Internet, although many of them have little or no data to support claims and some, such as dinitrophenol, are life-threatening.<sup>8</sup> Very few supplements demonstrate clinical efficacy, with no evidence beyond reasonable doubt that any specific dietary supplement is effective for long-term reduction of body weight. Short-term efficacy for adults was demonstrated for ephedra and ephedrine-containing products<sup>9</sup>; however, since April 2004, their sale has been prohibited in the United States because of concerns about serious adverse events and increased risk of

psychiatric, autonomic, or gastrointestinal symptoms and heart palpitations.<sup>5</sup> *Citrus aurantium*—an herb that contains synephrine, a sympathetic α-adrenergic agonist similar to ephedrine—is now commonly used as a substitute for ephedra in weight-loss supplements.<sup>10</sup> Bitter orange, however, demonstrated no statistically significant benefit for weight loss ( $P > .05$ )<sup>10</sup> and, in addition to the adverse effects reported with ephedrine, it can also cause photosensitivity and interact with certain drugs, increasing their concentration.<sup>4</sup>

There is some evidence of benefit for chromium picolinate, chitosan, conjugated linoleic acid (CLA), hydroxycitric acid, pyruvate, and fibre supplements in adults. Although chromium picolinate appears to have a small weight-reduction effect,<sup>11</sup> several cases of rhabdomyolysis or renal failure in patients taking chromium were reported, raising doubts about its safety. There is some evidence that chitosan is more effective than placebo in the short-term treatment of obesity, but results obtained from high-quality trials indicate that the effect of chitosan on body weight is minimal and unlikely to be of clinical significance.<sup>12</sup> Conjugated linoleic acid appears to attenuate increases in body weight and body fat in several animal models; however, results from 13 clinical trials in humans found little evidence to show that CLA reduces body weight and suggested that it might have adverse effects on human health via redistribution of fat deposition.<sup>13</sup> Several studies performed using *Garcinia cambogia* in overweight and obese adult subjects are inconsistent and yield conflicting results.<sup>14</sup> Although pyruvate has been reported to reduce body fat mass and body fat percentage,<sup>15</sup> the evidence is weak.

No studies of weight-loss supplements, other than fibre supplements, in children have been conducted. Intake of dietary fibre is inversely associated with body weight, body fat, and body mass index.<sup>16</sup> Its mechanisms for weight reduction include promoting satiation, decreasing absorption of macronutrients, and altering secretion of gut hormones. The average fibre intake in North America is less than half of recommended levels. Although increasing consumption of fibre (eg, fruits, vegetables, whole grains, legumes) with diet is an important step to curb the obesity epidemic, the addition of fibre supplements should also be considered. Glucomannan, a soluble and highly viscous dietary fibre derived from the root of the konjac plant, can promote weight loss in overweight and obese individuals and improve lipid and lipoprotein parameters and glycemic status<sup>17</sup> with minimal gastrointestinal side effects. Although little data exist on psyllium for weight reduction, it has been shown to improve glucose homeostasis and the lipid and lipoprotein profile in obese children.<sup>18</sup> Inulin (from chicory root) is being sold in many mainstream stores as a fibre supplement, including for use in children; however, its weight-lowering effect has not been studied.

## Pharmacotherapy

Pharmacotherapy should be considered for extremely obese children (body mass index  $\geq 2$  units above the 95th percentile) older than 12 years of age who are resistant to 12-month dietary and lifestyle modifications<sup>19</sup>; those with marked abdominal adiposity, impaired glucose tolerance or insulin resistance, steatohepatitis, and ovarian hyperandrogenism; and those with strong family history of diabetes, myocardial infarction, or stroke. Orlistat, a fat absorption inhibitor, is the only prescription drug indicated by the Food and Drug Administration for the treatment of overweight adolescents.<sup>2</sup> It can cause transient gastrointestinal adverse effects, such as abdominal discomfort, flatulence, and diarrhea, due to unabsorbed fat excreted in the feces.<sup>19</sup> However, side effects of orlistat can be prevented by concomitant prescription of dietary fibres.<sup>20</sup>

## Conclusion

Weight-loss supplements lack sufficient data supporting their efficacy and safety, even in adults. Most weight-loss supplements cannot be recommended at this time for children. Options to consider for obese adolescents include increasing consumption of dietary fibre or using fibre supplements. Dietary fibre also prevents side effects of orlistat, the only medication available for treatment of obese adolescents. More research is needed to draw definitive conclusions. No single approach will successfully treat pediatric obesity, and lifestyle modification should be maintained throughout the treatment. ❁

### Competing interests

None declared

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